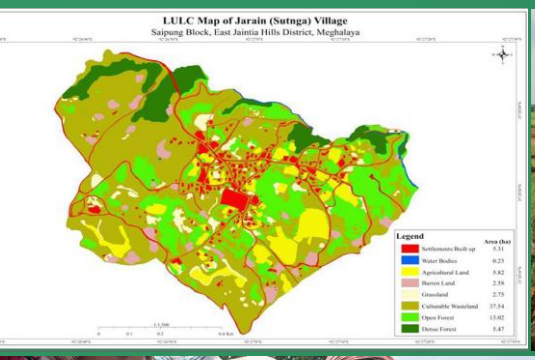
Meghalaya Community Led Landscape Management Project (MCLLMP)






Baseline Report

Prepared by
State Project Management Unit
Shillong, February 2020

MBMA
Meghalaya Basin Management Agency
ENVIRONMENT | ENTREPRENEURSHIP | MARKETS | FINANCE

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ACKNOWLEDGEMENT

The Government of Meghalaya has initiated the Community Led Landscapes Management Project (CLLMP) to strengthen community led natural resource management (NRM) with a landscape approach in 400 highly degraded and degraded villages of the state through World Bank support. A Baseline Study was commissioned to understand the current profile of three regions of the State i.e. Garo Hills region, Khasi Hills region and Jaintia Hills region.

The Study Team is greatly indebted to Mr. P. Sampath Kumar IAS, Project Director CLLMP, for his encouragement, support and leadership. The Team expresses gratitude to Mr. Pyush Dogra, Sr. Environmental Specialist and Ms. Mridula Singh, Sr. Social Specialist for entrusting this study to the State Project Management Unit (SPMU) We thank Ms. Swati Dogra, Social Development Consultant, and Ms. Aditi Jha, Environmental Consultant for giving their support in designing the questionnaire / data fields for data collection as well as providing inputs on subjects under their expertise.

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Mr. T. Jude Xalxo
Principal Investigator & Technical Specialist
Meghalaya Basin Management Agency (MBMA),
Nongrim Hills, Shillong, 793001

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Abbreviation

BOD	Biological Oxygen Demand
BPL	Below Poverty Line
CNRMP	Community Natural Resource Management Plan
C&RD	Community and Rural Development
GIS	Geographic Information System
GoM	Government of Meghalaya
LPG	Liquefied Petroleum Gas
MBMA	Meghalaya Basin Management Agency
MCLLMP	Meghalaya Community-Led Landscape Management Project
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MNREDA	Meghalaya New and Renewable Energy Development Agency
MSL	Mean Sea Level
NESAC	North East Space Application Centre
NRM	Natural Resource Management
pH	Physical Hydrological
PRI	Panchayati Raj Institution
SPMU	State Project Management Unit
VCF	Village Community Facilitators
VNRMC	Village Natural Resource Management Committee
WB	World Bank
WHO	World Health Organisation

EXECUTIVE SUMMARY

Meghalaya the abode of cloud, endowed with rich natural resources is under serious threat due to degradation of natural resources – forest, land and water due to impacts of anthropogenic factors and climate change over years. The natural resources have been people's primary source of income and livelihoods over years. Meghalaya Community Led Natural Resource Management Project supported by World Bank and implemented by Meghalaya Basin Management Agency aims at strengthening community institutions in planning and managing natural resources for sustainability in the state.

The baseline study is purposed at obtaining knowledge and establishing baseline data on current status of natural resources in the State and to enable the measurement of impact of various interventions taken up through a community led landscapes approach in the target 400 highly critical and critical villages in the state. The random survey study was conducted in 71 villages; 24 villages in Garo Region, 31 villages in Khasi region and 16 villages in Jaintia region. The study captures reports on the present status of natural resources and its present utilities. These villages have about 11690 households with approximately 64783 populations. The report presents 6 major sections; a) major occupation of target group and their sources of fuel, b) land use land pattern baseline information generated through GIS technology, c) village resources such as forest and water bodies and its use, d) status on the degradation of natural resources and water body pollution, e) region wise brief assessment report on first three sections, f) major findings and g) result framework.

The findings show that 85 percent of households are engaged in agricultural and related activities with income level of Rs.52956 per annum from average land holding size of 0.34 hectares per family. The remaining 15 percent of households are engaged in petty business, holding Govt. jobs and as teachers. Our study reveals that more that 90 percent of households are using fuel wood as their main source of fuel; just 25 percent plus use LPG along with wood, charcoal and kerosene.

GIS technology was utilised to establish base information on land use land cover pattern in the surveyed villages. It must be mentioned that the KML (Key Mark Language) village boundaries are created by using Google Earth Pro by the project team with the support of village elders or village NRM committees under MCLLM project. As such these village boundaries are not political or administrative demarcation and should not result into controversy on village boundary demarcation between villages. The village boundaries are created solely for implementation of CLLMP and not to be used by any individual or organization without due permission from the competent authority.

The 71 villages share a total area of 49330 hectares of land where maximum land is under open forest (23%), cultureable waste land (21%), dense forest with just 9 percent and agricultural land with around 7 percent of the total land available. Other land coverage includes plantations, barren land and water bodies with just 0.57 percent. Dense and open forest are found mostly in Khasi hills region, culturable wasteland are found mostly in Jaintia hills region, community forests are found in Khasi and Jaintia hills regions, whereas clan forest is more popular in Jaintia region and no such forests were found in Garo hills region. Agricultural lands are found mostly in Khasi hills region, however, more land under cultivation is found in Garo hills regions.

More water bodies are found in Khasi and Jaintia hills regions with maximum water body pollution taking place in Jaintia hills region due to mining activities and soil erosion. The study shows that 43 percentage of water bodies are polluted making it unfit for human and animal consumption and irrigation. Soil erosion is the major cause of land degradation that has maximum effect in the Garo hills regions. Forests fire is one of the factors leading to deforestation and is prevalent mostly in Khasi hills region. Shifting cultivation, unplanned deforestation and ruthless mining activities are found to be the major causes for natural resource degradation and pollution of water bodies, resulting in increase of wasteland and uncultivated agricultural fields. The study reveals that 3052 (6.19%) hectares of degraded land is present in 71 villages.

A comparative assessment report of three regions was carried out to highlight some distinctive features. Comparatively, Garo region ranks 'less' in many aspects such as; less habitats per village, less into business and employment, less or no private land. What is more is; soil erosion, highest degraded jhum land, more plantations, more cultivation and more use of water bodies. Khasi region can be categorized as 'land of plenty', as this region has more people engaged in government jobs, more into business, maximum dense forests, protected forests and maximum water bodies as compared to Garo and Jaintia regions. While Jaintia hills region is/was blessed with rich mineral and other resources, the region has reached a stage of total environmental imbalance due to unscientific mining. The region suffer from ruthless mining activities, massive deforestation, soil erosion and water pollution leading to increase in number of daily wage earners, limited or no plantation activities, so on and so forth.

This Baseline report also presents 11 major findings of the study in Chapter 5 that sets the **Project Base** for some of the major project interventions that the project need to address.

The last chapter of this report presents the Result Framework (RF) of the project that has four PDOs (Project Development Objectives) with 17 indicators. The RF also has six Intermediate Results with 16 indicators. The project has set high and an ambitious targets to establish 400 VNRMCs, develop and implement community managed NRM plans in all villages, measure community satisfaction on project implementation arrangements and interventions, targets at bringing about land area under sustainable landscape management practices in some 31,510 hectares of land, built capacity of village institutions across the state and establish MBDA as a Centre for Excellence in NRM. The project emphasises on gender balance as such it suggests all NRM plans has women's priorities in it. The project has Social and Environmental Safeguard Policies in place. The RF ensures compliances on the same.

CHAPTER 1 – INTRODUCTION

1.1 Meghalaya

On 30 December 1971, the Parliament passed the North Eastern Area (Reorganization) act 1971, conferring full Statehood to Meghalaya. Thus, Meghalaya emerged as a full-fledged state within the Union of India on 21st January 1972 carved out of the erstwhile United Khasi and Jaintia Hills and Garo Hills District of Assam. The State has an area of 22,489 sq. kms and is located between 20 degree 1' and 26 degree 5' North latitudes and 85 degree 49' and 92 degree 52' East latitudes. The altitude varies from 30 meters to 1900 meters above mean sea level (MSL). It has predominantly hilly terrain with foothills as plain and flood prone areas. It is bounded by the Brahmaputra valley of Assam in the North and Northwest and Cachar area of Assam in the East; the Surma Valley (Bangladesh) borders it in the South and partly in the South West. It has about 426 Kms of International border with Bangladesh.

In order to accelerate the pace of development and bring administration closer to the people, the State has now been reorganized into eleven districts and four sub-divisions. The State has 40 Community and Rural Development Blocks. The total number of villages in the state as per Census 2011 is 6,461 with 5,33,299 total households.

The population of Meghalaya is predominantly tribal. The main tribes are Khasi, Jaintia and Garo, besides plain tribes such as Koch, Rabha, Bodo, and Hajong. The Khasi (Khasi, Jaintia, Bhoi, War also collectively called, as the 'Hynniewtrep') predominantly inhabit the districts of East and Central Meghalaya. The Western part of the State, the Garo Hills, is predominantly inhabited by the Garo also called 'A'chik'.

The Rural population that largely depends on agriculture and manual casual labour as a source of livelihood accounts for 79.93 percent of the population of the State. Poverty level in Meghalaya varies from very high to moderate when compared from district to district

and block to block. On an average 48.9 percent of population in Meghalaya are below poverty line[1].

On the economic front, development in Meghalaya has lagged behind from the rest of India with a very low per capita income as compared to the national average. The growth that has taken place in recent years has largely been due to the growth in the government sector and ancillary trade and service sectors. This has benefited the urban areas whilst the rural population has remained largely untouched, widening the gap between urban and rural incomes. Meghalaya is a case of poverty in the midst of plenty. Other factors contributing to low development include the lack of commercial orientation of the indigenous entrepreneurship within tribal communities.

Meghalaya is basically an agricultural state with a majority of its population depending entirely on agriculture for their livelihood. Nearly 10 percent of the geographical area of Meghalaya is under cultivation. Agriculture in the state is characterized by limited use of modern techniques and low productivity. A substantial portion of the cultivated area is under the traditional shifting agriculture known locally as "Jhum" cultivation. As a result, despite the vast majority of the population being engaged in agriculture, the contribution of agricultural production to the state's GDP is low, and most of the population engaged in agriculture remains poor. Moreover, the state is still dependent upon imports from other states for most food items such as meat, eggs, food grains etc.

Climatic conditions in Meghalaya permit cultivation of large variety of horticulture crops including fruits, vegetables, flowers, spices and medicinal plants. The important fruits grown include citrus fruits, pineapples, papayas, bananas etc. The 'mandarin oranges' grown in Meghalaya are of very high quality. In addition to this, a large variety of vegetables are grown in the state, including cauliflower, cabbages and radish. Areca nut plantations can be seen all over the state, especially in the Garo hills region. Other plantation crops like tea,

[1] Meghalaya Human Development Report 2008

coffee and cashews have been introduced lately and are becoming popular. A large variety of spices, flowers, medicinal plants and mushrooms are grown in the state.

Meghalaya is considered to have a rich base of natural resources. These include minerals such as coal, limestone, Sillimanite, Kaolin and granite among others. Meghalaya has a large forest cover, rich biodiversity and numerous water bodies. Meghalaya has much natural beauty, and the state government has been trying to exploit this for development and promoting tourism.

The degradation of land and water in Meghalaya, which is likely to be further exacerbated by climate change, needs to be addressed to sustain the benefits of natural resource-based growth. In 2011–2012, about 22 percent of the state's area was under degradation, primarily because of loss of vegetation cover (19.4 percent) and erosion (2.4 percent). Given the hilly terrain, loss of top soil makes valleys unsuitable for cultivation and increases incidences of landslides and floods. Despite receiving the highest rainfall in the world, several towns in Meghalaya now face water shortage. The state has around 60,000 natural springs which provide drinking water for 80 percent of the population. However, over 54 percent of these springs have either dried or their water discharge has reduced by more than half. A state-wide climate vulnerability analysis[2] for the period ending in 2050 indicates an increase in water and agricultural vulnerability in parts of the state due to high variability of projected rainfall. Eastern parts of the state are projected to see an increase of about 3 percent and western parts, an increase of about 18 percent.

Meghalaya has a unique community-based natural resource management (NRM) system. Distinct from the rest of India, where the states are responsible for the protection and management of forests, nearly 90 percent of the forests in Meghalaya are managed under customary law by the Khasi, the Garo, and the Jaintia tribes, the majority population of the state. Their elaborate system of use-based classification of their lands has been in practice

2. Ravindranath et. al. (2011): Climate Change vulnerability profiles for North East India, Current Science, Vol. 101, No.3, 10 Aug 2011 pp. 384-394

for centuries. The national and the state forest laws do not formally recognize this form of community management. These forests are designated as 'unclassified forests' in the state records and for the most part do not receive technical or financial support from state institutions. There are no water related institutions or legal frameworks for water management in the state. Water bodies, rivers, and springs are considered common property like forests and are managed by traditional tribal institutions.

The Government recognizes the importance of integrated planning and natural resource sustainability for economic development. The Department of Planning, Government of Meghalaya (GoM) through the Meghalaya Basin Development Authority (MBDA), leads an ambitious program, the 'Integrated Basin Development and Livelihood Promotion Program (IBDLP)' which focuses on poverty alleviation, employment generation, and livelihood promotion. It has nine focal areas in agriculture, water, and NRM; and aims to bring new knowledge and skills to empower communities to make the best use of their natural resources through the value chain. The state has also recognized that its geo-environmental context, being in the eastern Himalayan region in the Brahmaputra - Meghna river systems, makes it vulnerable to climate induced water hazards such as floods, landslides and water scarcity. The GoM has also started shifting the emphasis from single sector programs toward integrated community-led natural resources management with community-level planning and approval at the village level and convergence of funding streams at the district level. The MBDA-steered IBDLP, is an opportunity to transform the way the state and communities manage natural resources.

1.2 Project Background

Meghalaya as a state, is undergoing serious problem of degradation of natural resources – forest, land and water due to impacts of anthropogenic and climate change over years. As the majority of Meghalaya's population is dependent on these natural resources for their primary income and livelihoods, the degradation of the natural resources in the State is a major cause of concern for all stakeholders.

The World Bank supported '**Community – Led Landscape Management Project** (CLLMP) aims to strengthen community-led natural resource management based on a landscape approach in Meghalaya. Meghalaya Basin Management Agency (MBMA) is implementing the Project over a period of 5 years from 2018 to 2023. During the project tenure, communities and related institutions, including relevant line departments of the Government of Meghalaya, will be systematically strengthened for improved governance, livelihood promotion and village development through effective natural resource management in the state.

The Project will be implemented in approximately 400 villages using a decentralized and participatory approach, with financial autonomy to the PRIs i.e. the Village Council (Dorbar, Nokma, Doloi) and a Village Natural Resources Management Committee (VNRMC) that will be constituted to support the planning and implementation of NRM interventions. There will be a strong focus on institution-building at the village-level, by ensuring systematic capacity-building on technical, managerial and social development skills, including, but not restricted to resource mapping and data collection, land use planning, project design and monitoring. The Project will also extend such training to communities beyond the targeted project villages and support efforts made by them to access funding from various rural and natural resource initiatives and schemes. Through these processes, the project would ensure convergence of various centrally and State Sponsored Programs to improve the efficiency of public spending on environmental protection.

The Project will also invest in improving the process and outcome delivery, by developing effective systems at the village, district and state levels to achieve the project's development objectives. The outputs include knowledge management, information technology systems, financial management, procurement management, citizens' engagement, conflict resolution, grievance redress and monitoring and evaluation through social audits at the community level.

CHAPTER 2 - PURPOSE, SCOPE & METHODOLOGY

2.1 The Purpose

A good Baseline Survey is crucial for measuring the outcomes and impact of the Project. The progress on the implementation of a program or project at regular intervals can be carried out in the desired manner only if the benchmarking is done properly at this stage.

a) This baseline study is undertaken to obtain knowledge and set a benchmark of the current status of subject matter (NRM) to be addressed by the project. The baseline report also covers other critical issues that the project seeks to address through targeted interventions in the project villages and for the communities living in those villages.
b) The purpose of the baseline study is to establish baseline information for the monitoring of result indicators as per the agreed Results Framework for the MCLLMP over the project period.

2.2 The Scope

The broad scope of the study is as follows:

a) To establish baseline data on land use and land cover of project villages.
b) To establish baseline data on availability of natural resources in the village.
c) To make assessment on the intensity of degradation of natural resources.
d) To make assessment on the use of water bodies by the community.
e) To make a comparative assessment between three regions on the status of natural resources.

2.3 The Methodology

2.3.1 Village Selection, Project Orientation and Interactive Discussions

Prior to data collection the surveyed villages were selected based on criteria provided by NESAC, where 1931 villages were identified as those having highly degraded and degraded landscapes. The surveyed villages were chosen from the list of *'most critical*' and '*moderately critical'* landscape villages, with not less than 60 households who agreed to sign

agreement to implement the project and from among the villages not covered under Meghalaya Livelihood and Access to Market Project (Megh-LAMP). On doing this, the project orientation programme was conducted in every village. The nature of the project, its objectives, expected outcomes, establishment of implementing agency at the village level, etc., were discussed and agreed upon with the community.

2.3.2 Participatory Rural Appraisal

Participatory Rural Appraisal was used for collecting information on village resources. The techniques used include transect walks, maps, seasonal calendars and diagrams by using locally available materials. Mapping was done to depict infrastructures, natural resources, land ownership, settlement pattern, soil types, cropping pattern, etc. These tools were used to facilitate planning of village natural resource management plans in all the surveyed villages. Each exercise was conducted adapting to the local situation for achieving specific purpose and outcome.

2.3.3 Data Sources

This baseline report is prepared from primary data collected from the field by district project officials, using a set of questionnaires. The Baseline Survey Format was developed jointly by the State Project Management Unit (SPMU) and the World Bank (WB). Data collected contains information pertaining to households and the village as a whole and not on individuals as the project target is the community and the natural resources. The data collected are on the matter relating to the demography, major occupation of households, sources of fuel, village resources and information pertaining to degradation of natural resources in a village. Geographic Information System (GIS) was used using Google Earth Pro to create the village boundary with the support of villagers and taking GIS data on important parameters such as settlement area, water bodies, forests cover, agricultural land, barren land, grassland, culturable wasteland, etc of the village boundary. Very limited secondary data was used in preparing this report. Data collection and report writing was carried out in January and February 2020.

2.3.4 Sampling

Table no.2.1 Sampling

DISTRIC	BLOCKS			VILLAGES		
	State	Project	Baseline	State	Project	Baseline
South West Garo Hills	2	2	2	495	50	5
West Garo Hills	6	5	3	1082	42	4
East Garo Hills	3	3	2	492	30	3
North Garo Hills	2	2	1	566	20	7
South Garo Hills	4	4	3	744	20	5
Ri Bhoi	4	4	4	579	23	8
West Khasi Hills	4	3	3	779	25	4
South West Khasi Hills	2	2	1	314	40	4
East Khasi Hills	8	7	5	912	100	15
East Jaintia Hills	2	2	2	192	25	11
West Jaintia Hills	3	2	1	306	25	5
TOTAL	**40**	**36**	**27**	**6461**	**400**	**71**

For the purpose of the study 71 villages were selected through random sampling in three regions of the State i.e. Garo, Khasi and Jaintia. From the Garo region 24 villages (34%) with 2872 households were selected, from the Khasi region 31 villages (44%) with 4930 households were selected and from the Jaintia region 16 villages (23%) with 3888 households were selected. The total population in all the 71 villages is 64783. Average number of households per village is 165nos with average population of 912 individuals per village as shown in table no.2.1

2.3.5 Data Analysis

Rigorous data verification, authentication and filtration were carried out to ensure correct information. The collected data was compiled in excel sheet for creating tables and figures for analysis. All data were arranged region wise and analysis done region wise as these three regions have distinctive features both in terms of geographic locations, topography/terrain and distinctive social characteristics. Comparative analysis was carried on the nature and availability of natural resources and its usage by the inhabitants.

Comparative assessment was also carried out on the extent of natural resource degradation and its major causes for all the three regions.

2.3.6 Limitations

a) The baseline study report is limited to the second component of the project, 'availability of natural resources and its present management status', and does not include report on the first component, i.e., people's or institutional capacity to manage NRM.

b) Data collection was carried out as per template meant for preparation of community NRM plans. Information collected were data available and not through reports of interviews or discussions as normally done in the carrying out any baseline studies.

c) The data was collected by officials from the districts who were not trained in data collection for the research. As such there were many data fields that were not filled and or wrongly filled. Several mails and number of phone calls had to be made to do data verification / authentication and filtration which were time consuming.

d) In taking GIS information the challenge of getting high resolution pictures were faced, due to poor infrastructure and availability of appropriate imagery, resulted a higher margin of error.

e) With very limited time available to carry out the baseline study, i.e. just 2 months time (7 weeks for data collection, collation, data authentication/filtration and just few weeks for report writing), made the effort a daunting task.

f) The Tata Institute of Social Science (TISS) Guwahati Campus was engaged for the study however, the work and deliverables were delayed and the final product needed considerable strengthening. As such the World Bank and MBMA team filled the gaps taking cognisance of the stage that the Project has reached. The team used CNRMP data which lacked the use of appropriate questionnaires as per the purpose and scope of the study. The study team was unable to carry out interviews, group discussions and actual data collection for the said purpose. Desk reviews were also constraint for time.

CHAPTER 3 - RESULTS AND FINDINGS

3.1 Demographic Profile

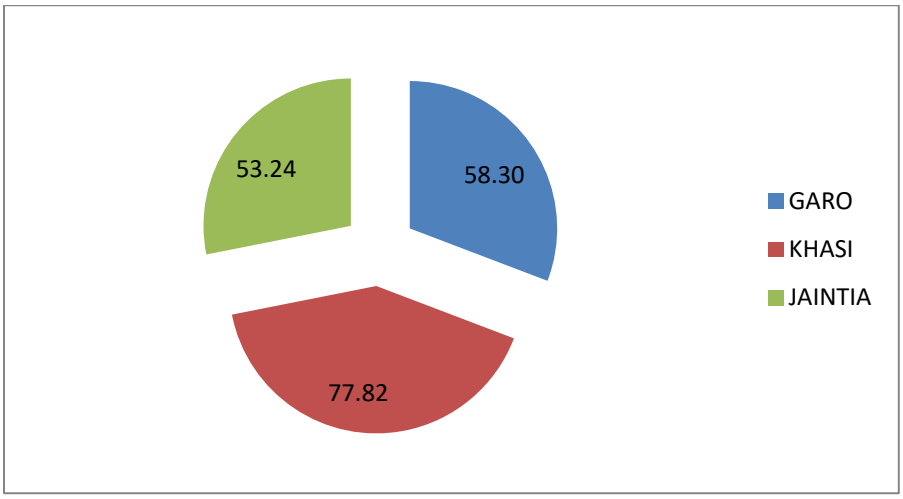
Table No.3.1 presents that the study was carried out in 71 villages with total number of 11,690 Households (HH) and population of 64,783. Highest density of population is found in Jaintia region (229 per Km2) followed by Khasi Region (129 per Km2) and Garo region (85 per Km2). With regard to sex ratio, it was found that the regions of Garo Hills and Jaintia Hills has higher female population than male with sex ratio of 1037 and 1090 females per 1000 males respectively. The Khasi Hills has lesser females than male with sex ratio of 969 females per 1000 males.

Table No.3.1 Population Density & Sex Ratio

REGION	Village	Area (Sq.km)	Households	Population	Dp per Km2	Sex Ratio
GARO	24	193.3	2872	16424	85	1037
KHASI	31	193.4	4930	23938	124	969
JAINTIA	16	106.5	3888	24421	229	1090
TOTAL	**71**	**493.2**	**11690**	**64783**	**131**	**1032**

The literacy rate was highest in Khasi region (77.82%) followed by Garo (58.30%) and Jaintia region (53.24%) as shown in Figure 3.1 below.

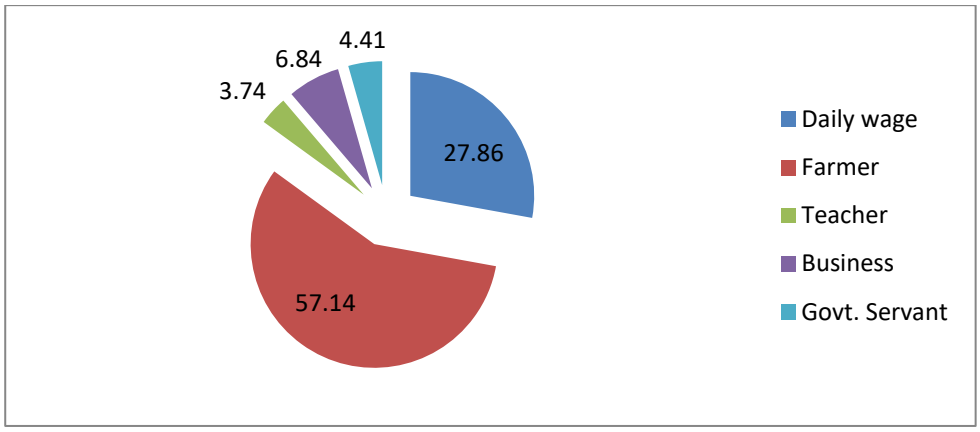
Figure 3.1 Literacy Rate



3.2 Major Occupation

Rural population in Meghalaya is 79.93 percent with bare minimum facilities. Poverty level in Meghalaya varies from very high to moderate when compared from districts to districts and blocks to blocks. On an average 48.9 percent of population in Meghalaya are below poverty line[3].

Figure 3.2 Major Occupations of Households in Percentage



In the study area, people are engaged in various occupations to manage their livelihood. Of total 11,690 households in 71 villages, 57.14 percent (6680hh) families are farmers, with average agri-horticultural and jhum land holding size of 0.34 hectares of land. Average annual income of farmers in Meghalaya, from agricultural activities is just Rs. 52,956[4]. It was found that 27.86 percent (3257hh) families major occupation is to get engage themselves as daily wage laborers (primarily agricultural activities) who earn around Rs.281.47 per person per day (rate under MGNREGA). Average annual income of unskilled labourers in Meghalaya is around Rs.48,360/-. The other major occupations are:

a) Families engaged in petty business (6.84% or 800hh),
b) Govt. job holders account for 4.41 percent or 516hh and
c) Only 3.74 percent (437hh) are employed as teachers.

[3] Meghalaya Human Development Report 2008
[4] Strategy Document on Doubling Farmers Income in Meghalaya by 2022 – ICAR – Umiam, Shillong

It is evident from figure 3.2 above that most (57 percent plus) of the households are marginal farmers, as such they have to find alternative sources of livelihood. It is observed that in Khasi region people are more into business and government jobs followed by families in Jaintia region as against the people in Garo hills region. This difference could be attributed to various factors like policies, governance, education, health, infrastructure, availability of resource and its use. In Khasi region literacy rate is the highest (77.82%) followed by Garo region with 58.30 percent and it was lowest in Jaintia hills with 53.24 percent. The other factor that can be attributed to this cause is the variances in landscape in the regions and its vegetation coverage. The terrain in Khasi and Jaintia region is more challenging as compared to Garo region in undertaking agricultural activities.

3.3 Fuel Use

The rural population in Meghalaya relies heavily on fuel wood, twigs, charcoal, etc. for meeting their fuel requirement. As per the results of baseline study conducted by the project it was found that 90 percent of households continue to depend on firewood as their main source of household fuel. Despite several efforts made by the central and state governments, just 21.46 percent of households use LPG for cooking. It was observed that though production of charcoal is one of the major causes of deforestation[5], only 2.40 percent household use charcoal as fuel for domestic purpose.

Table 3.3 Sources of Fuel (no.hh)

Region	Charcoal	Biomass	Wood	LPG	Total HH
Garo	0	0	2814	355	**11690**
Khasi	42	12	4281	807	
Jaintia	292	0	3468	1819	
Total	**334**	**12**	**10563**	**2981**	
Percentage	***2.86***	***0.10***	***90.36***	***25.50***	***100***

First of all it needs to be noted that most of the rural households use not just one source as fuel but multiple sources. From table 3.3 above it can be inferred that 90 percent of

[5] 'Identification of Drivers of Deforestation' in Meghalaya, by Rain Forest Research Institute, Jorhat, Assam

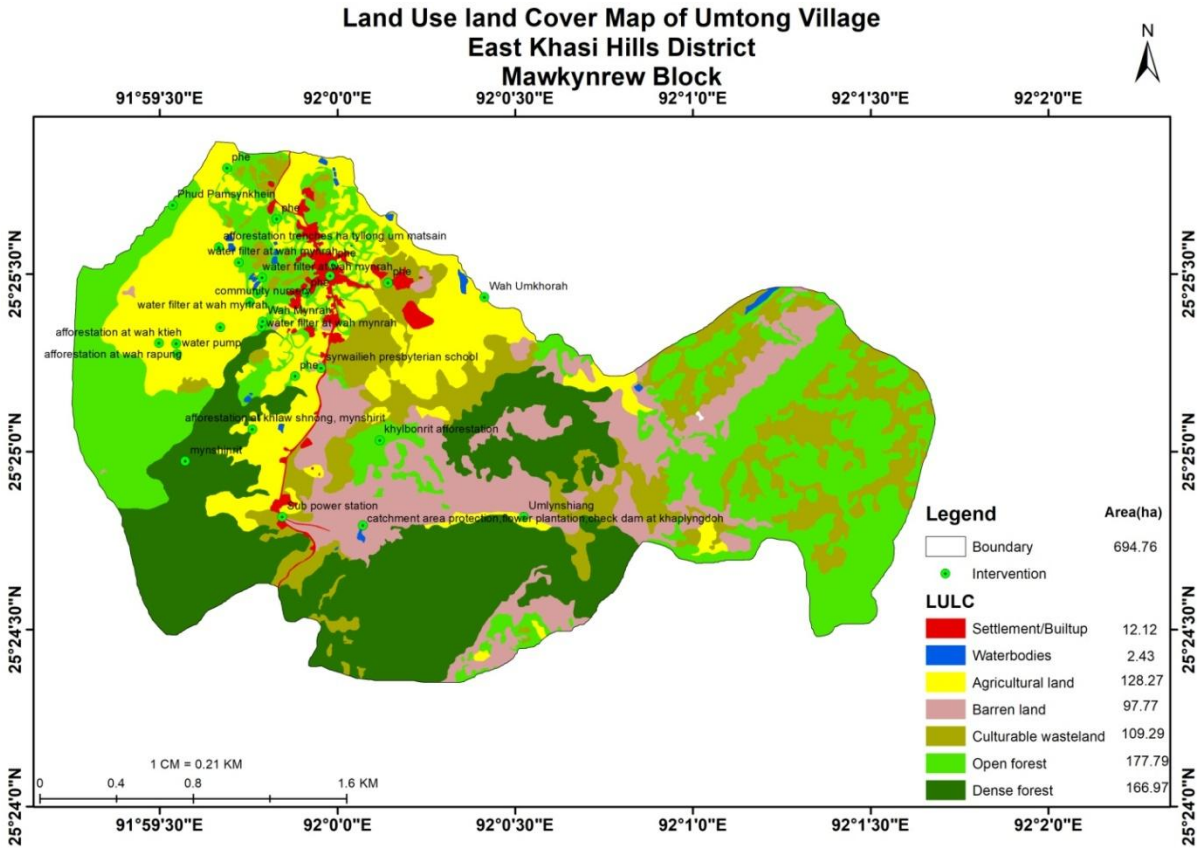
households use wood as fuel for cooking, heating, etc. Charcoal is also classified a wood as it is obtained from wood. Use of wood as fuel is found mostly in Khasi hills region followed by Jaintia and Garo regions. Families in Jaintia region use charcoal as fuel to the maximum. The massive use of charcoal in Jaintia hills is also evident from the fact that there is maximum unplanned deforestation (56.61%), as against 27.36 percent in Khasi and 16.03 percent in Garo hills regions. The high percentage usage of charcoal as a source of fuel could be linked to unscientific mining in the region that has destroyed large tracts of forest cover which is used for charcoal making used for commercial purpose especially in Ferro Alloy factories.

Table no.3.3 also indicates that the use of LPG is highest in Jaintia hills followed by Khasi hills and limited use of LPG is found to be in Garo hills. One of the major reasons why LPG is not used is because of the fact that villagers have to travel long distances to re-fill the cylinders. Also while the 1st cylinder was provided free of cost by the government to BPL families, the next cylinder had to be paid for. Other reasons for not using LPG can be associated with easy availability of fuel woods. It must be noted that villagers also use kerosene, electricity, etc., for cooking purpose; the data of the same was not captured in this study. It must be noted that rural people in Meghalaya are yet to increase the use biomass such as dung cake, biomass briquettes, bio-gas, etc. despite the fact that Meghalaya has constituted the 'Meghalaya New and Renewable Energy Development Agency' (MNREDA) in 1987 to identify, formulate and implement demonstration, experiment, promote projects and programs, related to Non-Conventional and Renewable Sources of Energy such as solar energy, wind energy, bio-energy, energy from waste bio-fuel energy, small micro hydel power stations etc. Our study shows that only 12 families from two villages in West and South West Khasi hills districts use biomass as additional fuel source.

3.4 LAND USE LAND COVER (LULC)

The study used GIS technology to measure and find out the land use pattern in 71 project villages. We have taken 10 parameters for the purpose as suggested by Forest Survey of India (FSI). It must be mentioned that the KML (Key Mark Language) village boundaries are created by using Google Earth Pro by the project team with the support of village elders or village NRM committees under MCLLM project. As such these village boundaries are not political or administrative demarcation and should not result into controversy on village boundary demarcation between villages. The village boundaries are created solely for implementation of CLLMP and not to be used by any individual or organization without due permission from the competent authority.

Figure 3.3 Sample GIS Map



Rural Meghalaya has low density of population than in the urban settlement as in other states in the country. Our findings show that just 1016.49 hectares (2.06%) of land is being used for settlement purpose in 71 villages. This means per village average of 14.32 hectares of land is being used for settlement purpose with average size of 165 households per village. It was found that the average land size per village is around 695 hectares.

Figure 3.4 Land Use Land Cover in Project Villages (in %)

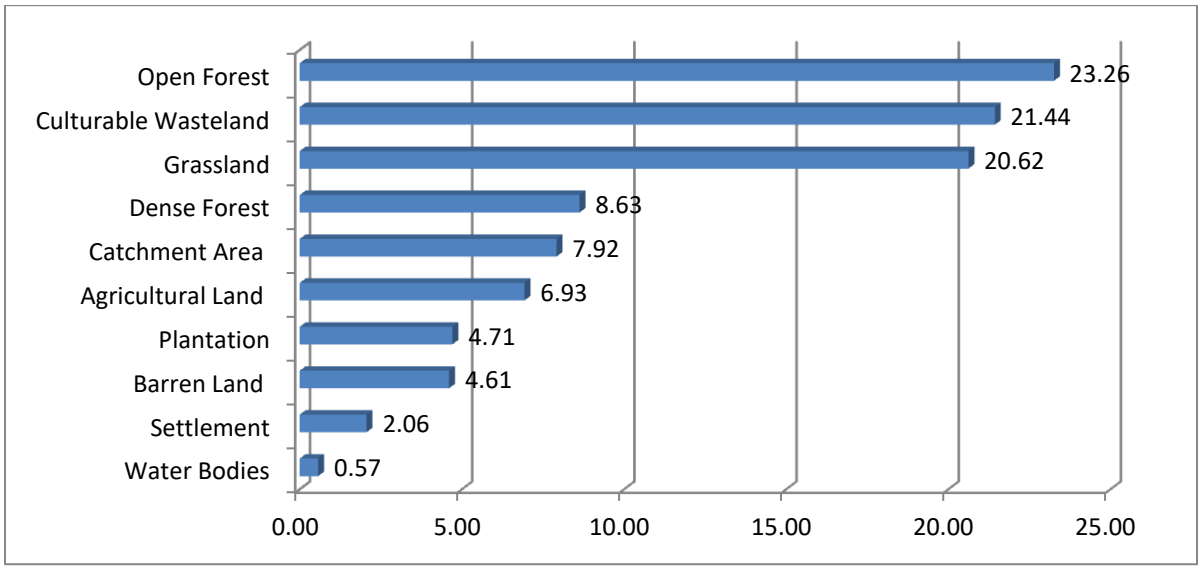


Figure 3.4 shows that total geographical area in 71 villages is 49,330.34 hectares of land out of which, 65.32 percent (32222ha) of land are under the category of open forest (3747ha), culturable wasteland (1369ha) and grassland (9166ha). Dense forests is limited to just 8.63 percent (4256.51ha) of total land availability. **The above findings clearly indicate that dense forests are turning out to be open forests, wasteland and grassland, a clear indication of increased deforestation and degradation in natural resources and biodiversity.**

3.4.1 Open and Dense Forests

The study indicates that there is 11474 hectares of land with open forest. Khasi hills region has maximum open forest (4975ha) followed by Garo region (3747ha) and Jaintia region

(2752ha). Dense or very dense forests are found to be in just 4257 hectares of land (8.63%) in 71 villages. Dense forests are found in Khasi hills region (2418ha) followed by Garo Region (1003ha) and Jaintia region (836ha). It may be noted that very dense forest (VDF) are forest with more than 70 percent canopy density, moderately dense forests (MDF) are forest with canopy density between 40 percent and 70 percent and open forests (OF) are forest with canopy density between 10 percent and 40 percent.

3.4.2 Culturable Wasteland

Culturable Wasteland includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings.

Culturable waste land is found to be the second largest area of land measuring around 10575 hectares in 71 villages. It is more prevalent in Jaintia hills region (5152ha) followed by Khasi hills region (4053ha) and Garo hills region (1369ha). The study reveals that maximum land under cultivation is found in Garo hills region followed by Jaintia and Khasi hills regions, despite the fact there is more wasteland for cultivation in the latter. In these two regions, income is derived from other sources of income such as coal and limestone mining, stone and sand quarrying, etc. The study also shows that these two regions are affected the most (land, water & forest) due to heavy mining activities, making the waste land unfit for cultivation. Again, it correlates the uses of water bodies which are minimal in Jaintia and Khasi regions, leading to less agricultural activities as compared to Garo hills region.

3.4.3 Grassland

The third highest land cover is found to be grasslands (10173ha), mostly found in Garo region (9166ha), followed by Khasi (629ha) and Jaintia hills region (378ha). The raw data collected shows that only one village in South West Garo Hills and just three villages in West

Garo Hills have grasslands. Grassland is defined as natural vegetation composed mainly by the members of Gramineae family of plants that are grazed by livestock.

3.4.4 Watershed / Catchment Area

Catchment area is the area of land from which water flows into a river, lake, or a reservoir. A catchment is an area where water is collected by the natural landscape. In a catchment, all rain and run-off water eventually flows to a creek, river, lake or ocean, or into the groundwater system. In hilly terrain like Meghalaya with over 6000 streams and rivers, catchments areas are of prime importance for preventing environmental degradation. Our study in 71 villages has around 49330 hectares of watershed or catchment area.

3.4.5 Agricultural Land

The study indicates that there are around 3420 hectares of agricultural/cultivated land in the surveyed villages, of which maximum land is available in Khasi hills (1779ha) followed by Garo hills (922ha) and Jaintia hills (719ha). Our study also shows that maximum families (57.14%) major occupation is agriculture (Figure 3.4). These figures mean that on an average, one village has an average of just 48 hectare of agricultural land and just 0.29 hectares per family. It is due such facts that the poverty level in rural Meghalaya is high although state report presents the average poverty level to be 48.9 percent (Meghalaya Human Development Report 2008). The Socio-Economic and Caste Census (SECC) also revealed that only 26 percent of the State's population own land and the rest 74 percent are landless. Through various interactions it was revealed that the actual cultivators were not owners but had taken the land on lease to pursue their livelihood as farmers.

In the State level context, 51.14 percent of households are engaged in agricultural activities as their major source of livelihood, the total land available for agriculture is just 6.93 percent, which is calculated at around 0.34 hectare of land per family. The net sown area is only 9 per cent in Meghalaya, which is not only significantly lower than the country average

which is 46 percent but also much lower than the North-Eastern Region as a whole (17%). Similarly area sown more than once is much lower than some of the other hill states such as Manipur and Arunachal, although it is far higher than in Nagaland. This suggests the severity of the impact of *Jhum* cultivation in Meghalaya[6]. The ICAR document on doubling farmers income by 2022, suggests that Jhum cultivation is the main cause of land degradation. However, our survey report from 71 villages suggests that it is the severity of the soil erosion, deforestation and the impact of mining that has degraded the land and water bodies leading towards reduction in taking up agricultural activities, leading towards reduction of healthy drinking water for humans and animals and leading towards reduction of water sources for irrigational purposes.

3.4.6 Plantation

Despite the fact that the surveyed villages have huge wasteland area (10575ha), land under plantation is just 2321.98 hectare. Plantation are found mostly in Garo hills region (65.79%, i.e., 1527.68ha). There is shift in cultivation from Jhum to cash crop cultivation in Garo hills region. Rubber, arecanut, broom grass, cashew, orange, etc. are some of the major plantations in the region. Plantation activities are limited (28.50%, i.e., 661.81ha) in Khasi hills region and just 5.71 percent or 132.49 hectare of land in Jaintia hills region. In Khasi hills region only Ri Bhoi district has some plantation. GIS data shows no plantation area or activities in East Khasi, West and South West Khasi hills districts of Meghalaya.

3.4.7 Barren Land

It can be inferred that there is just 2272.06 hectares (4.61%) of barren land in the surveyed villages. Barren land is those ecosystems in which less than one third of the area has vegetation or other cover. In general, barren land has thin soil, sand or rocks. Barren land can be defined as that land where there is no productive human activity has taken place.

[6] State Document on Doubling Farmers Income in Meghalaya by 2022, ICAR – Umiam, Shillong

3.4.8 Water Bodies

Meghalaya, popularly known for its scenic beauty with its numerous meandering streams, cascading waterfalls and natural springs, is one of the most rain-drenched places in the world, but providing safe drinking water for all is still a major challenge. The State is yet to realize and fully develop the true potential of the abundant water resources for overall development of its people. The government of Meghalaya has come up with Water Mission and Water Policy (first state in the country), implementing the Integrated Water Resources Management Programme (IWRMP) through the Department of Water Resources to ensure providing safe and adequate access to water for all by the time the state celebrates 50 years of statehood in the year 2022[7]. Despite these initiatives by the government, our findings shows that 301(43%) out of 706 number of water bodies are polluted, adversely affecting 11690 households in our project villages. Many villages have to purchase water for domestic and other purpose.

3.5 VILLAGE RESOURCES

3.5.1 FORESTS: Forest Types

With forest occupying more than 70 percent of total geographical area of the state and 80 percent rural population living in villages, depending largely on natural and forest products; plantation/ afforestation activities becomes crucial not just to nurture the prime natural resources but also to maintain biodiversity, ecological balance and ensure sustainable development. Government of Meghalaya through its Forest Mission is making several attempts in improving forest coverage in the state. The Meghalaya Community Led Landscape Management Project (CLLMP) is another effort to this end. The State ranks in 4th position in terms of percentage of forest cover in the country. However, due to prevailing land tenure system, only 1145.19 sq km of forest areas (5.10 % of Geographical area) comes directly under the control of the State Forest Department and rest of the forest areas belong to communities, clan and private people and District Councils.

[7] In Conversation with People of Meghalaya – Water Mission, Vol. 5, May 2014

Table 3.4 Forest Cover (ha)

Region	Community Forest	Private forest	Clan forest	Protected/ Sacred Grove	Total
Garo	367.91	2.32	0	23	**393.23**
Khasi	2,420.64	2,673.22	27.78	302.37	**5,424.01**
Jaintia	1,750.00	1,659.07	130	28.76	**3,567.83**
Total (Ha)	**4,538.55**	**4,334.61**	**157.78**	**354.13**	**9,385.07**
Percentage	***48.36***	***46.19***	***1.68***	***3.77***	***100***

Our findings in 71 villages shows that community forest (48.36%) and private forests (46.19%) has maximum coverage i.e., around 8873 hectares, as compared to clan and protected forests. The data shows that Garo hills region have limited community as well as private forests as compared to Khasi and Jaintia regions. It is observed that community forests are slowly getting converted to private forest, as also confirmed by respondents during data collection. Protected or Sacred Forest are found mostly in Khasi hills region.

3.5.2 Community Forest

Table 3.4 pertaining to forest cover reveals that, 4539 hectares of land is under community forest that is more prevalent in Khasi region (2421ha) followed by Jaintia (1750ha) and Garo (368ha) hills regions. Community forests are those forests which are owned and managed by the community such as village forest or '*Law Shnong* or *'Law Adong'* (in Khasi Language). Management of these forests varies from village to village wherein the community has specified access and privileges to these forests ranging from collection of NTFP, timber for domestic use, etc. In recent years, due to stringent Wildlife Protection Act, 1972 (Amendment 2002) the villages have curbed hunting in these community forests. However barring a few, most of the community forests are in different level of deforestation, due to various anthropogenic factors.

3.5.3 Private Forest

Similarly, private lands are found more in Khasi region (2673ha) followed by Jaintia (1659ha) and Garo (2.32ha) regions. Private forests or *'Law Kynti* are those forests which are owned

and managed by a particular individual or households wherein the owners have full rights to these forests. Most of these forests also suffer from high levels of deforestation mainly due to intensive logging operations (prior to the Supreme Court ban on timber logging, 1996) and later on due to charcoal making and illegal logging.

3.5.4 Clan Forest

No clan forests were found in Garo region however it is popular in Jaintia region (130ha) followed by Khasi region with 28 hectares. Clan forests or *'Law Kur'* as the name suggest are owned and managed by a particular clan. The management of these forests differs from clan to clan and from region to region.

3.5.5 Protected or Sacred Grove

Preservation and conservation of sacred forest is unique to the state of Meghalaya. There are 125 sacred groves in Meghalaya. Sacred forest or *'Law Kyntang* or '*Law Lyngdoh* are those forests which are preserved for performing traditional rituals by the indigenous faith in the state of Meghalaya. In these forests owing to the beliefs systems and satisfaction amongst the Khasi, it is a taboo to desecrate the forest. Both flora and fauna flourish in these forests and they are rich in biodiversity. These forests have much forest cover as compared to the other three types of forest in Meghalaya. Among all the three regions, Khasi region is more popular in preserving forests as sacred forest. This region has 302.37 hectares of land covered by sacred forest followed by Jaintia (29ha) and Garo region 23 hectares of land.

3.6 WATER BODIES

As far as water is concerned Meghalaya is generously endowed with water. Ironically out of 9326 habitations only 5041 are fully covered for drinking water supply at 40 litter per capita daily (LPCD) and remaining 4285 partially covered habitations yet to be covered with drinking water supply. Similarly, merely 25 percent of the cropped areas in the state are

covered under irrigation, while remaining 75 percent are still under rain fed cultivation. Water supply to habitants for their livestock remains almost un-organised in the state.

The major consumptive uses of water in Meghalaya are irrigation and household and industrial water supply, with irrigation being the main consumer. Annual domestic and industrial water requirements up to year 2025 are estimated as 0.096 billion cubic meters as per census 2001, and 1.014 billion cubic meters of ground water can be utilised for irrigation[8]. According to the Central Ground Water Board, 18 percent of the available groundwater is currently being utilised and there is thus ample potential for further increasing the exploitation of ground water. However, ground water stress is building up in urban areas due to water extraction for domestic purposes[9].

Table 3.5 Water Bodies

Region	Springs	Natural Ponds	Lakes	Streams	Rivers	Total
Garo	77	0	0	108	14	**199**
Khasi	193	6	1	90	32	**322**
Jaintia	86	49	1	27	22	**185**
Total	**356**	**55**	**2**	**225**	**68**	**706**

Types of springs, streams and rivers in Meghalaya

Meghalaya has depression springs, contract spring, fracture spring and karzts spring. The type of river and stream in Meghalaya are both lotic and lentic which is perennial and rarely seasonal. The reason of getting dried and its degradation could be due to human activity, deforestation, climate change and less of interventions to ensure high discharge the aquifers.

The findings from 71 project villages shows that Khasi hills regions has maximum (322) number of water bodies, followed by Garo hills (199nos) and Jaintia hills (185nos). All respondents (people from 71 villages) responded that springs are used for domestic

[8] Central Ground Water Board: Aquifer Systems of Meghalaya, 2012
[9] In Conversation with People of Meghalaya – Water Mission – Vol. 5, May 2014

purposes such as drinking, cooking, heating, washing, cleaning, etc. whereas only 21 villages (29.58%) use springs for irrigational purpose. Natural lakes and ponds are limited in number. Just one village (Muthlongrim) in West Jaintia Hills reported that the village has six ponds and one lake that are being used for irrigational purpose. While Jaintia hills have highest number of natural ponds, villages in Garo hills recorded with no natural ponds and lakes. There are 68 rivers in 71 villages that are used mostly for irrigational purpose and some for domestic purposes.

3.7 POLLUTION AND USE OF WATER BODIES

In Meghalaya water pollution is mainly due to solid and liquid wastes, mainly anthropogenic waste, hospital waste, automobile wastes and mining activities including coal and limestone mining and sand stone quarrelling.

These wastes come directly from household, market place, settlement in and around the rivers and streams. This point source of pollution when it is connected to the confluence of the stream and river without any proper treatment impairs the water quality into many different factors: The pH value is considered as the life of the water ecosystem which supports the healthy environment of the fresh water. Due to increase of population and indiscriminate dumping of solid and liquid waste it become alkaline in anthropogenic waste, hospital waste, automobile waste which is above the permissible limit of (WHO) and acidic in coal mining activity and fall drastically below the permissible limit.

The Dissolved Oxygen (DO) which supplies oxygen for the phytoplankton, zooplankton and aquatic ecosystem reported less than 3mg/Litre which is below the permissible limit of 8 mg/L according to World Health Organisation (WHO). Biological Oxygen Demand (BOD) is the main indicator of water pollution which is reported extremely high at the anthropogenic waste due to high demand of micro-organism present in the organic and inorganic waste for decomposition of the waste present in the water bodies and in return it release carbon dioxide.

Table 3.6 Water body Pollution and its Use

Water Source	Total (no)	Polluted (no)	Not Polluted (no)	Domestic use (hh)	Irrigation (hh)
Springs	356	213	143	71 (100%)	20 (28%)
Streams	225	75	150	62 (87%)	53 (75%)
Rivers	68	13	55	14 (20%)	29 (41%)
Ponds	57	0	57	1 (1%)	1(1%)
Total	**706**	**301 (43%)**	**405 (57%)**		

As mentioned above the study shows that there are 706 number of water bodies in 71 villages of which 301 (43%) are found to be polluted. Having studied and reported above, water body pollution has adversely affected 11690 households with 64783 populations; reduced the expansion of agricultural land and crop production and consequently their income level. The people in these villages are using only 57 percent of the available water bodies. Springs are used for domestic purpose in all villages, indeed springs are the main source for drinking, cooking and washing. The pollution level indicates big threat to this basic need '***the-life-gift of nature'***. Streams, rivers and ponds are also used for domestic purposes, however at different quantity as shown in Table 3.6 above. Irrigation is the next and most important usage of water bodies. The analysis reveals that people use more of streams for irrigation purpose than springs and rivers. Ponds and natural lakes are rarely used for domestic as well as for irrigation purposes.

Table 3.7 Region wise Water Body Pollution

Region	No. Of Water Bodies	No. Polluted	% Polluted
Garo	199	70	35.18
Khasi	322	140	43.48
Jaintia	185	91	49.19
Total	**706**	**301**	**42.63**

As observed in table 3.7 above highest level of pollution of water body is taking place in Jaintia region, followed by Khasi and Garo regions. Overall, 43 percent of water bodies are polluted due to mining and other factors discussed below.

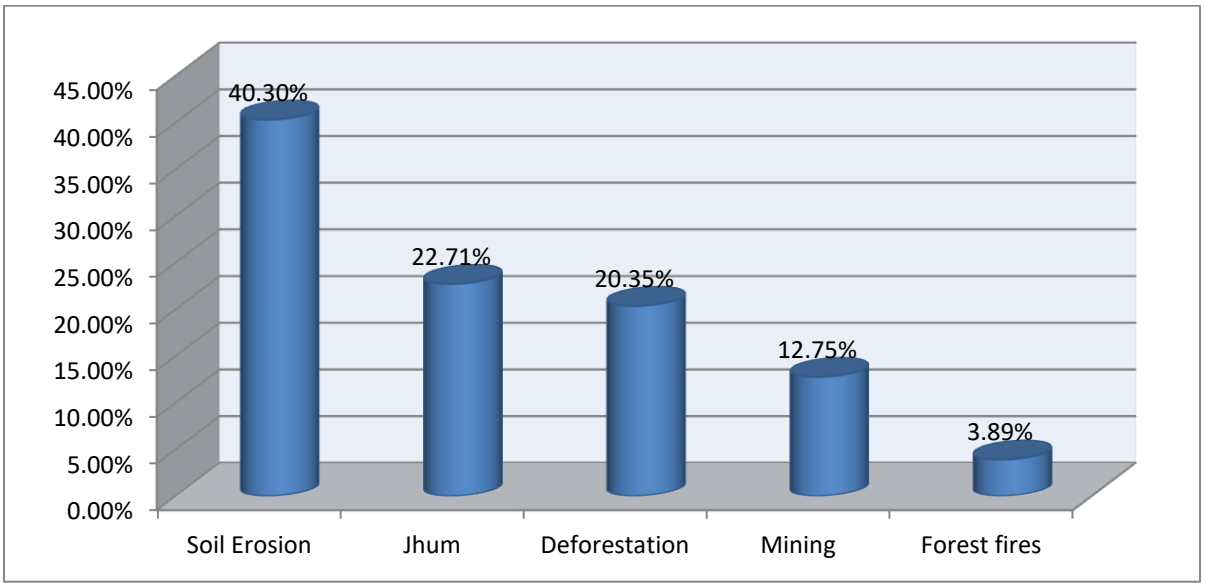
3.8 STATUS & CAUSES OF NATURAL RESOURCE DEGRADATION

The degradation of land and water in Meghalaya, which is likely to be further exacerbated by climate change, needs to be addressed to sustain the benefits of natural resource-based growth. In 2011–2012, about 22 percent of the state's area was under degradation, primarily because of loss of vegetation cover (19.4%) and erosion (2.4%). Given the hilly terrain, loss of top soil makes valleys unsuitable for cultivation and increases incidences of landslides and floods. Despite receiving the highest rainfall in the world, several towns in Meghalaya now face water shortage. The state has more than 60,000 natural springs which provide drinking water for 80 percent of the population. However, over 54 percent of these springs have either dried or their water discharge has reduced by more than half. A state-wide climate vulnerability analysis[10] for the period ending in 2050 indicates an increase in water and agricultural vulnerability in parts of the state due to high variability of projected rainfall. Eastern parts of the state are projected to see an increase of about 3 percent and western parts, an increase of about 18 percent.

Under this study five major factors were considered as the major causes of natural resource degradation; they are unplanned deforestation, unscientific mining, soil erosion, shifting cultivation and forest fires in 71 project villages. Figure no.4 shows that 3051.68 hectares of land are degraded land due to various factors. Garo hills region has the highest (1158.88ha, i.e., 37.98%) level of degradation, followed by Jaintia hills region (1111.81ha, i.e., 36.43%) and Khasi hills region (780.99ha, i.e., 25.59%).

10. Ravindranath et. al. (2011): Climate Change vulnerability profiles for North East India, Current Science, Vol. 101, No.3, 10 Aug 2011 pp. 384-394

Figure 3.5 Causes for Natural Resource Degradation



3.8.1 Soil Erosion

The baseline survey shows that soil erosion is the main reason for land degradation which contributes to 40.30 percent, followed by jhum cultivation (22.71%), unplanned deforestation (20.35%), and unscientific mining (12.75%) and forest fires (3.89%). A total of 1230 hectares of land are found to be degraded in 71 villages due to soil erosion. Maximum degradation is taking place in Garo hills regions followed by Jaintia and Khasi hills regions.

Soil erosion caused land degradation is due to deforestation, fragmentation of forests, jhum cultivation, illegal mining and logging, overgrazing, etc. Soil erosion is a concern not only for its impact on plant growth but also for its impacts to water quality and overall ecological balance. Three most important ways to control soil erosion could be to use land according to its capacity, protection of the soil surface with vegetation and by controlling the runoff before it develops into an erosive force.

3.8.2 Degraded Jhum Land

Shifting cultivation (Jhum) is a tribal farming practice associated with their culture and way of life which existed since time immemorial. However, this practice has its own negative

consequences that affect life globally. As discussed above, the study shows that shifting cultivation is the second major causes for land and plant degradation. Data on two aspects regarding Jhum was collected i.e. a) Degraded Jhum Land and b) Area under Jhum.

Table 3.8 Jhum land (ha) Past and Present

Region	Degraded Jhum Land (past)	Area under Jhum (present)	decreased / Increased in %
Garo	229	30	87% decrease
Khasi	233	338	45% increase
Jaintia	251	0	100% decrease
Total	**713**	**368**	**48% decrease**

The survey indicates that 713 hectares of land was in the category of degraded jhum land and only 368 hectares of land are now under jhum cultivation. It may be noted here that degraded jhum lands are also part of culturable wasteland[11]. Table 3.8 shows an overall reduction of 48% jhum cultivation during the period of the study. The reason behind this could be attributed to increase in plantation of cash crops such as rubber, arecanut, orange, cashewnut, etc. in Garo hills region. In Jaintia region the reduction of jhum land could be attributed to mining activities and felling of trees. On the contrary in Khasi hills region, there is an increase in area of jhum cultivation from the past by 48 percent. Degraded Jhum lands are those which the farmers have left after doing Jhum cultivation. It essentially means that the farmer has abandon the Jhum land for years and discontinued jhum cultivation or any activity without any maintenance thereby leaving the area exposed to the natural forces resulting in degradation.

3.8.3 Unplanned Deforestation

Unplanned deforestation is found to be the third major causes for degradation. It was observed that 621 hectares of land are being degraded in the surveyed villages due to unplanned deforestation. Maximum deforestation is found to be in Jaintia hills, followed by

[11] Culturable waste land are land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other.

Khasi and Garo region. Unplanned deforestation as the name suggest is deforestation taking place without any proper plans such as felling of trees without proper documentation that may also be deemed as illegal deforestation. Unplanned deforestation could also be caused by natural calamities like storms, lighting strikes etc. Unplanned deforestation can generate significant negative externalities like loss of biodiversity, elevated risk of erosion, floods, lowered water tables and increase in the amount of emitted carbon dioxide in the atmosphere associated with global warming and climate change.

It may be mentioned that **planned deforestation** is deforestation taking place due to expansion of road or any developmental projects with due sanctions or approval from the appropriate authority (state or national), deforestation taking place under working plans are also planned deforestation. In other words, planned deforestation can be deemed as legal deforestation.

3.8.4 Unscientific Mining

Unscientific mining the fourth factor leading to degradation is taking place mostly in Jaintia hills regions followed by Garo and Khasi hills. It was found that 389 hectares of land are being degraded due to unscientific mining in 71 villages. Unscientific mining or rat hole mining is primarily practiced in Meghalaya. In Jaintia hills rat hole mine involves manual digging of very small tunnels usually 4 - 10 feet wide. The extractions of coal can go as deep as 200 feet underground with differing depth from place to place. There are two type of mining; Box cutting and Side cutting. The hazardous storage of coal in and around rivers and streams leads to acid mine drainage (AMD) in which most of the rivers and streams has turn into typical red colour due to pyrite oxidation in which the pH of the water quality has drastically declined during post monsoon which lead to depletion of aquatic flora and fauna.

3.8.5 Forest Fire

Forest fire is the last but not the least reason for deforestation mostly prevalent in Khasi hills region followed by Garo hills region. No forest fire is found to be taking place in Jaintia

hills region. It was found that 119 hectares of land in 55 villages of Khasi and Garo hills region are being degraded due to forest fires. Forest fire can be described as any uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brush land or tundra, which consumes the natural fuels and spreads based on environmental conditions (e.g., wind, topography). Wildfire can be incited by human actions such as land clearing, extreme drought or in rare cases by lightning.

The most common hazard in forests is forests fire. Forests fires are as old as the forests themselves. They pose a threat not only to the forest wealth but also to the entire regime to fauna and flora seriously disturbing the bio-diversity and the ecology and environment of a region. During summer, when there is no rain for months, the forests become littered with dry senescent leaves and twinges, which could burst into flames ignited by the slightest spark.

Many forest fires start from natural causes such as lightning which set trees on fire. However, rain extinguishes such fires without causing much damage. High atmospheric temperatures and dryness (low humidity) offer favourable circumstance for a fire to start. Man made causes also cause forest fire when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.

In Meghalaya, Jhum cultivation is one of the factors contributing to uncontrolled forest fires because during the process of clearing a forest area for jhumming, more often than not it can be observed that the communities do not have a scientific system to control these fires.

CHAPTER 4 - REGION WISE BRIEF ASSESMENT REPORT

A comparative assessment report of three regions was carried out to highlight some distinctive features. The study has revealed a number of distinctive features of the three regions as described below.

4.1 Garo Hills Region

In the Garo Hills region it was found that the number of households per village averaged at 120 HH that is lesser than the other two regions of Khasi Hills and Jaintia Hills. The number of daily wage labourers, teachers, businessmen as well as government servants was comparatively low. Fuel needs was mainly met by firewood (89%) and to some extent by LPG (11%). There was no usage of charcoal or biomass for cooking.

The region has the highest area under barren land, grassland, plantation, horticultural crops but less forest and less culturable wasteland. Highest levels of soil erosion were observed in the region. There was little or no incidence of forest fires and less water body pollution. With regard to water resource there are no lakes or natural ponds and fewer rivers and springs but highest in the number of streams as compared to the other two regions. The region recorded highest usage of water bodies for domestic (74%) and irrigation purpose (57.14%).

The region ranks second in dense forest, open forest, protected forest, sacred groves, agricultural land and water bodies.

To be more specific, the study shows that there are 199 water bodies, second largest number after Khasi region (322). Water body pollution is least i.e., 35.18 percent as against Jaintia hills that has 48.11 percent and Khasi hills 43.48 percent respectively but at the same time it is a cause of concern.

Table 4.9 Garo: Water Bodies Pollution and its Use

Water bodies	in 24 Villages	Polluted	Domestic use	Use for Irrigation
Spring	77	25	24	16
Streams	108	40	24	22
Rivers	14	5	9	6
Ponds	0	0	0	0
Total	**199**	**70**	**57**	**44**
% of Pollution & % of its use		**35.18**	**28.64**	**22.11**

Garo hills region has less water bodies as compared to Khasi regions. This region also has less agricultural land (922ha) as compared to Khasi region (1779ha). Despite these facts people in region make more use of the water bodies (50.73%) as compared to Jaintia (32.97%) and Khasi (27.64%) region. The area of land (1361ha) in the region has been brought under horticulture plantations and cash crops in the 24 villages that is the highest as compared to other two regions. Water bodies here, especially streams and rivers are more perennial than seasonal as compared to the Khasi and Jaintia hills regions. Water bodies are more perennial due to its topography i.e., less terrain, lower altitude, high coverage of vegetation with more cash crop cultivation as compared to other two regions in the state. In this region villagers are more into agricultural activities as they have limited source of livelihood as compared to the other regions.

Despite more vegetation and other factors, land degradation is more vulnerable (1159ha) due to soil erosion (695ha), shifting cultivation (229ha), unscientific mining (134ha), and unplanned deforestation (100ha).

4.2 Khasi Hills Region

The number of HH in this region averages at 159 per village which is second after Jaintia Hills region. The other distinctive features in this region are that there are more people into business, more people holding government jobs and the only region to use biomass as fuel besides firewood, charcoal and LPG. It is observed that there is maximum usage of land for agricultural purpose as compared to the other two regions. The Khasi Hills has maximum

land covered with dense forests, community and protected / sacred forests but highest incidence of forest fires. The usage of water bodies for agricultural purposes is however, minimal. The region ranks second, after Garo region, in the area under horticulture crops and plantations.

Specifically, in 31 villages, there are 322 water bodies, highest as compared to Garo (199) and Jaintia hills (185) regions. There are 193 springs which accounts for 54.21 per cent as compared to Jaintia hills (86nos, or 24.16%) and Garo hills region that has 77 springs (21.63%). Water body pollution ranks second at 43.48 percent as compared to Jaintia that has 48.11 percent and Garo hills 35.18 percent regions.

Table 4.10 Khasi: Water Body Pollution and its Use

Water bodies	**in 31 Villages**	**Polluted**	**Domestic use**	**Use for Irrigation**	**Conservation**
Spring	193	119	31	0	0
Streams	90	20	26	20	0
Rivers	32	1	0	12	7
Ponds	7	0	0	0	0
Total	**322**	**140**	**57**	**32**	**7**
% of Pollution & % of its use		**43.48**	**17.70**	**9.94**	**2.17**

The study indicated that the usage of water bodies in 71 villages was only for domestic, irrigation and conservation purpose. It was revealed from the study that Khasi hills region has maximum (1779ha) agricultural land as compared to 922 hectares in Garo and 719 hectares in Jaintia hills region. The region has more water bodies with less pollution as compared to Jaintia region. Despite these factors, usage of water bodies is just 27.64 percent whereas Jaintia hills uses 32.97 percent and Garo region 50.73 percent of its water bodies. Less usage of water bodies consequently have resulted in less area of cultivation (656ha) by 4930 families as compared to Garo region where cultivation takes place in around 1361 hectares of land by 2872 families. The reasons behind this could be attributed to high rainfall in this region, the topography, (high range mountains), soil condition, temperature, more sources of alternative income, etc.

This is the only region that has utilized it's water bodies for conservation and preservation of natural resources in 7 rivers, three in West Khasi Hills (Langtor, Marskuin & Markasa villages) and four rivers in South West Khasi Hills districts (Wahsiej, Marshillong, Nongsynrih and Pynden Mawthawiang villages).

Comparatively, land degradation and deforestation is found to be less (25.59%) as compared to Garo region (37.98%) and Jaintia (36.43%) regions. The major factors leading to degradation of natural resources in these regions are soil erosion, shifting cultivation, unplanned deforestation, forest fires and unscientific mining. The study shows that 781 hectares of land are being affected due to these factors. It is to be noted that the incidence of forest fires is highest in this region as compared to other two regions.

4.3 Jaintia Hills Region

The average number of households per village is highest in this region and it was observed that the number of daily wage laborers, teachers and farmers was the highest as compared to the two other regions. Those engaged in government jobs was the lowest in this region. The use of wood, charcoal and LPG as fuel was the highest in Jaintia Hills.

With regard to the natural resources the region recorded the highest in the number of water bodies, maximum wasteland, maximum open, community, private and clan forests. There was maximum level of degradation of forests and pollution of water bodies. Grasslands and dense forests were less and there was limited plantation, limited land under agriculture and no degraded jhum land was found.

Findings suggest extreme conditions both in terms of social and environmental status. This region has more imbalances as compared to Khasi and Garo regions. The study suggests that the environment is under threat. Highest **water body pollution** is found in Jaintia hills region of the state. It is revealed that 16 villages have 86 springs (average 5 springs per village), of which 67 springs (78% or average 4 springs in every village) are being affected

due to mining activities. This in short would mean that 4 springs out of 5 in every village are being polluted. Out of 27 streams, 15 (55.56%) are polluted and out of 22 rivers 7 (31.82%) are polluted. It is due to these reasons that utility of water bodies has drastically reduced.

Table 4.11 Jaintia: Water Body Pollution and its Use

Water **Bodies**	in 16 Villages	Polluted	Domestic use	Use for Irrigation
Spring	86	69	16	4
Streams	27	15	12	11
Rivers	22	7	5	11
Ponds	50	0	1	1
T**otal**	**185**	**91**	**34**	**27**
% of Pollution & % of its use		**49.19**	**18.38**	**14.59**

Water pollution is also linked to land degradation through **soil erosion**. It is inferred that unplanned deforestation is happening in 351.61 hectares of land, i.e., 56.61 percent; highest unscientific mining is taking place in around 219.57 hectares of land, i.e., 56.44 percent; highest degraded jhum land measuring around 250.80 hectares, i.e., 36.19 percent and 2nd highest level of soil erosion taking place in some 289.83 hectares of land, i.e., 23.57 percent. All these figures are in comparison to Khasi and Garo hills regions.

Water pollution in Jaintia hills has reached its critical stage. People in these villages have to purchase water for cooking and drinking. The table above also suggests that people do not use these water bodies for irrigational purposed due to high degree contamination.

The study could not find any instances of **forest fire** in Jaintia hill region. However, it was expressed by community that during dry season in the months of December and January dry grasses are being burnt so that new grass come up that are being used for grazing of animals. Burning of dry grasses is also meant to clear bushes for cultivation as well as for plantation.

CHAPTER 5 - MAJOR FINDINGS AND WAY FORWARD

1. Literacy rate in project village is found to be 65.86 percent with highest literacy rate in Khasi region (77.82%) followed by Garo region (58.30%) and Jaintia region (53.24%). With the literacy rate being just above 50% in Garo and Jaintia region there will be a challenge in selection of Village Community Facilitators (VCF) which, suggest that more handholding support would have to be provided in these regions.

2. It was found that there were more females than males in Jaintia and Garo Hills regions and the sex ratio for Khasi region was 969. It can therefore be emphasized that the inclusion of women in all stages of the Project is of utmost importance.

3. Major occupation of 11690 households: 85 percent are farmers and daily wage labourers, 8 percent households are employed either by government or by private schools and just 7 percent households are into (petty) business. It can be inferred that there is a need to provide technical inputs and capacity building in land and agriculture productivity enhancement so as to enable the community to include such interventions in the community led plans.
4. On fuel use just 21 percent use LPG. Rest 79 percent depend on wood, charcoal, biomass, kerosene and electricity. There was no improvement in use of biomass despite Meghalaya New and Renewable Energy Development Agency's (MNREDA) effort since 1987 (33years). Effective use of biomass could reduce deforestation, as felling of trees for fuel is ranked by community as the second largest drivers of deforestation in a study conducted on 'Identification of drivers of deforestation in Meghalaya' by RFRI, under CLLM Project. Sourcing of appropriate technologies to reduce the use of wood as fuel such improved chulas, biomass briquetting, rocket stoves, biogas etc. that are also fuel efficient and cost effective will encourage the community to adopt them and result in reduction in deforestation.

5. The study revealed that there was ample availability of open forests, culturable wasteland and grassland thereby opening up the opportunity for forestry, agriculture and horticulture activities. This will greatly enhance the area under dense forest, land available for agri-horticultural activities, agro forestry in the Project villages.

6. Types of Forests: Community forests is maximum in coverage with 48 percent, followed by Private forests 46 percent, protected forest with 4 percent and then clan forest with just 2 percent. Khasi hills region has maximum forests followed by Jaintia and Garo. Garo Region has no clan forest, limited private, protected and community forest. Jaintia region has more clan forest as compared to other two regions.

7. Water Bodies: on an average 10 number of water bodies are found per village, with highest numbers found in Khasi region followed by Jaintia and Garo regions suggesting that conservation and preservation of water bodies and the immediate surrounding will greatly benefit the communities.

8. Water Body Pollution: On an average 43 percent of water bodies are polluted; highest percentage of pollution is found in Jaintia region followed by Khasi and Garo regions. The figure is alarming for a small state of Meghalaya thereby generating an urgent need for sensitization of the community to take immediate step to mitigate the situation.

9. Uses of Water Bodies: It was found that 21 percent of water bodies are used for domestic purposes and 15 percent are used for irrigation. Uses of water bodies are found more in Garo Regions than in the other two regions. Ways and means to gain access for optimal use of water bodies for various purposes need to be explored.

10. Soil Erosion is the major cause for land degradation caused by unplanned deforestation, jhum cultivation, mining activities, forest fires and other natural factors. Activities for control of soil erosion and reclamation of eroded stretches is urgently required and communities should be encouraged to take up suitable measures such as vegetative

barriers, contour bunds, engineering structures like gabions loose bolder check dams etc.

11. The study shows huge decline (48%) in jhum cultivation in Jaintia and Garo regions. On the contrary jhum area has increased by 45% in Khasi hills region. Encouraging, food forest concepts and cultivation of low volume high value crops to bring about reduction of jhum areas of Khasi Hills can be taken up.

CHAPTER 6 - RESULT FRAMEWORK

As prescribed in Project Appraisal Document (PAD), the Project Development Objectives (PDOs) define the intended outcomes of the project and hence Result Framework (RF) for each PDO and Intermediate Result Indicators has been arrived at. The Overall Project Development Objective has been defined as "***To strengthen community-led landscapes management in selected landscapes in the state.***"

RESULTS FRAMEWORK - CLLMP | Meghalaya		
PDO: To strengthen community-led landscapes management in selected landscapes in the state.		
PDO Indicators		
Objective /Outcome 1:	Indicator	**Baseline Report**
Village NRM Committees functioning with adequate fiduciary capacities, and capable of monitoring capacities to lead on landscapes management. (Number)	**Indicator 1:** VNRMCs maintaining Books of Accounts and Register	The Traditional Institutions at the village level in Meghalaya have been functioning since earlier times and are well organinsed to take up various development activities for the betterment of the community. These institutions have been capacitated with book keeping and maintenance of records through the SHG movement the state that started in the 90s. Further, with the launch of MGNREGA and the decentralization of development activities to the local authorities like the VECs (Village Employment Councils) have greatly strengthened and systematized their function. Projects implemented by various National and International agencies such as NERCOMP and MRDS have also contributed to strengthening of village level institutions. Again with the implementation of Meghalaya Social Audit Act, biannual social audit has been made mandatory for 22 programmes and schemes that are implemented at or by the

		village authorities. This has ensured accountability and transparency in programme implementation. Hence the project emphasis on community in maintaining proper records for CLLMP activities will also be followed systematically. The project envisages providing training to 12052 people from 6026 villages across Meghalaya by 2023.
	Indicator 2: Purchase committee established.	The implementation of MGNREGA mandates that purchase committees should be set up for procurement of materials utilized in the various permissible works taken up by the VEC.The same is also being introduced under CLLMP to formalize and strengthen the VNRMCs in procurement related areas. The committees are being annually constituted in a meeting of the VNRMC that has minimum 3 members; with at least one women member in the committee. The committee hold regular meetings and the minutes are to be recorded.
	Indicator 3: Information on activities and cost regularly displayed	To ensure transparency and accountability, village institutions do produce reports, put up sign boards and charts with details of schemes received, expenditure incurred, etc. in their community halls and or public places. In CLLM Project as well it is mandated that the VNRMC regularly and timely inform on physical and financial progress through information display at the project site, community hall, registers, etc.
	Indicator 4: Verification of works by VNRMC at start, mid-term and closure	The capacity of the VNRMCs and the VCFs are built to enable them to understand the parameters for verification of works and various stages. To ensure that all activities are implemented as per Community NRM Plan, all executive members of VNRMC are expected to visit the intervention sites, to supervise and monitor activities, record status, take corrective measures, etc., before, during and on

		completion of all project activities. CLLMP being a community-led management project, such practice is crucial and has to be undertaken most effectively.
Objective /Outcome 2		
Share of village-level NRM Plans under implementation according to agreed criteria (%)	**Indicator 1:** Green Charter and Village Grant Agreement signed	During the initial years of MGNREGA implementation the signing of a Social Agreement between the C&RD block the implementing authority and the Village level Implementing authority i.e., the VEC, had been practiced. However, this needs to be further strengthened to streamline the functioning of the village level institutions. As such CLLMP mandates the signing of Green Charter and the Village Grant Agreement. It is expected that the functioning of VNRMCs will improve substantially. This again will ensure that the community takes ownership of the project.
	Indicator 2: Formation of VNRMCs	The implement the Project the village constitutes itself into Village Natural Resource Management Committee (VNRMC) with Representation from each and every households of the village with 7-9 members whereby 33 percent of the members are women. The VNRMCs then constitute an executive committee to oversee the day-to-day implementation of the works. The project being implemented in 400 villages, 400 VNRMCs would be constituted by the 3rd year of project implementation.
	Indicator 3: CNRM plan complies with project environmental and social management framework	MBMA has developed and published the social and environmental safeguards policies of the World Bank, which are being adopted for effective community-led NRM Programmes and projects such as CLLMP. These safeguards policies must to be strictly adhered to at every stage of the project, from planning to implementation and monitoring.

		Environmental Management Framework ensures that the implementation and execution of the Community NRM Plans do not result in adverse environmental impacts. The Social management framework ensures that there is free and fair participation by all stakeholders with emphasis to address issues faced by vulnerable groups especially women. The social management framework also takes into account the local complexities relating to customary laws and policies.
Objective /Outcome 3:		
Percentage of beneficiaries 'Satisfied' with project interventions (disaggregated by sex) (%)	**Indicator 1:** Beneficiaries 'Satisfied' over functioning of VNRMC committee	These indicator 1-4 attempt to measure the level of satisfaction of the community on project implementation arrangement, planning, knowledge sharing on CLLMP principles and on the positive impact activities executed which in itself fulfils the project objectives or not. The exercise would be carried out by the end of 3rd and 5th year of the project period with the use of various participatory tools such as satisfaction surveys, feedback forms, interactions, focus group discussions, use of multimedia, etc. that will help in gauging the satisfaction level of stakeholders.
	Indicator 2: Beneficiaries 'Satisfied' on CNRM planning process	The entire community in the village is expected to be involved in the planning process of CNRM Plans. GIS maps PRA tools are re used for preparation of the plan. The community spends 3-5 days on preparation of the plan with the facilitation from project officials. The executive members of VNRMCs and the VCFs are provided focused training on plan preparation and implementation.
	Indicator 3: Beneficiaries	This is a community led project, as such the implementing agency the State Project

	'Satisfied' on information on the project	Management Unit (SPMU) provides sufficient information on the project to the community through various documents printed and translated into local languages, posters, flip-charts, short video documentation, etc. in addition to awareness campaigns, trainings, etc.
	Indicator 4: Beneficiaries 'Satisfied' on implementation of works	The project being implemented, monitored and evaluated by the community themselves, as such it becomes community-led project. This is a process of self learning and taking ownership on the environmental management at the grassroots.
Objective /Outcome 4:		
Land area under sustainable landscape management practices (Hectare(HA)	**Indicator 1**: Land area brought under Afforestation/ Reforestation.	The departments of Soil and Water Conservation, Forest, Water Resources, Agriculture and Horticulture departments have implemented various programmes and schemes like Integrated Watershed Management Programme (IWMP), Joint Forest Management (JFM) programme, National Watershed Development programme for rain-fed areas and other departmental schemes covered by them respectively in the past. These programmes and schemes have greatly benefitted the communities in the state. However, the anthropogenic activities that continued unabated over the years have at times resulted in degradation of the landscape and accelerated the destruction of such interventions. Hence, CLLMP focuses on rejuvenating the degraded landscapes through a community-led approach to ensure sustainability of NRM interventions and enhance the area brought under treatment and these interventions would be incorporated in the Community Natural Resource Management Plans of every project village. The project aims to bring about aforestation in some 6653 hectares of land.

	Indicator 2: Land area brought under Agroforestry	The project aims to bring land under agro-forestry in some 2758 hectares of land. Agro forestry is not popular in the state as such the project emphasises on the same to enhance livelihood of communities.
	Indicator 3: Land area brought under agriculture	As stated in the report, agriculture in the major occupation of rural population in the state with an average of just 0.29 hectares of available agricultural land. The project aims at improving agricultural land by 7265 hectares of land across project villages by the year 2030
	Indicator 4: Land area under soil and water conservation and catchment treatment.	Soil erosion and pollution of water bodies are two major threats to Meghalaya's eco-system. The MBMA has partnered with ACWADAM, CHIRAG, PSI, PRASARI, etc, working in the fields of Spring-shed development, development of catchment areas, etc. The project has a mandate to bring 11964 hectares of land under sustainable landscape management practices.
	Indicator 5: Area of Culturable wasteland covered under Horticulture	Our study presents 10575 hectares of culturable wasteland in 71 villages. The project aims to cover 2553hectares of land for Horticulture development in the state.
	Indicator 6: Mining affected area covered for treatment	Mining has greatly affected the landscapes of Meghalaya. The indiscriminate and unscientific mining activities in coal bearing areas of Meghalaya, and the absence of post mining treatment and management of mines have made the fragile ecosystem more vulnerable and that has resulted in large scale degradation and depletion on natural resource such as water, soil and forest cover. The project seeks to restore and rehabilitate 317 hectares of land affected by mining and address to mitigate the problems faced by communities by improving the quality and quantity of water. The NGT ban on illegal mining has been enforced in the state.

		Corporate entities operating in the state have been directed to contribute towards rehabilitation of degraded land in mining areas through the CSR.
Intermediate Results (IR) Indicators		
Share of villages supported with capacity-building package in NRM (Percentage)	**IR Indicator 1:** Village outreach programmes for sensitization	Sensitization, outreach, training and capacity building are an integral part of CLLMP. Prior to adoption of a village under the Project, ground truthing and sensitization are being carried out. Sensitization programs on the project are aimed at covering 6026 villages across the state with emphasis on the need for efficient NRM management. Training needs assessment (TNA) and development of training content, material, films, IEC material etc. are important activities under the project. MBDA has developed several modules for campaigning and sensitization at village level. As on June 2020, the outreach programs have covered 292 villages.
	IR Indicator 2: Trainings organized for VNRMC members	MBDA through a consortium of support organization has developed a diverse and tiered capacity development profile. It covers number of themes and plan for conducting trainings for Master Trainers, Village Facilitators, VNRMC members, team at DPMUs and SPMU. So far 81 virtual trainings and one classroom training have been organized for 89 master trainers, 137 VNRMCs are being trained and 379 villages reached out programmes has conducted
	IR Indicator 3: Training organized for Village facilitators	There are 855 number of Village Community Facilitators (VCFs) engaged since June 2020 and the number will increase as the project reaches to 400 villages. Orientation programme have been conducted for 382 VCFs, training are ongoing and the VCFs on their job role and are now in the field supporting VNRMCs in project implementation, monitoring and reporting.

	IR Indicator 4: Villages attend learning platforms	CLLMP aims to build and strengthen the capacity of communities of the state towards sustainable natural resource management. For effective delivery of training, new virtual platforms in addition to conventional trainings is being used. PDA is Participatory Digital Attestation which provides immediate access to content, post training and helps learn and perform tasks better. PDA also helps in providing verifiable digital proof of trainings attended and helps assert qualifications. As on date 106 training has been conducted, attended by 1675 participants and digital attestation done. Identification and documentation of contemporary as well as traditional NRM practices, and innovations are important activities under the project which can be scaled up and adopted by communities. For dissemination, project will organize annual knowledge sharing event at regional and state level where communities and functionaries can highlight best practices, innovations, lessons etc. and draw on the experiences of one another. Apart from these, useful resources for village are made available on the CLLMP website and MBMA/MBDA youtube channels. The project is also in the process of development of an interactive website for MBMA integrated with the project MIS and will use interactive maps, info-graphs, videos, photographs etc. to share best practices, information etc. for ease of access by all.
Forest area brought under management plans (Hectare(Ha)	**IR Indicator 1:** Total Forest land included in CNRM plans	Protection and management of forests is integral to CLLMP as such Community Natural Resource Management Plans include principles of scientific and sustainable forestry; its management practices and policies. The management practices and policies are framed

		by the entire village under the leadership of village headman. The project aims to bring about 12585 hectares of land under management plan by communities.
Meghalaya Basin Management Agency functional as Agency of Excellence in community-led NRM (Yes/No)	**IR Indicator 1:** Developed data systems on NRM	Various data would be captured on the third year of implementation, both through physical interaction as well as through the use of technology. Data on NRM are being collected with the use of CNRMP templates and GIS based maps to facilitate planning and intervention. The intervention sites are to be geo-tagged. Moreover, an MIS platform would be created and will be integrated with GIS. Data and information so collected would be utilized to strengthen policies and processes for sustainable NRM.
	IR Indicator 2: Established platforms for innovation and knowledge management	Research, identification, documentation, publication on traditional knowledge, lessons, good practices, replicable models and innovations would be undertaken by arranging various available and new platforms and events. Dissemination and stakeholder engagement through local, state level, national, international platforms, events and forums would be organized. This will inform to strengthen policies, processes and procedures for sustainable NRM.
	IR Indicator 3: Established learning centre on NRM	MBMA offers training modules and technical expertise on NRM. Besides organizing and facilitating dialogues, trainings, exposure visits etc., MBMA would also work on a strategy to establish as a Centre of Excellence for NRM.
Community NRM management plans prepared and approved by Village	**IR Indicator 1:** CNRM plans that leverage other schemes	Convergence and leveraging investments from other sources, programmes and schemes such as MGNREGA and other relevant programmes is part of project strategy. This enhances the investments in NRM and impact of NRM

CNRM Committees and DPMU of MBMA that include financing from other central and state government sources available for NRM (Number)		approach by the community in a larger scale.
	IR Indicator 2: Total convergence amount	As per CLLMP approach, the CNRM plans to be integrated in the ongoing and planned government schemes both from the state and the centre. As on date 57 VNRMCs are linked with MGNREGA and have received support amounting to Rs. 1,47,09,586/-
Share of Village NRM Committees with equal or more representation of women among 9 members of the Executive Committee (Percentage)	**IR Indicator 1:** VNRMC in place with 9 EC members	Since February 2019 the CLLMP has been setting up 9 members VNRMCs to implement the project. As on June 2020 there are 292 VNRMCs and fully functioning. Each VNRMC has an Executive Committee with 9 members with least 33% of women representatives. The VNRMC members comprises of every male and female head of each household in the village.
	IR Indicator 2: Purchase Committees in place with minimum two women members	The Purchase Committee within VNRMCs are established to look into all procumbent and purchases. The Purchase Committee comprises of maximum 5 members with quorum of 3, of which at least 1 (one) member is female. As on June 2020, 197 Purchase Committees are already in place.
	IR Indicator 3: VNRMC with 33% or more women members	In order to achieve gender balance in VNRMCs, efforts are being made to ensure 33% women's representation in the committee. As on date 292 VNRMCs have more than 33% women representatives.
CLLMP mainstreams gender and citizen engagement	**IR Indicator 1:** Women's priorities included in the CNRM Plans	The social management framework prescribes that utmost care be taken for gender inclusion and addressing priorities and needs of women. Having more than 33% of women representatives in VNRMCs, they do have their

(Yes/No) & Numbers		voices on matters of their concerns during all its meetings. These women are very much part of preparation of CNRM Plans where their concerns and priorities are very much raised and placed in the Plan.
	I**R Indicator 2:** Social Audit conducted in CLLMP villages	Social Audit has become mandatory in Meghalaya with the passing of the Meghalaya Community Participation and Public Services Social Audit Act 2017. The projects has partnered and engaged the MCPPS to carry out annual Social Audit in all project villages throughout the project period.
	IR Indicator 3: Functional Grievance Redrasal Mechanism	Independent system under the project with multiple channels to register complaints (physical, online and toll-free number) is being suggested to put in place with strong back end system for response, escalation, tracking and resolution on grievances faced by stakeholders and citizens. The project has already put in place the Grievance Redrasal Mechanism at Block, District and at State level which is function. An officer at every level is being placed who attend all grievances/complains and puts up the same to the competent authority for solution.

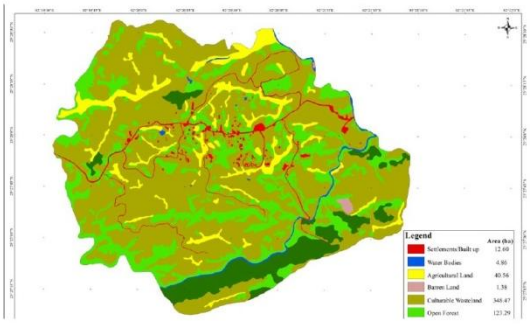
ANNEXURE: PHOTOGRAPHS

Sensitization programme on CLLMP at Tombolgre Village, NGH

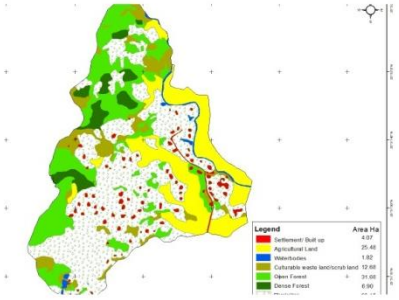
Community members of Dorambokgre village, West Garo Hills participating in small group discussions

Community members of Kdoh Hati village drawing the resource map

Land Use Land Cover (LULC) Map of Muthlongrim Village, Laskein Block, West Jaintia Hills



Land Use Land Cover (LULC) Map of Chidaret Ajarong, Resubelpara Block, North Garo Hills District



PRA exercise conducted at Duminikura village, South Garo Hills. Seen here is the resource map of the village and the seasonality calendar that the community prepared

VNRMC members from East Garo Hills being trained on soil testing as part of the land productivity trainin

Training on Springshed Management for VNRMC executive members & VCFs of Saipung block in Jarain village, East Jaintia Hills District

Community Nursery at Mawker Village,
Ri-Bhoi

Community nursery at Umsiang Maiong,
Ri-Bhoi

Contour trenches at Umdaita, Mawkyrdep,
Ri-Bhoi

Vermicomposting at Mawkyrdep,
Ri Bhoi

Conserving orchids by growing them on betel nut
tree - Umlakro village, Ri Bhoi

Spring Chamber at Mawthong Village,
South West Khasi Hills

Check Dam at Mawteibah Village,
East Khasi Hills

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C/o Meghalaya State Housing Financing Co-operative Society Limited,
Upper Nongrim Hills, Shillong 793003, Meghalaya, India