

A
Report on
Baseline Situation of the Water Mills in Nepal 2012

Submitted to



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Submitted by



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Acknowledgement

It is always said that there are around 25,000 water mills in Nepal through various reports and observations made in the IWM Sector. These facts are from 2008 or before. In the meantime after several interventions from Improved Water Mill Programme (2003-2012), there have been mills improved including Electrification reaching the figure more than 7,500 throughout the country.

Therefore, in today's context it is utmost to know about the valid data establishing total no. of Water Mills, end usage installed and electrifications completed. Measurement of socio economic impacts also falls in the same category to describe for the future benefits of sector. Against this background, SNV Netherlands Development Organisation supported to have fresh baseline of water mills in Nepal under the theme of Supporting Development of IWM Sector and Its Actors. This assignment was awarded to Renewable Energy Technology Service Centre Pvt. Ltd. and based on the provided ToR and Inception Report, this report of has been produced.

In producing this report, there are several persons and people involved in having fresh data. Hence I would like to commend and acknowledge the efforts made by **Mr. Santosh Mandal, Manager (RETSC)** **Mr. Dinesh Adhikari, Engineer (RETSC)** and **different officers based in DEES/Us** in collecting the data and information. It is a matter of fact that without the cooperation of **Mr. Madan Thapaliya, Programme Manager (IWMP)** this study would not have been possible. Therefore my special thanks go to him for his generous support.

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Uttam Jha
Team Leader

Executive Summary

Water Mills are life line for many hilly remote and rural people in Nepal. Traditionally it is used for Food processing for their livelihood and in operation since time unknown. These mills are also symbol of common cooperation and value as most of the Mills are located in public land but given permission to raise revenue from it to millers in the villages.

Clean and simple technology of watermills of Nepal came into notice in early 90s of last century and started to replace the wooden turbine with improved and steel turbines for increased efficiency and comfort to the mill operators. Hence because of added value of this, the significant wood consumption has been decreased and this technology became Green as well.

In this context it is always said that there are around 25,000 water mills in Nepal through various reports and observations made in the sector. These facts are from 2008 or before. In the meantime after several interventions from Improved Water Mill Programme (2003-2012), there have been mills improved including Electrification reaching the figure more than 7,500 throughout the country.

Therefore, in today's context it is utmost to know about the valid data establishing total no. of Water Mills, end usage installed and electrifications completed. Measurement of socio economic impacts also falls in the same category to describe for the future benefits of sector. Against this background, SNV Netherlands Development Organization supported to have fresh baseline of water mills in Nepal under the theme of Supporting Development of IWM Sector and Its Actors. This assignment was awarded to Renewable Energy Technology Service Centre Pvt. Ltd. and based on the provided ToR and Inception Report, this report has been produced. According to the baseline conducted the following summaries have been drawn:

- Based on the primary sources and secondary sources of data there are 22,676 TWMs and 7527 IWMs (Short Shaft 6,594 and Long Shaft 933) and 23 IWM/E in Nepal from 53 districts (33 IWMP districts and 20 potential non IWMP districts)
- Furthermore, at current practice, there is no proper way of calculation for tariff for electricity use in IWM Electrification; but it is found that the tariff rate is NRs. 2 per watt in general according to the survey conducted.
- It is found that with respect to the total no. of 933 Long Shaft IWMs, 981 different end usages installed along with the technology.
- Among the existing IWMs from the data of baseline survey, it is found that 100% improved mills are running under good conditions in the visited sample of 100 mills under IWMP districts. The operation hours of per IWM found on an average 10 hours per day. Yearly 10.75 months ghattas are found to be operated based on the 10 hrs/day calculations. However it varies from place to place and during the festival times.
- The number of HHs accessing IWM in average was found 57 HHs per IWM in sample IWMP districts. However, after analysing the data available with IWMP, it is concluded

that the number of HHs accessing IWM is found 52 HHs per IWM from data base of total IWM (7527).

- Average annual income of IWM owner was found about NRs.115, 000 from mill operation and farming. When the income from IWM operation segregated it is revealed that average annual income from mill only to be around NRs.39,000 from SS and NRs.85,000 from LS which is approximately 34% and 74% of total family annual income respectively. The dependency of no. of family members on IWM income found around 50% per Household.
- Regarding IWME as per the ToR it is revealed that in Dhading, Sindhuli and Kavre Districts there is possibility of 115 IWME projects from existing IWMs based on primary data sources of baseline study.
- Policy wise already there are several reference documents that provides enough ground for watermills. But the coordination, the appraisal of subsidy provisions including IWME needs to spell out clearly in the days to come for promotion of the technology making a mainstay of income of the IWM owners.
- Interestingly it is found that the capacity of the sector is enough to meet the target set by the GoN every year. But again in real sense due to various reasons, sometimes beyond the control of sector actors such as political and geographic adversaries the overall achievement against the target is found only around 78% in year 2011-2012.
- AEPC under the Ministry of Environment, Science and Technology provided annual budget for the IWM sector according detail Work Plan. Currently, AEPC/ESAP allocated the budget NRs. 630, 2228 for IWMP from July 2012 to December 2012 for subsidy to install IWMs and Programme Management Cost which also includes activities cost. After transition period of ESAP (up to December 2012) AEPC/NRREP allocated the budget 0.6 Million US \$ for the period of 5 years. There was no budget allocated for IWM R & D during the ESAP period. Moreover, budget has not been clearly allocated in the NRREP for IWM R & D sector.
- In the past the capacity development activities took place in higher side but due to the non consistency in such provisions, it is revealed that the current capacity of IWMP team and other Sector actors needed to be measured again and provide relevant capacity development inputs to the respective.
- Gender-wise it is found 4.68% IWMs are owned by female while 14% of the mills are owned by marginalized group of people. Whilst the Janajatis own the 27% of total IWMs operated in IWMP programme districts. Similarly the data shows that other (Brahmin, Thakuri and Chettries) own the remaining 59% of mills operated.
- In the front of Carbon Trading the Project Idea Note (PIN) for CDM is already prepared and the preparatory works have already been in the field. It is found that a calculation of emission reduction is fixed at 4.454 ton Co₂/ IWM/year.
- To make the technology more efficient R&D is most important but during survey it is found that the priority to this particular action got less priority.

- Financing IWMs particularly Long Shaft and IWME is not possible only from contributing by the community and the owner. At this point of study the contribution from micro finance or revolving fund found almost nil.
- Around 2,348,424 persons benefited from IWMs for grinding and other end usage, 7,572 persons got employment through IWMs, 5,226 people got lighting facility from IWME, and 33,627 tons Co2/year is reduced from total IWMs installed.
- During the interviews it is found almost the IWM owners ignorant about professional quality and entrepreneurship and calculation of their income.

-End-

Abbreviations/Acronyms

AEPC	Alternative Energy Promotion Centre
AGM	Annual General Meeting
CDM	Clean Development Mechanism
CES	Center for Energy Studies
CRT/N	Centre for Rural Technology, Nepal
ESAP	Energy Sector Assistance Programme
GESI	Gender and Social Inclusion
GOA	Ghatta Owners' Association
GoN	Government of Nepal
IOE	Institute of Engineering
INGOs	International Non Government Organizations
IWM	Improved Water Mill
IWM/E	Improved Water Mill Electrification
IWMP	Improved Water Mills Programme
IWMSP	Improved Water Mill Service Provider (AEPC-CRT/N)
LPOs	Local Partner Organizations
LS	Long Shaft
NGOFN	National Ghatta Owners' Federation Nepal
NGOs	Non Government Organizations
NRREP	National Rural and Renewable Energy Program
RETs	Renewable Energy Technologies
RETSC	Rural Energy and Technology Service Centre
SNV/N	Netherlands Development Organization
SS	Short Shaft
TU	Tribhuvan University
TWM	Traditional Water Mill

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1.0 Background

Nepal is a mountainous country where there is abundance of water resources. These water resources possess huge potential that can be converted into kinetic energy which is widely used in the country to run mill also known as “Ghattas” for grinding purpose since almost centuries ago. There are large numbers of such mill of oldest technology also termed as Traditional Water Mill (TWM) being used by local communities of high hill and mid hill regions of Nepal. It has been estimated that around 25000 – 30000 traditional watermills exist in 53 districts of the country. There is no exact and authentic information regarding the existence of traditional watermills in the country. In early 1980s an estimated figure of 25,000 traditional watermills in all over Nepal was established. Since then, all publication continue to use the same figure however the real numbers of traditional watermill operating in Nepal, the real market size of IWM, is unknown. To establish the real situation of the number of watermills in Nepal, a quick study needs to be implemented. Documentation and information with AEPC/IWM programme, the service centres, IWM kit manufacturers, Ghatta Owners Associations and also from the District Energy and Environment Units/Sections need to be collected and collated.

There has been intermittent support for improving the water mills in the past especially with the support from GTZ and later from ICIMOD. The Improved Water Mill (IWM) is an intermediate technology that increases the efficiency as well as longevity of Traditional Water Mills that have existed in Nepal over the years in the hills and mountainous region of Nepal by replacing wooden parts rotor and shaft by metallic one. On average one watermill serves 52 households of the nearby community by supplementing the household level grain and cereal grinding done mostly by women and girls utilizing heavy grinding stones and wooden planks (Dhiki, Jato Okkhal) moved by hands for long hours. IWMs provide increased energy output for agro processing facilities and other end usage applications including rice husking, oil expelling, sawmill and electricity generation for rural areas of Nepal. From early 2003, the pace of IWM installation took momentum in Nepal after the implementation of Improved Water Mill Support Programme (IWMSP) with the support from GoN and Netherlands Development Organization (SNV). Various organizations such as Centre for Rural Technology/Nepal (CRT/N), pre qualified IWM Service Centres, IWM kit manufacturers, I/NGOs are directly or indirectly involved in the promotion of IWM in Nepal from the initial stage of implementation of the programme. CRT/N is the implementing agency for the IWM support programme.

The IWM Programme has conducted baseline survey in 25 Programme districts which gives the status of traditional and improved water mill in that area. On the other hand, Government of Nepal has target of installation of 4,000 IWM in interim 3 years plan. In this regard, for better planning and implementation of the Programme in future, a survey study on traditional watermills existing throughout the country has been planned. Such study will also be helpful to collect basic information regarding TWMs which are potential for improvement to IWM while IWM status from the time of installation, their type short shaft (SS) or Long Shaft (LS), end usages and possibilities of electrification can be known.

In spite of huge potential on improving the livelihood of the rural and remote population through access to improved source of energy, GSI and income generation potentials from IWM, the performance of the sector has remained below its potential. Of the total potential of around 25,000 watermills, only around 7,500 traditional watermills have been improved. Short shaft IWM used only for milling is the predominant application with nearly 87% of the total where as long shaft IWM providing additional end use and also providing electrification services are 12.69% and 0.34% respectively. At the same time the district coverage so far is only 33 of the possible 53. Therefore, there is a need to upscale achievements of the programme with innovation, appropriate enabling environment and institution development of the sub sector with priority in substantially increasing the LS IWM installations. This baseline survey on TWM/IWM was carried in possible 53 districts by dividing into 33 IWMP and 20 potential districts.

2.0 Objective

The main objective of this study was to find the baseline situation of Water Mills of Nepal.

The specific objectives were to:

- Study the total number of TWM and IWM in Nepal
- Assess the operational status of Water Mills in Nepal
- Explore the potentialities for end-usages and electrification
- Study the conducive policy environment on IWM
- Study the capacity analysis of Sector and its actors

3.0 Methodology

In early 1980s an estimated figure of 25,000 traditional watermills in all over Nepal was established. Since then, all publication continues to use the same figure however the real numbers of traditional watermills operating in Nepal and the potentials to improve it including electrification and other end use installation.

To establish the real situation of the number of watermills in Nepal, there was a need of quick study. The conducted study adopted the following approaches in order to obtain data, analyze it and draw the conclusions.

1. Desk Study of the available study reports and annual progress reports of IWMP, Policy and planning documents
2. Dialogue with concerned officials such as DEEU/s, IWMP officials, etc.
3. Verification of Secondary data based on random and purposive selection of IWMP districts by conducting field visits including for IWM/E
4. Surveying the non IWMP districts by conducting the field visits and visits to DDCs

The details of the study methodology is described below:

I) Secondary Data Collection and Methodology

Desk Study

To get the right information, the following methodologies were adopted by the team: The desk study was carried out during which the consultant interacted with IWMP personnel, reviewed the previous reports. The desk study consisted overall planning to access data from 53 districts which was divided into 33 IWMP and 20 other potential districts. To obtain this objective the LCB team reviewed recent documents and various literatures prepared by AEPC, CRT/N and other Supporting Organizations for relevant information.

Secondary Information Sources

- Desk Study of 53 Districts IWM Baseline Survey 2008 conducted by Urja Consult Pvt. Ltd. (UCS) for AEPC in coordination with IWMP
- Available data at DEES/Us for 20 other potential districts uncovered by the IWMP so far
- Looking opportunity in available data at respective VDCs and DEES/Us under respective DDCs of Sankhuwasabha, Lamjung, Khotang, Arghakhanchi, Parbat and Gulmi Districts.

II) Primary Data Collection and Methodology

It included data collected through personal interviews with 30 traditional watermill (TWM) owners, 60 users of TWM, key informants at least with 2 VDC Secretaries per district and 6 DEES/Us Officers of 6 mentioned non-IWMP Districts.

To collect the above mentioned information the prepared survey questionnaire was used as given in **Annex 2**.

Preparation of Survey Questionnaires and Checklist

For the purpose of the study different sets of questionnaires for TWM owner and user of these ghattas specially focused on beneficiaries taking, potential for TWM to IWM, its operational status, service provided were prepared. The questionnaire was finalized with series of discussion among its stakeholders, SNV/N and the consultant. Besides the questionnaire a checklist for focal group discussion and other general observation sheets were also prepared. The field members were oriented for filling up the questionnaire. The questionnaire and checklist is included in the **Annex 2** and **Annex 3** of this report.

Coverage of Questionnaire

For the study different sets of questionnaires for 6 mentioned non IWMP Districts' TWMs, TWM owners and users, DEES/Us Officers, VDC Secretaries was prepared which mainly covered number of TWMs, their operational status & ownership, services provided, potential end uses and enterprises, details MFIs linkages, technical data of TWMs, economic status of TWM owners etc.

Sample Selection of Districts for Primary Data Collection for IWMP Districts

Out of Total 33 IWMP districts 12 districts were selected to get samples from the field in order to establish the available data indicating no. of TWM and IWMPs operating in the districts. The base for selection was mainly regional and concentration of TWMs and IWMPs shown by previous reports. In 30 districts, the scenario for the IWMP data collection was planned according to the following table.

To collect the data the questionnaire attached in **Annex 2**. The total number of IWMP sites to be visited in these districts was fixed at 100 and the distribution of those sampling IWMP sites are given in the following table:

Region	Name of the districts	Sample size of IWMP sites	Sample size of IWMP users to be interviewed
Far West Region	Accham	5	10
	Dadedhura	10	20
	Doti	10	20
	Bajhang	10	20
	Darchula	10	20
Mid-West Region	Surkhet	10	20
	Kalitkot	5	10
	Salyan	5	10
	Rolpa	10	20
Central Region	Makawanpur	10	20
	Okhaldhunga	5	10
	Dolakha	10	20
	Total	100	200

Sample Selection of Districts for Primary Data Collection for IWMP Districts with Electrification focus

The baseline team collected, collated and verified the available information on IWMP electrification in Sindhuli, Kavre and Dhading districts. Here the questionnaire attached in **Annexe 3** was used. The sample size distribution is taken as all of existing IWMPs.

Sample Selection of Districts for Primary Data Collection for non-IWMP Districts

Total 6 districts out of 20 non IWMP were selected for sampling, as other 33 districts of Mid, Western, Mid-West and Far West Regions have already covered by IWMP.

1. Selection on High density base

According to the "Report of Survey on status of TWMs and potential for IWMPs, 2008 (Urja Consult Pvt. Ltd.)" there are 3 districts which has more than 200 TWMs. Hence, the team decided to go in each 5 TWM sites of Khotang, Lamjung, Arghakhanchi, Gulmi, Parbat and Sankhuwasabha district for further verifications. Altogether 40 service users were interviewed for necessary information in the districts selected.

2. Medium density sample base

Following the same report, the team visited each 5 TWM sites of medium TWM concentrated (up to 200) Parbat District, where 10 service users were interviewed.

3. Low density districts with regional balance

The selection of low TWM concentrated Gulmi District selecting 5 TWM sites. For the necessary information regarding mill owner the baseline team interviewed 10 service users.

The targeted baseline districts, information and Methodologies are attached in the **Annex 1** of this report.

4.0 Limitation of the study

The conducted study is done within the short time available and purely based on the provided ToR by SNV. Hence results are drawn according to the field level observations made by the visiting persons in ghattas, analysis of first hand data brought by the RETSC personnel, secondary data available with IWMP and verifications made in the field according to the available data.

5.0 Findings

5.1 General/Basic Information of IWM

5.1.1 Number of watermills in Nepal

From the field visit, consultation with IWMP, study of different types of published documents related to watermills, report of Baseline Survey 2008 conducted by Urja Consult Pvt. Ltd. and baseline survey conducted by local support organizations in the year 2011 under the IWMP. The study team came to a conclusion that, the total number of TWMs at present is **22,676** and the total number of existing IWM is **7527** in numbers.

The list of number of TWM and IWM district wise is shown below in the table:

SN	Name of the District	No of Existing TWMs	No of existing IWM
Group A: Source: Consultation with IWMP and IWM Team			
1	Baitadi	766	290
2	Dadeldhura	540	228
3	Dhading	691	482
4	Dolakha	631	552
5	Ilam	72	58
6	Jumla	906	164
7	Kalikot	1858	334
8	Kavre	813	788
9	Lalitpur	374	304
10	Makawanpur	1278	1067
11	Nuwakot	1207	1029
12	Panchthar	0	16
13	Pyuthan	99	79
14	Ramechhap	661	414
15	Sindhupalchok	599	472
16	Surkhet	357	398
17	Bajura	1192	8
18	Doti	614	57
19	Bhajang	459	41
20	Accham	328	30
21	Darchula	607	42
22	Salyan	1045	39
23	Rolpa	674	6
24	Jajarkot	449	21
25	Mugu	445	11
26	Dailekh	376	74
27	Humla	340	0

28	Rukum	1549	0
29	Dolpa	288	0
30	Okhaldhunga	142	59
31	Sindhuli	275	337
32	Rasuwa	85	57
33	Gorkha	128	12
Group B: Secondary Sources (Consultation with DEEU/S, VDCs, Published IWM Documents)			
34	Terhathum	42	0
35	Baglung	243	37
36	Myagdi	157	18
37	Tanahun	11	1
38	Taplejung	10	2
39	Dhankuta	<i>160</i>	0
40	Udayapur	<i>150</i>	0
41	Bhojpur	<i>350</i>	0
42	Solukhumbu	312	0
43	Kaski	<i>150</i>	0
44	Mustang	68	0
45	Manang	<i>50</i>	0
46	Palpa	<i>150</i>	0
47	Syanjha	75	0
Group C: Source: Field Visit			
48	Lamjung	<i>250</i>	0
49	Khotang	<i>250</i>	0
50	Parbat	<i>150</i>	0
51	Arghakhanchi	<i>100</i>	0
52	Gulmi	<i>100</i>	0
53	Shankhuwashaba	<i>50</i>	0
Total		22,676	7527

Figures in italics are estimated figure provided by DEEU/S, VDCs and supporting organizations in that districts.

5.1.2 Number of IWM (ratio of LS and electrification)

The baseline study showed that out of the present total number of IWMs is 7527. Out of which there are 933 (12.4%) of LS IWM, 6594 (87.6%) of SS IWM and 23 (0.3%) of LS electrification. This detail has been incorporated in the **Annex 4** of this report.

5.1.3 Number of IWM owners and operators (GESI)

The conducted survey revealed that out of 7,527 IWM owners, 352 (i.e. 4.68%) IWMs are owned by Women and they are operators as well. The information on women Ghatta owners have been incorporated in the **Annex 5** of this report.

5.1.4 Types of IWM and End Uses

Based on the classification of shaft, there are 2 types of IWMs at present: Short Shaft (SS) and Long Shaft (LS) IWM. The SS IWMs are generally used for grinding purpose only while LS IWMs have diversified end uses. After the survey of End-Uses and compilation of available data from IWMP, the majority of IWM was found to be using for rice hulling, husking and polishing (84%). Similarly, saw milling (7%), electrification (4%), and other end-uses were found to be 1 % which includes: Theki cutter, Juice extractor, choya separator and tea squeezer.

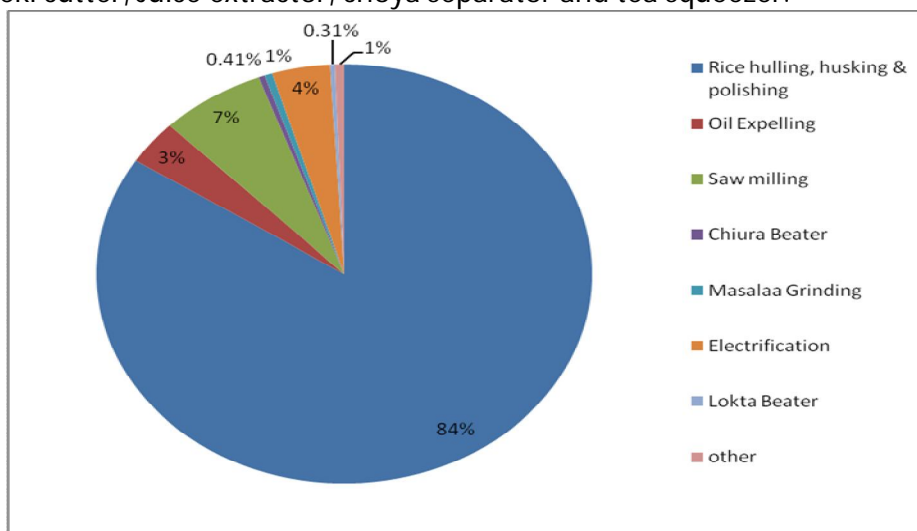


Fig. Chart showing endusage s in IWM

The above information and their number is shown in the table below and its detail is attached in the **Annex 6** of this report.

S.N	Types of End-Uses	No. of End-uses
1	Rice hulling, husking & polishing	825*
2	Oil Expelling	34
3	Saw milling	67
4	Chiura Beater	4
5	Masalaa Grinding	5
6	Electrification	37
7	Lokta Beater	3
8	other	6
	Total	981

* Note: Long Shaft IWM installions are most popular in those areas where the paddy cultivation is existed. These areas are relatively plain and have the enough source of water to cultivate the paddy.

Nepalese people consumes rice as main course of meal hence they need rice hulling, husking and polishing activities most.

5.1.5 Number of HH accessing in IWM

From the field study, the number of HHs accessing IWM in average was found to be 57 per IWM in sample districts. But after the analysis of IWMP database, the study team proposed to put forward the HHs accessing per IWM is 52 HHs per IWM. The class interval showing number of HHs and their respective total number of IWMs are given below:

Interval of HHs Beneficiaries	No. of IWMs
0-10	16
10--20	200
20-30	717
30-40	842
40-50	851
50-60	652
60-70	549
70-80	248
80-90	209
90-100	65
100-150	617

5.1.6 Income of IWM owner

In consultation with IWMP and from the field study, it is found that average annual family income of IWM owner is about NRs.115, 000 from mill operation and farming. It was also found that the average annual income from mill only is around NRs.39, 000 from SS and NRs.85, 000 from LS which is approximately 34% and 74% of total family annual income respectively.

5.1.7 Status of Operation of IWM

According to data analysis of data available with IWMP and from the field study, it is found that the average mill operation of a mill is around 10 hours per day this means that the 10.75 months in a year.

5.1.8 Number of electrification and Tariff Rate

At present, the total number of electrification of LS IWM installed as per guidelines of AEPC/ESAP is found to be 23 which have generated total power of 62.6 kW. Around 871 HHs are benefiting from all IWM electrification for lighting. The list of existing IWM electrification and their detail is attached in the **Annex 7**. At current practice, there is no proper calculation way of tariff used in IWM Electrification but as per quick survey done with IWM/E projects it is found that the tariff rate is NRs. 2 per watt in general.

5.1.9 Geographical Coverage of Water Mill

It was found that at present the IWM Programme has covered 33 hilly and mountainous districts out of possible 53 districts of Nepal. The IWM installed has covered certain districts of each Development Regions of Nepal. The Eastern Development Regions consists of 3

programme districts, while Central and Western Development regions consists 10 and 1 IWM districts respectively. Similarly, Mid Western and Far Western consists 12 and 7 respectively IWMs programme districts. The district wise coverage of IWM on the basis of Development Region has been included in the **Annex 8** part of this report.

5.2 Electrification Focus in Selected 3 Districts: Sindhuli, Dhading and Kavre

The survey analysis of existing IWM in Sindhuli district are given below but the detailed survey chart is attached in the Annex part of this report. The analysis of these three districts is shown in the table below:

S.N.	Parameter	Sindhuli	Dhading	Kavre	Remarks
1	No of IWMs surveyed	68	109	32	
2	No. of TWMs and IWMs	<ul style="list-style-type: none"> No. of TWMs=275 No of IWMs=337 	<ul style="list-style-type: none"> No. of TWMs=691 No of IWMs=482 	<ul style="list-style-type: none"> No. of TWMs=813 No of IWMs=788 	
3	IWM Owner and operator	It was found that majority of percentage 91% (men=62) of operator is men while only 9 % (women=6) of operator is women. In almost all cases, IWM owners are operators as well.	From the survey, it was found that <ul style="list-style-type: none"> Men=107 Women=2 i.e. majority of men person are IWM owner and operator while women operating IWM is negligible.	It was found that <ul style="list-style-type: none"> Men=31 Women=1 i. e. Majority of IWMs are owned and operated by men persons.	<ul style="list-style-type: none"> Annex 9, 10 and 11 for Sindhuli Annex 12 and 13 for Dhading Annex 14 and 15 for Kavre
4	Existing Power Source	It was found that at the place of 68 IWM sites visited; most of HHs has been using Solar Home System for lighting purpose.	From the survey of total 109 IWMs, the sites have found to be electrified from <ul style="list-style-type: none"> Peltric set Micro hydro Solar PV National Grid 	It was found that, all the 32 sites have been using solar tuki for lighting.	<ul style="list-style-type: none"> Annex 9, 10 and 11 for Sindhuli Annex 12 and 13 for Dhading Annex 14 and 15 for Kavre

			in this Dhading District.		
5	Grid Access	The survey conducted in Sindhuli district in 68 IWMs showed that 88% of IWMs area has no access to grid connection while very few 12% have only access to grid electricity. The HHs that is not connected to grid has been using Solar Home System.	Regarding the grid accessibility in Dhading district, the baseline survey of 109 sites showed that 85% of the location of IWMs has no access to national grid and have been using peltric set, MHP, Solar for electricity. Only 15 % areas of IWMs have been connected to grid.	It was found that all the 32 sites of IWMs are not being connected to grid connection. The survey also showed that all of these 32 sites have feasibility for LS IWM Electrification.	<ul style="list-style-type: none"> • Annex 9, 10 and 11 for sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for kavre
6	Income Generation & % Dependency of family on IWM and	<ul style="list-style-type: none"> • The average income per month from IWM was found to be about Rs. 12,000. Majority of IWM owners of Sindhuli district has income from IWM only per month below NRs.15, 000 while very few have more than NRs. 20,000. • Regarding the dependency of family on IWM, it can be concluded that majority of IWM 	<ul style="list-style-type: none"> • It was found that the average income per month from IWM only is Rs. 3200. Majority of IWM owners have earnings in the range of NRs. 3,000 to NRs 4,000 from their ghattas while some of them have 	<ul style="list-style-type: none"> • The average income per month from IWM only was found to be Rs. 7333 in which majority of IWMs owners have income in the range of Rs 7000 to 9000. • The average % of family dependency on IWM was found 	<ul style="list-style-type: none"> • Annex 9, 10 and 11 for Sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for Kavre

		<p>owners depend on IWM.</p> <ul style="list-style-type: none"> • Their dependency % ranges from (50 to 80) %. The average family dependency was found to be 50.66% on IWMs. 	<p>earnings even below Rs. 2,000.</p> <ul style="list-style-type: none"> • The average % dependency of family on IWMs was found to be 58.81% 	<p>to be 60%.</p>	
7	Feasibility for Electrification	<p>The survey carried out by Service Center in Sindhuli District showed that altogether there are 13 numbers of existing LS IWM that have feasibility of electrification with minimum power output of 1.6 KW to maximum of 3.75 KW. Similarly, the survey also showed that total of 15 SS IWM have potentials for electrification with various power output as shown in the table attached in the Annex 11.</p>	<p>It was found that altogether 55 IWM have feasibility for electrification. The output power from those IWM is given in the table attached in the Annex 13. Out of 109, the remaining IWM has either low output power or connected by national grid.</p>	<p>After conducting survey in kavre district, the baseline team found that altogether 32 IWM has feasibility for electrification. The maximum power output among these IWM is upto 4.5 KW. The various power output is given in the table attached in the Annex 15.</p>	<ul style="list-style-type: none"> • Total of 115 IWMs have potentialities of Electrification • Annex 9, 10 and 11 for Sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for Kavre
8	Possibilities of End usage	<p>From the detail survey of Sindhuli district, total 30 different IWM end-usage have possibilities of installation as follows:</p> <ul style="list-style-type: none"> • Oil Expelling=5 • Chiura Beater=2 • Electrification=17 • Furniture mill=6 	<p>From the detail survey of Dhading district, the various possibilities of end usage are as follows:</p> <ul style="list-style-type: none"> • Rice hulling=18 • Oil Expelling=2 • Saw milling=14 	<p>During the survey of Kavre district, in the 32 IWMs, it was found that mainly three end usages exist where the number of huller is larger while the</p>	<ul style="list-style-type: none"> • Annex 9, 10 and 11 for sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for kavre

			<ul style="list-style-type: none"> • Chiura Beater=3 • Electrification=55 	number of grinding mill is mimimum. <ul style="list-style-type: none"> • Grinding=2 • Sawmill=12 • Huller=18 	
9	Operation Time	<p>During the survey of 68 IWMs, it was found that mill operates in variation of months i.e. from 4 to 8 months in a year in Sindhuli District. The maximum number of IWMs operates for 5-6 months in a year. During the off season, the owners are engaged in the farming and other labor work based on daily wages.</p>	<p>From the survey of 109 districts, the average number of days the IWM operates is 27.98 days per month and 10.28 hour per day.</p>	<p>The average operation time per day was found to be 10.53 hours.</p>	<ul style="list-style-type: none"> • Annex 9, 10 and 11 for Sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for Kavre
10	Accessibility to Road	<p>From the survey of 68 IWMs of Sindhuli district, it was found that majority of IWMs are located very far from the accessibility of road. 46% of the IWMs are above 70 KM far from the nearest road while 34% are within (50-70) KM. The average distance from road access to the IWM site is about 62.48 KM.</p>			<ul style="list-style-type: none"> • Annex 9, 10 and 11 for Sindhuli • Annex 12 and 13 for Dhading • Annex 14 and 15 for Kavre

5.3 Socio Economic Status of Mill Owners

5.3.1 IWM Owners from Programme Districts

From 33 Programme districts, the detail information and analysis is shown in the **Annex 16** of this report.

- **Size of Family**

The survey carried out in 85 IWMs from IWMP Districts showed that the average family size of mill owners is 7.49

- **IWM Owner and operator**

Based on the survey carried out in 85 IWMs, it was found that 84 % of mill owner is male person while 16% of the mills are owned by female persons and in almost all the cases the owners themselves are the operators.

- **Ethnic Group**

From the survey of 85 IWMs, it can be concluded that 14% of the owners belongs to marginalized group while 27% of owners are Janjati. Similarly the data shows that other (Brahmin, Thakuri and Chettries) own the remaining 59% of mills operated as shown in the annex 16 of this report.

- **Mill Ownership**

With regard to the ownership, 93% of IWM are owned by self while 5% is running in partnership and 2 % as cooperative as shown in the chart attached in the annex 24 of this report.

- **Income of IWMs Owner per Year and % of Mill income in Total Income**

From the survey, the income status per year shows that the average annual income is Rs. 1,12,000 from all the sources like mill operation, farming and others in which maximum (35%) of owner has annual income of Nrs 50,000-1,00,000.

The information regarding the % of income generated by mill source shows that the average % of income generated from mill is 56.78%. The details is attached in the annex 16 of this report.

- **IWM Operation Status**

The survey showed that the average daily operation of mill is 10.12 hours while average mill operation is 10.75 months per year. The maximum number of mill operates 10 to 12 months a year. The detail is attached in the annex 16 of this report.

- **No of HHs covered by IWMs**

The survey revealed the average of 57.59 HHs is being covered by an IWM.

5.3.2 TWM Owner of non-IWMP district

The districts include Parbat, Arghakhanchi, Gulmi, Lamjung, Khotang and Sankhuwashaba for sample study representing 20 non IWMP districts.

- **Family Size of TWM Owner**

From the survey of 6 non-IWMP districts, it was found that the average of family size of mill owner is 7.3. The maximum size of family members were found to be upto 14 while minimum upto 4 members. The detail calculation part is attached in the **Annex 17** of this report.

- **Occupation**

From the survey of 30 TWM owners it was found that, the main occupation of the ghatta owners and their family is farming and ghatta operation. All of these owners are involved in 40% farming while 60% in mill operation throughout the year. Beside this, some of the family members were also involved in trade of local products, labor work in health post, school, MHP, etc. construction.

- **Annual Income**

After conducting survey among 6 districts and considering 30 mill owners for analysis, it was found that the minimum annual income of mill owners from their mill is Nrs. 3,000 while maximum amounts to NRs. 50,000. The majority of TWMs owner annual income from mill lies in between NRs. 10,000 to NRs 20,000. There is no any kind of cash transaction between mill owners and the service users, but the income stated is tentatively obtained by equivalent conversion of ground agro-products collected by the mill owners according to current price. The information can be shown in the table and chart attached in the **Annex 17** of this report.

- **No of HHs using ghattas**

From the survey of 30 TWMs, it was found that the minimum number of HHs benefitted from Ghattas service is 20 HHs while maximum up to 200 HHs. The average number of HHs using Ghattas services was found to be 50.47. The detail information is shown in the chart and table attached in the **Annex 17** of this report. The class interval showing number of HHs and their respective total number of IWMs are given below:

Interval of HHs Benificiaries	No. of IWMs
0-10	0
10--20	0
20-30	5
30-40	6
40-50	6
50-60	6
60-70	4
70-80	1
80-90	0
90-100	0
100 and Above	2
Total	30

- **Operational Status and Management of TWM**

During the survey of 30 TWM, it was found that 97% of the ghattas are owned by individual ghattas owners while very few 3% are running and they are the operators as well i.e. 100 of TWM owner are the operator and manager of the TWM.

The 73 % of mill operates 24 hours daily for 6-8 months during rainy season. After then only 27 % mill operates in winter season where there is continuity in the sources of water.

TWM Service Users

From the baseline survey conducted in 6 districts, the baseline team observed (in 30-45 minutes in a ghatta) and interview conducted with the TWM owners shows that the average visiting times for service users per month is 5.48 times and their average distance to be travelled to reach the mill is about 1 KM. The frequent visiting users are more from those who reside within the range of 500 meters. Gender-wise it revealed that 71% of visitors are women and 29% are men in the visited 6 non IWMP districts TWM. It is also interestingly found that among the total visitors including men, women and children, the percentage of child (age 8-15 years) observed to be 25% during the observation time. All of the users are using only grinding services provided by the TWMs. The frequency chart and all the information related with this section is attached in the **Annex 17** of this report.

5.4 R&D Activities on IWM Technology

In this regards the baseline team found that IWM programme has conducted different action oriented research mainly to increase the capacity and efficiency of IWM kits and to diversify the end uses that can be coupled in IWM for which, two experts (one working in Pulchowk Engineering campus and another freelancer having intensive work experience in turbine design) have been given task to conduct research. They have completed the design portion and will be continuing fabrication and testing component in 2009.

On the other hand, three more End-Uses have been successfully coupled in IWM mainly, Chiuri expeller, Tea squeezer and Sugarcane juice extractor. All three research areas were completed, however some modifications were found to be necessary after commencing operation. This plan has allocated a small budget to solve the problems faced during operation.

Furthermore, the programme has developed 5 kW IWM runner which was designed and tested by CES/IOE Lab in 2011. After testing lab and field, some technical changes (pulley size, runner orientation changes, bucket thickness, metal frame instead of wooden frame and welding skills in outer ring and hub) have been recommended for IWM runner

5.5 CDM Situation

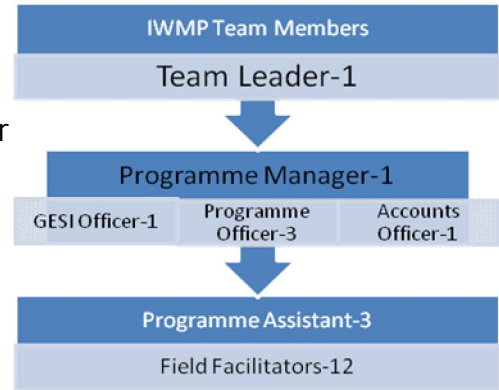
From the study, it was found that presently AEPC has been preparing PDD document. Initially the first round of CDM validation has been completed. As a result, IWM sector is at the final stage of registration in the CDM project. Also, the second round of validation is also going to

start very soon. Furthermore, it has been calculated that one IWM reduced 4.454 ton of CO₂ emission per year (Source: IWMP).

5.6 Capacity of the Sector and its Actors

5.6.1 IWMP Team Capacity/CRT/N

Improved Water Mill Programme (IWMP) is teamed up with 21 staff members. Among which 10 are in the office and remaining 11 serve in the field as Field Facilitator. Team Leader, Programme Manager, Programme Officer and Programme Assitants play a key role at central level whilst the Field Facilitators are deployed in either in GOA or Service Centres for daily advisory and monitoring support. Besides that Field Facilitators are also responsible for Technical services with respect to Ghatta installations.



In this sense, the total staff force is almost fifty-fifty in the office and field. The main role of this team is to perform the followings activities collectively:

- Operate day to day functioning of the Programme
- Planning, Implementation and Monitoring of the activities under IWMP
- Advice to GOA, Service Centre and Kit Manufacturers for the improved performances
- Develop the capacity of stakeholders
- Advice AEPC/ESAP in policy making
- Send the recommendations to AEPC for subsidy release
- Involve and coordinate for R&D and other aspects in the sector
- Conduct baselines and adaptive research occasionally
- Document and Publish the cases, learning and others

Major Competencies	Situation	Gap
Planning and monitoring	One of the core competencies of the team is this and it's high	Monitoring skills and thorough monitoring of implemented activities are needed
Technology related inputs	Almost all the staff are from technical background	Dimensions such as beyond technology is needed to add
Management and Business inputs for Ghatta owners	Below than needed	Needs to have at least one person having business studies background
GESI	Orientation is there as cross cutting	GESI specific programs to be developed more IWMP has only one women staff and hence need to consider to increase

Performance of IWMP Team

This performance of IWMP Team is directly associated with the no. of installations of IWMPs and targeted activities as set in annual plan of the program. For the purpose as per the provided

planning document, the achievement versus target of as mentioned in IWMP Annual Report (July 1, 2011- June 30, 2012) is the direct methodology used for performance of IWM Team.

The analysis shows that the total performance of IWMP is 77.84% with respect to no. of IWMs installation which also include long shaft for electrification. However, when we separate the electrification as different entity then the target vs. achievement is 40%.

Total no. of target for installation for fiscal year 2010-2011 was 250 out of which the achievement registered at 205 including 1 IWM Electrification Project. This means it 82% of achievement according to the target set for the duration.

The total no. of activities planned for year 2011-2012 was 103, where the achievement graph recorded at 68.93% completing 71 no. of activities. Three activities are ongoing; hence the actual scenario will be traced during next evaluation of the programme for these three activities. Performance of the team needs to enhance in the front of grass root level activities such as supporting GOA local meetings.

Financially IWMP was able to spend NPR. 11,349,282.50 **which** is 76.18% of total approved budget i.e. 14,879,468.24. The comparative data between performance (77.84%) and management/program cost in installation shows close connection and, the management cost is NPR. 11, 664.21 per IWM installation.

The performance scenario of the IWMP team is shown in the table attached in the **Annex 18** of this report.

5.6.2 Ghatta Owners Associations (GOAs)

It was found that at present there are altogether 16 GOA in the country. After a considerable period of operation of GOAs, some GOAs decided to organize a federation as an umbrella body for the sake of benefit of Ghatta Owners at large. The intervention for Ghatta Owners Associations took place early in 2005. These associations are membership based organizations representing the ghatta owners in respective districts. Purely volunteer based these organizations have democratically elected executive board and main income comes from membership fees and 10% contribution from IWM installation provided by Service Centers.

However, some GOAs also generate income by organizing activities in cooperation of local entities and government line agencies. The roles of GOAs are information dissemination and do advocacy on behalf of members. In some cases they also have been able to build the capacity of members through the programmes like literacy and skill training.

The capacity of GOA Federation and sixteen GOAs are given below:

Federation of GOAs

Status: Six months ago a meeting held in Banepa, Kavre decided to organize Federation of GOA Ad-hoc Committee for needy registration and other purposes. In the meeting the

representatives of GOA Kavre, Nuwakot, Dhading, Sindhuli, Sindhupalchowk, Dolakha, Lalitpur and Makawanpur were present. Each GOA contributed Rs. 3,000 for the registration and other purposes as their financial contribution.

The ad-hoc committee is organized under the leadership of Mr. Man Bahadur Gole, the current President of GOA Kavre and the names of the ad-hoc committee are given in the **Annex 19** of this report.

The based on draft Constitution and bylaws of the Federation, it has applied in Kahtmandu District Administrative Office for formal registration. Due to the not having tax free certificate of all GOAs the registration process is delayed.

Contact point: For the registration and other needy work, office of the GOA Kavre has been designated as contact office for the federation for the time being.

When we see in the list of ad-hoc committee out of 11 members 3 are women and all they are from ethnic group. Seven members of the committee including men and women are of ethnic background and remaining are from so called upper caste background.

Capacity of GOAs

The first GOA organized in the country is Kavre and they are one of the quite active GOAs organized so far. It is also quite interesting fact to know that out of 33 Service Centres, 8 GOAs in houses service centre; none was in year 2003, when IWMP started. It is a result of gradual capacity building done by IWMP. All GOAs have their offices in rented spaces and they also organized Ghatta Owners Group (GOG) due to the geographic adversaries. GOA officials have been trained frequently and support to run GOA is also provided in nominal scale by IWMP occasionally.

Fourteen GOAs are registered in District Administrative Office (DAO) and renewed up to fiscal year 2011-2012. It is learnt that 3039 members joined GOA and out of that 224 (7.37%) are female GOA Member. Interestingly 1310 members are of marginalized and ethnic background. Altogether 146 Board Members govern the GOA and out of which 39 is female that means 26.71% of the total.

Some GOAs like Kavre has high advocacy capacity and having good coordination with DDC and other VDCs for the benefit of GOA members during the displacement of ghattas or literacy classes for their members. Importantly the GOAs are also doing advocacy for swept away ghattas by flood to get compensation from AEPC through IWMP. Annual General Meetings are organized and the issues of the members discussed during this time even by inviting IWMP personnel and local officers of different GoN line agencies. Four GOAs out of 16 found inactive whilst remaining 75% of GOAs are active and delivering services to their members.

The further details of the GOAs are given in the **Annex 20** of this report.

5.6.3 Service Centres (SCs)

Service Centre are key stakeholder in IWMP and interface between supplier (kit manufacturers) and Mill Owners along with their association-GOA. Baseline survey, installation, monitoring and Project Completion Report are their main responsibilities as designed in IWMP.

It was found that at present there are 33 Service Centre located in different districts and location wise more than half (19) of the service centre are located in mid-west and far west development regions of the country. One can imagine that this is mainly due to remoteness and being potential districts to improve the mills. During the distance call interview and filled questionnaire as given in **Annex 2** with service centre, the table attached in the **Annex 21** of this report revealed the capacity and other related information on Service Centre.

From the table it can be analysed that if the appropriate environment exists according to the service centres, they can install 3,020 IWMs (SS/LS) in a year. At the same time if the environment for IWME persists, the installation rate will be 46 per year reveal the Service Centres. It is also a fact to know that under the service centres there are 155 persons employed currently. The range of income varies 2% to 100% of their total revenue in a year. Some Service Centres also offers its services beyond own district. Kavre GOA Service Centre is pioneer in providing such services to the 4 districts.

Governance/GESI in SCs

Membership: In all 33 Service Centres, which is almost all NGOs except some GOAs are running as NGOs. Though GOAs are also registered under the same act, they are membership based volunteer organizations. According to the survey it is revealed that 10,006 persons are members in these NGOs. Out of which 49.60 are female and 1,560 persons are of marginalized and ethnic group background.

Board of Directors: The board of directors of such NGOs is of 314 people and the percentage of female members in such arrangements is 32.80%. In the same manner 165 people out of 314 are of ethnic and marginalized group background.

Persons involved in IWM: 107 people got employment through the service centers in relation with IWM. Out of which 32 nos. is female remaining 134 are male. The people from marginalized and ethnic group represent 65.20% in the total no. of employment generated in Service Centres. During the survey it is also revealed that all most all Service Centers are having written agreement exchange with supplier and Ghatta owners to install the kits. The details information of Governance/ GESI of SCs is given in the **Annex 22** of this report.

Performance of Service Centres

According to the table given in the **Annex 23** of this report, the progress of Service Centres has been measured and there seems clear disparity between the set target and achievement. In this case one can say that whether the target planning is wrong or the set targets not

realistically drawn. There are 6 Service Centres who achieved up to 50% achievement whilst 9 Service Centres achieved more than 100% achievement. At the same time 7 Service Centres are registered with zero progress. This is mainly due to either recently pre-qualified or relatively new Service Centres. Eleven Service Centres achieved between 51-100% progresses at the same period.

5.6.4 Kit Manufacturers

Kit Manufacturers are private limited companies that have workshop and manufacturing unit to produce short shaft and long shaft water turbines for water mill. As IWM kits are mainly the iron work, these manufacturers buy iron pipes, sheets and other accessories local market and produces the kits using hand and some small tools and machines. According to the programme structure, these workshop or units has to be enlisted and pre-qualified by AEPC in order to manufacturer the kits. The manufactured kits are inspected by the Field Facilitators deputed by IWMP on the basis of 10% sample for total units manufactured for quality control purposes. However, after a year of installation of those manufactured kits a third party deputed by AEPC inspects the kits in the field and based on this releases remaining 10% of subsidy money to the respective companies.

In the meantime, after becoming pre-qualified from AEPC, the technicians of the companies are generally trained for technical aspects on the approved prototypes. At present there are three standard prototype kit designs prepared by the IWMP and approved by AEPC. The choice to select the prototype lies with manufacturing companies. It was found that at present there are 22 kit manufacturers in the country out of which 8 kit Manufacturers are active.

Technical Capacity

The technical capacity of Kit Manufacturers is more than sufficient according to the target set by the IWMP, which is basically also the target of GoN/ AEPC. The capacity to install SS, LS and IWM/E is possible, if the target to be achieved. Five Kit Manufacturers are having 5-10% of income from IWM related activities of their total income. Notably two manufacturers have been able to raise their income up to 20% of the total.

Some manufacturers have made the kit manufacturing almost a main stay of income source by supplying more than 10 districts, while at least each manufacturer maintained their supply to 3 districts. The covered kit manufacturers are engaged in manufacturing of kits, whilst there are other some pre-qualified manufacturers as well but they are not involved in manufacturing so far. The detail information is listed in the table attached in the **Annex 24** of this report.

Governance/Gender & Social Inclusion

The total employment generation is registered at 63 out of which 57 are of them is male and remaining 6 is female. When we look into the social background the out of total employed people 49 persons are of marginalized and ethnic background. This means 77.77 % people are marginalized or of different ethnicity working in the kit manufacturing.

There are 17 persons as shareholders of these business organizations and the share of female in this structure is 4 persons which means 23.52%. Only 4 persons having socially excluded or ethnic background are engaged as shareholders in 8 different companies that involved in kit manufacturing. Interestingly 50% of the organizations are registered at District Small and Cottage Industry Office (DSCI) whilst remaining is registered with Office of the Company Registrar. The detail information is listed in the table attached in the **Annex 25** of this report.

5.6.5 IWM Electrification Installer

IWM Electrification Installers are private limited companies that have workshop and fabricating unit to produce electrical and mechanical components for water mill. According to the programme structure, these workshop or units has to be enlisted and pre-qualified by AEPC in order to install the electrification projects. The detailed design projects are inspected by the Field Facilitators deputed by IWMP on the basis of 100% for quality control purposes. In the meantime, after becoming pre-qualified from AEPC, the technicians of the companies are generally trained for technical aspects for the installation process. It has been found that presently, there are 15 IWM Electrification Installer or construction companies working in this sector.

Technical Capacity

The technical capacity of Installer of IWM/E is more than sufficient according to the target set by the IWMP, which is basically also the target of GoN/ AEPC. The capacity to install IWM/E is possible, if the target to be achieved. Almost all Installers are having 5-10% of income from IWM/E of their total income. The covered installers are engaged in installing of IWM/E, whilst there are other some pre-qualified installers as well but they are not involved in installing IWM/E so far. The detail information is listed in the table attached in the **Annex 26** of this report.

Governance/Gender & Social Inclusion

The total employment generation is registered at 22. When we look into the social background the out of total employed people 5 persons are of marginalized and ethnic background. This means around 23% people are marginalized or of different ethnicity working in the IWM/E. There are 19 persons as shareholders of these business organizations. Generally, all of the organizations are registered at District Small and Cottage Industry Office (DSCI) and Office of the Company Registrar. The detail information is listed in the table attached in the **Annex 27** of this report.

5.7 Environment on Water Mill Technology

5.7.1 Laws, policy rules concerning IWM

The various laws, policy rules for IWM technologies are as follow:

- **Subsidy for IWM**
 - NPR 12,000 for grinding (SS) and NPR 27,000 for other end uses (LS) activity in all districts.

- Additional subsidy NPR 2,000 for grinding and NPR 3,500 for other end uses activity in 12 remote districts and not connected by roads as specified by AEPC in subsidy policy, annex-3.
- Additional subsidy NPR 3,000 for grinding and NPR 4,500 for other end uses activity in 3 remote districts and not connected by roads as specified by AEPC in subsidy policy, annex-3.
- NPR 60,000 per kW for IWM Electrification which will be up to 5 kW.

- **Policy Conduciveness for IWM Electrification**

The following delivery mechanisms are policy conduciveness for IWM/E:

Subsidy Provision in REP and Delivery Mechanism -1

Clause 5.2.1. a. Project electrifying up to 40 new households and as community or institutional project (up to 5 kW)

“In case of electrification from Improved Water Mill, subsidy request to MGSP shall be made by qualified company through the IWM Implementing Agency after completing the installation and POT, along with the survey/design and estimation, based on agreed standards/guideline. The IWM Implementing Agency will assess and verify the commissioning of the project. MGSP will assess the project completion document and details, and recommend to REF for the subsidy.”(Source: Renewable (Rural) Energy Subsidy Delivery Mechanism, 2010, Page # 32-33)

Subsidy Provision in REP and Delivery Mechanism -2

Clause 4.5 Improved Water Mill Support Programme (IWMP)

“A Management Committee comprised of AEPC Executive Director as the chairperson and representative from the programme implementing agency and relevant donor representatives will ensure the overall coordination, guidance, and monitoring of the IWM Programme activities. A technical committee (TC) with representatives from AEPC, MINI-Grid support Programme (for Water Mill electrification) and the programme implementing agency, will support the Management Committee on technical aspects.” (Source: Renewable (Rural) Energy Subsidy Delivery Mechanism, 2010, Page # 20-21)

Subsidy Provision in REP and Delivery Mechanism -3

Clause 3.1.2

“A subsidy amount of NPR 6,000 per household will be provided for to the add- on MHP Project (Improved Water Mill) up to 5 kW capacity, if it for electrifying villages. But the subsidy will not be more than NPR 60,000 per kW generated. ”(Source: Subsidy Policy for Renewable (Rural) Energy, 2009)

- **The subsidy rates and changes over years**

For the first time GoN brought the **Subsidy Delivery Mechanism** in year 2003-2004 and the subsidy provision of IWMs were also incorporated. Later under **Rural Energy Policy 2006** subsidy for IWM was also provisioned and in year 2007, the rate of subsidy given to owners

went down by 10%, which again in 2009 went up with revised Subsidy Policy of Government. In between of this, the local people started IWM/E by themselves having without any subsidy or contribution from government and then IWMP. Therefore, in 2007 AEPC provided Rs. 500,000 for five IWM/E piloting projects. After the prepared standard guideline and quality standards for IWM/E by IWMP, AEPC/ESAP granted subsidy since 2008 for IWM/E.

The subsidy rates and changes over years is given in the **Annex 28** of this report

Additionally, Rs. 2,000 for SS and Rs. 3,500 for LS targeting 12 districts as given in annex 3 of Subsidy Policy 2009. Similarly, Rs. 3,000 for SS and Rs. 4,500 for LS targeting 3 districts as given in annex 3 of Subsidy Policy 2009

5.7.2 Gaps and Barriers

The current subsidy policy for LS electrification requires updating. IWM subsidy allocation for electrification amounts to Rs. 60,000/kW on average whereas the cost per kW is around Rs. 230,000 including the cost for transmission lines. Moreover, the subsidy allocation for micro-hydro peltric sets amounts to Rs. 97,500/kW which is Rs 37,500/kW more than the allocation for IWM LS for electrification. For this reason among others the private sector (turbine manufacturers, installers) favour peltric sets.

The lands on which the majority of watermills are situated are generally public property. As a result micro-finance institutions are reluctant to provide micro-finance loans to the IWM owners due to a lack of collateral. To cater to this problem, GOAs with appropriate capacity development support can take up the role of providing micro-finance to their members targeting installation of LS IWMs.

5.7.3 Provision of Microfinance

Financing IWMs are done in two ways. The first source is government subsidy whilst the second one is the self financed by the owner itself. However, the owners are not in a position to bear the entire amount that they have to put. They need loan financing especially to install the Long Shaft and Electrification Projects. In the contrary, the ownership of IWM lies with the owner but the mill house erected mainly in public place where the water source is available. Due to which the micro finance institutions are found reluctant to finance the IWMs.

The existing cooperative and micro finance environment has also limitations. As the ghattas are spread over and homes of the owners are also scattered. Consequently the hindrances created and barring the owners in joining the local cooperative. Despite of the fact IWMP tried to draw the attention of MFIs through the workshops organized. But result is almost nonexistent and considering this in cooperation with SNV, IWMP created a concept on Revolving Fund for mill improvement.

In the past interventions a detailed guideline was prepared for GOA Kavre to lend the money and revolve it with Kavre GOA started to provide loans putting NPR 100,000.00 in the fund. Again with high demand and low fund, the GOA has stopped to provide loans to members. The

IWMP also prepared the profile of interested MFIs to provide loans to the mill owners in the programme districts. This effort has also not brought any significant result. In the mean time, an American NGO S3IDF carried out a survey and prepared a detail program to lend money to owners. ADB is found interested to finance this scheme but the actual execution has still in the process.

At present cost, to install a short shaft it will cost NPR 35,000 on an average. Similarly, cost for Long Shaft around NPR 60,000. If we compare this price with the available subsidy from government, i.e. NPR 12,000 and 27,000 for Short Shaft and Long Shaft respectively. This means that to install an SS IWM the share of contribution from owner is 34.28%. Similarly to install a long shaft IWM the owner has to contribute 55%.

5.7.4 Investments made by Govt of Nepal in IWM sector and in R&D

AEPC, Ministry of Environment, Science and Technology, GoN provided certain budget which is allocated annually in the IWM sector according detail Work Plan. Currently, AEPC/ESAP allocated the budget NRs. 630, 2228 for IWMP from July 2012 to December 2012 for physical target, HR costs and other activities cost. After ESAP will phase out from December 2012, AEPC/NRREP allocated the budget 0.6 Million US \$ for the period of 5 years. There is no budget allocated in IWM R & D sector during the ESAP period. Moreover, budget has not been clearly allocated in the NRREP for IWM R & D sector.

5.7.5 GSI policy and practice in the sector

In order to address the gender and social needs, the IWM Programme has set specific activities through its planning process. In implementation level some gender related activities such as training on social and gender inclusion, enterprise development training and support for increase participation of women in GOAs etc. were set in programme activities to give special attention to gender. To meet the objective of the Programme, it needs to focus on activities targeted for women especially for capacity building regarding operation and maintenance of the system and diverse end uses. The Programme has put its effort to upgrade the status of women through intervention of this intermediate technology, only the gender practical need was fulfilled by making ease in agro-processing, transferring of technical knowledge of ghatta operation and maintenance and saving time etc.

The Programme has succeeded in the establishment of female-owned water mills, enabling them to earn income. The Programme maintains gender disaggregated data with respect to ownership of the systems. Regarding the ownership, the participation of women is still less although it has increased from 3% to 7% in few years. Similarly, 73% of them are from various ethnic groups and dalits. Whereas, remaining 27% are from other relatively better off people of the society. Likewise, study shows that about 69% of females visit mills for various services which states women as primary beneficiary group; but their participation in different activities related to water mills including capacity enhancement in the operation of mills, various end uses and income generation activities is low. In case of control over income from IWM, the

access of women is reached to 48%. Similarly, regarding Ghatta related decisions; the decision-making role of women was found 25%.

It is observed that the Programme has made a lot of efforts towards gender uplift through different activities. Still there are various gaps prevailing at programme planning and activity level which needs to be addressed. Addressing these into the system is a process which requires remarkable time period. Based on the Strategy Paper 2012 prepared for IWM Programme, following activities are proposed for this fiscal year 2012-13, which seems to be more important to be incorporated.

- Capacity building of female representatives of GOA (about GOA, IWM technology, presentation skills, decision making roles, personality development etc).
- Capacity building of IWM Programme Staffs on GESI.
- Monitoring and outcome tracking activities to determine whether GESI issues were being effectively mainstreamed and the possible outcomes are in line with the GESI objectives of the Programme.

6.0 Conclusion

The presented facts are based on the mix use of methodologies i.e. direct and indirect to conduct the study. This study has also its limitations such as time constraint but as IWM is one of the established RE sub sectors, the study team has tried its best to verify, collate and establish the fact avoiding duplications. Hence the study team is confident that the presented facts and figures are based on factual base. It's also matter of fact that as shown by facts there are still a chance to improve the major chunk of TWMs in future.