

MEGHALAYA WATER MISSION (Draft)

Executive Summary

Water Mission is one of the eleven missions under the state government's flagship Integrated Basin Development and Livelihood Promotion programme. The key elements of the Water Mission include knowledge management, institutional development and capacity building, water use and water use efficiency, water quality management, ground water management, flood management, promoting multipurpose use of water, water and climate change adaptation, water governance and convergence. The Water Mission will play the important role of linking the various initiatives by comprehensively involving all aspects of water management and linking them to various livelihoods with the goal of bringing a positive change in the lives of people of the state.

The Water Mission lays special emphasis on enhancing the knowledge of all the water resources, both surface and ground water in the state. Better knowledge amongst the various stakeholders would ensure better planning and targeted developmental efforts. Further, to ensure sustainable development and utilization of the state's water resources, the Water Mission encourages extensive community participation in the planning and development of water resources projects. It is envisaged that all efforts would be led from village level and upwards and the communities would be appropriately incentivized to take active participation to develop and manage water resources projects that ultimately ensure sustainable and inclusive development throughout the state. State wide awareness building initiatives such as a Water Campaign would be launched to sensitize various stakeholders and invoke active participation. To ensure wide coverage, the government would be engaging the youth as green ambassadors to take forward this awareness and water resource management initiatives. Use of advanced technologies is being promoted through partnership with North Eastern Centre for Technology Application and Reach (NECTAR) for efficient water sector development.

The Water Mission lays down the basic guiding principles for putting together a framework for addressing the significant issues surrounding water quality and livelihood. While availability of water is critical to sustainable livelihoods, it is also extremely important to ensure that development does not take place at the cost of environment due to over exploitation of available resources or pollution. In this regard the Water Mission envisions putting together a comprehensive water quality monitoring system and appropriate regulatory frameworks to ensure the rejuvenation of all areas, especially areas that are already over exploited and thereby ensuring that the State is prepared to adapt and mitigate the effects of climate change. Water Mission is promoting programs to ensure that water quality monitoring systems encompass all forms of water resources including ground water and for water resources throughout the state.

Water Use and Water Use efficiency have been given utmost important in the Water Mission. Strategies such as promotion and development of infrastructure for multipurpose use of water are highly

encouraged. The water mission envisions and lays down the basic framework for promoting adaptation of technology and best practices for increasing water use efficiency and multipurpose use of the state's most prized resource.

The Water Mission emphasizes the need for evolving a comprehensive approach to flood management for ensuring complete convergence of investments from all sources while getting the best value for the investments. Innovation through programs such as Water Plus initiative that focus on making incremental investments in the water bodies already created and factoring in harnessing the best value from such investments by putting in place the approach of integrated water resources management.

The implementation strategy for the Water Mission has been put together especially keeping in mind the various ongoing schemes and efforts of various departments. The Water Mission is laying the foundations for mobilizing and collating resources from various schemes and programs including funding from international development funding agencies. The importance of converging efforts and schemes will be critical to the success of the Water Mission.

The Water Mission lays special emphasis on water governance at all levels starting from farmer to village and district to state levels. The importance of supportive regulations and institutional framework was apparent and in this regard the government is putting together an actionable implementation plan for launching the Water Mission document which would act as the guideline for the policy makers to put together the Water Policy, Water Act and Water Code which would ensure that all efforts are properly streamlined and are collaborative in nature. In addition to the state wide policies and legislative frameworks, the Water Mission gives special importance to the development of social agreements which shall define the exact roles and responsibilities of all the stakeholders. Water Mission has clearly outline the necessity to design frameworks and regulations that ensure proper alignment of interests is maintained as that would be critical for the long term sustainability of the projects.

The target of the Water Mission is to achieve water security in the state by the end of 13th Five Year Plan and the Chief Minister has clearly laid down the vision for the Water Mission to provide safe and adequate access to water for all in the state by the time the state celebrates 50 years of statehood in the year 2022.

Abbreviations

AIBP: Accelerated Irrigation Benefit Programme
BRGF: Backward Regions Grant Fund Programme
CADP: Command Area Development Programme
DONER: Development of North Eastern Region
DWRC: District Water Resource Council
GDP: Gross Domestic Products
HYV: High Yield Varieties
IBDLP: Integrated Basin Development and Livelihood Programme
IWDP: Integrated Watershed Development Programme
IWMP: Integrated Watershed Management Programme
IWRM: Integrated water Resource Management
MBDA: Meghalaya Basin Development Authority
MBDC: Meghalaya Basin Development Council
MeWDA: Meghalaya Water Resource Development Agency
MNREGA: Mahatma Gandhi National Rural Employment Guarantee Act
MGNREGS: Mahatma Gandhi National Rural Employment Guarantee Scheme
MoRD: Ministry of Rural Development
MR: Multipurpose Reservoir
MW: Mega Watt
NABARD: National Bank for Agriculture and Rural Development
NAPCC: National Action Plan for Climate Change
NEC: North Eastern Council
NESAC: North East Space Application Center
NFSM: National Food Security Mission
NWDPPRA: National Watershed Development Project for Rainfed Areas
PHED: Public Health Engineer Department
RIDF: Rural Infrastructure Development Fund
RKVY: Rashtriya Krishi Vikas Yojana
RSVY: Rastriya Sam Vikas Yojana
UNFCCC: United Nations Framework Convention on Climate Change
WDPSCA: Watershed Development Project in Shifting Cultivation Areas
WUA: Water Users Association

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1 Introduction

The Average Annual Rainfall in Meghalaya is 2818 MM (source: rainwaterharvesting.org), whereas, Sohra or Cherrapunjee and Mawsynram in Meghalaya receive the highest rainfall in the world i.e. about 11000 mm annually, but this huge rainfall is concentrated only in monsoon months. 11, 667 sq km of the State drains into the Brahmaputra basin and the rest 10,650 sq km into the Barak Basin (Source: Central Water Commission).

In less than 12 hours all the rainfall run-off water reaches the plains of Bangladesh taking along with it top soil, boulders and logs besides creating flood-havoc in Bangladesh. In contrast during non-monsoon months, most of the rain-fed surface sources and spring sources get dried, leading to water scarcity, which is a major problem as the people living in these areas with highly variable rainfall, experience droughts and floods and often have insecure livelihoods. In many dire cases people do not even have regular access to water for drinking purposes.

The availability of surface water sources in Meghalaya has been roughly estimated at 15.09 BCM (source: report by WAPCOS). Although there is no tangible accounting of water domains in the State, however, countrywide, it has been assessed that 89% of water is used for agriculture and livestock, 6% for industry and 5% for domestic use (source: Water sector in India, report by Ernst & Young). Further, as per discussion paper on water mission prepared by state govt. the State requires about 15 BCM of stored water annually for meeting the water requirements for drinking water, irrigation and other livelihood generating activities such as fisheries etc. Increasing water availability throughout the year in the State by providing storage facilities has been given importance and various projects have already been taken up by the State government.

The situation, caused because of highly variable rainfall, has been aggravated because of traditional agriculture method of Jhum Cultivation. The State of Meghalaya like other north eastern states faces problems due to shifting or Jhum cultivation. Almost the entire state has been or is being influenced under shifting cultivation, except for some pockets of valley bottomlands, and reserve forests. Shifting cultivation involves clearing a patch of forest land, but retaining useful trees and plant varieties, cultivating it for two to three years and then abandoning it for 10-20 years to allow the natural forest to grow back and the soil to regain its fertility. The cycle of cultivation, leaving it fallow and coming back to it for cultivation, is called the Jhum cycle. Traditionally, a village community owns/controls the forest land and decides on such rotational cultivation pattern. Thus the community cultivates land for its livelihood while practicing conservation and taking care of the ecological balance.

However, with the population pressure, communities wanting to grow more crops for self consumption or for livelihood are forced to clear greater chunks of forest lands and return to the fallow plots much sooner than the older Jhum cycles of around 10-20 years. In some extreme cases, it has been noticed that the length of the fallow phase between two successive cropping phases has come down to even two to three years. This has resulted in soil degradation; fall in yield, lower returns, and reduction in green cover (source: Soil and Water Conservation Department, GoM)

Meghalaya's water resource management problem is further amplified due to the fact that about 80% of Meghalaya's population resides in rural and widely distributed areas (census 2011). Hence, it has been experienced that a standard water management solution does not adequately address the challenges in an effective manner. For example, while a single large reservoir would be able to store sufficient water, it could also pose a threat to livelihood security for downstream water-users who are dependent on a water source and upstream users who affect its quality or quantity in ways that make "normal" downstream activities impossible.

Issue is not just about the sufficient availability of water, but that of water quality as well. The water quality determines the life span or health factor of human being. Acidic or alkaline water beyond the tolerance limit destroys the life of aquatic being and plants or vegetation. In certain mining areas the water quality of streams has deteriorated because of excessive and non-scientific mining processes. Undoubtedly, coal mining operations in Jaintia Hills have brought wealth and employment opportunities in the area, but concurrently have resulted in extensive environmental degradation. Large scale denudation of forest cover, scarcity of water, pollution of air, water and soil and degradation of agricultural lands are some of the prominent environmental repercussions of coal mining.

Water quality in all the three aspects of physical, chemical and biological parameters need to be understood so as to ensure that pollution of water does not threaten its utility for irrigation and drinking purposes. A comprehensive understanding of the water quality in the state is currently not available and hence effective policy and decision making is usually not possible. It is thus very critical that as Meghalaya treads to become more productive it does adopt sustainable practices that not just ensure longevity of projects but also ensure that the environment is not harmed irrevocably.

The dwindling of forests due to felling of trees has influenced the average rainfall, resulting in less annual rainfall (Observations of increased tropical rainfall preceded by air passage over forests, research done by University of Leeds and the NERC Centre for Ecology and Hydrology, published in Nature Magazine, Published online 05 September 2012). Due to the decrease in rainfall, water availability has reduced considerably. The discharge of many streams has decreased to a great extent, where in some cases the streams or the springs have dried up.

Places where drinking water is drawn from water bodies, erratic geo-climatic conditions, large scale deforestation, flooding, sedimentation, soil erosion and drought has had a telling effect on the status of such water bodies in as far as water availability is concerned. The declining trend of availability of water signifies a possible danger waiting in the state of Meghalaya; which may also reduce the water availability per capita in the state from year to year. In order to address the issues of water management, climate change, issues related to Jhum cultivation and livelihood generation, the Government of Meghalaya has launched this Water Mission as a core mission of the IBDLP while also keeping in mind the national targets set for combating the challenges the country faces due to climate change. The following sections discuss in detail the genesis of the Water Mission and its links with the IBDLP, 12th Five Year Plan and NAPCC.

1.1 Integrated Basin Development and Livelihood Program (IBDLP)

Meghalaya has recently launched its flagship program – the Integrated Basin Development and Livelihood Program (IBDLP). Some important components of the IBDLP are:

- The programme would be aiming at improving local capacity in understanding challenges related to development and in identifying strategies and programmes to address those challenges.
- Emphasis would be put on preparation of projects and programmes having significant development impact on large population and areas, thereby avoiding small, wasteful projects and thin spread of resources.
- Planning for achieving integration across sectors and resources. The plans of different sectors should organically merge into an Integrated Basin Development Plan, emanating from a shared vision of development.

IBDLP endeavors to achieve livelihood security and inclusive growth by promoting optimal and effective development through value chain linked utilization of the State's natural resources within the broad framework of sustainable development along with efficient conservation and preservation of natural resources, *especially water*.

IBDLP has adopted a mission mode approach by launching independent missions for the specific sectors and organically merging them with the IBDLP. Under the IBDLP the following missions have been put in place:

1. Apiculture Mission
2. Aquaculture Mission
3. Forestry and Plantation Crops Mission
4. Horticulture Mission
5. Livestock Mission
6. Rural Energy Mission
7. Sericulture Mission
8. Tourism Mission
9. Water Mission
10. Green Mission
11. Organic Mission

The Meghalaya Water Mission is one of the core missions under the IBDLP. The Mission aims at promoting Integrated Water Resources Management (IWRM) in the State with a vision to ensure availability of adequate water resources for drinking purposes as well as for different economic activities particularly the ones promoted under the aegis of Integrated Basin Development & Livelihood Promotion Programme.

The Water Mission under the IBDLP became necessary to address challenges which were unique to the State. Meghalaya grapples with the irony of scarcity amidst plenty. Although the State receives the highest rainfall in the world, it is one of the driest places in the region during winters wherein people

face extreme shortage of water for drinking and irrigation. Agriculture in Meghalaya is mainly dependent on monsoon in the kharif and cultivation in rabi is carried out with soil moisture retention. With state experiencing heavy rainfall annually is adequate for few months but water retention capacity is less (megplanning.gov.in). It is envisaged that after the implementation of the Water Mission under IBDLP, it would be possible to grow two or even three crops in a year in regions where only one-two crops are being grown. Also, the additional water harvested and stored shall also be used for other livelihood generation activities such as fishery, live stocks etc.

It is envisaged that projects and activities under each independent mission of the different sectors will converge and integrate within the IBDLP framework. IBDLP has a clear focus of achieving local economic development by improving the quality of public services with strong focus on inclusive growth by especially targeting the poor and the marginalized population in the State.

In brief it can be stated that the broad goal of the IBDLP and its Missions is to facilitate participatory integrated natural resources conservation and management in the development process particularly focusing on water, soil and biotic resources. The Meghalaya Basin Development Authority (MBDA) will provide leadership and support to the various Missions (including the Water Mission) and facilitate platform for convergence and coordination between various government departments.

1.2 Twelfth Five Year Plan

The challenges in water sector can only be met through a paradigm shift in the management of water resources in India. This shift comprises the following elements:

- A move away from a narrowly engineering construction- centric approach to a more multidisciplinary, participatory management approach to our major and medium irrigation projects, with central emphasis on command area development and a sustained effort at improving water use efficiency.
- Since groundwater accounts for nearly two-thirds of India's irrigation and 80 per cent of domestic water needs, we need a participatory approach to sustainable management of groundwater based on a new programme of aquifer mapping.
- A massive programme for watershed restoration and groundwater recharge must be launched by transforming Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) into our largest watershed programme, giving renewed energy to the reformed Integrated Watershed Management Programme launched in the Eleventh Five Year Plan and launching a completely revamped programme on Repair, Renovation and Restoration (RRR) of Water Bodies.
- A new approach to rural drinking water and sanitation.
- All urban water supply projects to necessarily integrate sewage systems within them.
- Definite targets for recycling and reuse of water by Indian industry to move in conformity with international standards.
- Renewed focus on non-structural mechanisms for flood management.
- Vastly improved systems of water-related data collection and management as also transparency in availability of data.

- Adaptation strategies to mitigate the likely impact of climate change to be pursued under the National Water Mission (NWM).
- Perennial rivers with sufficient draft through the year could be the focal point of a renewed thrust to inland waterways transport as an environment friendly economical mode of transport compared to road and rail.
- A new legal and institutional framework for water based on broader consensus among the States.

The reform agenda for the Twelfth Plan will have five major thrust areas:

- Investments in Water Supply Will Focus on Demand Management, Reducing Intra-City Inequity and on Quality of Water Supplied
- Protection of Water Bodies
- No Water Scheme Will be Sanctioned without a Sewage Component, Which Joins the Dots with Pollution of Rivers and Waterways
- Plan Deliberately for Recycling and Reuse of Treated Wastewater
- Plan on a Regional Scale

1.3 National Action Plan on Climate Change (NAPCC)

In order to adapt and mitigate the effects of global climate change, Government of India has developed a National Action Plan on Climate Change (NAPCC). India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. Climate change may alter the distribution and quality of India's natural resources and adversely affect the livelihood of its people. Hence, India needed a national strategy to adapt to climate change and ensure sustainable economic development.

As per the NAPCC, India will engage actively in multilateral negotiations in the UN Framework Convention on Climate Change, in a positive, constructive and forward looking manner. Its objective will be to establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and respective capabilities, enshrined in the United Nations Framework Convention on Climate Change (UNFCCC). Such an approach must be based on a global vision inspired by Mahatma Gandhi's wise dictum "The earth has enough resources to meet people's needs, but will never have enough to satisfy people's greed". Thus we must not only promote sustainable production processes, but equally, sustainable lifestyles across the globe.

Finally, through the NAPCC India is trying the approach that is compatible with its role as a responsible and enlightened member of the international community, with the intention to make a positive contribution to the solution of a global challenge, which impacts on humanity as a whole. The success of India's national efforts would be significantly enhanced provided the various states in India take a similar step at the state level and play their part to achieve the goals outlines in the NAPCC.

In addition to adding value to the efforts for combating climate change on the global scale, India also faces the acute challenge of ensuring high growth rate which is essential for increasing living standards of the vast majority of people of India and reducing their vulnerability to the impacts of climate change. In order to achieve a sustainable development path that simultaneously advances economic and environmental objectives, the NAPCC was formulated based on the following principles:

- Protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change.
- Achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions.
- Devising efficient and cost-effective strategies for end-use Demand Side Management.
- Deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace.
- Engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote

There are Eight National Missions which form the core of the NAPCC, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. While several of these programmes are already part of ongoing activities, they may need a change in direction, enhancement of scope and effectiveness and accelerated implementation of time-bound plans.

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Ecosystem
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

The subsequent section discusses the salient features and goals of the Nation Water Mission.

1.3.1 National Water Mission

Under NAPCC, Government of India has launched Nation Water Mission. The main objective of the Mission is “conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management”. The five identified goals of the Mission are:

1. Comprehensive water data base in public domain and assessment of impact of climate change on water resource
2. Promotion of citizen and state action for water conservation, augmentation and preservation;
3. Focused attention to over-exploited areas
4. Increasing water use efficiency by 20%

5. Promotion of basin level integrated water resources management

Various strategies for achieving the goals have been identified which lead to integrated plan for sustainable development and efficient management with active participation of the stakeholders after identifying and evaluating the development scenario and management practices towards better acceptability on the basis of dependable projection of the impacts of climate change on water resources based on reliable data and information. Identified strategies of the National Water Mission also aim to review.

1. National Water Policy
2. Policy for financing water resources projects
3. Criteria for design and planning for water resources projects

The most important strategy is to identify and evaluate development scenario and management practices towards better acceptability with due consideration to integrated water resources planning and emphasis on ensuring convergence among various water resources programmes.

Some of the important features of the Mission are:

- Review of National Water Policy
- Research and studies on all aspects related to impact of climate change on water resources including quality aspects of water resources
- Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages
- Promotion of traditional system of water conservation
- Intensive programme for ground water recharge in over-exploited areas;
- Incentivize for recycling of water including wastewater
- Planning on the principle of integrated water resources development and management.
- Ensuring convergence among various water resources programmes
- Intensive capacity building and awareness programme including those for Panchayati Raj Institutions, urban local bodies and youths
- Sensitization of elected representatives of over exploited area on dimensions of the problem and to orient investment under NREGA towards water conservation

In order for the Meghalaya Water Mission to be more effective and succeed it is important the interlinks between the two are well understood and established. It is important that the activities and projects outlined in the two missions are properly synchronized such that maximum convergence of schemes is explored and synergies harnessed such that capital infusion is optimized and benefits are maximized.

1.3.2 State Action Plan on Climate Change

In line with the NAPCC, the state of Meghalaya has put together the State Action Plan on Climate Change. In addition to the macro challenges of sustaining India's rapid economic growth while dealing with global threat of climate change, Meghalaya is facing unique challenges because of its heavy dependence on natural resources. Since Meghalaya's economy is closely tied to its natural resources

base and climate-sensitive sectors, such as agriculture, water and forestry, Meghalaya may be forced to face and adapt to a major threat because of the projected changes in climate.

Meghalaya has a fragile eco-system. It has one of the wettest places in the world. The average rainfall at Cherrapunjee during the last 35 years has been 11,952 mm (470 ins) and there were several years when it was substantially more than this. However, in the last few years since 2005-06, it has shown a declining trend. Experts attribute this to the phenomenon of global warming and deforestation. However, short duration heavy rainfall and unprecedented variations in temperature and climate pose a potential destructive effect on the agriculture, the mainstay vocation in the State. Meghalaya's rich natural resources, high potential in horticulture that can have temperate, tropical and sub-tropical fruits and vegetables and its fodder plains including tea bushes are highly sensitive to climate change. Government of Meghalaya has understood the importance of climate change issue and its impact on growth, development and poverty reduction, and has decided to formulate a Climate Change Action Plan (CCAP) for the state.

The main objective of CCAP is to strategize adaptation and mitigation initiative towards emission stabilization and enhance the resilience of the ecosystem. This exercise helps serving as a platform to take the climate change agenda of the State forward, which in future could be a combination of advocacy, knowledge deepening, policy analysis, operational work and strengthening participatory governance.

The State's agrarian population is envisaged as a highly vulnerable group to the changing weather patterns, unpredictable floods and dry spells as well as soil and water contamination from acid mine drainage in mining areas. Intensive research and pilot studies on stress tolerant varieties of crops, promotion of low volume high value crops, optimization of Jhum through improved measures such as contour bunding, documentation of traditional adaptation practices, soil and water conservation, rainwater harvesting for irrigation, treatment of catchment areas, vaccination programmes for control of vector-borne diseases and widespread capacity building of farmers on sustainable agricultural practices are the key priorities that will be addressed in this context.

To ensure judicious use of water in the State in a way that safeguards the natural environment, establishment of a State water use policy has been accorded prime importance. Studies on water budgeting, water scarcity and assessment and maintenance of water quality, etc. are being taken up to enable formulation of an integrated water resource management policy. This policy would ensure efficiency of water use and incorporate polluters pays principle to ensure prevention of water pollution. Integrated river basin management would be taken up under the proposed State River Basin Authority. Traditional water conservation methods would be revisited and propagated, alongside restoration of existing water bodies and monitoring of surface and ground water quality.

2 Background

Meghalaya is blessed with abundant water. It has several rain based rivers and some places in Meghalaya receive on an average 2818 cm. of rain every year. The rain pours continuously for eight months from April leaving four months almost dry in Meghalaya. It is essential to make use of this vital resource for the development of the state.

Forest cover in the State (42.01%) is below the national norm of 60% recommended for hilly areas. This is because a sizable proportion of the Forest area is reportedly under shifting cultivation resulting in depletion of the Forest Cover. A very meager proportion of the geographical area is net sown area, including area under shifting cultivation. The potential net sown area could be increased if and when the fallow lands are utilized for cultivation purposes. The cultivable waste land of the state is 20.63% of the geographical area a part of which might be progressively utilized for cultivation purpose in the long run provided proper water management and drainage is planned (megagriculture.gov.in).

In this backdrop and based on the objectives of Integrated Basin Development and Livelihood Program (IBDLP) and National Water Mission, Government of Meghalaya has launched Meghalaya State Water Mission to address the issues of water resource planning, development and management to make the state sufficient in water supply for all purposes, and promote Meghalaya Water Resources Development Agency to take up activities relating thereto.

2.1 Vision

“To promote Integrated Water Resources Management in the State of Meghalaya and to conserve and use water judiciously with the ultimate goal of building of water related livelihood and enterprise opportunities in the state.”

2.2 Mission

“To manage Meghalaya's water resources for the common benefit to assure its sustained use by the people of the state”.

2.3 Mission Intervention

The following are the key interventions that are envisaged through State Water Mission.

- 1) Awareness and Sensitisation Programme for efficient water use
- 2) Development of Multipurpose Reservoirs
- 3) Knowledge Sharing
- 4) Convergence of various schemes for effective infrastructure creation and management
- 5) Support linking to social, economic and ecological development

- 6) Legislation and policy framing
- 7) Water quality control
- 8) Monitoring, evaluation (including social auditing) and learning

The State Water Mission envisages a cluster approach for intensive development and management of state water resource as per its potential and aims to promote convergence and participatory development in the water sector.

2.4 Mission Components

The Water Mission is sub-divided in to the following ten “sub-missions” and the succeeding chapter outlines the objectives and goals and recommended strategies in respect of each sub-mission.

1. Knowledge sub mission
2. Institutional Development and capacity Building sub mission
3. Water Use & Water Use Efficiency sub mission
4. Water Quality Management sub mission
5. Ground Water Management sub mission
6. Flood Management sub mission
7. Promoting multipurpose use of water sub mission
8. Water & Climate Change sub mission
9. Water Governance sub mission
10. Convergence sub mission

2.4.1 Sub-Mission 1: Knowledge sub mission

Knowledge is essential for good water resource management, which balances economic development, social equity, and environmental sustainability. With the challenges of improving service coverage, meeting increasing demands, and protecting and rehabilitating water resources in a context of increased pressure on their integrity, there is a need for new technologies and approaches, not only requiring new technology, but also new management approaches and tools to influence the behavior of individuals, organizations and enterprises. Currently, the data and knowledge available in Meghalaya are insufficient, scattered, and often they are not regularly updated. The primary aim of the Knowledge sub-mission is to enhance data collection by use of state-of-art-technologies to ensure availability of reliable and regularly updated data on the state of water resources, water management, and socio-economic challenges and constraints vis-à-vis water in Meghalaya for informed and evidence-based decision making.

Under this sub-mission it is proposed to setup a State Water Resources Information System (SWRIS) in collaboration with NECTAR to collect and collate hydrologic data regularly from all over the state, conduct the preliminary processing, and maintain in open and transparent manner on a GIS platform. This would also involve installation of water sensors along with automatic weather stations in strategic locations in the state. 17 locations have already been identified in different parts of the state and feasibility studies for the same are currently being carried out. Keeping in view of the likely climate

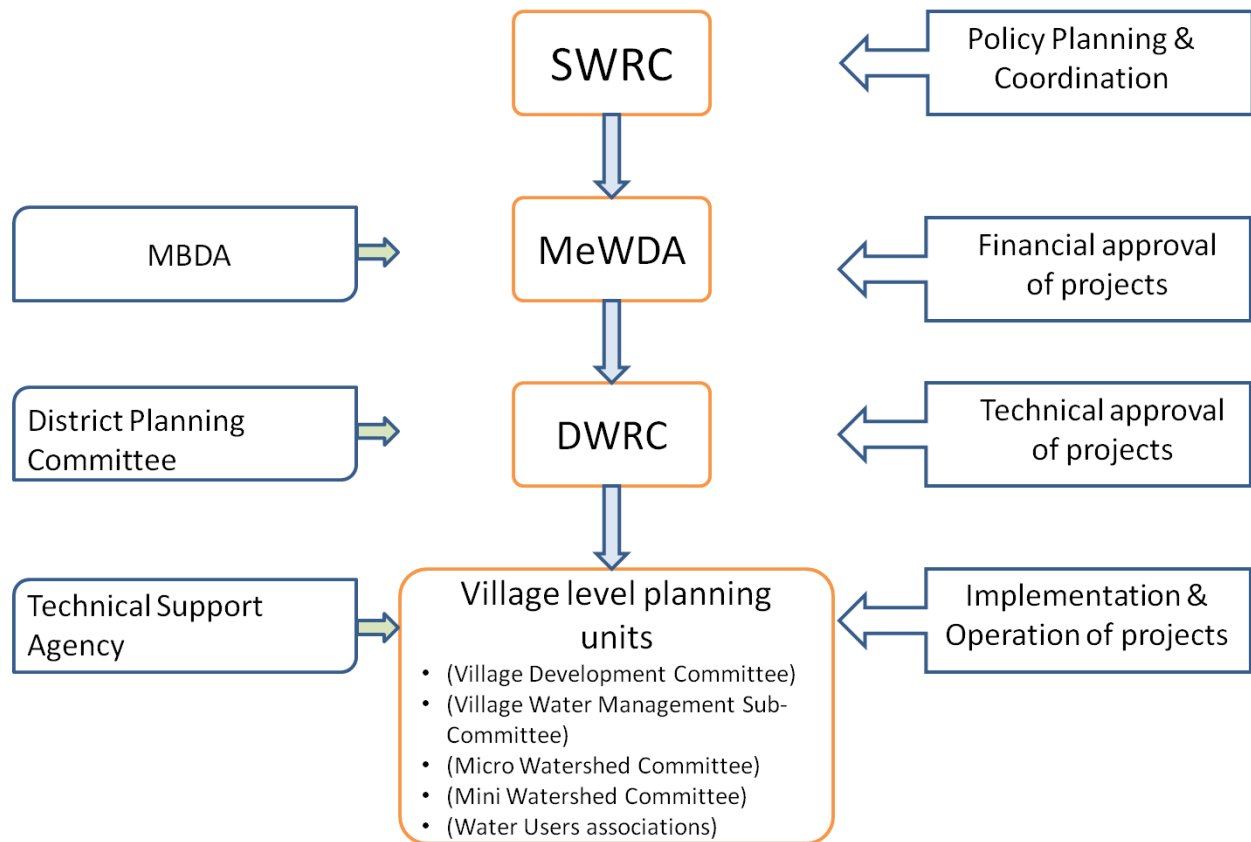
change and its impacts, much larger data about hydraulics, river / stream geometry changes, etc. shall be collected. Appropriate arrangements for each river basin will be developed to collect and collate all data on regular basis with regard to rainfall, geo-morphological, geological, river flows & ground water, climatic, area irrigated by crops and by source, utilizations for various uses by both surface and ground water and to publish water accounts on monthly basis every year for each river basin with appropriate water budgets and water accounts based on the hydrologic balances.

All water related data collected will be adequately integrated with well-defined procedures and formats to ensure creation of a comprehensive online database which would enhance knowledge sharing, transfer of data to facilitate informed and scientific decision making and designing of projects for sustainable management of water resources.

2.4.2 Sub-Mission 2: Institutional Development and Capacity Building sub mission

The objectives of the “Water Mission” can be achieved only through proper co-ordination, effective monitoring and in-depth evaluation at regular interval. Therefore, an appropriate institutional set-up is needed.

The institutional setup for implementing the Water Mission is shown in the graphic below and described in the following sections.



The State Government will be the policy planning and coordinating agency for the project. Village / Community level Institutions will be the Implementing Agencies.

The State Water Mission will be headed by the Chief Secretary/ Officer of Chief Secretary rank. The State Government will provide necessary operational flexibility to the Mission for integrated implementation of inter linked missions of IBDLP.

The institutional setup along with well defined roles and responsibilities of each of the stakeholders for the Water Mission are summarized below.

a. State Water Resource Council (SWRC)

The State Water Resource Council (SWRC) has been notified with the Chief Minister as Chairman, and Ministers of water related departments and Chief Secretary as members. Principal Secretary / Commissioner and Secretary of Water Resource Department will function as Member Secretary.

The SWRC is the apex body in the state to decide on policy planning relating to water resources in Meghalaya. The functions of the Council will include policy planning, resource mobilization and co-ordination of the activities of various departments / agencies of the government as well as civil society organizations.

b. Meghalaya Basin Development Authority (MBDA)

The Meghalaya Basin Development Authority (MBDA) is headed by the Chief Secretary, Government of Meghalaya. It will be Apex Committee for implementing Water Mission. The key functions of the MBDA involve policy planning, co-ordination of efforts of various stakeholders and facilitating convergence of various missions under IBDLP.

c. Meghalaya Water Resource Development Agency

Meghalaya Water Resource Development Agency (MeWDA) housed under Water Resources Department is the executive committee for implementing the Water Mission in the state. The authority is created to coordinate the activities of various government and other agencies involved with the water sector and acting as a multi-sectoral autonomous institution having representation of all water sector departments.

The Meghalaya Water Resource Development Agency is a registered body under the Meghalaya Societies Registration Act 1983 and governed by the Governing Council with the Chief Secretary and Additional Chief Secretary as Chairman and Vice Chairman respectively. The members of the Governing Council shall include Principal Secretary / Commissioner and Secretary of the concerned departments, distinguished persons from public and private sectors, research and development institutions, civil society organizations, academics, management etc.

The agency also has the Executive Council at the State Level with Commissioner and Secretary (Water Resources) as Chairman, Chief Engineer (Water Resources Department) as Member Secretary and Chief Engineer (PHE), Chief Engineer (PWD-Roads), Chief Conservator Forest, Director (Agriculture), Director (Horticulture), Director (Soil & Water Conservation), Director (C&RD), Director (Tourism), Chief Engineer (MeCL), Chief Engineer (CWC, Shillong), Office in Charge (CGWB, Shillong Unit) as the members.

The Existing Society for Rain Water Harvesting Mission has also been merged with MeWDA with all assets and liabilities of the erstwhile society transferred to it.

The following are the key functions to be performed by MeWDA:

1. Financial Approval of the schemes
2. Receive funds from center for implementing the schemes
3. Judicially distribute the funds for implementing schemes
4. Monitoring the progress of individual schemes and projects

d. District Water Resource Council (DWRC)

At the district level, the MeWDA has District Water Resources development Council (DWRC) is chaired by the Deputy Commissioner. The members include District Heads from Water Resources / Public Health Engineering / PWD-Roads / Forest / Agriculture / Horticulture / Soil & Water Conservation / C&RD / Power and Tourism and any other officer or expert that may be co-opted by Deputy Commissioner. The Executive Engineer (WR) or any other officer identified by the Deputy Commissioner shall be the Member Secretary.

The following are the functions to be performed by DWRC:

1. Clearance of all water projects from DWRCs shall be mandatory so that efficient coordination and convergence all activities related to Water Mission at the district level are achieved.
2. Sensitizing the public representatives, officials and the general public about the Water Mission principles.
3. Scrutiny and technical approval of the schemes submitted by the Water Users Association and submit it for financial approval with its observations on the same.
4. Selection of agencies and/ NGOs and enter into agreements for social mobilization, capacity development, communication, project management and supervision.
5. Monitoring and evaluation, capacity building and training with help of MeWDA inclusive of expert consultant engaged for this purpose
6. Interaction with MeWDA, State Government for Meghalaya for obtaining financial approval of the scheme.
7. Periodic review of implementation of the MOU signed with Water User Association.
8. Monitoring and evaluation of physical and financial performance and management of the water projects.
9. Arranging independent certification of the quality of construction of Water Mission projects based on the inputs received from different monitoring agency.

e. Village level planning units

In every village, there will be an integrated village development committee. Under this committee there will be a village water management sub- committee. Two candidates, one male and one female, from

the village water management sub-committee will be nominated to represent their village in the micro water shed committee. A few members from the micro-watershed committee will then be nominated into the Mini-Watershed committee. A micro watershed on an average comprises of 2 villages with an area of approx 800 hectares while the mini water shed comprises of 11 villages on an average and covers an area of approx 3700 hectares. There are 2776 micro watersheds and 550 mini watersheds in the state.

f. Water Users Association

Water Users Association (WUA) are being formed and registered under the Registration of Societies Act and these will be grass root associations for implementing the projects under Water Mission. Total number of WUAs till date is 254 out of which 94 WUAs have been formed in the last 2 years. WUAs consist of representatives of people involved in different livelihood activities around water. WUA should also consist of members of VWSC, VHSC, watershed committee, Village employment committee so as to have convergence at village level. WUAs will also ideally have technical members or advisors from water resource departments who can help the community with the technical matters relating to preparation of proposals and actual implementation of projects. WUAs significantly enhance participation of farmers & farmer groups at all stages of planning, design and implementation of projects which is critical for project success

The following will be the key responsibilities of the WUA:

1. To assist the Department during project formulation & implementation phase
2. To take responsibility in Operation & minor maintenance of the project
3. Resolve conflict amongst beneficiaries
4. Interact with Enterprise Facilitation Centers (EFCs) to conceptualize projects for water management that generate or enhance livelihood opportunities.
5. Prepare and submit proposals for water projects to DWRC for technical appraisal and which would further submit these proposals for technical and financial approval to MeWDA with its observations on the same.
6. Ensure community participation and decision making in all projects such that targets of inclusive growth are actually achieved.
7. Organize community contributions towards capital costs, both in cash and kind (land, labour or materials).
8. Open and manage bank accounts for depositing community cash contributions, O&M funds and management of project funds.
9. Sign various agreements with the DWRC.
10. Plan, design, and implement all water project with the assistance of MeWDA and other government departments.
11. Procure construction materials/goods and selection of contractors (where a specialized work is required) and supervision of project implementation activities.

12. Commission and takeover operations and maintenance of completed water works so that the development partners are from the same society having full alignment of end goals and objectives.
13. Collect funds through a tariff, charges and deposit system for O&M of water works for proper managing and financing of O&M of the services on a sustainable basis
14. Empower women for day to day operation and repairs of the scheme.

Capacity Building and Awareness Programme

To meet the need of the skilled manpower in the water sector, regular training, capacity building and awareness programs will be promoted. The various programs planned under this sub-mission include:

- a) Workshop and stakeholder on Draft Water Mission Document
- b) Workshop on Jalkunds
- c) Workshop on Small Multipurpose Reservoirs (SMRs)
- d) Awareness Programme on “Save Water, Save Earth” in collaboration with Central Soil & Material Research Station (CSMRS), New Delhi
- e) Water Retreat at Sohra in collaboration with Meghalaya Water Foundation (MWF)
- f) Training Programme on Micro-Irrigation Techniques in collaboration with NERIWALM.
- g) Capacity building programs directly targeting WUAs shall be organized both at state and district levels regarding participatory irrigation management (PIM) in collaboration with Indian Network in Participatory Irrigation Management.
- h) Under this sub-mission an elaborate mass awareness “Water Campaign” shall be organized to provide a platform to reach out to the rural community in all villages to spread the importance of sustainable development of water resources. The key objective of this campaign would be to enhance and promote integrated approach for planning, designing and operations of water projects in which government, civil society, village community, traditional institutions and all other stakeholders shall work together towards achieving the common holistic vision laid for the Water Mission.

In order to have effective capacity building throughout the state it is proposed to setup training framework which shall be regularly updated by developing infrastructure and promoting applied research, which will help to improve the current procedures of analysis and informed decision making in the line departments and by the community.

It is necessary to give adequate grants to update technology, design practices, planning and management practices, preparation of annual water balances and accounts for the site and basin, preparation of hydrologic balances for water systems, and benchmarking and performance evaluation.

2.4.3 Sub-Mission 3: Water Use & Water Use Efficiency sub mission

Under this sub mission, demands for various uses of water including those that generate livelihood opportunity in the state shall be identified in consultation with WUAs. Water demands for various sectors like Drinking water, Irrigation, Fisheries, Horticulture, power generation etc will be identified and sources for fulfilling these demands will have to be identified at village/ micro-watershed level.

Under this sub-mission the following key areas related to water resources would be developed.

1. Water Use for Irrigation Development: The total irrigation potential in the state is about 2.18 lakh hectare. Until 2010-11, only 34,624 ha of land was covered under irrigation scheme and since the inception of the Water Mission in the year 2011-12 there has been a 77% increase in the total area under irrigation. Currently, about 28% of the total identified irrigation potential has been covered under irrigation schemes. The goal is to achieve 50% irrigation coverage by the year 2017.
2. Development of Jalkunds/Water Harvesting structures: Jalkunds are Rain Water Harvesting structures which have a vast potential for domestic use & agricultural purposes for farmers. Jalkunds are technically and financially viable options in case of upland areas where sites for construction of ponds has limited catchment area and there is severe water scarcity during off season. Creation of these structures will facilitate enhancement of crop productivity, livestock, etc, besides improvement of soil and water conservation. Thereby significant emphasis has been put on creation of such water harvesting structures. Already a sum of Rs. 28 crores has been sanctioned for the construction of jalkunds and 581 structures will help create 2405 ha irrigation potential by year 2014. The existing and future Jalkund schemes shall be implemented through the WUAs and DWRCs.
3. Water supply: Under this sub-mission significant emphasis has been laid on increasing access and availability of water to all the people of the state. The goal is to provide safe and adequate access to water for all in the state by the time the state celebrates 50 years of statehood in the year 2022.
4. Water use for promoting fisheries development: The Water Use sub-mission of the Water Mission shall fully support and converge with the activities under the Aquaculture Mission to target creating 1 lakh ponds covering a water spread area of about 10,000 ha by the end of the 12th five year plan.
5. Water Use for Hydro Power Generation: This sub-mission shall fully support and converge with the activities under the Energy Mission for creation of hydro-power plants such that sufficient energy is sustainably harnessed from the available water resources in the state leading to complete energy independence.

In case of any competing demands, the following framework is suggested for community based conflict resolution

Type of concern	1 st level resolution	2 nd level resolution
Water use allocation for various sector within village	Water User Association	Village development committee

Type of concern	1 st level resolution	2 nd level resolution
Water usage affecting multi village	Micro watershed committee	DWRC

If the issues are not resolved in the forums proposed above, DWRC will deliberate upon issues relating to water and evolve consensus, co-operation and reconciliation amongst different stake holders. The above proposed forums will be responsible for amicably resolving differences in competing demands for water amongst different users of water. Any other water disputes shall be taken up by MeWDA.

By identifying water use/ demand promotion of micro-enterprises and generation of variety of livelihood opportunities by leveraging the intrinsic natural resource potential in a given area will be covered under this Sub-Mission. The key intention is to increase the availability and reliability of water supply so that people of the state can choose other sustainable livelihood activities and thereby improve their lives and also contribute effectively to the growth of the GDP of the state and the nation.

Water Use Efficiency

According to the Second UN World Water Development Report, if present levels of consumption continue, two-thirds of the global population will live in areas of water stress by 2025. Increasing human demand for water coupled with the effects of climate change mean that the future of our water supply is not secure. As of now, 2.6 billion people do not have safe drinking water. Added to this, are the changes in climate, population growth and lifestyles. The changes in human lifestyle and activities require more water per capita. This tightens the competition for water amongst agricultural, industrial, and human consumption.

Water use efficiency in agriculture in India, which consumes major portion of our water resources, is only around 38 per cent, which compares poorly with 45 per cent in Malaysia and Morocco and 50–60 per cent in Israel, Japan, China and Taiwan (twelfth five year plan)

In order to address the pressing issues related to water availability in a sustained manner, water use efficiency is the need of the hour. The following initiatives have been planned for enhancing the water use efficiency in the state.

1. **Command Area Development (CAD):** In order to enhance the water use efficiency command area development activities such as improvement of canal network is existing minor irrigation projects, to improve efficiency, provide lining of canals, strengthening embankments, etc.
2. **Water Plus initiative:** The Water Plus initiative is a state wide program that envisages an optimal utilization of water in existing command areas where irrigation facilities have already been provided. The target is to improve the overall impact of the schemes by facilitating multiple use of available water which shall be achieved by providing latest inputs and promoting technology in the fields of agriculture, horticulture, fisheries, etc, to further enhance the economic activities of the stakeholders around the command. The Water Plus shall also promote activities surrounding protecting the catchment area through various treatment works. The scheme also envisages achieving its goals by converging its activities with other missions of the Integrated Basin Development & Livelihood Promotion (IBDLP) Programme.

3. Raising of Dam height: In order to increase the water use efficiency, project for raising existing dam height shall be taken to achieve optimal utilization of water in existing projects as that additional water collected will be used for multi-purposes. DWRCs have already begun identifying feasible sites to take up such work and MeWDA with the assistance of NECTAR shall provide assistance with the use of advanced technologies such as remote sensing & GIS technology.

2.4.4 Sub-Mission 4: Water Quality Management sub mission

Water is most essential but scarce resource in our country. Presently the quality & the availability of the fresh water resources is the most pressing of the many environmental challenges on the national horizon. The stress on water resources is from multiple sources and the impacts can take diverse forms. Geometric increase in population coupled with rapid urbanization, industrialization and agricultural development has resulted in high impact on quality and quantity of water in our country. The situation warrants immediate redressal through radically improved water resource and water quality management strategies.

The steps involved in preparation of a water quality management plan in a rational manner the following steps to be adopted (Guidelines for Water Quality Management, CPCB):

- Setting Water Quality Goal:
 - Water Quality Monitoring: Network of water quality monitoring labs including mobile testing vans shall be set up across the state,
 - Monitoring for establishing baseline water quality
 - Observing trend in water quality changes
 - Calculation of flux of water constituents of interest
 - Surveillance for irrigation use
 - Control and management of water pollution
- Identification of Nature and Magnitude of Pollution
- Source Inventory
 - Identify the source(s) of such pollution is/are identified.
 - Inventorise the number of outfalls joining the water body for identification of point sources
 - Measure the quality and quantity of wastewater flowing through each of the outfalls.
 - For each outfall pollution load joining per unit time (normally per day) should be measured in terms of important pollutants.
 - Inventorise the human activities in the upstream catchments area of the water body to identify the nonpoint sources of pollution. The activities could be open defecation, unsewered sanitation, uncollected garbage sewage and industrial wastes, commercial wastes in case of urban or industrial areas and application of agrochemicals in case of rural areas.
- Water Quantity information: It is proposed to develop a water quality monitoring system by which water quality from various sources will be obtained and will be integrated and

documented for use by different water sector departments. The following data shall be collected and integrated.

- In case of river or stream acquire the flow data from CWC, State Irrigation Deptt. For atleast last 5 years or more.
- In case of lakes, reservoirs collect the information on water levels for atleast last 5 to 10 years
- Carry out mass balance to estimate the dilution available in different seasons.
- Estimate the least dilution available in last 5 years.
- Assess the assimilation capacity by applying simple streeter-phelps equation and generate different scenario to estimate the extent of pollution control required.
- This exercise would give precisely how much pollution load needs to be reduced to achieve the desired water quality.
- Selection of Technology
 - Simpler technology should be adopted for sewage treatment
 - Sewage collection and treatment being primary responsibility of local authorities
- Financing Waste Management
 - The present approach of financing the waste management is neither adequate nor effective in tackling the massive problem water quality degradation. Thus the approach needs to be changed.
 - The major part of the cost on waste management should be born by the urban population according to 'polluter pay principle'.
 - It can be applied to any dischargers, cities or industries, with two benefits; it induces waste reduction and treatment and can provide a source of revenue for financing wastewater treatment investments.
 - Municipal wastewater treatment is a particularly costly and long-term undertaking so that sound strategic planning and policies for treatment are of special importance.
 - Pricing and demand management are important instruments for encouraging efficient domestic and industrial water-use practices and for reducing wastewater volumes and loads.
 - Water and sewerage fees can induce urban organizations to adopt water-saving technologies, including water recycling and reuse systems, and to minimise or eliminate waste products that would otherwise end up in the effluent stream.
- Maintenance of sewage treatment plants
- Pollution from industrial sources
 - Pollution control at source
 - Reuse/recycling of treated industrial waste and resource recovery
 - Waste minimization and clean technologies
 - Waste water discharge standards and charges on residual pollution
 - Mixing sewage with industrial waste wherever advantageous
- Pollution from non-point sources (such as acid mine drainage)

- Unsewered sanitation, uncollected wastes dumped haphazardly in urban and industrial areas and application of chemicals in agriculture such as pesticides, insecticides and chemical fertilizers. In this regard it is essential that an integrated pest management policy should be evolved and standards made to regulate the use of toxic pesticides and to develop substitutes which are ecologically more acceptable.

Certain areas such as the mineral-rich Jaintia Hills district of Meghalaya, are being seriously affected by mining activities. As a result, the people living in these areas or downstream face acute drinking water crisis as major rivers there have been declared “unfit” for human use due to high level of acidity caused by unscientific mining and it should be addressed. However, while finding appropriate solutions, remediation measures and enforcement strategies it would be ensured that people involved in mining sector are not dislocated or left with no other livelihood option. Special emphasis shall be given to implement long term sustainable solutions that ensure the delicate balance between livelihood opportunities, environment and social development is well maintained.

2.4.5 Sub-Mission 5: Ground Water Management sub mission

It is ironic that while much of India suffers from falling water tables due to overexploitation of groundwater, eastern India is broadly characterized by under-utilization of this precious resource. During the Twelfth Plan sustainable groundwater irrigation development will be promoted in 11 Eastern States including the seven North-Eastern States in order to more fully realize the potential of this region to contribute to the needs of national food security, even while ensuring that this intensification of groundwater use does not lead to the same deterioration in water table and water quality that has been experienced in other parts of India (Twelfth Five Year Plan)

There is a very high density of drainage network system in Meghalaya, but most of the rivers and streams have water only during the rainy season and many streams dry up or their flow dwindles during the summer leading to water scarcity. Groundwater is the largest accessible and yet underdeveloped resource in the entire State. The regional water shortages and water crises can only be met with a rational and sustainable use of this untapped freshwater reservoir. The importance and contribution of ground water is felt in the recent years to cope up with development and scarcity situations, particularly to meet the drinking water needs.

The annual gross dynamic ground water recharge of Meghalaya has been estimated as 1.234 billion cubic meter (BCM). Annual allocation for domestic & industrial water requirement upto year 2025 is estimated as 0.096 BCM as per census 2001. 1.014 BCM of ground water potential may be utilized for irrigation. The level of ground water development in the state is 0.15%.

Central Ground Water Board, North Eastern Region, Guwahati has compiled information regarding ground water in Meghalaya in an Atlas, “Aquifer Systems of Meghalaya”. It provides valuable information on the areal and vertical extents of major aquifers and their characteristics. Using these information as the starting point, the ground water shall be developed under this sub-mission.

While developing the ground water resources groundwater pollution, recharging and judicious exploitation issues shall be taken care of by planning for ground water recharging and source protection measures.

2.4.6 Sub-Mission 6: Flood Management sub mission

The state of Meghalaya has two major basins: Bhramaputra and Barak. The Brahmaputra River has its origin on the northern slope of the Himalayas in China (Tibet), where it is called as Tsan-Po. It flows towards east for a length of about 1,130 km and then turns towards south and enters Arunachal Pradesh state of India at its northern-most point and flows for about 480 Km. Then it turns towards West and flows through Arunachal Pradesh, Assam and Meghalaya states for another about 650 Km and then enters Bangladesh. At the border, the river curves to the South and continues on this course for a length of about 240 Km to its confluence with the Ganges. The Barak basin covers parts of India, Bangladesh and Myanmar. In India it spreads over states of Meghalaya, Manipur, Mizoram, Assam, Tripura and Nagaland having an area of 41,723 Sq.km. The Barak River rises from the Manipur hills, south of Mao in Senapati district of Manipur at an elevation of 2,331 m. It flows then along Nagaland-Manipur border through hilly terrains and enters Assam. It further enters Bangladesh where it is known by the name of the Surma and the Kushiara and later called the Meghna before receiving the combined flow of the Ganga and the Brahmaputra.

Basin	Basin Area (Lakh Ha)	No Of Catchment	No of Sub Catchment	No of Watershed	No of Sub Watershed
Left Bank of river Brahmaputra	11.29	2	5	20	92
Barak Basin	11.21	1	3	15	87
Total	22.40	3	8	35	179

Flood affected areas are mostly on the low altitude areas, bordering Assam and the international border (India-Bangladesh). Flash floods have become a regular feature in these areas, due to massive deforestation, unchecked jhum cultivation. The flood water carries huge amount of hill sand, stone, logs and trees, which are deposited in agricultural fields due to inundation of banks in the foot hills, thus causing immense damage to crops. This sub-mission intends to address the issue of floods in the state and its mitigation measures.

2.4.7 Sub-Mission 7: Promoting multipurpose use of water sub mission

Multipurpose Reservoir (MR) is an artificial dyke, levee, check dam or other barrier, together with appurtenant works, which is constructed for impounding water for multipurpose use.

Cascading MRs of various sizes and designs may be constructed to meet the various water use requirements such as upstream reservoir could be used for water supply for drinking and irrigation purposes and downstream reservoirs for fish farming.

MRs will have the following components:-

- Structural components having a combination of components for different uses such as Drinking & Domestic Water, Irrigation, Fisheries, Livestock, Micro hydel (< 100kw; where ever feasible) etc.
- Non-structural components like capacity building, institution building, Management Information System (MIS), monitoring & evaluation, entrepreneurial promotion, etc.
- Ancillary Components like water filtration, soil fertility testing, water testing kits, improvement of traditional sources, improvement of catchment areas, conveyance systems through canals and pipes, etc.

Multi-purpose reservoirs are a widely used form of infrastructure for the provision of water. They supply water for domestic use, livestock watering, small scale irrigation, and other beneficial uses. In order to achieve the goal of storing water for multiple purposes without giving rise to conflicting social and environmental issues, the State Government has initiated the development of multipurpose reservoirs (MR) through a community led participatory approach.

The DRWRc along with WUAs and MeWDA district staff have been working on identifying feasible sites for MRs. In the first phase, comprehensive water planning and development of MRs is proposed for the following sub-basins.

- Ganol sub-basin
- Bugi sub-basin
- Simsang sub-basin
- Umsohryngkew sub-basin
- Kynshi sub-basin
- Wahblei sub-basin

Ultimately, the entire state of Meghalaya will have a wide variety of MRs that will be designed and constructed to suit the local people requirements. In order to gain maximum coverage efforts to consolidate and converge existing and proposed water resources schemes shall be given high importance.

The creation of multipurpose reservoir would also enhance the water use efficiency by making the water available throughout the year thereby allowing use of improved irrigation methods. Also by using the same water for different purposes in a cascading manner for example water after micro hydel can be used for irrigation purposes, water use efficiency shall be enhanced.

2.4.8 Sub-Mission 8: Water & Climate Change sub mission

The state of Meghalaya is highly prone to the effects of climate change because of its geo-ecological fragility, humid monsoon climate, and socio-economic problems. Since 2005-2006, there has been reportedly a trend of declining annual rainfalls in Meghalaya. This is attributed by experts to a combination of climate change and deforestation. Furthermore, the rainfall variability and occurrence of extreme events has increased and is expected to further increase, with monsoon rains variability already having increased drastically since 2001 and shifted towards the “post-monsoon” period. This has over

the last 20 years led to an increased frequency and magnitude of floods during the monsoon. At the same time, the occurrence of droughts has increased in Meghalaya. Thus, it is anticipated that climate change will in the future further increase the frequency and magnitude of floods and droughts and in general make the weather patterns more variable.

Further, short duration heavy rainfall and unprecedented variations in temperature and climate pose a potential destructive effect on agriculture, the mainstay in the state. Meghalaya's rich natural resources and horticulture production of tropical, sub-tropical and temperate fruits and vegetables and tea bushes are highly sensitive to climate change. Hence, climate change impacts are potentially very severe for the environmental security and sustainability and thus for rural livelihoods. Calamitous hailstorms also cause crop damage. The increased uncertainty, variability and unpredictability make agricultural planning all the more difficult. As a result of this, crop production is affected, which threatens the livelihoods of the vast majority of Meghalaya's population, who are engaged in the agricultural sector. The following specific negative impacts of climate change in Meghalaya are observed:

1. Due to excessive rainfall food grains are destroyed, resulting in low agricultural productivity, which in turn is increasing food insecurity. The rainfalls also affect the growth of the young plants at the nursery stage.
2. Heavy rainfall increase the soil erosion associated with shifting cultivation in hilly areas.
3. Climate change and specifically floods have forced people to leave their homes and land. This internal displacement has caused a dramatic increase in environmental refugees. Meghalaya has seen a significant increase in the number of environmental refugees from Bangladesh, which put further strains on the state's resources.
4. Climate change is not only affecting the livelihoods of hill farmers who depend on sub-soil water, but has also resulted in shortages of drinking water, particularly during winter months.
5. Forests have been destroyed because of the drastic climatic conditions disturbing the flora/ecosystems of Meghalaya.

Studies involving climate change modeling have been initiated in Umiam Basin and appropriate adaptation measures to mitigate the effect of climate change are being formulated. Such efforts shall be replicated in other water basins throughout the state.

Water Resource Department along with S&WC are putting special efforts to repair, renovate and restore existing water bodies by collecting specific data and devising localized strategies to recover and make the existing water bodies sustainable.

Another important focus area under this sub mission is to study and arrest the effects on water quality and ecosystems. Water quality is resultant of Eco-system in which the water source is located, hence in order to protect water quality the aim should not be only source protection but also the development/ protection of natural resources around the source. Appropriate policy provisions shall be made for defining and enforcing quality controls at various levels of governance of water resources. Comprehensive programs for improvements in water quality shall be made an integral part of water resources planning and implementation which ultimately fall an important element of IWRM. Adopting

an integrated approach for design & implementation shall ensure coordinated development and management of water, land and related resources such that the programs can be designed and delivered to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.

IWRM aims to protect the environment, foster economic growth and sustainable agricultural development, promote democratic participation in governance, and improve human health. Worldwide, water policy and management are beginning to reflect the fundamentally interconnected nature of hydrological resources, and IWRM is emerging as an accepted alternative to the sector-by-sector, top-down management style that has dominated in the past.

2.4.9 Sub-Mission 9: Water Governance sub mission

The Water Mission is the first step towards forming a comprehensive and supportive water governance framework. To make the Water Mission effective, an enabling environment is needed. And, therefore, the foremost requirement is to have a set of principles to guide decisions and achieve rational outcomes to fulfill the Mission.

The Meghalaya State Water Policy shall provide the framework for sustainable management of the state's water resources. Applying an Integrated Water Resources Management approach, the state water policy targets all stakeholder in the water sector. The objective of the policy is to ensure that water is used efficiently, shared equitably, managed sustainably, governed transparently and is contributing to improving the health and livelihood of all citizens.

Another requirement of the enabling environment is to provide legal authority i.e. Water Act (legislation framework) to undertake and carry out activities in accordance with the policy guidelines and pursuant to the mission. Hence, this is where the Water Act is important. The provisions of the Water Act are intended, amongst other things, to promote maximum beneficial use of the water supplies in the State and to safeguard water supplies from avoidable pollution. More specifically and by way of example, the objectives of the Water Act are stated below -

- To establish the basic principles and framework relating to the appropriation, control and conservation of water resources to achieve the optimum development and rational utilization of these resources;
- To define the extent of the rights and obligations of water users and owners including the protection and regulation of such rights;
- To adopt a basic law governing the ownership, appropriation, utilization, exploitation, development, conservation and protection of water resources and rights to land related thereto; and
- To identify the administrative agencies that will enforce this Act.

The Water Act covers subjects relating to appropriation of water, utilization of water, conservation and protection of water and related land resources, administration of water and enforcement of the provisions of the Act.

Along with the Water Act, the state shall also have a Ground Water Act which shall provide a framework for regulating and controlling the development and management of ground water in the state. The Ground Water Act provides for the establishment of State Ground Water Authority and District Ground Water Authorities and would lay special emphasis on the need for developing and maintaining rain water harvesting structures for ground water recharge. This act shall also provide power to regulate sinking of wells and drawal of ground water and power for imposing penalty for pollution of ground water. A draft Meghalaya State Ground Water Act has been drafted and copies circulated to related departments for their views and comments.

Finally, in order to attain the Mission, a Water Code is required to facilitate effective working. The Code prescribes design specifications, work rates, operational procedures for authorization of works, and their execution, budgeting, accounting and reporting.

2.4.10 Sub-Mission 10: Convergence sub mission

Water Mission seeks convergence with other schemes, agencies and departments to achieve the following benefits:

- a) Avoid duplication of efforts and redundant actions
- b) Enables sharing of resources for common objectives
- c) Enhances effectiveness of Mission delivery
- d) Improves quality of service provided
- e) Develops effective linkage with various development initiatives
- f) Helps to identify new opportunities and options
- g) Ensures transparency and accountability in governance
- h) Effective monitoring of outcomes

For effective and successful implementation of the Water Mission, it is imperative to dovetail and coordinate the activities of different sectors that have water dependence so as to have a holistic approach. In this context, IBLDP has several schemes that underline convergence among various sectors for proper utilization of water resources.

Convergence of Water Mission with other missions, schemes, agencies and departments

The convergence can be under different forms and types. A brief outline on the forms and types of convergence is given below:

Convergence of various missions under IBDLP:

Mission	Nodal Agency	Demand/Supply	Notes
Aquaculture	Fisheries Dept.	Demand	The infrastructure required could be implemented under Water Mission
Apiculture	Industries Dept.	Demand	Water required for the Mission could be made

Mission	Nodal Agency	Demand/Supply	Notes
			available by developing water infrastructure under Water Mission
Livestock	Animal Husbandry Dept.	Demand	-same as above-
Horticulture	Horticulture Dept.	Demand	Horticulture department will be approaching MWRDA/MeWD for seeking water access for their projects. Hence this mission can be converged with Water Mission
Sericulture	Sericulture Dept.	Demand	Water required for the Mission could be made available by developing water infrastructure under Water Mission
Forestry & Plantation Crops	Forest Dept.	Demand	-same as above-
Tourism	Tourism Dept	Demand	Water Infrastructure which is developed under Water Mission could be converged with Tourism Mission as value addition
Energy	Power Dept. / MREDA (for renewable energy)	Demand (in case of micro hydel projects) Supply (in case of higher capacity hydel projects)	Need to enhance coordination for MR projects.
Water	Water Resource Department / Meghalaya Water Resource Development Agency (MWRDA)	Supply	Converge with other missions under IBDLP for meeting their water requirements

Convergence with other schemes, agencies and departments

- a) Dovetailing (additive convergence) e.g. with MGNREGS NWDPPRA, IWDP, IWMP etc.
- b) Scaling up (multiple convergence) e.g. funding under RSVY
- c) Inter departmental convergence e.g. convergence of different ministries viz. MGNREGS of MoRD and programs of Ministries of Water Resources like AIBP, CADP, RKVY etc.
- d) Intra departmental convergence e.g. convergence of different schemes under same ministry e.g. Meghalaya Water Mission with schemes like AIBP, CADP, RKVY etc.

- e) Financial convergence – convergence of different financial institutions and schemes joining hands together for financing a sector or mission e.g. financial assistance under various schemes like RIDF of NABARD, schemes of DONER ministry, BRGF, NEC, IWDP, IWMP, WDPSCA, NWDPR, AIBP, etc.

MNREGA and Integrated Water Resource Management

Convergence between NREGA and Programs of MoWR is mutually beneficial. There is a gap between the irrigation potential created and that utilized. Many of the irrigation projects in the country have also been under operation below their potential due to inadequate maintenance, which is one of the important factors for reduced irrigation efficiency at project level. This has resulted in the problem of low efficiency of water usage and low productivity.

Increasing trend of water logging, salinity and alkalinity is offsetting the advantages of irrigation by rendering the affected areas unproductive or under-productive. The process of reclamation is far exceeded by an additional area becoming water logged and saline/alkaline. There are seven programs of MOWR being implemented in the country with works similar or complementary to NREGA works.

Works identified under NREGA for convergence will be planned and executed within the parameters of NREGA i.e.

1. The cost of material component of projects including the wages of the skilled and semi-skilled workers taken up under the scheme shall not exceed forty percent of the total project cost.
2. As far as practicable, a task funded under the scheme shall be performed by using manual labor and not machines.
3. No Contractors will be engaged.

Convergence with Watershed Committees

Under the National Watershed Development Program in Rainfed Areas, watershed committees were formed and registered as societies to manage natural resources, engage in sustainable agricultural development and conserve biodiversity in micro watersheds. The committee can converge with Water Mission for meeting the goals of both.

3 Goals and Implementation Strategies of the Water Mission

3.1 Knowledge sub mission

The key objectives of this sub mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To carry out comprehensive mapping of water resources and preparation of a state wide Water Resources Master Plan	<ul style="list-style-type: none"> a. Preparation of comprehensive map for development of water resources regarding needs for irrigation, domestic needs, industries and hydropower generation etc. b. Creation of a water inventory information database for monitoring evaluation and surveillance. The database will be in public domain. c. Development of the set-up of the Meteorological division with Water Resource Department and automatic weather stations at all strategic locations in the state. d. Integrating micro watershed atlas with irrigation atlas, ground water atlas and other information with various agencies like NESAC, ICAR and MGA etc. e. Initiation for establishment of emerging techniques for data acquisition and system modeling through remote sensing and GIS. These instruments shall be used for planning, designing and M&E. These shall be updated annually. f. To develop Water Grid based on the mapping of water resources while considering the requirement of people for various water uses g. To study flood protection and soil conservation works. h. To study the water quality status of the water bodies in the state and propose necessary interventions.
2.	To assimilate data related to water and water uses collected through various sub-missions / department	<ul style="list-style-type: none"> a. Collect baseline data for water use efficiency in irrigation sector b. Study of present utilization of water resources and estimation of the existing and future demand. c. Agro-climatic zoning on the basis of land and soil characteristics, vegetation, agricultural practices and climatological data d. Formulation of General Cropping pattern according to sustainability of different crops for different soils & climatic conditions e. To suggest future planning, basin wise, for optimal

Sl. No	Objectives	Recommended Strategies and Identified Action Points
		utilization of water resources

3.2 Institutional Development and Capacity Building sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To ensure adequate capacity of stakeholders, technical officers and users	<ul style="list-style-type: none"> a. Organize workshops and trainings for capacity building of institutions and stake holders (including Women and Vulnerable sections) to impart and enhance knowledge for management and water use efficiency of all water resources projects. b. Training and Exposure visits for officials of the mission and Water Users Societies/ Cooperatives, Multiple Service Providers. c. Planning and implementing agencies to hold interactive sessions with policy makers for consultation. d. Arrangement for imparting the latest scientific know-how to all technical persons in planning and implementation of water resources projects e. Documentation of Success Stories, Good Practices, Mission-Activities to be done in order to encourage one regions to learn from activities of other region
2.	To work on awareness, capacity building and hand holding of the local people to create and manage the infrastructure for their livelihood generation.	<ul style="list-style-type: none"> a. Public awareness building in promotion of do-it-yourself action by citizens through intensive social communication. b. Involvement of traditional institutions / NGOs in various activities related to water resource management, particularly in planning, capacity building and mass awareness c. To impart technical knowhow to optimally utilize the assets created d. Programme to be initiated to Incentivize officials of Mission, water Users Societies/ Cooperatives Multiple Service Providers (MSPs) for their contribution to achieve the objectives of Mission
3.	To develop an effective institutional setup to carry out the objectives of State Water Mission	<ul style="list-style-type: none"> a. Empowering and strengthening WRD, MeWDA, WUAs and Multiple Service Providers and village development committee. b. Formation of water regulatory authority under SWRC to enable resolution of water conflicts, to protect the right to drinking water for all and appropriate pricing of water c. Providing support for promotion of Meghalaya

Sl. No	Objectives	Recommended Strategies and Identified Action Points
		Water Foundation, a civil society organization to mobilize participation of water user communities and traditional self-governance institutions around the water sector issues. d. Decentralization to the district level for formulation of plans and actions for the all-round development of the water sector through the district administration in convergence with all line departments through the District Water Resources Council.

3.3 Water Use and Water Use Efficiency sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To promote judicious utilization of water resources in the state of Meghalaya for surface water and ground water	a. Determination of the water efficiency for drinking, irrigation, industrial and other uses through DWRC. b. Allotment of the water budget according to the optimum need for each purpose. c. Creation of awareness programs for all the water users for dissemination of information pertaining to the importance and value of the efficient water use. d. Improvement of water use efficiency in irrigation sector with the help of modern advanced techniques like drip, sprinklers and modern application techniques besides control of seepage and percolation loss.
2.	To develop integrated water resource planning by pooling in resources and promote water use efficiency in all water sectors	a. Formulation of Water Policy, Water Act and State Water Code (manual for all sectors of stakeholders and users). b. Development of Land Use Policy for the state of Meghalaya c. Technology infusion on water management, water saving devices, etc d. Facilitate involvement of stakeholders (including women and vulnerable sections) in various activities related to water resource management, particularly in planning, capacity building and mass awareness. e. Encourage corporate sector/ industries to participate, take up, support and promote water conservation, augmentation and preservation within the industry and as a part of corporate social responsibility f. Incentivizing recycling of water / waste water

Sl. No	Objectives	Recommended Strategies and Identified Action Points
		<ul style="list-style-type: none"> g. Development of intensive program for ground water recharge h. Formation of Water User Associations (WUA) for creation and management of small water storage and usage at community level
3.	To identify demands for various uses of water including those which generate livelihood opportunity in the state	<ul style="list-style-type: none"> a. Village and sector wise demand survey for assessment of water demands as well as identification of latent demand b. Assessment of the requirement of water in various basins through different missions under IBDLP c. To plan and manage the water resources using the data base created in Knowledge sub-mission such as planning of Water bodies for supply of drinking water at village level by Spring Chambers, Ring-Wells etc. Also, the learning and information thus gathered shall be again be put in the data base using knowledge sub-mission d. Specify water use (s) of all the water bodies and the users e. Conduct studies through concerned department (s) on baseline data of water use efficiency in irrigation sector
4.	To Promote basin development Through Mission mode intervention	<ul style="list-style-type: none"> a. Preparation of micro watershed(as unit for Planning) plans required for promoting optimum use of water resources b. All water related activities (ie Drinking water, irrigation, fisheries etc.)should be included in Plan c. Inter micro watershed transfer should be allowed by taking community in confidence d. Formation of cascading water alliances and disputes to be resolved by micro and mini watershed committee
5.	To support and ensure water availability for sectoral development	<ul style="list-style-type: none"> a. Creation of potential for enhancement of irrigation facilities to small and marginal farmers so as to increase from the present around 28% (source: wrmin.nic.in) of irrigation achievement to 50% by the end of the year 2017. b. Enhancement of access to safe drinking water from existing level of 70% (source: indiasanitationportal.org) to 80% by 2017 and to 100% by 2022. c. Expansion of water users in the field of aquaculture, industries through water shed projects.

3.4 Water Quality Management sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	Improved water resource by better water quality management strategies	<ul style="list-style-type: none"> a. Strengthening of water quality monitoring system b. Technology infusion for cleaning the river system and monitoring the health of rivers, water bodies c. Integrating the water quality results of streams and water bodies in Water Grid so that it could be monitored d. Infrastructure to be created for the treatment of sewage and other liquid pollutants in urban / industrial areas e. Water testing kits to be used by Water Users Associations for regular monitoring of water at source and user end

3.5 Ground Water Management sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	Development and strengthening of ground water resources and utilization in the State	<ul style="list-style-type: none"> a. Setting up of the ground water division/cell, with multi-disciplinary expertise & important machinery and equipment, within WRD for the study and exploration including assessment for the optimum drawal of ground water to avoid over exploitation. b. Periodic Monitoring of the ground water drawal and recharge. c. Formulation of rules and regulations for ground water utilization and issue of clearance certificate to any users in conformity with CGW Act/ MGW Act 2013. d. RWH should be encouraged in overexploited and critical watersheds for recharging groundwater

3.6 Flood Management Sub Mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To carry out functions of Flood management including	<ul style="list-style-type: none"> a. To Prepare state level flood management plan b. To install recorders on rivers and other water

Sl. No	Objectives	Recommended Strategies and Identified Action Points
	forecasting, flood operations, and other key flood emergency response activities in the state.	<p>bodies at state level and their results to be linked with and update in database under Knowledge Sub Mission</p> <p>c. To carry out Hydrologic, topographic geotechnical studies as required for planning, and design studies that are necessary for implementing repairs.</p> <p>d. Developing datasets and models to be used for the planning, designing, improving, retrofitting, constructing and repairing of new and existing capital assets and infrastructure</p> <p>e. Store and process information and geographic data that support the tracking and reporting of flood emergencies, flood incidents, and other high-water events in resonance with Knowledge sub-mission.</p> <p>f. Carry out flood vulnerability analyses, emergency response planning, and flood control activities at the local level.</p> <p>g. The awareness of the community at risk of flooding should be raised and maintained, with a clear understanding of their role in responding to emergency situations appropriately.</p> <p>h. Flood proofing, a combination of long-term, non-structural and minor structural measures as well as emergency actions, is important not only in reducing damage due to flooding, but also in preventing the negative impacts on the environment such as the spread of pollutants.</p>

3.7 Promoting multipurpose use of water sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To develop multipurpose reservoirs facilities for increasing Rain Water Harvesting and water use efficiency by promoting multipurpose use of stored water	<p>a. Development of storage infrastructure for using water for multipurpose uses such as drinking, irrigation, aquaculture, micro-hydel power generation, eco-tourism etc. based on community demand and techno-economic feasibility.</p> <p>b. Development of innovative models for promotion of micro-hydel projects including construction of flood retention-cum-harvesting dams at different reaches of the rivers, construction of farm ponds and tanks to mitigate the intensity of flood as well as tackle the water scarcity during drought period.</p> <p>c. Development of Jalkunds/Water Harvesting</p>

Sl. No	Objectives	Recommended Strategies and Identified Action Points
		Structures to particularly cater to needs of areas otherwise left out of irrigation commands.
2.	Sustainable water availability as the enabling factor for enhancing livelihood options and security	<ul style="list-style-type: none"> a. Development of storage infrastructure for using water for multipurpose uses such as drinking, irrigation, aquaculture, hydel power generation etc. to help integrated development of the area b. Catchment protection should be a part of creation of water body and to be linked to Horticulture mission / Forestry & Plantation Mission

3.8 Water & Climate Change sub- mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To control Jhum cultivation by providing sustainable and reliable access to water (and fertilizers, other missions / departments)	<ul style="list-style-type: none"> a. Providing water security through this mission and fertilizer through other missions, and rationalize Jhum cultivation. b. Promote terrace farming c. Use Intelligent Advisory System for Farmers (IASF: mobile based system) to promote agriculture and dissuade Jhum cultivation. d. Create water bodies to provide other livelihood opportunities so as to discourage Jhum cultivation e. Promote integrated farming. f. Capacity building to be done to educate people involved in Jhum cultivation as it is traditional practice and needs a cultural shift and linking with other programs such as literacy programs and skill development programs
2.	To repair, renovate and restore water bodies and springs including soil retention for enhancement of water storage so as to preserve water for adaptation and mitigation of climate change impact.	<ul style="list-style-type: none"> a. Encourage development and improvement of the water bodies including rejuvenation of springs through the Meghalaya Water Resources Development Agency as a means for enhancement of water storage and preservation for adaptation and mitigation of climate change effect. b. Encourage climate change adaptation and mitigation by introducing the knowledge base for land use and water availability with micro irrigation techniques like drip and sprinkler irrigation. c. Treatments of all wastewater (both municipal and industrial) reaching the water bodies. d. Inventory of existing water bodies to be made with interventions required to repair, renovate and restore them. e. Treatment of catchment area should also be incorporated to restore the water bodies.

Sl. No	Objectives	Recommended Strategies and Identified Action Points
3.	To identify the eco sensitive zones and rejuvenate them	<ul style="list-style-type: none"> a. Identification of eco sensitive zones and make efforts to rejuvenate the zones by using the water harnessed under Water Mission b. Disposal of industrial wastes and treatment – promote decentralized waste management and treatment c. Establishment of Water Sanctuaries
4.	Afforestation by providing access to water and linking it to forestry mission	<ul style="list-style-type: none"> a. Afforestation in close coordination with Forestry and Plantation Crops Mission. b. Identification of projects for converging schemes and projects with Forestry and Soil and Water conservation Departments for planting trees in deforested areas.

3.9 Water Governance sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	To develop a comprehensive and supportive water management and governance framework	<ul style="list-style-type: none"> a. Formulation of Water Policy, Water Act, Ground Water Act and State Water Code (manual for all sectors of stakeholders and users). b. Organize stakeholder consultation workshops for involvement of stakeholders (including women and vulnerable sections) in various activities relating to formulation of water regulation and governance framework. c. Set up steering and monitoring committees to ensure smooth and coordinated functioning of various departments and delivery of projects. d. Creation of climate change cell at appropriate level to consolidate efforts throughout the state and also at national level.

3.10 Convergence sub mission

The key objectives of this sub-mission and the strategies proposed and action points identified to meet these objectives are provided below:

Sl. No	Objectives	Recommended Strategies and Identified Action Points
1.	Convergence of and enhancing various missions under IBDLP with Water Mission so as to facilitate their requirement of water in livelihood generation	<ul style="list-style-type: none"> a. Facilitate generation of livelihood based on water use through different activities in the multiple reservoirs like creation of tourist spots, fishing centers, agriculture, horticulture and floriculture activities etc.

Sl. No	Objectives	Recommended Strategies and Identified Action Points
	activities.	<ul style="list-style-type: none"> b. Facilitate generation of employment to the farmers through convergence in the water resources projects c. Closely work with Energy Mission for developing hydel power on the perennial streams to ensure power security in the rural areas d. Facilitate other IBDLP missions to generate livelihood opportunities with the ultimate goal of inclusive growth and financial inclusion especially women, underprivileged and assetless.

4 Monitoring & Evaluation Mechanism

4.1 Introduction

There is shift in the focus of monitoring and evaluation in recent times. Earlier the focus was on implementation process and now it is on tracking the results. The implementation process monitoring concentrates on tracking input mobilization, activities undertaken and completed and outputs delivered. The result-based monitoring adds project outcomes to the key features of implementation-based monitoring. Impacts are expected to begin after the completion of implementation. Impacts may be positive or negative, primary or secondary (long-term), intended or unintended.

Monitoring and evaluation is an integral part of the project design because it provides an opportunity for intervention during implementation and mid-course correction. Monitoring and evaluation is the driving force to see that the program is moving in the right direction and the expected goals are achieved. Though monitoring and evaluation play complementary role rather than competitive role, the purpose, process and outcome of monitoring and evaluation functions are different.

Sl. No.	Description	Monitoring	Evaluation
1.	Purpose	A continuous assessment of project implementation.	A periodic assessment of efficiency.
2.	Process	Focuses on routine collection of information and tracking project implementation progress.	Focuses on critical analysis of the information and provides ex-post assessment of effectiveness and impact.
3.	Outcome	Measures efficiency in implementation and helps in assessing the effectiveness of implementation.	Attempts to confirm project expectations and bring out the impacts to help in understanding to what extent the expected goals are being achieved. The evaluation system answers two basic questions: What types of interventions are successful and why? , and, what improvements in project interventions would maximize the outcomes?

In summary, monitoring will help assess the effectiveness of implementation and evaluation will focus on the evaluation of the strategies and actions taken under the Water Mission. In recent times the focus of monitoring and evaluation is broadened by including results. Area expansion being the main component and crucial for poverty alleviation, it should be monitored regularly by a third party. It will help to identify if any mid-course corrections are needed and whether the goals set initially, are reached.

4.2 Monitoring and Evaluation System for Water Mission

Several Departments and organizations/agencies are responsible for implementation of activities related to the Water Mission. Each of these entities has specific responsibilities and roles in monitoring and evaluation. A framework of the responsibilities and roles of these agencies are presented below.

Sl. No.	Activities	Department/Agency
1	Overall Policy Issues	SWRC
2	Rural Drinking Water	PHED
3	Urban Drinking Water	PHED
4	Industrial Water	PHED
5	Hydropower Development	MNREDA / MECL
6	Tourism/ Eco-tourism	Department of Tourism, GoM
7	Environmental Issues	State Pollution Control Board
8	Overall Planning for Water Resources Development and Fund Allocation	MeWDA
9	Watershed Development	WRD / Watershed Development Committees
10	(a) Water planning for Agriculture, (b) Micro Irrigation & (c) Management of Water related Disaster (Drought)	Agriculture Department
11	Management of Water related Disaster (Flood)	WRD

4.3 Steps in Designing Monitoring and Evaluation System

There are five steps in designing the monitoring and evaluation system for Water Mission. These are:

Monitoring

The Water Mission will organize monitoring in two steps.

The first step in monitoring is conducting baseline census survey of all the development partners to obtain their socio-economic characteristics. This information will be computerized properly in a database. This will be useful inputs for further evaluation studies.

The second step will be collection of information for a management information system (MIS) which will be used as a decision making tool during the planning and implementation stages. A simple

questionnaire will be designed and the data entry formats will also be prepared so that data can be computerized and stored.

Evaluation

Evaluation will be entrusted to a Council of representatives from neighboring villages to jointly monitor the work of each village (to avoid rivalry and danger of deteriorating relationship) and it will be done at three stages.

The first stage evaluation will be at the end of the first year of the project/program. This will help to identify the deficiencies in implementation. The report should be completed in four months so that corrective steps can be taken in the implementation during the second year of the project/program. This report will be confined to the area expansion.

The second evaluation will be the mid-term evaluation. This will be taken up after the completion of the second year. This will focus both on the implementation problems as well as the benefits derived by the communities. The suggestions made in this report will be useful for the implementation of the scheme in the fourth and fifth years.

The third evaluation report will be at the end of the fifth year. This will cover the beneficiaries of different years so that long term benefits can also be identified.

4.4 Sample Size and Cost Estimate for Evaluation Studies

The sample size for the evaluation study at the end of first year will be 1000 households. It is expected that after the scrutiny at least 900 questionnaires will be available in completeness. There will be proper representation for different districts. Blocks with large extent of area will be selected for the study. The mid-term evaluation will cover 1500 households. In this survey more representation will be given for the areas not covered in the first year end survey. Final evaluation will cover 1500 households. In this evaluation samples will be drawn from farmers of first three years so that impact can be clearly measured. The villages covered in the first three years will be taken for the study. In addition to conducting the sample survey, some villages not covered under the survey will be identified and PRA will be conducted for qualitative their assessment of the program.

This can be treated as a substitute for Social Audit. The only difference is that this exercise will be confined to a few villages. The agency for conducting these studies will be identified in the first six months of the Mission so that they can be familiar with the activities of the Mission, and the data collected in various surveys including the base line survey. The budget for these surveys can be decided at a later stage. The agency should take the responsibility of computerizing the baseline survey data which will be a permanent record for any future use.

The services of North East Space Application Centre (NESAC) and Meghalaya Geospatial Application (MGA) shall be taken in monitoring the actual progress in terms of creation of water infrastructure and improvement in agriculture after implementing the Water Mission.

The agency is expected to prepare the soft copies of the baseline survey data and also the data collected by the agency in the evaluations.

5 Financial Targets/Outlays till 13th Five Year Plan period

The expected financial outlay for different activities under Water Mission are as outlined below:

5.1 Knowledge sub mission

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
To setup State Water Resources Information System (SWRIS) and to develop Water Grid based on the mapping of water resources in terms of quantity and quality and to assimilate data related to water uses	15	15	10	10	5	5	5	5	70 crore
To install Stream Gauge and silt monitoring stations on rivers and other water bodies at state level	8	8	8	8	4	4	4	4	48 crore
Setting-up of the Meteorological division with Water Resource Department and installing automatic weather stations at all strategic locations in the state.	8	8	8	8	4	4	4	4	48 crore

5.2 Institutional Development and capacity Building

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Capacity Building activities of stakeholders, technical officers and exposure visits of officials for adopting participatory	20	20	10	4	4	4	4	4	70 crore

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
approach									
Awareness, capacity building and hand holding of the local people	8	8	8	8	4	4	4	4	48 crore
Strengthening of MeWDA, Project management – salary and operating costs for infrastructure creation and operation	10	10	15	15	15	15	20	20	120 crore

5.3 Water Use & Water Use Efficiency

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Minor and Medium Irrigation systems	200	200	300	430	430	430	430	430	2850 crore
Rural and Urban Drinking Water Supply and Sanitation	300	300	400	400	400	400	400	400	3000 crore

5.4 Water Quality Management

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Quality monitoring of water resources	10	10	10	10	10	10	10	10	80 crore

5.5 Ground Water development

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Development and strengthening of ground water resources and utilization in the State	10	10	10	10	10	10	10	10	80 crore

5.6 Flood Management

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
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Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Strengthening of Flood Management Division under Water Resource Department	3	3	4	4	5	5	6	6	36 crore
To carry out functions of floor management including forecasting, flood operations and other key flood emergency response activities in the state	5	5	5	5	5	5	5	5	40 crores

5.7 Multi Purpose Reservoir

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Identification and selection of MRs sites	10	10	5	5	5	5	5	5	50 crores
Survey and DPR preparation	15	15	15	15	15	15	15	15	120 crores
MR and allied infrastructure creation	350	350	350	350	350	350	350	350	2800 crores
Project management – salary and operating costs	5	15	15	20	20	25	25	25	150 crores

5.8 Water & Climate Change

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
RRR of Water Bodies	75	75	100	50	50	50	50	50	500 crore

5.9 Water Governance

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Develop a comprehensive and supportive water management and governance framework	10	10	12	12	12	12	16	16	100 crore

5.10 Convergence

Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
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Activities	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Total
Strengthening of DWRC for convergence at district level	50	50	60	60	70	70	80	80	520 crore