Terms of Reference (ToR) for Conducting Research & Studies on Climate Change & Natural Resource Management (Revised)

Project: Meghalaya Community-Led Landscape Management Project (MCLLMP), Government of Meghalaya, (funded by the World Bank)

1. Background

1.1. Meghalaya Community-Led Landscape Management Project (MCLLMP):

The Government of Meghalaya with the aid from World Bank is implementing the Community-Led Landscape Management Project [CLLMP, 2018-2023], which will helprestore and sustainably manage forests, land and water resources, and biodiversity in theState. At present, the destructive combination of climate change and unrestrained exploitative anthropogenic activities are seemingly leading to degradation of forests, land, water resources and in some cases the permanent loss of biodiversity.Majority of Meghalaya's rural population relies on these natural resources for their livelihood and day- to -day activities. Thus the degradation, of these natural resource has become a major cause of concern from socio-economic and ecologicalperspective. The project (MCLLMP) endeavors to address these issues holistically by adopting a community-based approach to control degradation and managethe natural resources.Accordingly, the Project is focused on supporting Meghalaya's unique community-based natural resource management (NRM) system, which relies primarily on its population – the Khasi, the Garo, and the Jaintia tribes – to manage forests and other natural resources through customary laws.The higher-level objectives of the Project are to:

a) Managing and conserving the natural resources, especially forests and water sources, so that it supports accelerated economic growth and well-being of every community inMeghalaya.
b) Institutionalizing and demonstrating a model for government support to community-led management of natural resources, especially forests, that could be replicated in other parts of India.

The Project implementation is being carried out through community-level planning and implementation in selected communities, preceded by intensive theme-based capacity building of village-level facilitators and committees. All communities in the state will benefit from capacity building and skill training of their members on natural resources management. In this regard, special emphasis is being given to youth and women empowerment, with the focus on creating livelihood and entrepreneurship opportunities. The Project is also supporting small grants to kick-start innovation in natural resources management, including revival of traditional knowledge and practice. Communities will also have access to knowledge management outputs from consultative workshops and IT-based learning initiatives. The Project is also enabling convergence with other government programmes, leading to synergies across the value chain, as well as institutional strengthening andsustainability.The Project is being implemented by *Meghalaya Basin Management Agency (MBMA).* More information on the Project activities can be found on *www.cllmp.com*

1.2. MeghalayaState Context:

Meghalaya is a state located in the northeastern part of India, bounded by Assam in the north, northwest and the east, and by Bangladesh in the south and southwest. The state is divided into three divisions, namely, Jaintia Hills (with two districts), Khasi Hills (with four districts) and Garo Hills (with five districts). About 76% of the state is under forest area, about ninety five percent of which is under community or private management.

Meghalaya has a population of 29.64lakhs of which 14.92 lakhs are male and 14.71 are female. Meghalaya is predominantly a tribal state. Nearly 86 percent of the state's total population constitute Scheduled tribes. Khasi, Garo and Pnarare the predominant indigenous tribes of the Khasi Hills, Garo Hills and Jaintia Hills respectively. Other tribes include Hajong, Rabha, Koch, Mikir, Kuki, Lushai, Naga, Boro and Hmar that inhabit the state. Meghalaya is predominantly rural with79.92 percent of the population residing in the rural area and 20.07 percent in the urban area.Largely agrarian economy, important crops are potato, rice, maize, pineapple, banana, papaya, spices, etc.

Population by Language		
Language	**Population**	**Percentage to Total population**
Khasi	10,91,087	47.05
Garo	7,28,424	31.41
Assamese	36,576	1.58
Bengalee	1,85,692	8
Gorkhali/ Nepali	52,155	2.25
Hindi	50,055	2.16
Koch	20,834	0.9
Rabha	22,395	0.97
Other languages	1,31,604	5.68
Total	23,18,822	100

Source: Meghalaya Statistical Handbook 2017

The Southern region of the state is one of the wettest regions in the world, recording an average of 12,000 mm (470 in) of rain in a year. Yet, at the same time, it is challenged by degradation of water bodies, soil erosion and water scarcity in the dry season. While forest cover is high, unscientific coal mining and limestone quarrying and logging are contributing to degradation of the natural resource base. Though there is abundant rainfall, there is very little management for storage. Excessive oil runoff in the upper catchments is also a major concern. Rural communities in the state depend heavily on forests and community lands for livelihoods, food and medicine. A significant proportion of the population depends on jhum or shifting cultivation. However, due to conversion of jhum lands to other land uses such as for raising of plantation crops, the net area available for jhum cultivation has reduced which has forced jhum cultivators to reduce the fallow period, which is the time between the end of previous plantation and beginning of next plantation, to meet their production requirements. Jhum cycles in most parts of Northeastern India have reduced to as little as 3-4 years from 10 years or longer, which has in turn led to drastic reduction in productivity, increase in soil erosion, forest degradation and loss of biodiversity.

Because of the land tenure system and the private/community ownership, the forests do not receive support from state institutions. This has resulted in the traditional tribal institutions having limited resources to deploy on the natural resources. Their task is made even more difficult due to the communities being driven by a preference for immediate gains resulting in over-extraction of minerals and timber resources.

The indigenous Khasi, Garo and Jaintia tribes have a long history of sophisticated management of natural ecosystems. Spiritual connection with land and its biodiversity manifest in their traditions and customs. Traditional practices such as sacred groves and community forests, demonstrate community-based natural resource preservation. Traditionally, community land and forests are classified and named depending on their uses, which is based on administration and religious perceptions. Governance is facilitated through customary laws. This legacy of community management of natural resources is recognized in the Sixth

Schedule of the Constitution, which vests the rights over forests and water resources with the Autonomous District Councils (ADCs) established under theschedule.

References towards the overall context, customary rights and traditions, traditional institutions engaged in management of forests and natural resources, and rules and regulations under ADC may be seen from below link:
http://cllmp.com/wp-content/uploads/2018/05/CLLMP_Environmental-Management-Framework-MCLLMP.pdf?x87367
http://khadc.nic.in/acts_rules_regulations_bills/Acts_Rules_arranged/19A_24A_Forest_Act_1958_Rules_1960.pdf

1.3. Climate Change Context in Meghalaya

Climate of Meghalaya is influenced by the south-west monsoons which bring torrential rains and flash floods in many parts of the State specially in the low altitude areas bordering Assam in the north and Bangladesh in the south-west causing heavy damage to agricultural fields, human settlements and even loss of lives and livestock. Located at the unique confluence of the Indo-Malayan and Indo-Chinese and Indian sub-continent bio-geographical region coupled with its physiographic features, the State has generated a profusion of habitats which harbors diverse biota with high level of endemism. Meghalaya's rich natural resources, biodiversity, high potential horticulture and its fodder plains are highly sensitive to climate change. In addition, the fragile geo-environmental settings and under developed economic situation further poses threats to the resilience of the vulnerable community. Moreover, the highly dispersed and vulnerable population is poorly equipped to cope effectively with the adversities of climate change due to low capabilities, weak institutional mechanisms, inability to diversify to other livelihood activities and lack of access to adequate resources to recover from climate shocks.

Meghalaya has generated a range of database and knowledgerelated to climate change and vulnerability specific to the state through various scientific studies collaborated with IIT Gandhinagar, IISC Bangalore, IIT Guwahati and IIT Mandi, CII, Godrej, Hyderabad. **Detailed reports of the studies can be accessed at meghalayaccc.org**. The studies include:

- Identification of climate vulnerability hot-spots in Meghalaya using high-resolution climate projections
- Carbon Footprint Study for Meghalaya State
- Assessment of the Impact of Climate Change on Forests and Biodiversity of Meghalaya
- Climate Vulnerability Assessment for Meghalaya using a Common Framework at District level
- Vulnerability Profile of Meghalaya State: Block Level Integrated Vulnerability Assessment
- Agriculture Vulnerability Profile of Meghalaya: District Level Vulnerability Assessment

The scientific analysis of climate trends in the State indicates that the State is already under the impacts of climate variability, and the change in temperature and rainfall is supposed to continue with varying degrees of intensity. Though, the rate of change is slow but the impacts will significantly pose serious threats, thus making it a big concern for the hill State. The State is also expected to face extreme climatic events if the current trend continues. The climate uncertainty and their associated threats advocate urgency for the State to escalate the efforts to enhance the State's resilience towards the current and anticipated climate threats. Since most of the studies conducted are vulnerability assessments, there is a need to carry out impact Assessments. Climate change impact assessments seek to characterise, identify, and project risks or impacts of environmental change on people, communities, economic activities, infrastructure, ecosystems and natural resources.

Natural resource assessments often focus on the synthesis of scientific information and may also include

extensive quantitative analysis. These assessments generally explore the effects of current stressors and evaluate potential future resource conditions as affected by future changes.

2. Objectives & Rationale of theAssignment

To provide support to the project M-CLLMP, MBMA proposes to hire Organisations/Firms/Institutions to undertake two research studiesas outlined below:

- Study of impact of climate change in **three** different time horizons **(say 2021 to 2050, 2051 to 2070 and 2071 to 2100)** on water resources of Meghalaya with a special reference to the consequences on livelihood
- Study of impact of climate change in **three** different time horizons **(say 2021 to 2050, 2051 to 2070 and 2071 to 2100)** on agriculture including horticulture in Meghalaya

Since the Project is based on a community-driven landscape approach to development (CDD) primarily based on natural resources,therefore, there is need for effective understanding on the impacts of climate change on natural resources as vital part of its activities. The study should include an assessment of observed climate change in the last 30-40 years and its projection on high resolution upto the year 2100.

3. Scope of the Assignment

The scope of the assignment is to (i) conduct an assessment for an in-depth understanding on the impacts of climate change on agriculture and water resources (ii)suggest recommendationsforstrengthening the State's climate resilience (iii) organise workshops to present the findings of the assessments to the staffs of the project, relevant line department officials and key stakeholders and (iv) draw a roadmap for disseminating actionable adaptation and mitigation measures to minimize the impacts of climate change on the target sectors.

The study is also expected to build synergy with MCLLMP through specific activities, both technical and policy responses particularly in the CNRM Plans/Community Landscape Plans. **The study is to be carried out for the whole State and the result is to be given at the district and block levels.**

4. Methodology

The study should follow a methodology which is recognized in the academia and supported by research papers published in the high impact journals. The impact study should be compatible to the highest resolution climate models.

5. Deliverables

Sl. No.	Proposed Studies	Deliverables
1.	Study of impact of climate change in different time horizons on agriculture including horticulture in Meghalaya	1. Projected impacts of climate change on major agricultural and horticultural crops in different time horizons 2. Simulated crop growth under different climate change scenarios 3. Recommendation of different cultivars of agricultural and horticultural species which are resilient under different climate change scenarios 4. Identifying indigenous agriculture, horticulture crops and practices which are suitable for resilient livelihood practices under different climate change scenarios.

		5. Recommendations on management of insects/pests and diseases of agricultural and horticultural species 6. Identification of agriculture and horticulture vulnerability hot-spots 7. Recommendations for sustainable agricultural practices and management 8. Ways and means to mitigate impacts of climate change in theagriculture sector of the State. **9. Produce a climate change vulnerability map with respect to agriculture in the State**
2.	Study of impact of climate change in different time horizons on water resources of Meghalaya with a special reference to the consequences on livelihood	1. Estimation of surface water and ground water including springs under different climate change scenarios 2. Identification of water resources (surface, ground, springs) vulnerability hot-spots including spatial layer of the same 3. Identification of flood and drought prone areas under different climate change scenarios including spatial layer of the same 4. Recommendations for water management under different climate change scenarios 5. **Produce a climate change vulnerability map with respect to water resource in the State**

6. Duration of the Assignment

The duration of the assignment is 9 monthsfrom date of signing the contract.

7. Team Composition and Qualification Requirements for the KeyExperts:

MBMA will assess the demonstrated experience and capacity of interested consulting organisations/ institutions/ firms applying for this assignment. The qualifying Team must include two Key Experts with qualifications and experience mentioned below:

Position	**Desired Qualifications and Minimum Experience**
Key Expert: Agriculture ***Number:*** **1**	***Essential Qualification:*** Doctoral degree on Agriculture/Horticulture. ***Desired Experience:*** Minimum 10 years' of working experience in the field of Agriculture/Horticulture and at least 5 years experience in the field of climate change and its impacts. Should have minimum 10 published papers related to the subject in reputed journals. Should have undertaken 1-2 projects on similar topic. ***Desirable specialization:*** Impact assessments and crop modelling; having experience of working in Meghalaya or NER will be given due weightage.
Key Expert: Hydrologist/ Water	***Essential Qualification:*** Doctoral degree in the field of Hydrology/Water Resources.

Resource ***Number*: 1**	***Desired Experience*:** Minimum 10 years' of working experience in thefield of Hydrology/Water Resources/Water Managementand at least 5 years experience in the field of climate change and its impacts. Should have minimum 10 published papers related to the subject in reputed journals. Should have undertaken 1-2 projects on similar topic. ***Desirable specialization:*** Impact assessments and hydrology modelling; having experience of working in Meghalaya or NER will be given due weightage.

8. Reporting Requirements, Progress Timelines and Time Schedule for Payments

The Consultant will report to the Project Director, CLLMP. However, on day-to-day basis, the consulting team will be working with the two Deputy Project Director - NRM (DPDs) and/or designated person of the Project who may be assigned as the Nodal Officer. The consultants will prepare a work planfor the assignment including reporting requirements, progress timeline and schedule of payments.

9. Client's input and counterpart personnel including Data and Facilities to beprovided by theClient

Services, Facilities and Materials to be made available by the Client to the Consultant are as below:

- Office space to the Consulting team with internet facilities, if required during the course of consultancy tasks, upon request addressed to the designated Point ofContact.
- Conference hall/meeting rooms as may be required during the course of the assignment for the purpose of making a presentation, submission of reports, workshops, brainstorming sessions andmeetings.
- Necessary project documents such as PAD, PIP, COM, etc., under its control and copyright for use and reference of the Consulting Team to facilitate execution of theassignment.
- Project Personnel of the State and Districts shall provide necessary inputs tothe Consulting Team throughout the duration of theassignment.
- During the field visits/works, the MCLLMP team at the District Headquarters(DPMU) will provide necessary support including meeting with community leaders, government officials, local NGOs, etc.
- **The MCLLMP will provide only those GIS layers which are already available with MBDA/MBMA to the successful bidder if the same is requested for.**
- All training expenditure for the enumerators should be borne by the consultant.
- The expenditure for conducting the workshops will be borne by MBMA, however, no incidental cost (e.g. resource person fee, TA, DA, etc.) towards the consultants will be entertained.

10. Composition of review committee and review procedure to monitor the progress of the assignment:

The Consulting Team will report to the Project Director, CLLMP. However, the Team will work with the Deputy Project Director (NRM) on day-to-day basis. The Project Technical Team comprising of Project Director, DPDs, the General Manager will provide comments/ final approval on each deliverable within 10-12 days of submission of deliverable which will also trigger the process of release of payment. The DPD (NRM) will be the Single Point of Contact from MBMA for the Consulting Team. The Consulting Team will receive a detailed briefing at the beginning of the assignment from the MBMA contact, with regular follow-up discussions via email, phone and in-person as required. All agreements reached with

timelines [if any] and the basis thereof will be minuted/recorded by the Project/MBMA and shared for common understanding.

The project may appoint a committee comprising subject matter experts, as required, for the purpose of evaluating the work of the Consulting Team /Agency under this assignment.

11. Ethical Issues

- The cultural sensitivities, religion, language sensitivities, gender issues, etc., have to be kept in mind while designing, and undertaking field works and interactions with rural communities.
- Ethical considerations will also be kept during data collection and dissemination of information with respect and acknowledgements for original informants.
- Precautionary principles will be applied in all the community and public dealings.

12. Copyright

All materials and documentation during the assignment will be the sole property of MBMA.

13. Report / Deliverables.

- Two major deliverables:
    - Study Report on "Impact of climate change on water resources of Meghalaya with a special reference to the consequences on livelihood"; and
    - Study Report on "Impact of climate change in different time horizons on agriculture including horticulture in Meghalaya"

- **The draft final report should be submitted latest by the end of the 8th month from the date of award of the study, after which the final report should be submitted latest by the end of the 9th month after making suitable modifications taken into considerations the comments made on the draft final report by the MBMA Officials.**

- All the spatial and non spatial data in soft copy format.

- All the reports submitted should also include list of people met (date-wise), list of villages visited (date-wise), workshop participants, photographs, necessary annexures, list of references, etc.

- 50 printed copies of the final report for each study to be submitted to the Project/MBMA.

- 10 printed copies of the Workshop Report(s) to be submitted to the Project/MBMA

- Word file & PDF in electronic version + all data, including raw and processed, spatial and non spatial, from both the studies to be submitted to the Project/MBMA.

- Hands on training to the client during the study period. (TA/DA to be borne by the client itself)

ANNEXURE 1

Concept Note on Integrated Landscape Approach to Natural Resource Management in the Era of Climate Change.

Concept Note for a Study on Climate Change & NRM

Study theme	Research & Study on Climate Change & NRM: Meghalaya
Suggested title of the study	Integrated Landscape Climate Change Impact Assessment for Meghalaya
Name of the Project hosting the study	Meghalaya Community Led Landscape Management Project (MCLLMP)
Name of Implementing Agency	Meghalaya Basin Management Agency (MBMA), Upper Nongrim Hills, Shillong, Meghalaya 793003
Period of the Study	9Months
Background & Context	Implementation of MCLLMP is mandated to undertake a number of key thematic research and development studies, one of these being on 'Climate Change and Natural Resources Management'. A detailed study on climate change and NRM will enhance the knowledge of the MCLLMP team with clear directions for actions, use the study recommendations and findings for capacity building of the communities around the theme of climate change and NRM, and above all provide specific orientation and guidance to identify activities that could be incorporated in the Community Landscape Plans/Community Natural Resource Management Plans for community actions that will contribute to improved adaptation and mitigation actions towards building more resilient communities.
Introduction	**Overview with the scope of the study** The term 'natural resources' refers to forests, water, landand minerals, that occur in nature and serves a number of social, economic and ecological purposes. These resources frequently represent an important source of livelihoods. Climate change adversely affects the livelihoods of the rural communities who depend on these natural resources.The situation is exacerbated by unplanned overuse of natural resources with visible impacts being degrading natural resources that are the very foundation of the traditional socio-economic base of the rural communities. On the other hand, there are emerging evidences that integrated landscape approach to natural resource management could meaningfully mitigate adverse impacts of climate change both on the natural resources and the communities. NRM in the present study would be in the context of rural communities' natural environment, except mining[1]. Thus, NRM is management of rural ecosystems with diverse land cover land uses including varied farming practices (such as agriculture, horticulture, cash crops plantations, shifting cultivation, *bun* cultivation, terracing, wet rice cultivation), forest (natural forest and plantation

[1] Mining in any form such as coal, sand and stone quarrying is excluded from the purview of the present study.

	forest), water (including wetlands and springs), fishery, wildlife, biodiversity and associated genetic resources. Integrated NRM is about sustainable management of resources to meet the goals of resource users, mainly the communities, to meet production for food and nutrition security, profitability/regular cash income, as well as risk aversion. Sustainable utilisation of natural resources is also linking to overall ecosystem services that underpin human wellbeing. A landscape approach, which is essentially an ecosystem approach, primarily entails the concept of viewing and managing multiple land uses in an integrated manner, considering both the natural environment and socio-human systems that depend on these resources. Borrowing from LPFN 2016,"A landscape is a social-ecological system that consist of a mosaic of natural and/or human-modified ecosystems, often with a characteristic configuration of topography, vegetation, land use, and settlements that is influenced by the ecological, historical, economic and cultural processes and activities of the area". Integrated landscape approach to natural resource management broadly encompasses a framework to integrate policy and practices for multiple land uses and other natural resources within a given area to ensure equitable and sustainable use of land and other natural resources while strengthening measures to mitigate and adapt to climate change. It seeks to balance the competing demands on land at a landscape level through adaptive integrated management systems taking into consideration internal and external socio-economic and socio-political drivers affecting natural resources particularly land use for agriculture and allied activities, conservation of forest, loss of biodiversity, water management and so on.
Objectives of the Study	To provide support to the project M-CLLMP, MBMA proposes to hire Organisations/Firms/Institutions to undertake two research studies as outlined below: • Study of impact of climate change in **three** different time horizons **(say 2021 to 2050, 2051 to 2070 and 2071 to 2100)** on water resources of Meghalaya with a special reference to the consequences on livelihood • Study of impact of climate change in **three** different time horizons **(say 2021 to 2050, 2051 to 2070 and 2071 to 2100)** on agriculture including horticulture in Meghalaya
Study Methodology/ Approach	The study should follow a methodology which is recognized in the academia and supported by research papers published in the high impact journals. The impact study should be compatible to highest resolution climate models.
Expected Output 1 (O1):Agriculture	1. Projected impacts of climate change on major agricultural and horticultural crops in different time horizons 2. Simulated crop growth under different climate change scenarios 3. Recommendation of different cultivars of agricultural and horticultural species which are resilient under different climate change scenarios 4. Identifying indigenous agriculture, horticulture crops and practices which are suitable for resilient livelihood practices under different climate change scenarios. 5. Recommendations on management of insects/pests and diseases of agricultural and horticultural species 6. Identification of agriculture and horticulture vulnerability hot-spots

	7. Recommendations for sustainable agricultural practices and management 8. Ways and means to mitigate impacts of climate change in theagriculture sector of the State. **9. Produce a climate change vulnerability map with respect to agriculture in the State**
Expected Output 2 (O2): Water	1. Estimation of surface water and ground water including springs under different climate change scenarios 2. Identification of water resources (surface, ground, springs) vulnerability hot-spots including spatial layer of the same 3. Identification of flood and drought prone areas under different climate change scenarios including spatial layer of the same 4. Recommendations for water management under different climate change scenarios 5. **Produce a climate change vulnerability map with respect to water resources in the State**

Note: All the reports submitted should also include list of people met, list of villages visited, photographs, necessary annexures, list of references, etc.