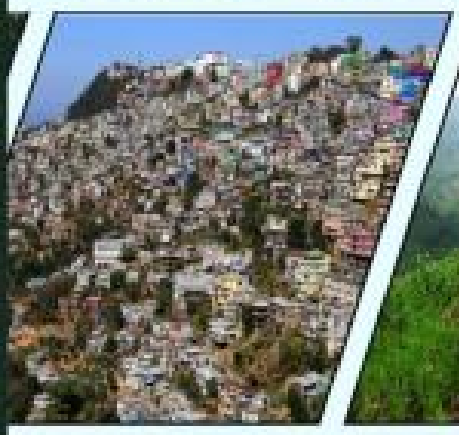
Government of Mizoram

State Action Plan on Climate Change

(Upto 2030)




Zoramthanga
Chief Minister
Mizoram

MESSAGE

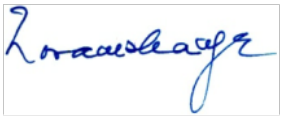
Global climate change is an imminent threat to the entire humanity and its ecosystems. The Himalayan region is already facing existential threat due to the melt down of the glaciers and snows. The changes in Himalayan region are likely to bring irreversible changes in the river basin, hydrology, and livelihood of not only people of the Himalayas, but also adversely affect people of downstream flood plains.

Scientists have estimated that warming in the Himalayan region has been much greater than global average. This has enhanced the variability in rainfall patterns. The weather patterns are becoming increasingly unpredictable and extreme; posing challenges to hilly state like Mizoram. The effect of climate change in states like Mizoram is severe, where the living condition is difficult due to its peculiar geophysical conditions. The changes in weather elements also disproportionately affect the life and livelihood of the vulnerable population, flora and fauna of the State. The 2015 Paris Agreement offers the International Community a unique opportunity to tackle the threat of climate change. More than 100 nations including India have come together to address the issue of climate change in form of voluntary Nationally Determined Contributions (NDCs) to reduce emission. Mizoram can contribute to this effort by playing meaningful role in helping our country to achieve the climate goals as well as Sustainable Development Goals.

I am happy that the first phase of the State Action Plan on Climate Change has been quite useful and has been implemented by departments and organizations in order to mitigate the impact of climate change. Most of the departments, experts and civil society have come together to look at different sectors of the state's economy and put in place the first phase of the State Action Plan on Climate Change.

Similarly, I hope the second phase of the State Action Plan on Climate Change that has been prepared keeping in mind our global and national commitment will be implemented in right earnest, so that the possible adverse impacts of climate change are minimized, and the development process is carried out in a manner which is expected to mitigate the adverse impact of climate change through appropriate adaptation and resilient practices and strategies.

I wish the effort all success and seek cooperation from all the stakeholders to collectively address this imminent threat of climate change.



(ZORAMTHANGA)

TJ Lalnuntluanga
Minister of State,
Environment, Forest & Climate Change
Mizoram

MESSAGE

According to Intergovernmental Panel on Climate Change (IPCC), global surface temperature change by end of the 21st century is likely to exceed 1.5°C relative to pre-industrial levels. This change will bring significant adverse consequences for our country as well as in the States of the fragile Himalayan region. India through its nationally determined contribution under the Paris Agreement has contributed to critical climate goals for emission reduction and creation of additional forest carbon sinks to address climate vulnerabilities. Several nation missions have been formulated at the national level to contribute to these goals. Mizoram has been in the forefront in aligning several departmental actions to make meaningful contributions to achieve the national missions.

While preparing the second phase of the State Action Plan on Climate Change, we have taken stock of the implementation of the previous Action Plan with extensive consultations and formulated the second Action Plan closely aligned to nationally determined contributions and sustainable development goals targets.

I am sure, this document will serve as guide for developmental priorities to adapt and mitigate the adverse impact of climate change. It will also serve the basis for national and international collaboration for climate adaptive technologies, additional climate finance for the state. I wish the effort all success.

(TJ LALNUNTLUANGA)

Lalnunmawia Chuaungo, IAS
Chief Secretary
Govt. of Mizoram

FORWARD

Climate Change is one of the most important global challenges today, which has engulfed most of the regions of the world. The major reason for this phenomenon is the phenomenon is the ever-increasing emission of greenhouse gas in the post-industrial era. This emission if allowed to increase unabated can produce catastrophic consequences for the world.

Mizoram is a state rich in biodiversity and natural resources which make us more vulnerable as majority of the state's population depends on climate sensitive natural resources-based livelihood such as Agriculture, Forestry and Animal Husbandry, etc. Mizoram has been experiencing the wrath of climate change for more than a decade and the intensity and frequency of the natural calamities have increased in the recent past. It is predicted that temperature will go up further with likely decrease in rainfall in the years to come. The changing patterns of temperature and climate have induced considerable implications on Agriculture, water supply, etc. as well as on the health scenario of the State of Mizoram.

In order to reduce the emission, India has prepared its Nationally Determined Contributions (NDCs) to address this changing scenario and for achieving the purpose of the Paris Agreement and its long-term goals. The second phase of Mizoram State Action Plan on Climate Change not only takes stock of the implementation of the first State Action Plan, but also seeks to address the NDC commitment at state level.

I sincerely hope the second phase of the State Action Plan on Climate Change for the State of Mizoram does complete justice to its objective and departments would come together to achieve the common goal of creating a better environment for the generation to come.

(LALNUNMAWIA CHUAUNGO)

Dr. Ch.M. Rao, IFS
Principal Secretary & Chairman
Climate Change Coordination Group
Govt. of Mizoram

ACKNOWLEDGEMENT

The State Action Plan on Climate Change (SAPCC) prepared for the operational period 2012-17 was due for revision w.e.f. 2018. The State Government constituted Climate Change Coordination Group (CCCG) in December 2017 with members drawn from all the mission lead departments and few partner departments to revise the SAPCC.

Under the aegis of Executive Council on Climate Change, Mizoram, the Nodal Department (EF&CC) initiated SAPCC revision with full participation of mission lead departments and partner departments through the CCCG.

The Nodal Department is indebted to the Hon'ble Chief Minister, Mizoram, Chief Secretary, Govt. of Mizoram, Vice Chairman, State Planning Board, Principal Secretaries and Secretaries to the Govt. of Mizoram for their support.

The Nodal Department gratefully acknowledged the technical assistance rendered by GIZ through the services of CTRAN Consulting for revising the Mizoram SAPCC in a time bound manner. The Nodal Department places on record heartfelt gratitude to Dr. Ashok Kumar Singha, MD CTRAN and his team of sectoral experts who guided and assisted the SAPCC revision with remarkable competence and efficiency.

The credit for completion of SAPCC revision goes to all the members of CCCG who tirelessly worked meticulously with remarkable dedication for revision of respective sectoral mission documents.

The revision of Mizoram SAPCC was initiated under the able guidance of Shri Lalram Thanga, IFS, former PCCF & Principal Secretary (EF&CC), Mizoram and coordinated by Dr. K. Kire, Addl. PCCF& Nodal Officer (Climate Change) with various agencies which ensure its completion is commendable.

Last, but not the least, the invaluable inputs rendered by officers and staff of the nodal department is hereby gratefully acknowledged.

Dr. Ch. M. Rao

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EXECUTIVE SUMMARY

The State Action Plan on Climate Change (SAPCC) for Mizoram was formulated in 2013, and since then the state has implemented several sectoral projects. The second phase of State Action Plan on Climate Change contains the stock-taking of the proposed activities listed in the first phase along with the redefined actions based on the issues faced by the sector, gaps and new policies initiatives. The activities listed in the second State Action Plan have been carefully designed in light of Nationally Determined Contribution (NDC) and Sustainable Development Goals (SDG).
For stocktaking component, the State commitment has been measures as follows:

A projection for 2030 for some of the indicators has been presented in the below table when the NDC monitoring will start.

Indicators	Unit	2011-12	2030	Remark
GSDP at current prices	In Rs. Lakh	6,88,975	41,45,795	ARIMA model
Population	In 000’	1,097.00	1,200.14	ARIMA lag 2
Urban Population	In 000’	571.77		
Per capita GSDP	In Rs.	59,307.00	3,45,442.61	The per capita GSDP will significantly increase in the state as it is growing fourfold and population rise is moderate
		2017-18	2030	
Electricity Demand	In MU	497.00	1817.00	Per capita electricity consumption of the state as on 2017 is 39% of the national average
The status of energy consumption and carbon sinks as on 2017				
		Mizoram	India	
Per capita energy consumption	In MJ	5,765.00	22,351.00	The lower per capita energy consumption in the state is a clear indication of energy in-equity and disparity.
Forest carbon sink	In million tonnes	95.04	7082.06	By 2030 the forest carbon stock is likely to decrease

Key intentions of the state to address climate change concerns are enshrined in various policies and these have been summarized below:

Key Policy Elements	State Performance
National Action Plan on Climate Change	The state has all eight missions aligned to NAPCC; It also has a mission on Human Health

State Action Plan on Climate Change	The state has prepared SAPCC duly endorsed by MoEFCC, which was placed before National Steering Committee in April 2013
Energy Policy	Renewable Energy Policy, 2003 State Solar Power Policy, 2017 Net Metering Regulation by JERC, 2018 Electrification by September 2018: 94% Ujala Yojana launched in 2018, already distributed (as on December 2018) 6,15,225LED lights and 36,225 LED Tube light and 1,579 Fans
Industrial Policy, 2012	The Industrial Policy of Mizoram State was notified to give direction to the strategy for Industrial development of the State. It laid stress on reducing shifting cultivation by encouraging a shift from primary to secondary sectors while protecting the Socio-Cultural and ethnic identity of the indigenous enterprise of Mizoram. It is directed towards all- round development of the people of Mizoram with special focus on upliftment of indigenous people and also towards giving them gainful employment and self-employment opportunities in the Industries and allied sectors.
State Policy for Environment, Forest & Biodiversity	The state exercises several acts and rules for the conservation of its environment and biodiversity such as - Forests Rights Act, 2006, Forest Conservation Act, 1980, Wetlands (Conservation and Management Rules, 2017), Mizoram Forest Act, 1955, Bear Conservation Action Plan, State biological diversity rules, 2010, Mizoram Wood based Industry Rules, 2017, National Green Tribunal Act, 2010, Wildlife Protection Act, 1972 Mizoram Eco-Tourism Policy 2017, Water (Prevention & Control) Act, 1974, Air (Prevention & Control) Act, 1981
Mizoram Organic Framing Bill 2004	The Mizoram Organic Farming Bill was passed by Mizoram Legislative Assembly in July 2004. As the organic farming system solely depends on use of crop residue, animal and green manure, incorporating legumes, use of bio-fertilizes etc., the agriculture department is gradually reducing the import of chemical fertilizers. And several awareness and training camps are being organized. Mizoram state has a great scope for successful organic farming.

The vulnerability assessment shows that, most of the districts had marginal change in their risk except for Kolasib and Lunglei districts. Kolasib is assuming higher risk and Lunglei is lowering it a bit, so also Champhai district. In terms of vulnerability major improvement has been noticed in case of Kolasib and Siaha districts. Mamit continues to be the district with maximum climate risk without change in last 5 years. Vulnerability of Aizawl & Champhai districts have reduced a bit. Lawngtlai and Lunglei districts show no change in their vulnerability as compared to baseline.

POVERTY AND FOOD SECURITY

According to the report published by the Planning Commission in 2014, during 2011-12, about 27.4% of population in the state was living under poverty as compared to the national average of 29.5%. As compared to 2009-10, the rural poverty in the state has increased. This leaves them highly vulnerable to the changing climatic scenarios. The performance of the state in terms of Food Security is improving every year as the food grain production shows an increasing trend.

MISSION FOR SUSTAINABLE AGRICULTURE

This is a comprehensive scheme trying to address issues relating to climate change adaptation in

agriculture and allied sector. The allocation under the rainfed area development component of the National Mission for Sustainable Agriculture has shown a rise after 2015-16 while the allocations under RKVY are showing a decreasing trend.

WATER MISSION AND WATER USE EFFICIENCY

The main objective of the National Water Mission (NWM) is "Conservation of water, Minimizing wastage and Ensuring its equitable distribution both across and within states through integrated water resources development and management". The mission has a broad target of improving water use efficiency of 20%.

PMKSY has been formulated with the vision of extending the coverage of irrigation 'Har Khet Ko Pani' and improving water use efficiency 'More crop per drop' in a focused manner with end to end solution on source creation, distribution, management, field application and extension activities.

Swachh Bharat Mission (SBM)

One of the major public funded sanitation programmes SBM has shown significant result in the state. As per the Swachh Bharat Mission – Gramin dashboard, since October 2014, there is 27.97% increase in household toilets.

ENHANCEMENT OF CARBON SINK AND GREEN INDIA MISSION

Mizoram has 18,186 sq km area under forest which is 86.27% of its geographical area. However, only 131 sq km of forest is very dense forest, 5,861 sq km is moderately dense and 12,186 sq km is open forest. The total carbon stock of the state forest is 95.041 million tonnes (348.484 million tonnes of C02 equivalent) and the state contributes to 1.34% of the total carbon stock of the country.

MISSION ON STRATEGIC KNOWLEDGE FOR CLIMATE CHANGE

The Government of Mizoram has taken various measures to tackle the problem of climate change. A detailed roadmap has been chalked out to develop the climate change action plan for the state. The Climate Change Council of Mizoram is created to develop a state action plan for assessment, adaptation and mitigation of climate change with an objective to monitor the targets, objectives and achievements of the national missions specified by the National Action Plan on Climate Change (NAPCC).

MISSION ON SUSTAINABLE URBAN HABITAT

Two key programmes have been launched by the Government of India for urban transformation, which not only provides for basic amenities in the cities, but also have strong adaptation and mitigation benefits. These two are Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart City.

SOLAR MISSION AND RENEWABLE ENERGY

In addition to the Renewable Energy Policy, notified in 2003, the state government has notified the State Solar Power Policy -2017 with an aim of creating an enabling environment for prospective solar power developers to harness solar power in the best possible manner. The state solar power policy also allows the open access of power. In addition, the Joint Electricity Regulatory Commission (JERC) has also notified Net Metering regulations for promotion of rooftop solar units across the state.

STATE MISSION FOR SUSTAINABLE AGRICULTURE

Mizoram has traditionally been an agrarian state and nearly 60% of the population is directly or indirectly engaged in agriculture. The primary sector comprising agriculture & allied activities, contributed 31.72% (2016-17) to the GSVA. The contribution of agriculture and allied activities (Crops, Livestock & Fisheries) shows steady but slow growth.

Due to its difficult terrain and lack of irrigation infrastructure, almost 90% of the area under cultivation in Mizoram is rainfed. Paddy cultivation occupies the largest share of area and production. The area under traditional method of cultivation, commonly known as Jhum is slowly reducing. Even though rice is the major crop, the state is still not self-sufficient in its production.

As far as the GHG emissions from the sector are concerned, the high value of methane emission is due to its pre-dominant rice cultivation and livestock management, while low nitrous oxide emission is due to less use of nitrogenous fertilizers in the state. The erratic variability of rainfall and temperature due to changing climate is highly likely to affect the sowing pattern and productivity of agriculture and horticulture crops in the state. It is also likely to impact livestock, poultry and fisheries in the state.

Major Achievements

Development of Sustainable Agriculture

- Finalizing household level adaptation interventions, Capacity building & awareness, Soil conservation, water harvesting and management, enhancement of crop production & productivity, Farm mechanisation (Custom Hiring Centres-CHCs)

Development of Land

- Assistance for in situ moisture conservation like land levelling, bunding, etc. 200 ha of land have been developed
- 1,625 ha land have been converted into permanent cultivation through construction of terraces, Construction of Hill Slope terraces

Jhum Cultivation

- About 56.38% reduction (check) in Jhum cultivation area
- Subsidy assistance on critical inputs like improved seed, fertilizers, chemicals, herbicides etc. is provided to jhum farmers.
- 8304 ha of land have been optimized.

Improving post-harvest management

- Promotion of organic farming through usage of compost and vermin compost
- Adoption of Integrated Pest Management for improved crop yield
- Fodder cultivation
- Water bodies conservation for fishery sector and establishment of fishery units in reservoirs and riverine area.

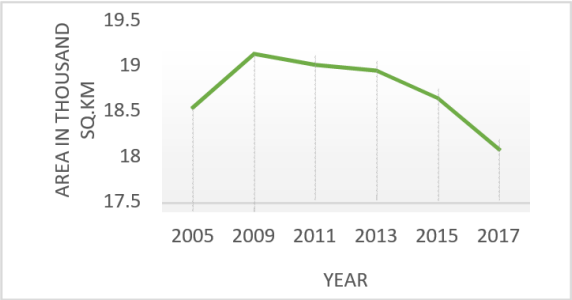
Budget Proposed in SAPCC Phase 1	Rs. 42,062.70 Lakh
Budget Allocated from 2013-14 to 2017- 18	Rs. 44,657.71 Lakh
Percentage Share	106.16%

Effective and result-based measures will be supported for the development of approaches at all levels on vulnerability and adaptation, as well as capacity-building for the integration of adaptation concerns into sustainable agriculture development strategy of Mizoram. In agriculture sector, adaptation measures often generate significant mitigation effects. The state is also planning to make generous investments on providing subsidies on fertilizers, water and other agri-input areas with GHG mitigation is significant.

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	8	23,752.50
Mitigation based	0	0.00
Both	6	24,869.00
Total	14	48,621.50

STATE MISSION FOR GREEN INDIA

In Mizoram, forest is one of the most important natural resources for the people. As per ISFR 2017, the forest cover in the state is 18,186 sq km, which is 86.27% of the total geographical area of the state. Of this, only 131 sq km is very dense forest, 5,861 sq km is moderately dense and rest (i.e. 12,194 sq km) is open forest. According to ISFR 2017, the total carbon stock of the state's forest is 348.484 million tonnes of CO_2 equivalent.



Jhum cultivation, high incidences of forest fires, population pressure, land tenure system, rapid and unplanned urbanization and threats to biodiversity are some of the major challenges faced by the sector in the state.

In line with the NDC commitment and SDG target, the Government of Mizoram has identified some adaptation and mitigation activities to reduce the climate change impact. These include strengthening of National Mission for a Green India, conservation & protection of forest and forest resources to improve green cover and enhance quality of biodiversity, enhancement in livelihood by strengthening the market linkages for bamboo and NTFPs, prevention of forest fires and capacity building & empowerment of institutions for sustainable forest management.

Major Achievements

Improvement in forest quality & density

- In degraded lands and abandoned jhum lands- Plantations in 52.407 ha

Promotion of forest-based industries

- Recommended 9 industrial estate which can accommodate 15 wood-based industries
- Improvement in the productivity of Bamboo and promotion of local value addition through establishment of market linkages- Bamboo plantation in 35,320 ha

Livelihood Improvement activities for forest dependent communities

- Promotion of poultry and piggery farming

Awareness & Capacity building program

- Van Vigyan Kendra (VVK) farmer trainings, trainings of communities for climate change adaptation
- Strengthening of local VSS, Publicity/ media and outreach

Conservation and Management of Wetlands

- Tamdil and Palak wetlands have been recognised for conservation and development activities

Protection of Forests

- 7 wildlife sanctuaries, 2 national Parks and one Tiger reserve project activities covering 1,908.75 sq km

Research and Assessment Studies

- Study on NTFP and Traditional Knowledge under the head of research related to climate change (NEDP)

Budget Proposed in SAPCC Phase 1	Rs. 28,360.00 Lakhs
Budget Allocated from 2013-14 to 2017- 18	Rs. 11,418.66 Lakhs
Percentage Share	40.26 %

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	1	9,000.00
Mitigation based	0	0.00
Both	3	103,092.00
Total	4	112,092.00

STATE MISSION FOR SUSTAINING HIMALAYAN ECOSYSTEM

Mizoram falls within the North-east Biogeographic Zone. The state forms a part of the Indo-Burma biodiversity hotspot and encompasses rich biodiversity. As per Mizoram State of Environment Report 2016, the state has recorded 2,358 plant species and more than 1,440 animal species.

In addition, 37 species of bamboos have been reported from the state of Mizoram out of which, 20 species are indigenous to the state, while 14 species have been introduced from outside. Mizoram is one of the well explored areas with regards to orchids (252 species belonging to 74 genera). Total 12 species of rattans belonging to four genera viz. Calamus, Daemonorops, Plectocomia and Zalacca have been recorded and identified from the state. In Mizoram, 236 medicinal plants have been reported and out of these, 204 plants grow in the forest areas of the state.

Climate change is one of the significant environmental challenges in the Himalayan region affecting the ecosystems. The major issues faced by the sector are forest degradation due to jhum cultivation and unplanned developmental activities, lack of coordination among various stakeholders, lack of research and collaboration with research institutions and line departments, lack of skilled human resource etc.

Major Achievements

Improvement in forest quality & density

- Valuation of forests was done, and the estimated value is Rs. 516.94 crores

Capacity building & Awareness Programmes

- Generate awareness in the line of conservation and effect of climate change on local ecosystems through booklet, pamphlet newsletter, etc

Protected Area and Wetland Conservation

- This activity has been done under wildlife conservation through 7 wildlife sanctuaries, 2 National Parks and one Tiger reserve project activities covered 1,908.75 sq. km.
- Two wetlands of Mizoram (Tamdil and Palak) have been recognised by the Government of India (GoI) and conservation and development activities have been started from 2014-15 under the scheme of National Plan for Conservation of Aquatic Ecosystem (NPCA)

Improvement in forest quality & density

- Presently the department is implementing 7 medicinal plants project funded by NMPB through 5 FDAs and mainly focused on resource augmentation and establishment of conservation areas.
- The State Biodiversity Board of Mizoram has constituted a total of 255 Biodiversity Management Committee (BMC) through village level local bodies

Budget Proposed in SAPCC Phase 1	Rs. 13,120.00 Lakh
Budget Allocated from 2013-14 to 2017- 18	Rs. 1,111.91 Lakh
Percentage Share	8.40 %

Regarding NDC commitment and SDG target, the Government of Mizoram has prioritised some adaptation and mitigation activities to reduce climate change impact. The major activities include conservation, protection and enhancement in the quality of biodiversity, mitigating habitat fragmentation of corridors, human wildlife conflict etc., preserving traditional knowledge and diversification of livelihood activities, restructuring land use policy for jhum cultivation, climate proofing on natural resources and enhancing resilience of indigenous communities

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	2	22,000.00
Mitigation based	0	0.00
Both	2	37,340.00
Total	4	59,340.00

STATE MISSION FOR HEALTH

Mizoram is undertaking initiatives in building a healthy society by making medical facilities available and reachable to the people and also by focusing on preventive health care. The state also aims to achieve SDG Goal 3 which ensures healthy lives and promote well-being for all at all ages. Improving maternal & child health and ensuring their survival are critical elements of the Sustainable Development Goals (SDGs). Climate change widens health inequity due to its negative impact on food security and nutrition. The change in water quality (due to excess and deficit rainfall) and air quality (due to residue burning and transport emission) also adversely impact the health of human and livestock. The Vector-borne diseases such as dengue, malaria is largely dependent on climate sensitivity because of the carrier mosquito whose operational time and cycle sporogony is directly proportional to temperature, rainfall, wind velocity and relative humidity. In the year 2017, no deaths were recorded due to malaria, which is a great success for the government of Mizoram towards beating the impacts of climate change. Lack of early warning system in the state, absence of strong surveillance system, lack of basic information database and lack of easily accessible data are some of the key institutional issues faced the sector. Based on the projection of increased incidence of vector and water borne diseases it is imperative that the climate change issues, particularly in A1B scenario, need to be integrated into health sector planning of the state. The impacts of climate change are expected to increase the disease burden in the state. As a result, the constraints & barriers to adaptation, needs to be reassessed to address the problem in future. The Government of Mizoram has proposed 11 activities in the SAPCC Phase 2 (2018-23). The state will be focusing on research work on vector-borne & water-borne diseases, development of required institutional infrastructure keeping specific focus on climate risk management, and capacity building of officials and health workers on impact of climate change on human health.

Major Achievements

Reduction in Malaria Outbreak

- The state has worked effectively towards handling the malaria crisis of the state.
- Total number of Malaria cases (Pv & Pf) in 2016 was 7583 (71.28% reduction from 2015)
- 57.14% reduction in deaths as compared to 2016
- Fogging and source reduction of dengue has been done at outbreak localities

Health Infrastructure Development

- The state has shown some significant improvement in public health infrastructure development.
- 7 new sentinel site hospitals have been identified in 7 districts of Mizoram
- New entomological unit has been set up in the state headquarter for surveillance, research-based studies, sensitivity testing, etc

Capacity Building and trainings

- Capacity Building - Trainings of Medical Officer on Dengue treatment and diagnosis have been conducted.
- Several workshops on climate change has been organised by Mizoram

Budget Proposed in SAPCC Phase 1	Rs. 30,150.00 Lakh
Budget Allocated from 2013-14 to 2017- 18	Rs. 14,708.61 Lakh
Percentage Share	48.78 %

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	11	52,900.00
Mitigation based	0	0.00
Both	2	0.00
Total	11	52,900.00

STATE MISSION ON STRATEGIC KNOWLEDGE FOR CLIMATE CHANGE

Strategic knowledge for climate change attempts to make a dynamic knowledge system that would help in attaining the objective of ecological sustainable development. It also aims to develop a better understanding by acquiring and upgrading information and knowledge available from the discipline of climate science and analyzing the impacts of climate change at the local level. The main objective of the 'State Mission on Strategic Knowledge' is knowledge generation. This is achieved by identification of knowledge gaps and bridging up those knowledge gaps. It is very important to build institutions for conducting more in-depth research and studies on climate change at the state level. The issue of bridging up gaps will be addressed through the creation of knowledge networks. It is also important to acquire indigenous knowledge from the local people for natural resource management and climate change adaptation. Under strategic knowledge, the state not only focuses on GHG reduction, but also involves in strengthening the adaptation capacity of the population who are vulnerable to negative climate change externalities. It is very important to build institutions for conducting in-depth research and studies on climate change at the state level. The basic objective of NDC is to achieve the vision of a sustainable lifestyle and climate justice to protect the poor and vulnerable from adverse impacts of climate change. The Government is quite responsive towards building the capacity of the state through awareness generation and bringing in the climate change issue in the educational platform. Infrastructure development of monitoring centres for minimizing the effect of climate change on people and their livelihood. In SAPCC 2.0, four activities have been proposed by the Nodal Department. Apart from generation & dissemination of knowledge on the science of Climate Change, focus is directed towards generating awareness and capacity building of the local people for easy and smooth development of the state as well as keeping the tradition and values of the communities intact and including climate change issues in educational platform.

Major Achievements

Development of Knowledge Management on Climate Change and facilitating its operation

- Collection and Compilation of Meteorological data on a regular basis
- District wise assessment of vulnerability due to climate change was done on water resources, human health, socio-economic and biophysical sectors.
- Published booklet 'Meteorological data of Mizoram' and 'Climate Profile of Mizoram'
- A leaflet 'Climate (Sik leh sa) leh Mizoram' was prepared for awareness material.
- Brochure- Mizoram Climate Change Cell was prepared

Capacity Building on Climate Change

- MoU has been signed with Administrative Training Institute, GoM for institutionalizing capacity building on climate change adaptation planning in service departments
- Capacity building workshops and trainings for government officials, line departments, NGOs, academicians and research scholars, journalist
- Sensitization workshop on climate change was organised in 7 district colleges of the State.

Budget Proposed in SAPCC Phase 1	Rs. 1,400.00 Lakh
Budget Allocated from 2013-14 to 2017- 18	Rs. 84.87 Lakh
Percentage Share	6.06 %

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	4	3,270.00
Mitigation based	0	0.00
Both	0	0.00
Total	4	3,270.00

STATE WATER MISSION

Mizoram is endowed with enough amount of fresh water in the form of perennial rivers and springs to meet the present demand. However, ensuring availability of drinking water both in terms of adequacy and quality on sustainable basis is one of the major challenges.

Located in a fragile ecosystem, Mizoram is highly prone to the effects of climate change. As the land terrain is mountainous, piped water supply is the main source of water in most habitations of Mizoram. Smooth water supply to the households is a major challenge in the state because of hilly terrain and gravity based piped water supply systems. Uneven and heavy precipitation often leads to occurrence of natural disaster like floods, landslides etc. This in turn affects the quality of groundwater, results in higher runoff and negatively impacts the agricultural productivity.

Major Achievements

Finalisation of plan for conservation and preservation of water resources

- A MoU has been signed with the Young Mizo Association to work towards preservation of the existing water sources and to take up various measures to increase the water sources

Formulation of State Water Policy

- The Irrigation & Water Resources Department has initiated formulation of "State Water Policy" which is facilitated by GIZ CCA NER. A task force comprising of all the stakeholder departments has been constituted by the government for formulation of Mizoram State Water Policy. The draft has been already prepared

Renovation and development of traditional water harvesting system with scientific intervention at district level

- Rainwater harvesting schemes are taken up in places where piped water supply schemes are not feasible. Various public buildings as well as individual households have taken up the rain water harvesting scheme for an alternative source of water supply

Budget Proposed in SAPCC Phase 1	Rs. 46,974.00 Lakh
Budget Allocated from 2013-14 to 2017- 18	Rs. 1,089.89 Lakh
Percentage Share	2.32 %

Some of the schemes implemented by the Irrigation & Water Resources Department include Minor Irrigation Scheme, Command Area Development & Water Management Scheme and Anti Erosion Scheme and projects under Repair, Renovation & Restoration (RRR) of Water Bodies and National Hydrology Project. "Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)" has been formulated with the vision of extending the coverage of irrigation 'Har Khet ko Pani' and improving water use efficiency 'More crop per drop' in a focused manner with end-to-end solution on source creation, distribution, management, field application and extension activities. The state government will also take a major step towards climate adaptation by using solar energy for enhancing water supply system to micro/minor irrigation. Development and protection of catchment area of spring-sheds is also being taken up by the state government. Mapping and monitoring of surface water resource and conservation of ground water through artificial recharge structures are also target areas. A total of 8 activities have been proposed in the SAPCC, Phase 2.

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	6	75,325.21
Mitigation based	0	0.00
Both	2	6,000.00
Total	8	81,325.21

STATE MISSION FOR ENERGY (ENHANCED ENERGY EFFICIENCY & STATE SOLAR MISSION)

Ensuring long term energy security in line with the economic development and environmental needs is of high importance in the state. The situation in Mizoram is a clear reflection of the national perspective of energy drudgery and in some cases are further worse. The unreliable and inadequate access to modern energy sources has already taken a toll on the state's developmental agenda. This situation can derail the state's developmental agenda in case the state is unable to ensure rapid and sustainable transformation in the energy sector without compromising the climate goals. Diversity of the primary and secondary energy supply, demand-supply scenario, energy consumption in relation to GDP, import dependency and preparedness in terms of infrastructure and human resource capital are selected as the indicators for mapping of energy security.

Major Achievements (Energy Efficiency)

- Detailed study to assess the current AT&C losses and strategies to be adopted for reduction of the AT&C loss to 15% has been carried out under UDAY scheme and reported under "Power for All".
- Constitution of Drafting Committee for amendment of Energy Conservation Building Code.
- Renovation and modernisation of 132 kV sub-station at Bukpui.
- Augmentation/Up-gradation of distribution network in Lawngtlai and Champhai district.
- Around 98% of the consumers with connected load of 20 kW is covered under consumer metering.
- DELP Programme & LED village programme (Demonstration Programme) - 180 consumers across Muthi village.
- Construction of 4 MW Kawlbem SHP, 5 MW Tlawva SHP, Tuiriza SHP & Tuiching SHP with cumulative capacity of 9.20 MW is in progress.
- Institutionalisation and operationalization of State Energy Conservation Fund (SECF).
- Development of Sector Specific Energy Conservation Plan.
- Organising of sensitisation workshop/awareness campaign.
- Board of School education has introduced a chapter on energy conservation at school level up to class VIII

Budget Proposed in SAPCC Phase 1	Rs. 58,181.50 Lakhs
Budget Allocated from 2013-14 to 2017- 18	Rs. 20,010.52 Lakhs
Percentage Share	34.39 %

Energy production and use accounts for substantial portions of the total GHG emissions and is regarded as the major driver behind the human induced climate change. Unlike the impact of climate change in undermining prosperity and hampering sectoral growth, the energy sector is equally impacted. In addition to the Renewable Energy Policy, notified in 2003, the state government has notified the State Solar Power Policy -2017 with an aim of creating an enabling environment for prospective solar power developers to harness solar power in the best possible manner. The state solar power policy also allows the open access of power. In addition, the Joint Electricity Regulatory Commission (JERC) has also notified Net Metering regulations for promotion of rooftop solar units across the state. Activities under Energy Efficiency.

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	0	0.00
Mitigation based	4	19,632.00
Both	2	3,934.00
Total	6	23,566.00

The state is heavily depending upon the central sector power station, even for meeting up of the restricted power demand. Of the total power allocation of 150 MW, the state's share from hydro based unit accounts for only 20%. The state hydro power unit being mostly run of river units, generates power in tune of about 15 MW. The higher import dependency and lower reliability of state-owned unit are the biggest challenge for the state.

Both SDG's and NDC's targets are aimed at the overarching objective of integrating decarbonization growth strategy with developmental planning, ensure access to affordable and sustainable energy source and ensure inclusive and sustainable development towards sustained economic growth and shared prosperity.

The primary energy requirement of the state is entirely met through procurement. The higher import dependency of the country for fossil fuel and the price volatility are likely to impose serious threat to the state's energy security concern.

The per capita electricity consumption has grown at a CAGR of 5.19% between 2012-13 and 2016-17. The growth is limited due to the restricted electricity demand in the state. The per capita growth of GSDP has however been substantial during the same period and is in tune of 16.25%.

Major Achievements (Solar Mission)

- ZEDA, govt. of Mizoram has promoted solar power packs to address the lack of access/un-reliable access to electricity in rural areas. The stand-alone system disseminated includes 83 number of 500 Wp system and 6,176 number of 100 Wp system.
- ZEDA has facilitated deployment of 20 (twenty) numbers of small solar power plant in rural areas with cumulative capacity of 0.519 MW.
- Development of Mini-Grid SPV Power Plant at Vathuampui and Sailam (Site identification and development of DPR for 500 kWp solar power plant at 50 locations with a cumulative capacity of 25 MWp)
- ZEDA has undertaken enormous stride to unlock the
- 9.09 GWp solar power potential in the state and has exceeded the implementation target.
- Development of 20MW Mega Solar Park at Vankal; Developed infrastructure (mega solar park) and enabled favourable policy for private developers to set up solar power generation in the state.
- Development of Grid Connected Rooftop Solar Power Plant at 132 kV Sub-Station at Luangmual, Khawiva and Sihhmui.
- The state govt. of Mizoram has published "Solar Power Policy of Mizoram" during March 2017.
- Annual Report of MNRE specifies implementation of 37 numbers of solar water pumps in the State

Budget Proposed in SAPCC Phase 1	Rs. 15,817.50 Lakhs
Budget Allocated from 2013-14 to 2017- 18	Rs. 5,801.89 Lakhs
Percentage Share	36.68 %

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	0	0.00
Mitigation based	5	339,788.94
Both	0	0.00
Total	5	339,788.94

STATE MISSION ON SUSTAINABLE HABITAT

Climate change and its effect are intrinsically linked with unsustainable, unplanned and rapid urbanization. Urban areas in an eco-fragile terrain are mostly affected by the major, naturally occurring variations in climate conditions including climate extreme events. The economically disadvantaged sections (21.5% of BPL population in 2010) of the urban settlements that are challenged by the insecurity of tenure, livelihoods, safety, health, limited access to appropriate housing infrastructure and incapable of accessing basic services, are most vulnerable to the impacts of climate change. Also, with the increase in number of migrants, there is increasing pressure on urban infrastructure and services, as well as increase in consumption of energy and associated greenhouse gas emissions. The increasing pressure in several districts has gone beyond the carrying capacity of the region and profound pressure is felt on livelihood of the people and various environmental components, especially the land and water. The urban issue focuses on the main public services like drinking water supply, sanitation, urban transport and solid waste management. Due to the rapid growth in the number of vehicles, the urban transportation facilities are jeopardized with the issues of traffic congestion. Sanitation is one of the major concerns in the urban areas of the state due to lack of proper drainage facilities. Other critical problem is the blockage in drains and rainwater causing water logging. The difficult terrain of Mizoram is again an issue for proper operationalization of solid waste management facilities in the state. A sustainable lifestyle and climate justice to protect the poor and vulnerable from adverse impacts of climate change is the basic objective which the NDC aims to achieve through various commitments. In SAPCC 2.0, a total of 17 activities have been proposed by the state government to tackle the urban challenges.

Major Achievements

Improvement in water usage management for urban drainage to reduce climate change impacts

- Sewerage treatment plant, bio-digester has been implemented and initiated by SIPMIU which is PSU under the UD & PA department
- Mizoram has already achieved 65% storm water drain coverage and is expecting to reach 100% by 2030

Development of climate friendly waste management systems and improvement of aesthetics

- Scientific solid waste management project has been started at Aizawl, Kolasib and Lunglei
- Zero waste management has been promoted from NEDP projects, i.e., New Economic Development Program

Reduction of Disaster Risk through climate change adaptation

- Building regulations and building permissions have been issues in line with the provisions for safety construction of building
- Master Plans have been prepared for almost all the city and towns in Mizoram

Improvement of vehicular pollution control mechanism for reduction of gas emissions

- Vehicle inspection license and certification centre (I & C centre) to be established to keep a check on vehicular emissions

Capacity Building and research initiatives on climate change impacts and preparedness

Budget Proposed in SAPCC Phase 1	Rs. 1,31,460.00 Lakhs
Budget Allocated from 2013-14 to 2017- 18	Rs. 17,564.58 Lakhs
Percentage Share	13.36 %

Type of Activities	No. of Activities	Budget Proposed in Lakh INR
Adaptation based	6	775,118.40
Mitigation based	6	252,196.24
Both	5	312,997.00
Total	17	1,340,311.64

SUMMARY ALLOCATION OF CLIMATE RELEVANT BUDGET IN DIFFERENT MISSIONS

In the SAPCC Phase 1, 91 climate actions were proposed. The tentative budget to implement these actions was Rs. 3,675.2 crores for 5 years. The estimated adjusted allocation as deciphered from various sources seem to be Rs. 1,164.5 crore which is about 31% of what was needed.

Out of the proposed actions in the last SAPCC, 71% were for adaptation, 19% for mitigation and 10% had characteristics of both. Similarly, in terms of adjusted allocation, 71% of adaptation actions had 57% of the total adjusted allocation, 19% mitigation actions had 34% of the total allocation and balance was for both.

Sector	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Adjusted allocation past 5 years (2013-18) in Lakh INR
State Mission for Sustainable Agriculture	42,062.70	44,657.71
State Mission for Green India	28,360.00	11,418.66
State Mission for Sustaining the Himalayan Ecosystem	13,120.00	1,111.91
State Mission for Health	30,150.00	14,708.61
State Mission on Strategic Knowledge for Climate Change	1,400.00	84.87
State Water Mission	46,974.00	1,089.89
State Mission for Enhanced Energy Efficiency	58,181.50	20,010.52
State Solar Mission	15,817.50	5,801.89
State Mission on Sustainable Habitat	131,460.00	17,564.58
TOTAL	**367,525.70**	**116,448.64**

The above table shows, sectoral, the investment focus has been more on the agriculture sector that has strong relevance for NDC and is highly affected by climate change.

Prioritized Interventions

For the planning purpose as discussed in the methodology, three parameters were chosen. (1) The linkages with either NDC or SDG or both (2) funding linkages (3) levels of implementation based on the past. The proposed activities were scaled on these bases on the scale: 0: none 1: meagre 2: some 3: decent. They were assigned weight too. A total of 74 planned activities have been identified in eight sectors which have been examined based on its linkages SDG-NDC, funding linkage and implementation potential. Based on the above-mentioned scoring, majority of the activities have significant linkages to SDG and NDC, and on further analysis based on funding linkage, it was found that more than 80% of the proposed activities have either reasonable or significant funding linkages. Amongst the sectors, agriculture and urban have maximum funding linkage. However, sector wise resource requirement for all the proposed activities for next 10 years (up to 2030) have been given in the table below:

Sector	Proposed Budget (as in SAPCC 2021-30) in Lakh INR	Sources	Gap Funding in Lakh INR
State Mission for Sustainable Agriculture	48,621.50	Central & State Schemes	
State Mission for Green India	112,092.00	Central & State Schemes	
State Mission for Sustaining the Himalayan Ecosystem	59,340.00	Central & State Schemes	
State Mission for Health	52,900.00	Central & State Schemes	
State Mission on Strategic Knowledge for Climate Change	3,270.00	Central & State Schemes	
State Water Mission	81,325.21	Central & State Schemes	
State Mission for Enhanced Energy Efficiency	23,566.00	Central & State Schemes	1.260.00
State Solar Mission	339,788.94	Central & State Schemes	61,641.48
State Mission on Sustainable Habitat	1,340,311.64	Central & State Schemes	
TOTAL	**2,061,215.29**		**62,901.48**

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Subsequent to the introduction of National Action Plan on Climate Change (NAPCC) in 2008,State Governments were also encouraged to prepare their own State Action Plan on Climate Change (SAPCC) consistent with strategies in the NAPCC. States/UTs were encouraged to integrate state-level variations in ecosystems, geographic conditions, socio-economic scenario, and other factors, while converging with the existing policies and ongoing programmes and schemes being implemented at the state level. Till date, 33 SAPCCs of States and Union Territories have been approved and are operational. Dedicated climate change institutions/cells have been established in most of the States/UTs to coordinate activities related to climate change. States/UTs have initiated capacity building actions and demonstration projects to implement SAPCCs since the formulation of SAPCCs. Mizoram had prepared SAPCC duly endorsed by MoEFCC, which was placed before National Steering Committee in April 2013.

The national and international climate action and policy landscape have evolved since the formulation of SAPCCs. Paris Agreement has been agreed upon in the year 2015 to limit global mean temperature within 2 degree and working towards to limit at 1.5 degree. India has submitted its Nationally Determined Contributions (NDC) goals for post-2020 with eight different goals including three major quantifiable goals related to emission reduction, renewable energy and forestry. Over the years, India has pursued major domestic policies and schemes in areas of climate change mitigation and adaptation actions, particularly in the fields of clean and renewable energy, enhancement of energy efficiency, development of less carbon-intensive and resilient urban development, promotion of waste to wealth, electric vehicles, etc.

The scientific and socio-economic understanding and knowledge on climate change have also advanced over the last few years. The dedicated climate change institutions/cells established in the States/UTs, with the active support of scientific, academic and research institutions, have carried out several regional and sectoral vulnerability studies highlighting the impacts of climate change. The enhanced capacities and improved understanding of sectoral and regional climate variabilities and projections, GHG Emissions, long-term vulnerabilities, mapping vulnerable regions/ social groups/sectors, etc. will help identify and prioritize mitigation/ adaptation strategies and refining regional specific action plans and strategies.

In this context, SAPCCs need to be revised and strengthened further considering the evolving context of climate science, policy and actions. MoEFCC requested States to initiate the process of revision of the SAPCCs in January 2018.

The Missions identified by the State of Mizoram in SAPCC 1.0 and subsequently in the revised SAPCC 2.0 are as follows:

State Missions	Alignment with National Mission
State Mission for Sustainable Agriculture	National Mission for Sustainable Agriculture
State Mission for 'Green India'	Green India Mission
State Mission for Sustaining Himalayan Ecosystem	National Mission for Sustaining the Himalayan Ecosystem
State Mission for Health	National Health Mission
State Mission on Strategic Mission for Climate Change	National Mission on Strategic Knowledge for Climate Change
State Water Mission	National Water Mission
State Mission for Enhanced Energy Efficiency	National Mission for Enhanced Energy Efficiency

State Solar Mission	National Solar Mission
State Mission on Sustainable Habitat	National Mission on Sustainable Habitat

1.2 OBJECTIVE

Considering the evolving context of climate science, policy and actions, the State Action Plans on Climate Change need to be revised and strengthened. The objective is to identify and prioritize mitigation/ adaptation strategies and refine regional specific action plans and strategies

1.3 SCOPE

The Mizoram SAPCC 2.0 has six sections:

Section A: State Profile
Section B: Climate profile & Vulnerability Assessment
Section C: Adaptation Strategies- Stocktaking Planning and Financial layout
Section D: Mitigation Strategies- Stocktaking, Planning and Financial layout
Section E: Financing & Implementation Mechanism
Section F: Monitoring and Evaluation Framework

1.4 APPROACH AND METHODOLOGY

The Mizoram SAPCC 2.0 builds on the developments at the national level, various policies & programmes and the national and international commitments by India on the issues of climate change adaptation and mitigation. The broad guidelines for the revision of SAPPCs as enlisted by MoEFCC is shown below:

Principle 1

- SAPCCs should be a policy document of the States/UTs outlining the major initiatives and strategies reflecting the commitments and proposed actions in the state to tackle the vulnerabilities and impacts of climate change across the socio-economic sectors.

Principle 2

- SAPCCs should envisage an inclusive, sustainable and climate resilient low carbon development pathways with a focus on climate change adaptation and mitigation within the key sectors in the States/UTs and should protect the poor and vulnerable sections of society from adverse effects of climate change.

Principle 3

- SAPCCs should take into account recent scientific assessments and projections on global warming; vulnerability; and impacts.

Principle 4

- SAPCCs should synergise with the goals of NDCs under the Paris Agreement, though the targets under NDCs are national targets. It should also contribute towards achieving other development goals including Sustainable Development Goals (SDGs).

Principle 5

- SAPCC should highlight the links with national missions related to climate change.

Principle 6

- SAPCC should also be built on the evolving socio-economic development context and priorities of the state.

Principle 7

- States/UTs can strengthen existing climate action measures as well as launch new initiatives in their priority sectors. Some of the initiatives can be introduced in the areas of efficient and cleaner technologies, promoting renewable energy generation, reducing emissions from transport sector, afforestation and greening activities and standardizing knowledge management system for adaptation and mitigation.

Principle 8

- Time period of the implementation of SAPCCs should be clearly brought out starting with the implementation cycle of NDCs i.e. 2021-2030 and beyond.

Principle 9

- Financial resources required for the implementation of the action plan should primarily be leveraged from the existing budget of the State Governments and convergence with the relevant schemes and programs.

Principle 10

- SAPCCs should set out the institutional mechanism for implementation including stakeholder engagement ensuring inclusiveness along with the mechanism for capacity building and monitoring and evaluation with clear indicators for reporting.

Figure 1: Guiding Principles, from Ministry of Environment, Forest and Climate Change, "A Common Framework for revision of State Action Plan on Climate Change", 2018

The steps taken for Mizoram SAPCC 2.0 are depicted below. Vulnerability assessment is done that provides current and future projections. Key priorities have been outlined both in adaptation and mitigation sectors. Synergy has been established with the International climate goals like NDC and SDG. Capacity needs in the form of multi stakeholder consultations have been achieved for proper implementation. A base business as usual scenario and additional scenarios have been studied for financing needs. National policies and programmes for each sector have been in line with the State adaptation and mitigation strategies. Chapter on Monitoring and evaluation will help to monitor the progress of the State in coping with climate change. Institutional arrangement has been set up to that the responsibility for various missions will rest under individual departments, which shall strive to attain all listed objectives within stipulated periods and ensure their vertical integration with the National Mission objectives of the NAPCC.

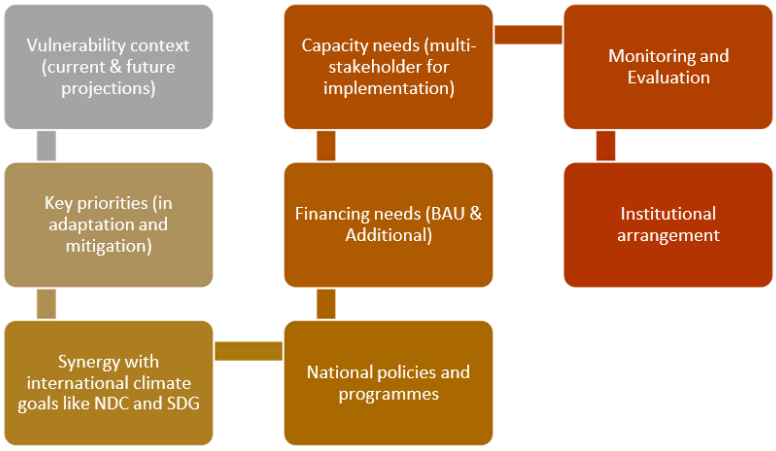


Figure 2: Approach and Methodology

The State's commitment has been measured by the physical achievements of proposed activities in SAPCC 1.0, financial commitment and alignment with the National Missions, NDC and SDGs.

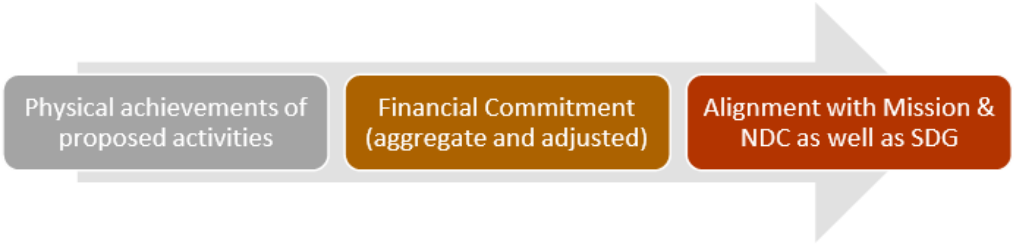


Figure 3: Measuring State's Commitment

A Multi-Dimensional Stock Taking method is adopted and the dimensions for the activities are as follows:

1. The activities that were planned by the State nodal departments and implemented.
2. The activities that were planned by the State nodal departments but could not be implemented on ground.
3. The activities that are already carried out by the State nodal departments but were not a part of SAPCC 1.0
4. The activities that are newly proposed by the State nodal departments

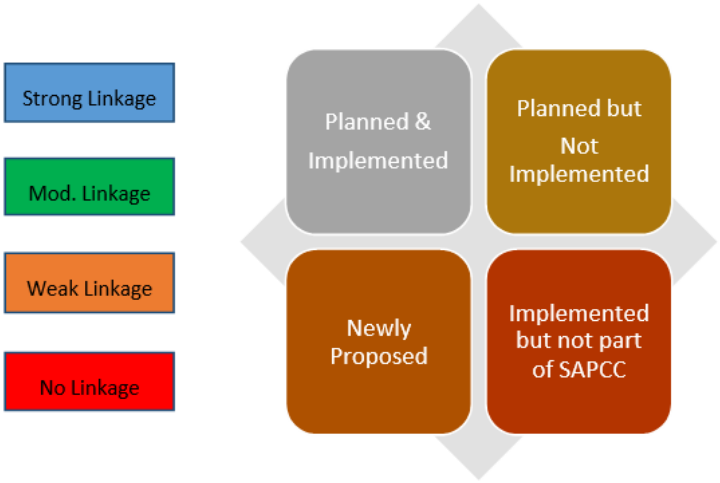


Figure 4: Activity Analysis

The linkages that are established could be Strong/ Moderate/ Weak/ NIL linkages based on the extent towhich the proposed activities can be linked with NDC or SDGs or both.

For the activities that are proposed, the following criteria is used for prioritization:

- **High Priority Activities**: Activities having strong linkage with NDC and SDGs with low barriers for implementation.
- **Medium Priority Activities**: Activities having linkages with either NDC or SDGs with medium level barriers for implementation.
- **Low Priority Activities**: Activities having weak linkages with either NDC or SDGs with high-level barriers for implementation.
- For investment purposes, High priority and Implemented activities will have a weight of 50%.
- Medium priority and implemented activities will have a weight of 30%.
- Activities planned with a budget provision but not implemented will have a weightage of 20%.

CHAPTER 2: STATE CIRCUMSTANCES

2.1 STATE PROFILE

2.1.1 Location, Geography and Size

Mizoram spreads over a total area of 21,081 sq km, accounting for 0.64% of India's total geographical area. The state is situated on the extreme south of north-eastern part of India between 21o58' - 24o35' N latitude and 92o15' - 93o29'E longitude. Among the north-eastern states, it is the southernmost landlocked state, sharing borders with Tripura, Assam and Manipur. The state also shares 722 km of international border with Bangladesh and Myanmar.

Mizoram has mainly mountain topography with the presence of several hills that are steep and are separated by rivers, which flow to either the north or south, creating gorges between the hill ranges. Eastern sector is higher than the western sector. Fed by heavy rainfall during the monsoon season and occasional rainfall throughout the year, most of the rivers in the state are perennial in nature. The major rivers are Chhimtupui, Tlawng, Tut, Tuirial and Tuivawl and major lakes include Palakdil, Tamdil, Rungdil and Rengdil.

2.1.2 Demographic Profile

The state has eight administrative districts, which include Aizawl, Lunglei, Champhai, Lawngtlai, Mamit, Kolasib, Serchhip and Siaha; Aizawl being the capital. There are three Autonomous District Councils in the state namely Chakma Autonomous District Council, Lai Autonomous District Council and Mara Autonomous District Council. The demographic profile of the state is outlined below:

Table 1: Demographic Features of Mizoram as per Census of India, 2001 & 2011

Particulars	Mizoram		India	
	2001	2011	2001	2011
Population (in Lakh)	8.89	10.97	10,287.38	12,101.93
Population Decadal Growth Rate (%)	29.18	23.48	17.60	21.50
Population Density (person per sq km)	42	52	324	382
% of ST Population	-	94.43	-	8.63
Sex Ratio (Per 1000 Males)	935	976	933	943
Literacy Rate (%)	88.80	91.33	64.83	74.04
Male Literacy Rate (%)	90.72	93.35	75.26	82.14
Female Literacy Rate (%)	86.75	89.27	53.67	65.46

2.1.3 Economic Profile

The State Government continues to largely depend on devolution of fund from the Central Government. The Gross State Domestic Product (GSDP) of Mizoram has been continuously growing at the robust rate over the years. Gross State Domestic Product (GSDP) at constant (2011-12) prices is expected to attain a growth rate of about 9.35% over the previous year. The GSDP at constant (2011-12) prices has clocked 12% average annual growth rate during the financial years 2012-13 to 2016-17. The projected growth rate for India as a whole has been placed at 6.75% in 2016-17 (Economic Survey Mizoram 2017-18).

The Per Capita Income of Mizoram for the year 2016-17 is projected at Rs.1,25,107 as against the National Per Capita Income, which is projected at Rs 1,03,219. The State continues to achieve a phenomenal success by attaining Per Capita Income above the National average (Economic Survey Mizoram 2017-18).

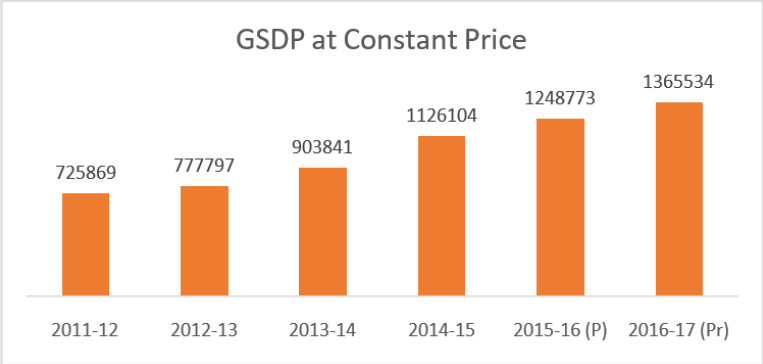


Figure 5: Mizoram GSDP at Constant Price (in Lakhs Rs.)

The share of Primary Sector comprising Agriculture and Allied activities, has increased from 17.66% in 2013-14 at constant (2011-12) price to 27.84% in 2015-16 and is projected at 26.28% in 2016-17. Share of Manufacturing & Industry Sector has been gradually increasing and it is projected at 26.58% in 2016-17. Meanwhile, share of services sector has witnessed a gradual decline from as high as 59.43% in 2011-12 to 47.68% at constant (2011-12) price in 2015-16. It is projected at 47.14% in 2016-17 (Economic Survey Mizoram 2017-18). Agricultural sector still occupies a very important place in the economy of Mizoram. Nearly three- quarters of families depend on agriculture and allied incomes. The age-old practice of Jhum cultivation is still carried out annually by a large number of people living in rural areas of the State.

2.2 SECTORAL HIGHLIGHTS

2.2.1 Agriculture & Allied Sectors

Agriculture occupies a very important place in the economy of Mizoram and farming has traditionally been recognized a subsistence livelihood option in the State. About 80% of people of Mizoram are either directly or indirectly engaged in agricultural practices. The economy of the State is primarily dependent on traditionally cultivated cereal crops. The agriculture in Mizoram is mainly dependent on the rainfall mostly occurring in monsoon season. Shifting cultivation (Jhum cultivation) is the primary method of farming practiced by Mizo people. Shifting cultivation is environmentally detrimental and low agricultural production and productivity.

Owing to the degradation of soil and environment as a whole, the concept and significance of organic farming, and permanent and sustainable agriculture in Mizoram have been emphasized. It is strongly felt that Mizoram, by virtue of very less amount of chemical inputs, has a great scope for successful organic farming. In recent years, significant progress has been made in organic farming in Mizoram.

Agro Climatic Zones	Humid Temperate Sub Alpine ZoneHumid Sub-Tropical Hill Zone Humid Mild-Tropical Zone
Soil Profile	Texture: Loam to Clay loam Acidity: 5.4 to 5.7 (moderate to strongly acidic) Organic Carbon content: 1 to 3% (medium to high)
Gross Cropped Area	2,35,095 ha
Net Sown Area	2,26,085 ha
Cropping Intensity	105 (As of 2017-18)
Percentage area under irrigation	10.86 %
Rainfed Area	89.13%
Total food-grain production	75,201 tonnes (2016-17)
Whether food surplus or deficient	Deficient
Crops grown in state	Rice, maize, pulses like rice bean, arhar, field pea, cow pea, and chickpea, oilseeds like soya bean, sesamum, rape mustard and oil palm

Major Crop	Rice
Area under Paddy	36858 ha (Jhum + WRC) in 2016-17
Productivity of rice per ha.	WRC – 21.93 Jhum – 12.07
Horticulture crops grown in state	Fruits (*Mandarin Orange, Banana, Mango, Strawberry, Grape, Pineapple, Dragon fruit etc.*), Vegetables (*Cabbage, Tomato, Capsicum, and Broccolietc.*), Spices (*Ginger, Turmeric and Birds eye Chilli*),Plantation crops (*Arecanut etc.*), Medicinal, Flowers (*Anthurium, Rose etc.*) and aromatic plants
Livestock reared	Pig, Cattle, Goat, Mithun, Sheep
Meat production	14,786 tonnes (2016-17)
Fisheries potential	24,000 ha
Existing area under fish culture	5,468.34 ha
Key Issues and Challenges	• Lack of water harvesting and irrigation infrastructure • Connectivity Issues • Post-harvest storage management and value addition • Market Linkage • Unsustainable Jhum Practice • Decreasing agriculture yield • Lack of awareness on marketing strategy

2.2.2 Forest & Biodiversity

Mizoram possesses different types of forests, which have been classified differently by different researchers. Widely used classification of forest of Mizoram includes (a) Tropical wet-evergreen forests, (b) Tropical semi-evergreen forests, and (c) Montane sub-tropical pine forests. Mizoram falls within the Northeast Bio-geographic Zone. The State forms a part of the Indo-Burma biodiversity hotspot and encompasses rich biodiversity. Several factors have contributed to this richness. Topographical variety along with great diversity of climate, different forest types are some of the factors.

Total Forest Cover	18,186 sq km
Percentage of state area under forest	86.27%
Area under VDF (Very Dense Forest)	131 sq km
Area under MDF (Moderately Dense Forest)	5,861 sq km
Area under OF (Open Forest)	12,194 sq km
Scrub	0
Total Protected area in the state	1,908.75 sq km
Total tree cover	467 sq km
Total forest and tree cover	18,653 sq km
Bamboo bearing area within forest area of state	3,267 sq km
Total carbon stock of forest	95.041 million tonnes (348.484 million tonnes of CO_2 equivalent); 1.34% of total forestcarbon of country
Extent of water bodies within forest	124 sq km
Species diversity of the state	Plant species - 2,358 Animal species - 1,440 Bamboo species – 37, (20 indigenous to thestate) Orchid species – 252 Rattan species – 12
Key Issues and Challenges	• Increasing pressure on forest due to jhum cultivation and development pressure • High incidences of forest fire Rapid urbanization • Land degradation • Reducing area under forest cover

2.2.3 Health Sector

Directorate of Health Services (DHS) is concerned with provision of Community Health Services through its network of 12 Community Health Centres, 57 Rural Primary Health Centres, 8 Urban Primary Health Centres, 372 Sub Centres and 166 Sub-centre clinics.

Mizoram, like other Indian states, has undergone an epidemiological transition since 1990 in that the epidemiological transition ratio that was 1.18 in 1996 was 0.53 in 2016. This means that diseases and illnesses because of Non-Communicable Diseases (NCDs) has increased tremendously over a decade.

The India State-level Disease Burden Initiative has indicated that malnutrition and tobacco are the top two risk factors driving the most deaths and disability combined. Malnutrition is a tremendous challenge especially for children under 5 years of age. Mizoram had the highest number of tobacco users in the country until 2017. The absolute figure for current tobacco use has also declined from 67.2% to 58.7%.

Birth Rate	16.1	
Death Rate	4.3	
IMR	35	
Institutional Delivery against expected delivery	18,814 Persons	0.78
Total reported live births	18281	0.976
Total Still Birth	292	0.008
Reported Deaths due to Maternal & Perinatal, Diarrhea, Tuberculosis, Respiratory (excluding TB), Malaria, Other Fever related, HIV/AIDS	0.361	
Neonatal death within 24 hours	12	
Up to 1 Weeks of Birth	152	
Between 1 week & 4 weeks of birth	7	
Neonatal Death	171	
Total reported maternal deaths	738	
Tobacco use in any form	0.672	0.587
	Male- 72.5%, Female- 61.6%	Male- 64.9%, Female- 52.4%
Current tobacco smokers	0.397	0.344
	Male- 59.4%, Female-19.0%	Male- 54.1%, Female- 14.3%
Smokeless	0.407	0.335
	Male- 32.6%, Female- 49.1%	Male- 21.3%, Female- 46.0%
Current dual tobacco users (smoked and smokeless)	0.132	0.092
		Male- 10.6%, Female- 7.9%
Mean age of initiation	17.4 years	17.8 years
Key Issues and Challenges	• Insufficient manpower • Lack of adequate infrastructure • High incidences of drug and alcohol abuse High number of HIV cases • Financial	

2.2.4 Water Resources

The state is endowed with numerous ephemeral and perennial streams and rivers, which swell or recede in response to seasonal variations in precipitation. A total of 21 rivers along with their tributaries cross 1700 km of length in the State. Of these, 15 are major rivers in Mizoram. The occurrence of ground water in Mizoram is mainly restricted to weak zones such as fractures. The geological unit is characterized by very low permeability and infiltration rate. It acts as run off zone. Thus, the ground water potential is low. Aquifers formed in the valleys also show low permeability. The ground water resources of the State are yet to be developed and harnessed. Mizoram is highly prone to the effects of climate change. As the land terrain is mountainous, piped water supply is the main source of water in most habitations of Mizoram. Smooth water supply to the households is a major challenge in the state because of hilly terrain and gravity based piped water supply systems. Uneven and heavy precipitation often leads to occurrence of natural disaster like floods, landslides etc.

Average Annual Rainfall	2794 mm
Annual Yearly Rainfall in 2011	2527.1 mm
Annual Yearly Rainfall in 2016	2381.4 mm
Projected Mean Annual Rainfall	Decrease by 6.8%
Projected Rainfall	Increase by 17.25%
Six most important drainage systems	Tlawng drainage system, Tuirial drainage system, Tuivawl drainage system, Tiau drainage system, Chhimtuipui drainage system and Khawthlangtuipui Drainage system
Net Annual Ground Water Availability	0.03548 BCM
Annual Ground Water Draft	0.00104 BCM
Stage of Ground Water Development	2.90%
Artificial Recharge to Ground Water (AR)	Feasible AR structures: 500 check dams, 1000 weirs, 1000 gabion structures, 300 rooftop harvesting, and development of 200 springs
Annual Replenishable ground water resource (In BCM)	0.03942
Annual Replenishable ground water resource during Monsoon season	0.02899
Annual Replenishable ground water resource during non-monsoon season	0.01042
Natural Discharge during non-monsoon season (In BCM)	0.00394
Net Annual Ground Water Availability (In BCM)	0.03548
Annual Ground Water Draft (In BCM)	0.00104
Projected Demand for Domestic and Industrial (In BCM)	0.00238
Ground Water availability for future irrigation (In BCM)	0.0331
Stage of Ground Water development (%)	2.9
Key Issues and Challenges	• Inadequate infrastructure for irrigation and water supply • Paucity of funds • Lack of sufficient scientifically backed data • Connectivity issues

2.2.5 Energy

Ensuring long-term energy security in line with the economic development and environmental needs is of high importance in the state. The situation in Mizoram is a clear reflection of the national perspective of energy drudgery and in some cases are further worse. Primary energy requirement of the state is entirely met through procurement. The higher import dependency of the country for fossil fuel and the price volatility are likely to impose serious threat to the state's energy security concern.

The state is heavily depending upon the central sector power station, even for meeting up of the restricted power demand. Of the total power allocation of 150 MW, the state's share from hydro based unit accounts for only 20%. The state hydropower unit being mostly run of river units generates power in tune of about 15 MW.

Total Power Allocation	150 MW
State's share from Hydropower	20%
Per Capita electricity Consumption	449 Kwh
Energy Intensity	0.053
Per Capita sales of Petroleum Products	76% of the national average
Household Electrification Status as of Sept 2018	94%
LPG Penetration as of September 2018	96.90%
Emission Intensity	4.60 kg CO_2e/1000
AT & C losses	34.8%
Total Emission	6,28,095 tCO_2
Rural and Urban Firewood Consumption	2,57,329 tonnes/year
Unmet Peak Demand in 2017-18	8.60%
Off-Grid Solar Power Project in 2013-18	1.18 MW
Number of Activities Proposed under Solar Mission of SAPCC	22
Number of Activities Initiated	15
Key Issues and Challenges	• Lack of institutional capacity and human resource with the state department • Lack of mandates for commercial building • Yet to notify ECBC, implement street lighting and Municipal energy efficiency program • Poor regulatory enforcement • Low capacity of existing T&D network and intra-state power trading

2.2.6 Urban Sector

Urban areas in an eco-fragile terrain are mostly affected by the major, naturally occurring variations in climate conditions including climate extreme events. Climate change and its effect are intrinsically linked with unsustainable, unplanned and rapid urbanization. The increasing pressure in several districts has gone beyond the carrying capacity of the region and profound pressure is felt on livelihood of the people and various environmental components, especially the land and water.

The urban issue focuses on the main public services like drinking water supply, sanitation, urban transport and solid waste management. Sanitation is one of the major concerns in the urban areas of the state due to lack of proper drainage facilities. Other critical problem is the blockage in drains and rainwater causing water logging. The difficult terrain of Mizoram is again an issue for proper operationalization of solid waste management facilities in the state.

Total Population	1097206
Urban Population	571771
Urban Male Population	286204
Urban Female Population	285567
Urban Pop Growth Rate	0.2965
Urban Sex Ratio	998
Urban Literacy Population	484841
Urban Literacy Rate	0.9763
Male Literacy Rate	0.9798
Female Literacy Rate	0.9702
total individual household (urban) latrine application	2650
total constructed toilet	2194
Number of ODF cities	23
Number of wards for 100% door to door waste collection	264
Key Issues and Challenges	• Hilly and difficult terrain • Solid waste management is not properly • There is no sewage system in the state. Households have septic tanks which are not often cleaned • Poor road condition and connectivity • Pressure on urban land availability • Lack of strict laws to control the vehicular emission • Lack of skilled personnel and inadequate manpower • Paucity of funds

2.3 KEY DEVELOPMENT ISSUES AND POLICIES

The per capita GSDP at current price for Mizoram was Rs. 59,307.00 in 2012 and was higher than national average in 2012. The state economy is growing and even when the per capita GSDP (at current price) will be Rs. 4.14 lakh, it will still be above the national average by 2030. Energy demand will grow to 1,817 MU by 2030.

The status of industrialization in the state is relatively in nascent stage. However, an examination of GSDP from 2004-05 to 2015-16 shows that, the secondary sector growth in the state is atCAGRof21.27%, which is fastest in the region. Key indicators having strong relevance to NDC are listed below:

Table 2: Key Indicators with respect to the NDC

Indicators	Unit	2011-12	2030[1]	Remark
GSDP at current prices	In Rs. Lakh	6,88,975	41,45,795	ARIMA model
Population	In '000	1,097.00	1,200.14	ARIMA lag 2
Urban Population	In '000	571.77		
Per capita GSDP	In Rs.	59,307.00	3,45,442.61	The per capita GSDP will significantly increase in the state as it is growing four-fold and population rise is moderate.
		2017-18	2030	
Electricity demand	In MU	497.00	1,817.00	Per capita electricity consumption of thestate as of 2017 is 39% of the national average.
The status of energy consumption and carbon sink as of 2017				

		Mizoram	All India	
Per capita Energy Consumption	In MJ	5,765.00	22,351.00	The lower per capita energy consumption in the state is a clear indication of energy in-equity and disparity.
Forest carbon sink	In million tonnes of Carbon	95.04	7082.06	By 2030, the forest carbon stock is likely todecrease.

The major categories of industry in the state are not energy intensive and use the local feedstock. These include handloom and handicraft, hydropower, bamboo-based industries and food processing. Therefore, a major change in energy efficiency regime is not expected. However, there is scope of enhancing the quantum of renewable power generation in the state, which has remained virtually stagnant at 36.67 MW2 (as of November 2018). The conversion of streetlights to solar LED and changing the domestic lights to LED and introduction of efficient city transport system will make positive contribution to NDC.

Table 3: Key Policies

Key Policy Elements	State Performance
National Action Plan on Climate Change	The state has all eight missions aligned to NAPCC. It also has a mission on Human Health.
State Action Plan on Climate Change	The state has prepared SAPCC duly endorsed by MoEFCC, which was placed before National Steering Committee in April 2013.
Energy Policy	Renewable Energy Policy, 2003 State Solar Power Policy, 2017 Net Metering Regulation by JERC, 2018 Electrification by September 2018: 94% Ujala Yojana launched in 2018, has already distributed (as on December2018) 6.15 Lakh LED lights and 36,225 LED Tube light and 1,579 Efficient Fans.
Industrial Policy, 2012	The Industrial Policy of Mizoram was notified to give direction to the strategyfor Industrial development in the state. It laid stress on reducing shifting cultivation by encouraging a shift from primary to secondary sectors while protecting the socio-cultural and ethnic identity of the indigenous enterprises of Mizoram. It is directed towards all-round development of the people of Mizoram with special focus on upliftment of indigenous peopleand towards giving them gainful employment and self-employment opportunities in the industries and allied sectors.
State Policy for Environment, Forest & Biodiversity	The state exercises several acts and rules for the conservation of its environment and biodiversity such as - Forests Rights Act, 2006, Forest Conservation Act, 1980, Wetlands (Conservation and Management Rules, 2017), Mizoram Forest Act, 1955, Bear Conservation Action Plan, State Biological Diversity Rules, 2010, Mizoram Wood based Industry Rules, 2017, National Green Tribunal Act, 2010, Wildlife Protection Act, 1972, Mizoram Eco-Tourism Policy 2017, Water (Prevention & Control) Act, 1974, Air (Prevention & Control) Act, 1981.
Mizoram Organic Farming Bill 2004	The Mizoram Organic Farming Bill was passed by the Mizoram Legislative Assembly in July 2004. As the organic farming system solely depends on use of crop residue, animal and green manure, incorporating legumes, use of bio-fertilizes etc., the agriculture department is gradually reducing the import of chemical agriculture. In addition, several awareness and training camps are being organized. Mizoram state has a great scope for successful organic farming.

2.4 PERFORMANCE UNDER NDC-SDG IN LAST 5 YEARS

2.4.1 Adaptation Areas

Poverty and Food Security

As per the report published by the Planning Commission in 2014, the overall poverty in Mizoram from 2009-10 to 2011-12 is almost the same. While the urban poverty has decreased from 2009-10 to 2011-12, there is an increase in rural poverty.

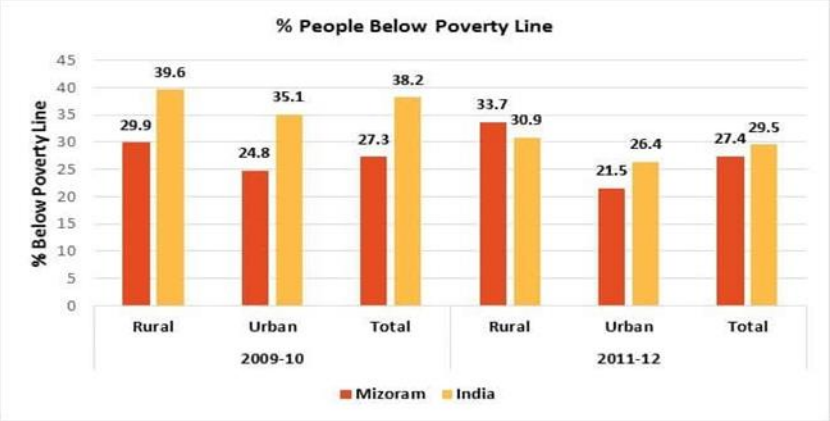


Figure 6: Poverty level in Mizoram

Source: Report of the expert group to review the methodology for measurement of poverty, Planning Commission, 2014

The increase in rural poverty leaves them highly vulnerable to changing climatic scenarios. However, the state has shown a promising attitude towards solving its food security issue. The food grain production in the state shows an increasing trend.

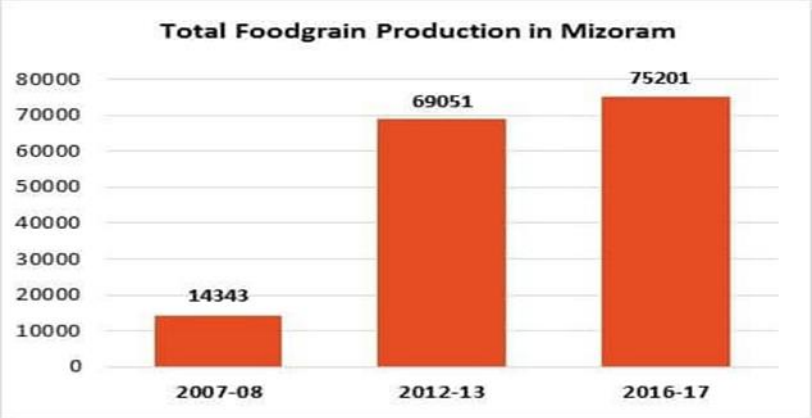


Figure 7: Food-grain Production in Mizoram

Source: Agriculture Statistical Abstract Mizoram

National Mission for Sustainable Agriculture

National Mission for Sustainable Agriculture and RKVY, a comprehensive scheme tries to address issues related to climate change adaptation in agriculture and allied sector. The allocations under the Rainfed Area Development component of National Mission for Sustainable Agriculture have been presented in the figure below:

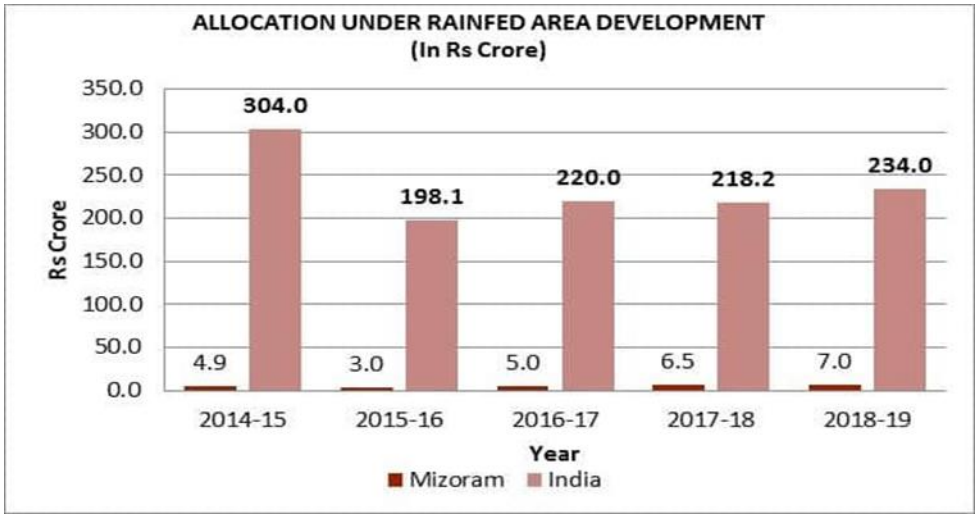


Figure 8: Allocation under NMSA
Source: NMSA Dashboard

The RKVY allocation has been given in the figure below:

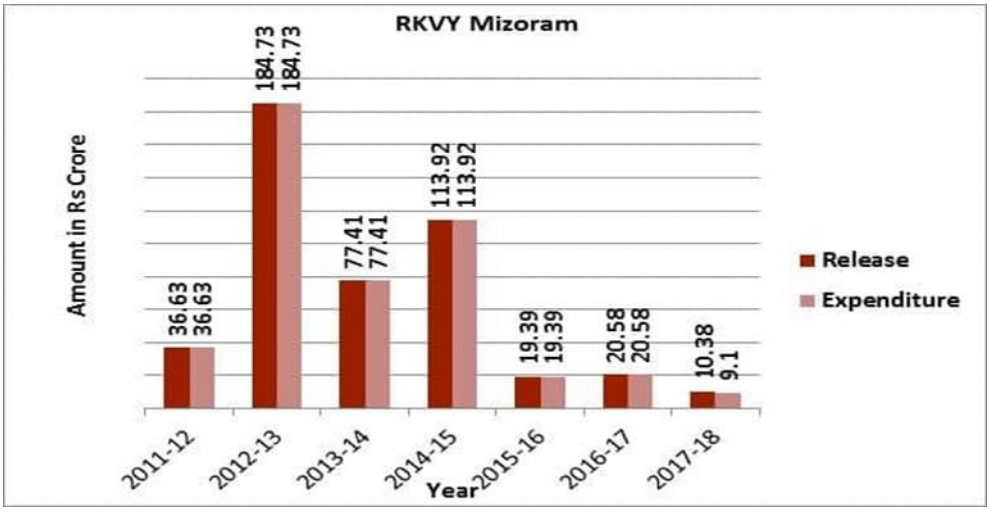


Figure 9: Allocation under RKVY in the state
Source: RKVY

WATER MISSION AND WATER USE EFFICIENCY

The main objective of the National Water Mission (NWM) is “Conservation of water, minimizing wastage and ensuring its equitable distribution both across and within states through integrated water resources development and management”. The mission has a broad target of improving water use efficiency of 20%.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been formulated with the vision of extending the coverage of irrigation ‘Har khet ko pani’ and improving water use efficiency ‘More crop per drop' in a focused manner with end to end solution on source creation, distribution, management, field application and extension activities. The approved financial plan under PMKSY for new and old water harvesting structure renovation and micro-irrigation, etc. are given below. This helps in creating additional command and giving lifesaving irrigation during critical stages of crops.

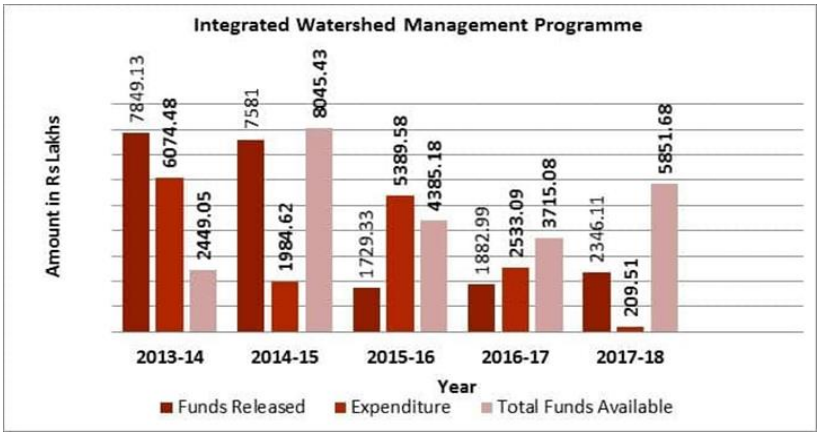


Figure 10: Allocation under IWMP in Mizoram
Source: IWMP Dashboard

The main objectives of the Integrated Watershed Management Programme (IWMP) are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil run-off, regeneration of natural vegetation, rainwater harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihood to the people residing in the watershed area. The Irrigation & Water Resources Department has been declared nodal department for preparation of State Specific Action Plan for Water Sector in Mizoram.

Table 4: Details of Agricultural Land in Mizoram

Description	2012-13	2013-14	2014-15	2015-16	2016-17
Gross Cropped Area (Ha)	133,591	132,634	217,058	221,430	232,648
Net sown area (Ha)	130,821	130,049	214,184	218,608	225,210
Irrigated area (Ha)	14,320	15,620	16,712	16,804	16,862
Rainfed area (Ha)	116,501	114,429	197,472	201,804	208,348
% of irrigated area	10.72	11.78	7.70	7.59	7.25
% of rainfed area	89.28	88.22	92.30	92.41	92.75

The above trend shows a steady increase in gross cropped area, net sown area as well as irrigated land. However, the percentage of irrigated area under cultivation shows a decreasing trend post to 2013-14.

DRINKING WATER AND SANITATION

Provision of clean drinking water is a key sustainable development goal. The central allocations for the drinking water supply have been given in the figure below:

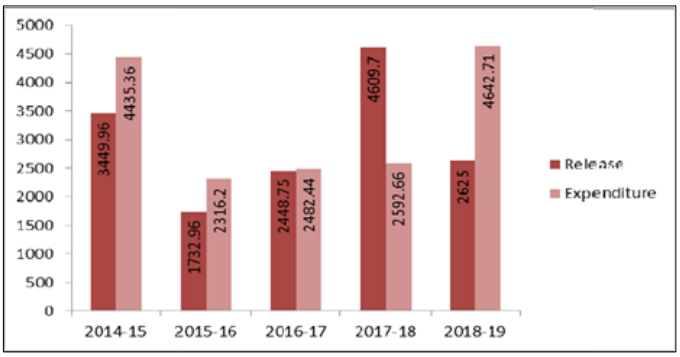


Figure 11: National Rural Drinking Water Programme Fund Allocation
Source: NRDWP MIS Dashboard

SWACHH BHARAT MISSION

One of the major public funded sanitation programmes - SBM has shown significant result in the state. Since October 2014, there is 27.97% increase in household toilets. In total, 34,000 numbers of toilets have been built.690 number of Gram Panchayats have been declared Open Defecation Free (ODF) in all eight districts with 100% coverage.

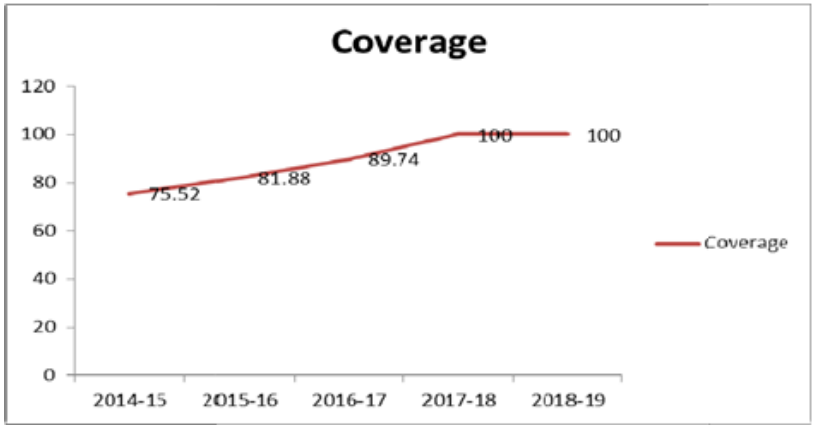


Figure 12: Coverage under Swachh Bharat Mission in Mizoram
Source: Swachh Bharat Mission - Gramin Dashboard

ENHANCEMENT OF CARBON SINK AND GREEN INDIA MISSION

The Green India Mission is an important initiative by the country to help in creation of additional forest cover and carbon sink. It will significantly contribute to the NDC. Mizoram has 18,186 sq km area under forest, which is 86.27% of its geographical area. However, only 131 sq km of forest is very dense forest, 5,861 sq km is moderately dense and 12,194 sq km is open forest. The total carbon stock of the state forest is 95.04 million tonnes (348.48 million tonnes of C02 equivalent) and the state contributes to 1.34% of the total carbon stock of the country.

The forest sector investment has both adaptation benefit and strong mitigation co-benefit.

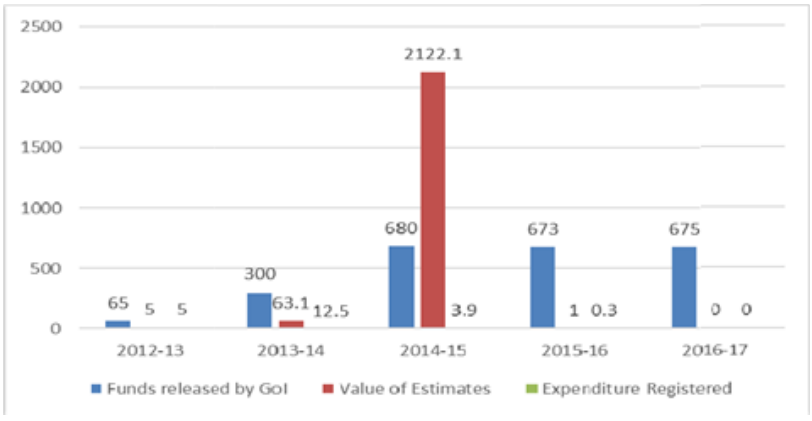


Figure 13: Summary of CAMPA fund for Mizoram (in Lakh Rupees)
Source: e-Green Watch Plantation Works and Estimates Management System, dashboard

MISSION ON STRATEGIC KNOWLEDGE FOR CLIMATE CHANGE

The Government of Mizoram has taken various measures to tackle the problems of climate change. A detailed roadmap has been chalked out to develop the Climate Change Action Plan for the state. The Climate Change Council of Mizoram is created to develop a state action plan for assessment, adaptation and mitigation measures with an objective to monitor the targets, objectives and achievements of the national missions specified by the National Action Plan on

Climate Change (NAPCC).

The Mizoram SAPCC is formulated by the Mizoram Climate Change Council. To synergize sustainable development and adaptation to climate change, a list of programmes and policies have been identified in the following areas: Agriculture, Forests, Biodiversity, Urban, Health, Solar and Renewable Energy, Energy Efficiency, Water and Strategic Knowledge. The development of detailed climate vulnerability and risk analysis covering all districts, as well as specific analysis pertaining to each of the aforementioned sectors have been addressed in Mizoram State Action Plan on Climate Change. In the second version of the SAPCC, change in the vulnerability in past five years in the districts level has been documented.

2.4.2 Mitigation Areas

MISSION FOR URBAN HABITAT

Two key programmes have been launched by the Government of India for the urban transformation; which not only provides basic amenities in the cities but are also the strong adaptation and mitigation benefits. These two are Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart City. Mizoram focuses on the following thrust areas:

1. Water supply,
2. Sewerage and septage management,
3. Storm water drains to reduce flooding,
4. Pedestrian, non-motorized and public transport facilities, parking spaces, and
5. Enhancing amenity value of cities by creating and upgrading green spaces, parks and recreation centres, especially for children.

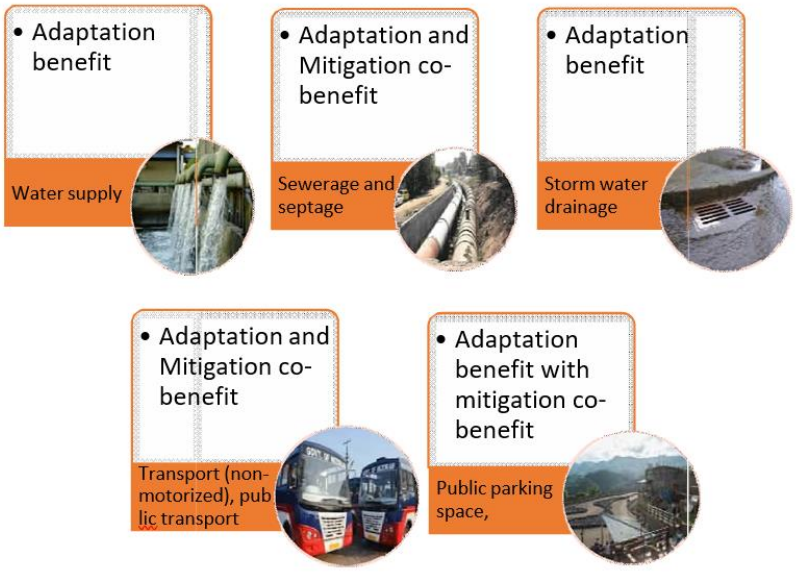


Figure 14: Adaptation and Mitigation Co-benefits

At present, Aizawl is the only city included under AMRUT and priority has been given for water supply and storm water drainage. The total allocation for the state has been Rs. 40.56 crores in 2015. In 2016- 17, it was enhanced to Rs. 47.79 crores with the funding pattern of 90:10 (i.e. Rs. 42 crores from central funding and Rs. 4.67 crores is state share). For the financial year 2017-18, the total fund allocated is Rs. 56.83 crores with same funding pattern of 90:10.

The Government of India had launched‘100 Smart Cities Mission’ in 2015 and Aizawl was selected under this smart city program. The main sectors identified for formulating smart solutions were water supply, sanitation, mobility, housing, energy and environment.

2.4.3 State Performance in Key Identified Areas

Several actions proposed in the SAPCC 1.0 had linkages to NDC and SDG outcome. The relative performance of the state has been given in the table below:

Table 5: State wise ranking according to the performance

	Unit	Year	Mizoram	India	Rank	Year	Mizoram	India	Rank
Energy									
Capacity addition	MW	2012-13	150	223,344	29	2015-16	119	298,060	32
Electrification (village electrification)	%	2011-12	92.80	93.75	25	2014-15	93.61	96.69	28
Forest									
Enhancement of Forest Cover (Area)	sq km	2013	19,054	697,898	12	2017	18,186	708,273	14
Urban									
Slum population accommodation (year-wise house completed under PMAY-G	No.	2013-14	0	134,728	22	2016-17	1,354	2,549,979	21
Health									
Reduction in vector borne diseases (No. of Malaria cases)	No.	2012	9,883	1,067,824	17	2017	5,710	842,095	15
Reduction in IMR		2012	35	42	15	2016	27	34	16
Water									
Gross Area Irrigated	'000 ha	2010-11	12	88,933	30	2013-14	16	95,772	30
Agriculture									
Food grain production	'000 Tn	2012-13	3123.3	257,134.6	25	2015-16	77.4	251,566.3	30
Horticulture area	'000 MT	2012-13	761.16	268,847.45	23	2016-17	625.02	300,642.95	22
Livestock	No.	2007	1,567,000	1178,530,000	26	2012	1583209	1241,266,621	26

State Performance on various SDG Goals

According to NITI Aayog's SDG India Index Baseline Report 2018, the performance of Mizoram on several SDG goals is shown in the table below. With a composite score of 59, Mizoram is slightly above India's average composite score of 57.

	SDG Goal	Score	Performance Category
Goal 1	No Poverty	71	Front Runner
Goal 2	Zero Hunger	69	Front Runner
Goal 3	Good Health & Well Being	53	Performer
Goal 4	Quality Education	54	Performer
Goal 5	Gender Equality	43	Aspirant
Goal 6	Clean Water & Sanitation	67	Front Runner
Goal 7	Affordable & Clean Energy	78	Front Runner
Goal 8	Decent Work & Economic Growth	65	Front Runner
Goal 9	Industry Innovation & Infrastructure	0	Aspirant
Goal 10	Reduced Inequalities	100	Achiever

Goal 11	Sustainable Cities & Communities	32	Aspirant
Goal 15	Life on Land	69	Front Runner
Goal 16	Peace, Justice & Strong Institution	71	Front Runner
	Composite Score	59	Performer

CHAPTER 3: MIZORAM CLIMATE PROFILE

3.1 CLIMATE PROFILE

3.1.1 Past and Ongoing Climate Trend

The Tropic of Cancer runs through the heart of Mizoram. Thus, the state enjoys a moderate climate throughout the year. In winter, the temperature varies between 11˚C and 21˚C and in summer, it ranges from 20˚C to 30˚C. The state receives an average annual rainfall of 2500 mm. The year may be divided into four distinct seasons namely, spring (March- May), rainy season (June- August), autumn (September-November), and winter (December- February). During rainy season, the climate in the lower hills and river gorges is highly humid, whereas it is cool and pleasant in higher hills.

Temperature

The average monthly maximum temperature taken during the period of 1996-2005 shows an increase over the previous decade of 1986- 1995, during the early part (January-February) as well as later part (November-December) of the years. There is increase in the average maximum temperature during 1996- 2005 by +0.28°C, over the decade of 1986-1995, which denotes a trend in increase in temperature during the last decade. The same increase is also reflected in the average minimum temperature recorded for the decade of 1996-2005 which is +0.30°C, much higher than that recorded for the previous decade of 1986- 1995. The overall trend in temperature also shows a gradual increase during the 1996-2005 decade. The increase in temperature as per the data indicates that there might be further rise in the heat wave in the years to come (State remote sensing center report, Mizoram).

Based on the historical IMD Gridded data on daily temperature (maximum and minimum) from 1951 to 2013 for the state of Mizoram has been analyzed. This has been given in the table below:

Table 6: District-wise Temperature of Mizoram (in ˚C)

District	T_{max}	T_{min}	Average Temperature
Aizawl	24.67	16.67	20.64
Kolasib	26.35	17.34	21.83
Mamit	26.67	17.46	21.74
Champhai	22.91	14.43	18.63
Lunglei	25.08	16.98	20.99
Serchhip	23.69	15.40	19.51
Siaha	24.61	16.46	20.51
Lawngtlai	26.08	17.76	21.89

From the above table it shows that, the maximum average temperature in the past was observed in Mamit and minimum in Champhai. The lowest average temperature was 18.63°C in Champhai and highest average was 21.89°C in Lawngtlai.

Rainfall

Pattern of rainfall in Mizoram during the years from 1986 to 2005 follows the usual expected trend in which maximum downpour occurred during the monsoon seasons and declines during the rest of the seasons. However, when analyzed on a yearly basis the trend shows a gradual decline and then a sudden increase from 1990 to 1995. In fact, during the span of the 20 years study period, 1995 recorded the highest rainfall of 3185.98 mm whereas 1994 had the lowest rainfall with a measure of 2278.29 mm only. The monthly average rainfall during 1996-2005 when compared to the previous decade of 1986- 1995 shows a gradual increase during the

month of March, May, September and then a remarkable increase during the month of July, with one-day maximum peaks. Under the action of heavy rain, flash floods may be caused resulting in bank erosion and some local damage.

3.1.2 Climate Projections and Analysis

The following climate trends are available for the state of Mizoram.

RCP 8.5 was developed using the MESSAGE model and the IIASA Integrated Assessment Framework by the International Institute for Applied Systems Analysis (IIASA), Austria. This RCP is characterized by increasing greenhouse gas emissions over time, representative of scenarios in the literature that lead to high greenhouse gas concentration levels (Riahi et al. 2007).

RCP 4.5 was developed by the GCAM modelling team at the Pacific Northwest National Laboratory's Joint Global Change Research Institute (JGCRI) in the United States. It is a stabilization scenario in which total radiative forcing is stabilized shortly after 2100, without overshooting the long-run radiative forcing target level (Clarke et al. 2007; Smith and Wigley 2006; Wise et al. 2009).

Table 7: Summary of Climate Analysis

Observed Climate Data (1951-2013): IMD Gridded Data (Based on IMD Gridded data for 63 years)		
Temperature	**Precipitation**	**Climate Extremes**
Increasing trends observed for both maximum & minimum temperatures (Low to Medium confidence) for the entire region it is 0.2°C- 0.3°C per year	Annual average precipitation showed a decreasing trend.	Frequency of one-day maximum precipitation, warm nights and hot days increased (Medium confidence)
Projected Climate Data (2040-69): RCP 4.5 and RCP 8.5 (Based on 29 GCM CMIP simulated for Mid Century Scenario (near term to our NDC 2030) under RCP 4.5 and RCP 8.5 scenarios)		
Projected change in Temperature **Under RCP 4.5** T_{max}: 1.5°C T_{min}: 1.4°C	Projected annual precipitation changes **Under RCP 4.5** Decrease by 6.8%	Projected extreme events: Heavy rainfall, floods and droughts are likely to increase in future and will become increasingly important and play a more significant role in disaster management
Under RCP 8.5 T_{max}: 3.6°C T_{min}: 3.5°C	**Under RCP 8.5** Decrease by 17.25%	

Temperature:

The analysis (Climate Impacts and Vulnerability Assessment by CTRAN consortium) of the projected daily temperature under climate change scenario shows that:

- Mean annual maximum temperature for RCP4.5 scenario is projected to increase by about 1.5 degree Celsius by mid-century. For RCP 8.5 scenario, it is projected to increase by about 3.6 degree Celsius by mid-century for the state of Mizoram.
- Mean annual minimum temperature for RCP4.5 scenario is projected to increase by about 1.4 degree Celsius by mid-century. For RCP 8.5 scenario, it is projected to increase by about 3.5 degree Celsius by mid-century.

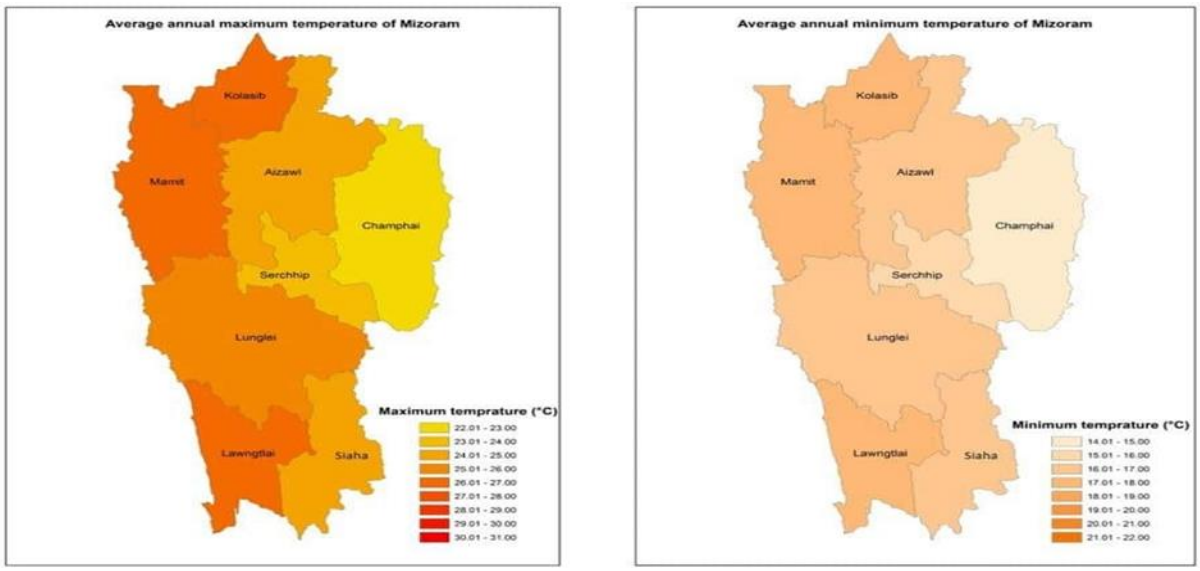


Figure 15: Average Annual Maximum Temperature of Mizoram (Left); Average Annual Minimum Temperature of Mizoram(Right)

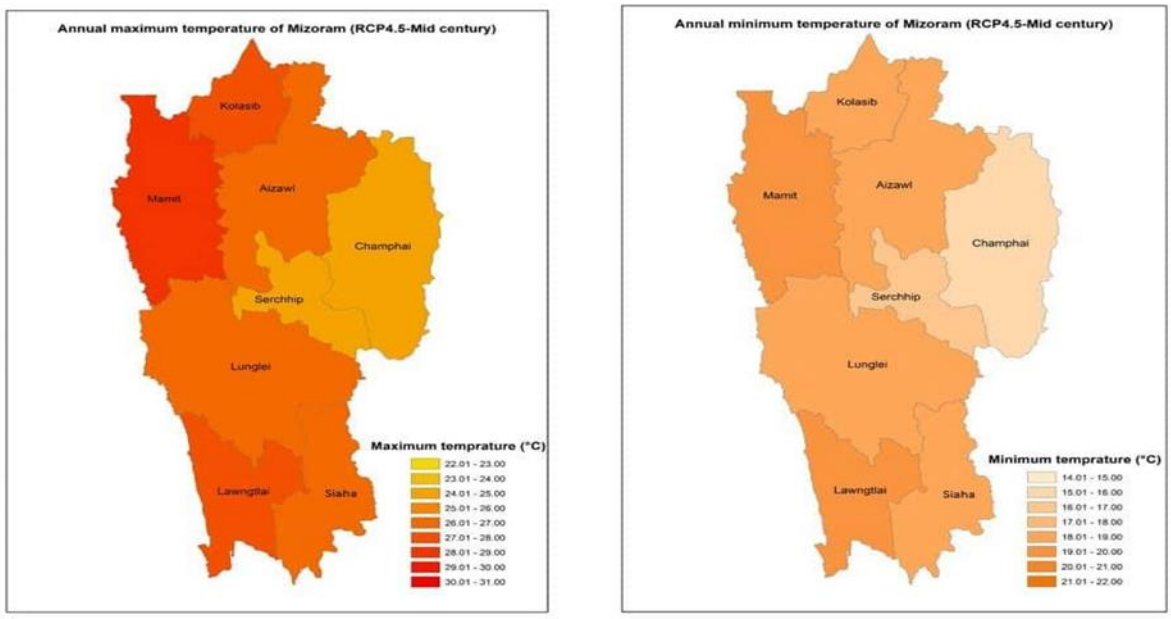


Figure 16: Annual Maximum temperature of Mizoram - RCP 4.5 - Mid Century (Left); Annual Minimum temperature of Mizoram - RCP4.5 - Mid Century (Right)

Rainfall

The analysis of annual rainfall reveals a negative trend indicating that, the total amount of rainfall received has been decreasing for some parts of the districts in Mizoram.

- Mean annual rainfall for RCP4.5 scenario is projected to decrease significantly by about 6.8% towards mid-century. For RCP 8.5 scenario rainfall is projected to decrease by about 17.25% towards both mid-century. The maximum decrease in rainfall is expected in Aizawl and Lunglei districts under RCP 4.5 mid-century scenario.

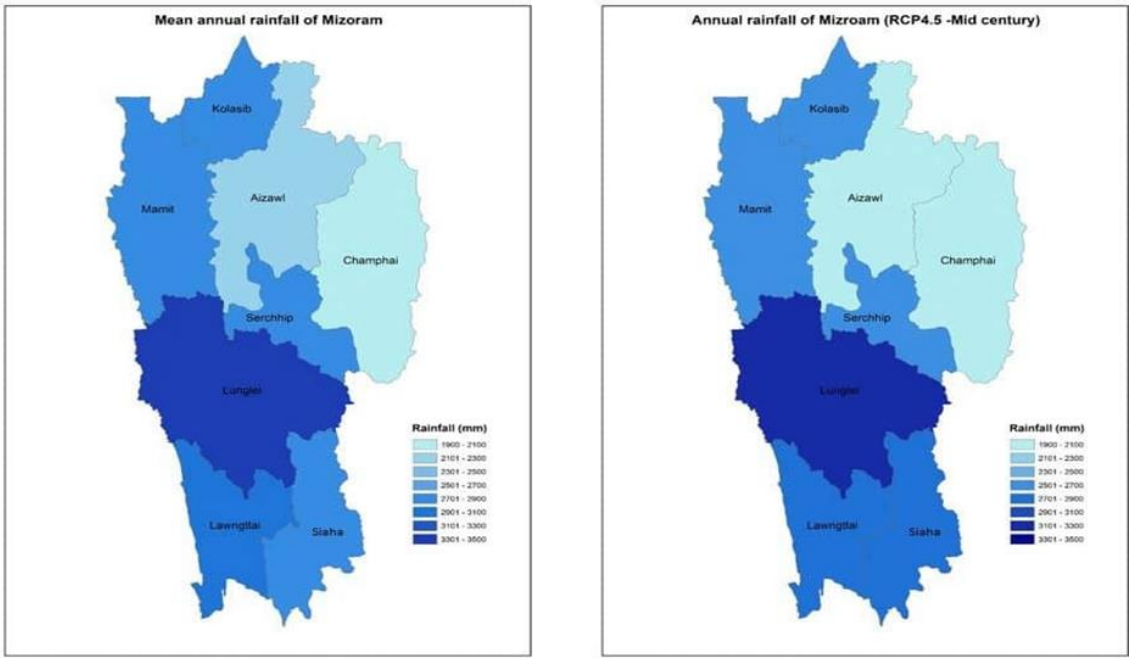


Figure 17: Mean Annual Rainfall of Mizoram (Left); Annual rainfall of Mizoram - RCP 4.5 - Mid Century (Right)

General implications of temperature increase may include heat stress related health impacts, increase in energy demand for cooling, additional evaporation and evapotranspiration losses resulting in increase in water require for irrigation of crops. Increase in intensity of rainfall events may lead to floods, urban storms, vector borne diseases, loss of work, transport disruption, additional cost for flood proofing factories and warehouses.

3.2 DISASTER RISK, LOSS AND DAMAGE IN MIZORAM

Mizoram is a hazard prone state. The state forms a part of the most severe seismic zone in the country, namely Zone V of Seismic Zone Map of India that is referred as Very High Damage Risk Zone. Mega earthquake of magnitude 8 and above have occurred in the past in the state, causing widespread damage to life and infrastructure.

As the Tropic of Cancer passes through the middle of the State, there is always abundant rainfall during the monsoon season. High wind/cyclonic storm always strike the State at the beginning and after the monsoon season, which creates havoc in the State by damaging dwelling houses and crops. Mizoram is vulnerable to the impact of tropical cyclones, which develop in the North Indian Ocean (Bay of Bengal). In addition, retreating monsoon also causes cyclonic disturbances.

Considering the housing stock, the state has high biomass (bamboo) structures and therefore, the damage to structures is widespread. Cloudbursts with a fall rate of more than 3.94 inches per hour are also quite common. Due to excess rainfall, landslides are very serious hazard for the State. Landslides disrupt road, communications, damage houses and cause loss of life every year.

Heightened vulnerabilities to disaster risks can be related to expanding population, urbanization and mushrooming of unplanned RCC buildings on steep hill slopes, especially in Aizawl City where buildings have been constructed in a congested, haphazard manner with minimum seismic considerations. Quality and design specifications of houses as well as materials used for housing, particularly for roofing and walling, have a bearing on the

vulnerability of houses to earthquakes, high wind, floods and fires. Lack of proper sewerage is also a major concern.

In the context of human vulnerability to disasters, the economically and socially weaker segments of the population are the ones that are most seriously affected. Within the vulnerable groups, elderly persons, women, children and disabled persons are exposed to higher risks. The monetary loss due to various hazards that are directly or indirectly related to changing climatic trends is presented in the table below:

Table 8: Monetary loss due to various hazards in the state

Calamity Type	Year	Loss Assessment in terms of money INR				
		Human life (as Ex-gratia)	Houses	Agriculture	Procurement of relief measures	Total
Fire	2014-15	15,00,000	2,32,31,500	36,14,370	15,68,800	2,99,14,670
	2015-16	16,00,000	1,71,52,000	62,90,600	1,98,800	2,52,41,400
Flash Flood	2014-15	-	-	1,21,900	-	1,21,900
	2015-16	-	5,92,800	1,28,06,785	-	1,33,99,585
Cyclone	2014-15	-	2,79,09,600	17,15,750	-	2,96,25,350
	2015-16	-	1,16,67,600	3,11,360	-	1,19,78,960
Storm/ Hailstorm	2014-15	-	38,91,000	-	-	38,91,000
	2015-16	-	50,42,200	2,73,000	-	53,15,200
Landslide	2014-15	3,00,000	85,32,800	1,57,836	-	89,90,636
	2015-16	4,00,000	1,94,55,000	6,51,830	-	2,05,06,830
Cloud Burst	2014-15	-	-	-	-	0
	2015-16	-	97,000	-	-	97,000
Pest Attack	2014-15	-	-	-	-	0
	2015-16	-	-	93,000	-	93,000

Source: Mizoram ENVIS Centre; Report on Natural Calamities, 2014-15 & 2015-16

CHAPTER 4: VULNERABILITY ASSESSMENT

4.1 METHODOLOGY

The concept of 'Climate Change Vulnerability' helps us to better comprehend the cause/effect relationships behind climate change and its impact on people, economic sectors and socio-ecological systems. The adaptation strategies and prioritization of resources also can be done as per the vulnerability. However, the extent of vulnerability and their pattern varies as per the number, types and directionality of the indicators. The framework to be used for the vulnerability assessment as described in the IPCC AR5.

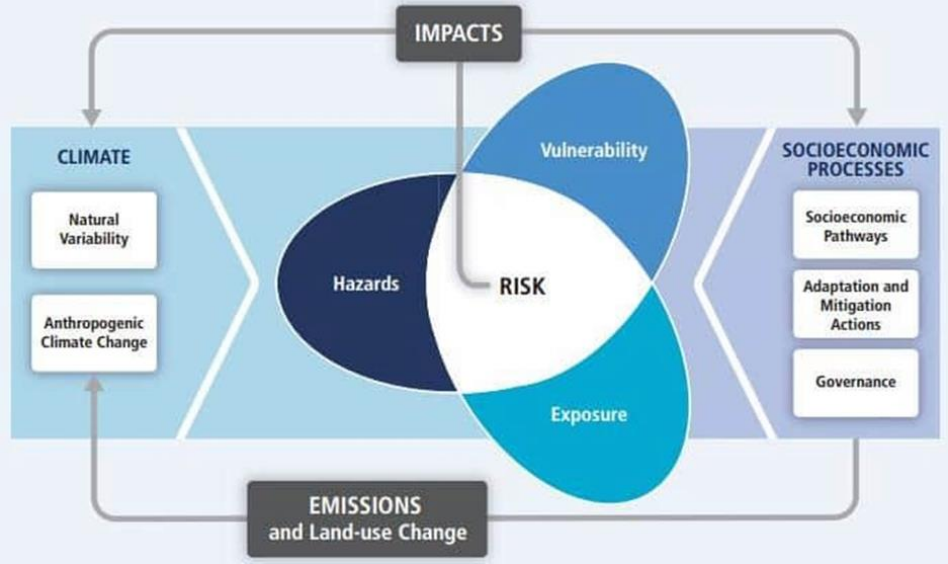


Figure 18: Illustration of the core concepts of Vulnerability Assessment. Risk of climate-related impacts results from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems. Changes in both the climate system (left) and socioeconomic processes including adaptation and mitigation (right) are drivers of hazards, exposure, and vulnerability
Source: IPCC AR5

Vulnerability

Climate change vulnerability is defined as the propensity to be adversely affected by climate change (IPCC 2014). It encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope with and adapt to future changes (IPCC 2014). Earlier, vulnerability was defined as a function of exposure, sensitivity and adaptive capacity. Now vulnerability is a function of sensitivity and adaptive capacity, whereas risk is a function of hazard, exposure and vulnerability. This framework to some extent captures the extreme events and loss and damage impact.

Risk is defined as the potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events (likelihood) multiplied by the impacts (or consequences) if these events occur. Risk results from the interaction of vulnerability, exposure, and hazard (IPCC, 2014)

The hazard due to temperature and precipitation is for the mid-century scenario and remains same during the period 2012-17. The two periods considered for this analysis are: First period from 2009-10, 2010-11, 2011-12 (when the first SAPCC was formulated); second period is 2013-17. Some of the data variables that are available for 2016-17 have been used as it is, while some variables have been projected. As per the AR5 report, the vulnerability is a function

of sensitivity and adaptive capacity. Therefore, the combined risk has been computed across three dimensions i.e. hazard, exposure and vulnerability.

Twenty-eight indicators for which data was available at the district level were collected for computation of the indexusing PCA method. It is a multivariate computer model that assigns weight based on the hidden pattern of data without bias.

As per the vulnerability manual, the combined indicator values have been generated using the following steps:

I. Identification of indicators (in this case indicators where sectoral investments made have been chosen for relevance, as well as climate linked hazards and exposures).
II. Normalization of indicators have been done.
III. In PCA method, Eigen values have been computed and vector multiplications have been done to determine the weights category wise.
IV. As per AR5 Vulnerability is a function of sensitivity and adaptive capacity V = f (sensitivity, adaptive capacity) and risk is a function of hazard, exposure and vulnerability R (h, e, v).

Concisely, the data shows the change in vulnerability as well as the change in risk over the last five years. The indicators have been enlisted in the table below, which are hazard/ exposure/ sensitivity/adaptive capacity linked in nature.

Table 9: Example of some of the Indicators for the computation of the combined vulnerability index

	Indicators	Interpretation with respect to risk and hazard due to their exposure, sensitivity and adaptive capacity
Hazard Indicators	Projected increase in temperature in degree Celsius by 2050	Higher temperature means higher risk of drought hazard, water scarcity and yield loss.
	Projected increase in precipitation in percentage by 2050	Higher precipitation means higher risk of flood hazard and yield loss due to submergence.
	Multi Hazard Score	Higher the score, higher is the risk to the exposed population.
Exposure Indicators	Sex Ratio	A better sex ratio ensures gender equity & work division, and better ability to cope with the risk.
	Urban population as a percentage of total	Higher number of exposed urban population affects the capacity of the exposed to cope with the hazards. Reduced ability to cope with the risk due to resource congestion.
	No. of Household having monthly income of highest earning household member less than Rs. 5000/-	More no. of Household having monthly income of highest earning household member less than Rs. 5000/- means those households are likely to be more vulnerable.
	% of SC (Schedule Caste) population	More Percentage of SC (Schedule Caste) Population is likely to be more vulnerable
	% of ST(Schedule Tribe) Population	More Percentage of ST (Schedule Tribe) Population is likely to be more vulnerable
	Percentage of Forest area to Geographical area	Positive change in forest area helps in carbon sequestration and reduces the local climate variability.
	Livestock & Poultry Population	Livestock population especially considering the food habits of the region is likely to enhance methane emission due to enteric fermentation and has adverse relationship with climate sensitivity.
Sensitivity	Literacy rate	Higher the literacy of the exposed population better will be their ability to cope with the risk due to climate change.

Indicators	Share of agriculture workers	Agricultural workers, especially those practicing paddy monocultures, least diversification and low value addition are sensitive to climate variability adversely.
	Net Sown Area as a percentage of district geographical area	More the net sown area means more food production.
	Gap in work participation rate (M-F), Not projected	Higher the gap implies more vulnerability.
Adaptation Indicators	Access to drinking water	Vulnerable to water borne diseases
	Electricity access percentage to total Households	People having better access to electricity have better adaptive capacity.
	Access to toilets	Access to toilets will reduce open defecation and water pollution, which in turn will reduce the disease burden and this implies better adaptive capacity.
	Share of Household using firewood for cooking	People having more usage of firewood for cooking would affect forest biomass, increase indoor air pollution, pulmonary diseases and therefore reduces the adaptive capacity in the long run.
	Share of Household using crop residue for cooking	People having more usage of firewood for cooking would affect forest biomass, increase indoor air pollution, pulmonary diseases and therefore reduces the adaptive capacity in the long run.
	Share of Household using electricity for cooking	Usage of electricity for cooking will enhance the adaptive capacity.
	No. of health centers/ lakh population	Better health infrastructure means better adaptive capacity.
	Access to Mobile Phone Only percentage	Access to mobile phones will help in dissemination of information like early warning system, pest and disease, market information, etc. and would improve the adaptive capacity.
	Households having access to banking services	Household having access to banking are more likely to have improved livelihood and this enhances their adaptive capacity.
	Total number of all scheduled commercial banks/ lakh population (in nos.)	More number of financial institutions means better credit accessibility, thus enhancing their adaptive capacity
	Credit Deposit Ratio (in %)	Better Credit Deposit Ratio means higher adaptive capacity.
	Road density	Better road density is linked to reduction in congestion, and better livelihood options. Thus, it enhances adaptive capacity.
	Percentage household with access to Television	More household with access to Television services will be better informed about warnings
	Percentage household with access to radio	Household with access to radio services will be better informed about warnings

The baseline period selection was done based on year of preparation of State Action Plan for Climate Change and 2 to 3 years before that, for which district-wise data from the Census and other official sources were available. This was either compared with the data after 2015 or projected for 2017 wherever feasible. Principal component analysis method was used to compute the index after necessary normalization. For the projected figures only, RCP 4.5 and mid -century scenario has been considered.

4.2 CLIMATE VULNERABILITY OF MIZORAM

Result: The risk and vulnerability index for baseline 2011-12 and 2017 have been presented below:

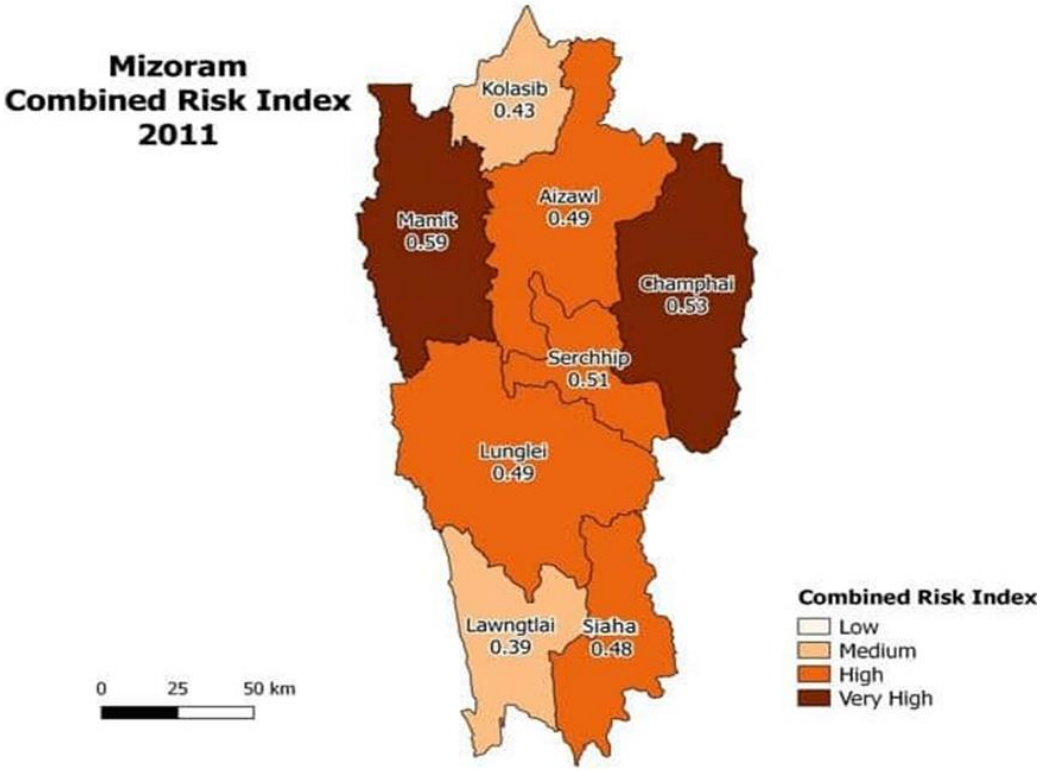


Figure 19: Baseline Vulnerability and Risk Index, 2011

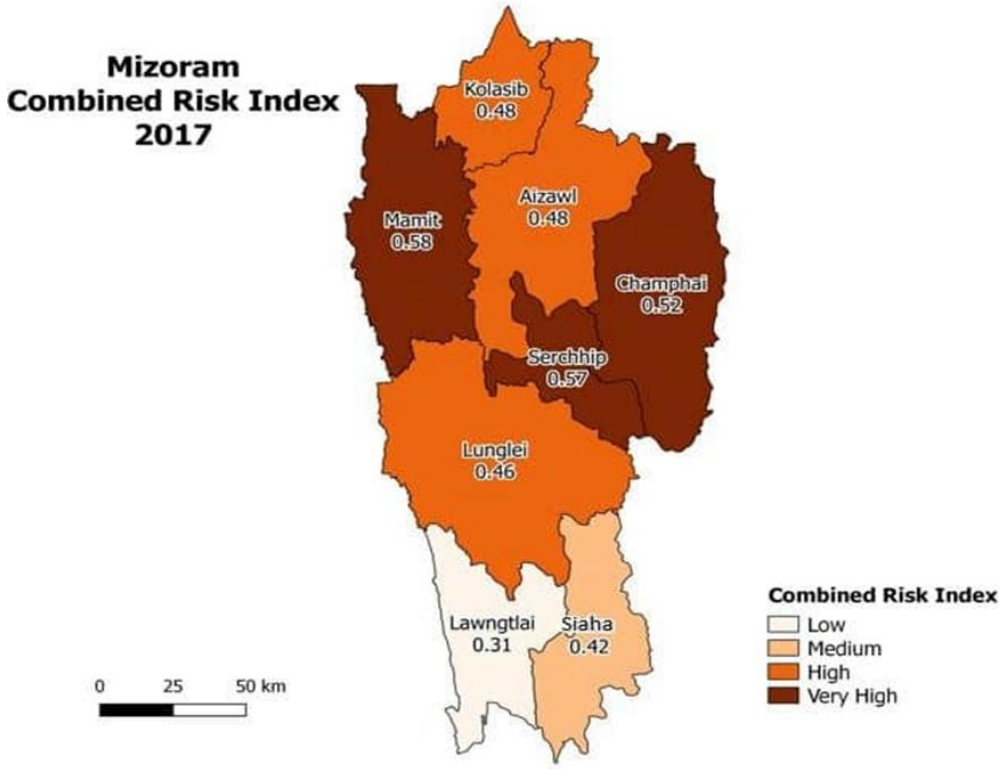


Figure 20: Vulnerability and Risk Index, 2017

Table 10: Spatial spread of risk and vulnerability in Mizoram, 2017

Districts	Hazard Index	Exposure Index	Vulnerability Index	Combined Risk Index	Vulnerability Rank 2017	Combined Risk Rank 2017
Aizawl	0.435	0.508	0.505	0.483	5	4
Champhai	0.621	0.415	0.521	0.519	3	3
Kolasib	0.387	0.480	0.558	0.475	2	5
Lawngtlai	0.169	0.464	0.307	0.313	8	8
Lunglei	0.492	0.380	0.510	0.461	4	6
Mamit	0.750	0.508	0.491	0.583	6	1
Siaha	0.282	0.511	0.475	0.423	7	7
Serchhip	0.613	0.460	0.623	0.565	1	2

The change in risk and vulnerability of the state has been given in the table below:

Table 11: Spatial Change in Risk and Vulnerability

Districts	Vulnerability Rank 2017	Vulnerability Rank 2011	Combined Risk Rank 2017	Combined Risk Rank 2011
Aizawl	5	4	4	4
Champhai	3	2	3	2
Kolasib	2	6	5	7
Lawngtlai	8	8	8	8
Lunglei	4	5	6	5
Mamit	6	7	1	1
Siaha	7	1	7	6
Serchhip	1	3	2	3

The above table shows the changes in the risk and vulnerability spatially in past five years since the SAPCC was implemented. Most districts had marginal change in their risk except for Kolasib and Lunglei. Kolasib assuming higher risk and Lunglei lowering it a bit, so also Champhai. In terms of vulnerability, major improvement has been noticed in case of Kolasib and Siaha. Mamit continues to be the district with maximum climate risk without change in last 5 years. Vulnerability of Aizawl and Champhai have reduced a bit. Lawngtlai and Lunglei show no change in their vulnerability as compared to baseline.

There is some degree of unpredictability observed in hazard events, that affect the vulnerability and therefore, multi-hazard scores have been taken. The state is highly prone to high-risk tectonic events. Landslide events are primarily attributed to high slope and relief, immature geology and neo-tectonic activity. Apart from this, heavy rainfall, unplanned and improper land-use practice in the state makes it riskier and more vulnerable. The projected sectoral vulnerability in water and agriculture seems to be adversely impacted in both the emission scenario. Considering the fact that, high intensity rainfall in a smaller number of days is expected in the near-term; it could possibly result in even more soil erosion. Cloud burst related infrastructure damage to storage structures and field channels are likely to damage.

4.3 SECTORAL VULNERABILITY & IMPACTS

Abrupt changes in climatic conditions affect all the sectors in one or the other way. Certain regions might benefit from changing climate, but overall, the impacts fall on negative side. Difference in the way certain sectors are depended directly or indirectly on nature, greatly determines the amount of impact it has to face. Following section gives a brief outlook of the impact of changing climatic patterns on different sectors in the state. However, detailed description is given in respective chapters.

AGRICULTURE & ALLIED SECTORS **(Horticulture, Fisheries, Animal Husbandry & Veterinary & Dairy)** 	**Likely impacts on the sector** • Reductions in post-monsoon and winter rainfall and increasing dryness during winter months • Intensify acute water shortage in the state • Amplify the risk of uncontrolled forest fire • Affect the agriculture calendar • Increase in incidences of insects and pest attacks • Crop failure cases leading to promoting farmers to adopt mono plantations and exotic species. • Reduced production in rainfed rice, maize and other crops • Altitudinal movement of species- horticulture crops. Fisheries habitat fragmentation & alteration in sex ratios. • Increasing heat stress causing hindered growth of animals, reduced reproduction efficiency and decreased production of milk and eggs. • Emergence of new vector borne diseases in livestock (PRRS & Goat Pox) **Vulnerable Groups** • Farmers (especially small & marginal farmers, jhum cultivators) • Food security could threaten entire state population • Livestock
FOREST & BIODIVERSITY SECTOR 	**Likely impacts on the sector** • Alteration in temperature & precipitation is likely to affect the growth, productivity and regenerative capacity of several tree species. • Shifting of floral and faunal species towards higher altitudes • Loss of biodiversity, Extinction of rare/threatened flora and fauna • Forest fragmentation leading to habitat loss and changes in migratory patterns of animals and birds. • Increased cases of Invasive species and weeds • Increased infestation of insects and pests • Increased frequency and intensity of Forest fires • Decline in provisioning services of forest • Disruption in water cycle and retention capacity of soil leading to soil erosion • Population displacement and loss of livelihood **Vulnerable Groups** • Forest dependent communities • Farmers, local communities • Biodiversity (flora and fauna)
HEALTH SECTOR 	**Likely impacts on the sector** • Changing climate is adversely affecting food and water availability • Changes in average temperature, precipitation & humidity also leads to accelerated parasite replication and increased biting rates, prolonged transmission seasons, re-emergence of formerly prevalent diseases, changes in distribution and abundance of disease vectors and reduced effectiveness of vector control interventions. • Increasing temperature can lead to changes in adaptation capabilities of microbes, which may lead to increase in food and water borne diseases. • Low food production leading to malnutrition decreased labor productivity • Heat stroke is linked to temperature rise. • Diarrheal diseases which are major killer in the state gets aggravated due to deterioration of water quality both in excess and deficit rainfall conditions **Vulnerable Groups** • Children below 5 years of age • Pregnant women • Elderly people and people with disabilities • Low-income groups (labors, construction & mining workers)

WATER RESOURCES SECTOR 	**Likely impacts on the sector** • Increased intensity of flood has an extensive pressure on the infrastructure, which is mainly exposed such as pumping stations and water treatment centres. • Reduced precipitation may lead to drying up of water bodies, streams etc. affecting agriculture productivity and safe drinking water. • Due to inadequate facility for draining the excess water, there is increased breeding of water borne insects. • Social- Increased water stress due to erratic rainfall pattern • Water System-Increased precipitation coupled with variation of the precipitation pattern • Due to less rainfall in certain years, longer dry spells early withdrawal of monsoon or its late arrival, which are fallout of climate change, effects the lifestyle of the population in a larger extent. **Vulnerable Groups** • Farmers, local communities • Population in urban as well as rural set ups
ENERGY SECTOR 	**Likely impacts on the sector** • Climate variability can severely impacts hydro power plants and could jeopardize the power supply scenario. • Extreme events like flood resulting in higher discharge or drought might affect the infrastructure and generation. • Climate extreme events impose serious threat to energy access to far-off remote villages. • Increase in temperature has a dichotomous relation with increase in energy demand to meet up the cooling load. • Changing weather patterns and extreme weather events present challenges to solar and wind energy. **Vulnerable Groups** • Urban as well as rural households • Basic services like hospitals and offices • Industries
URBAN SECTOR 	**Likely impacts on the sector** • Urban Planning- Increased frequency and intensity of precipitation have shown adverse effect on urban infrastructure • Transport- Climate change results in high intensity rainfall in the State causing major damage to roads and affects public transport • Energy Consumption- Disruption of electric and fuel transmission line due to extreme events and increased demand • Fuel supply system in Mizoram is mostly through uncovered pipelines. Extreme events causes breakdown of these pipelines and power transmission lines • Water System- Increased precipitation creates a lot of pressure on the urban drainage system of the area. The situation coupled with increased precipitation can result in contamination of water bodies • Dependence of rural communities on natural resources is affected by the climatic changes, thus potentially causing urban influx • Rise in urban population leads to increased production of waste **Vulnerable Groups** • Population in urban settlements (especially low-income groups) • Slum dwellers

CHAPTER 5: CLIMATE CHANGE STRATEGY - ADAPTATION

According to UNFCCC, *"Climate change adaptation is a response to global warming (also known as 'climate change' or 'anthropogenic climate change'), that seeks to reduce the vulnerability of social and biological systems to relatively sudden change and thus offset the effects of global warming."*

Chapters covered under Adaptation Strategy are:

5A: State Mission on Sustainable Agriculture

5B: State Mission for Green India

5C: State Mission for Sustaining Himalayan Ecosystem

5D: State Mission for Health

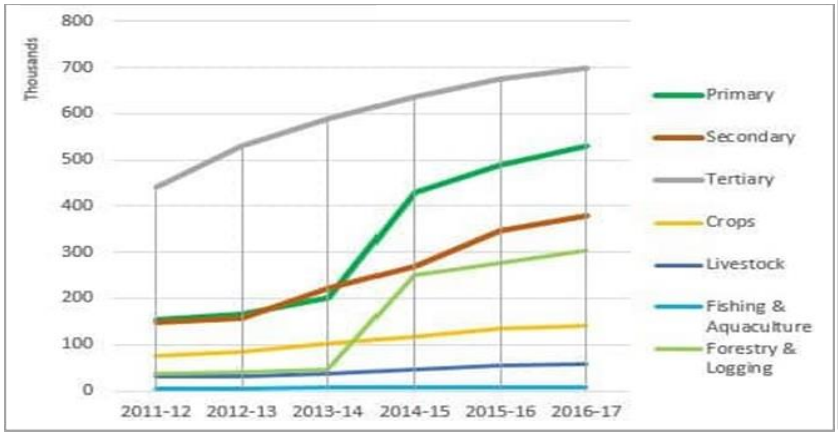
5E: State Mission on Strategic Knowledge of Climate Change

5F: State Mission on Water

5A. STATE MISSION FOR SUSTAINABLE AGRICULTURE

5A.1 SECTORAL OVERVIEW

Mizoram has traditionally been an agrarian state and nearly 60% of the population is directly or indirectly engaged in agriculture. The primary sector comprising agriculture & allied activities, contributed 31.72% (2016-17) to the Gross State Value Added (GSVA). To meet the challenges of rising population and its demand, a faster growth in agriculture and allied sectors is crucial.



- The contribution of agriculture and allied activities (Crops, Livestock & Fisheries) shows steady growth
- The sudden growth of Primary sector from 2013-14 to 2014-15 is mainly due to increase in forestry and logging activity

Figure 21: GSVA by Economic Activity at Current Prices(Base year - 2011-12), in '000 Lakh INR
Source: Statistical Handbook of Mizoram, 2017

Agriculture Scenario: Mizoram enjoys a wonderful blend of climatic conditions ranging from tropical, sub-tropical to temperate. The state receives heavy rainfall with low intra annual variability. However, due to its difficult terrain and lack of irrigation infrastructure, almost 90% of the area under cultivation in Mizoram is rainfed. The soil in the state is moderate to strong acidic (pH ranging from 5.4 to 5.7) and the organic carbon content ranges from medium to high (1 to 3%) as compared to other states.

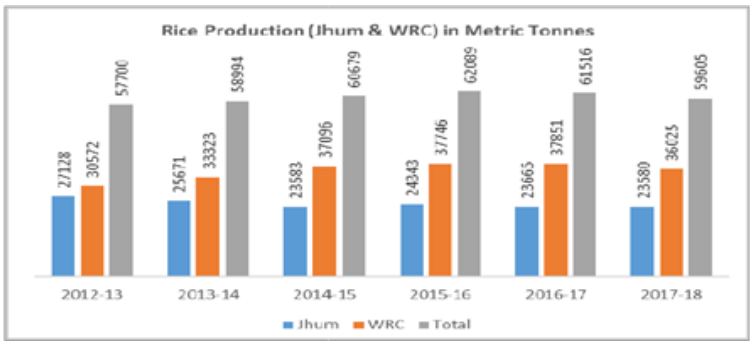


Figure 22: Figure 22: Comparison of Rice Production from Jhum and WRC from 2012-13 to 2017-18

The current fertilizer consumption of the state is 75 kg/ha, which is far below the national average of 112.30 kg/ha[1].

Rice is the most important crop and it occupies the largest share of area and production. The traditional method of paddy cultivation in the hill slopes, commonly known as Jhum, has been practiced from times immemorial in Mizoram. Due to hilly terrain, the available Wetland Rice Cultivation (WRC) areas of the state are very limited and scattered. Rice cultivation area (WRC) is recorded at 17,256 ha, which accounts for about 45.58% of the total rice area. In recent years, the utilization of WRC potential area has increased from 16.25% in 2010-11 to 23.20% in 2016-17. In the aforementioned figure, trend in the rice production shows a slow decline of rice cultivation under Jhum and increasing production under WRC. Small fluctuations in production can be attributed to erratic rainfalls. The reason for slow increase in WRC area is largely because of land unavailability due to steep slopes and land degradation. According to the *Compendium of Environment Statistics Report -2016*, about 29.29% of land area in Mizoram (617,826 ha) is degraded. Champhai (58.01%), Serchhip (49.73%) and Lawngtlai (48.18%) have highest percentage of degraded areas. Other major crops grown in the state are maize, pulses

[1] Agriculture Statistic Abstract, Mizoram 2016-17

like rice bean, arhar, field pea, cow pea, and chickpea, oilseeds like soya bean, sesamum, rape mustard and oil palm.

Food and Nutritional Security

Even though rice is the major crop, the state is still not self-sufficient in its production. As per the Economic Survey of 2017-18, the annual minimum requirement of rice for the state is estimated to be about 1,80,000 MT, while the production was only 61,516 MT in 2016-17, which could meet only 34.18% of its rice requirement. National Food Security Mission (NFSM) had been implemented in 2012-13 covering only rice for two consecutive years (i.e. 2012-13 & 2013-14). Since 2014-15, with the modification of the guideline, NFSM scheme now covers rice, pulses, coarse cereals and oil palm.

Horticulture

Horticulture potential area in Mizoram is 11.56 lakh ha. At present, the total area under horticulture crops is 1.51 lakh ha, which is 13% of total state area. The geo-climatic situation of Mizoram offers an excellent scope for growing different crops including fruits (Mandarin Orange, Banana, Mango, Strawberry, Grape, Pineapple, Dragon fruit etc.), vegetables (Cabbage, Tomato, Capsicum, and Broccoli etc.), spices (Ginger, Turmeric and Birds eye Chilli), plantation crops (Areca nut etc.), medicinal, flowers (Anthurium, Rose etc.) and aromatic plants of high economic value. From 2006-07 to 2016-17, there has been a considerable growth in production as well as productivity of major horticulture crops[2]. Floriculture has shown a tremendous growth in the last decade. Low volume high value crops help the farmers in fetching good price for their produce.

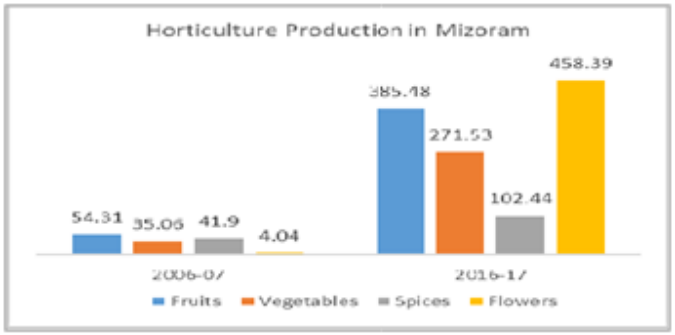


Figure 24: Productivity of various horticulture crop and its decadal growth

Figure 23: Growth comparison of major horticulture crops for the year 2006-07 and 2016-17

Livestock & Animal Husbandry

Livestock and poultry farming have been an integral part of the people of Mizoram. The people here are primarily meat eaters and they rear animals like pig, cattle, goat, mithun, sheep etc. With increase in population, the demand for meat is bound to increase. The adjoining figure shows the comparison between requirement (as per ICMR recommendation) and current availability of meat, milk and eggs in the state[3]. On one hand, the livestock and animal husbandry sector contribute substantially towards the state's rural economy by generating livelihood opportunities for the rural people and increasing their incomes. However, on other hand, it is also responsible for high GHG emissions (about 63% of the total emission from agriculture

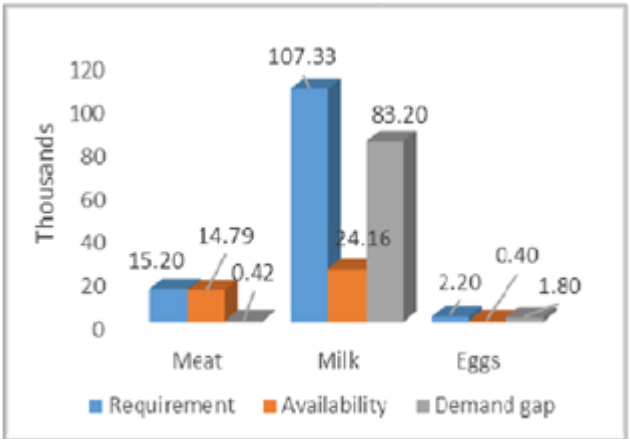


Figure 25: Demand Gap of Major Livestock Products for 2016-17 (Milk, Meat in tones; egg in lakh nos.)

[2] Economic Survey, Mizoram – 2017-18
[3] Economic Survey, Mizoram – 2017-18

sector[4]) through enteric fermentation, etc. However, adopting judicious management through small changes in current practices like proper dietary planning of livestock and improved manure management, can result in considerable mitigation possibility. Animal waste if decomposed an aerobically in bio-digester can produce biogas, which can be used as an alternate fuel for cooking purpose. The by- product of anaerobic decomposition of animal waste is a rich source of organic fertilizer.

Fisheries

Mizoram has 24,000 ha of potential area available for fish farming. In the last decade, the performance of state has enhanced steadily. From 2006-07 till 2017-18, number of fish farmers have gone up from 7,279 to 16,043 and area under fish culture has gone up from 2,597.35 ha to 5,468.34 ha. In addition, there has been an increase of almost 86% in total fish production in the State[5].

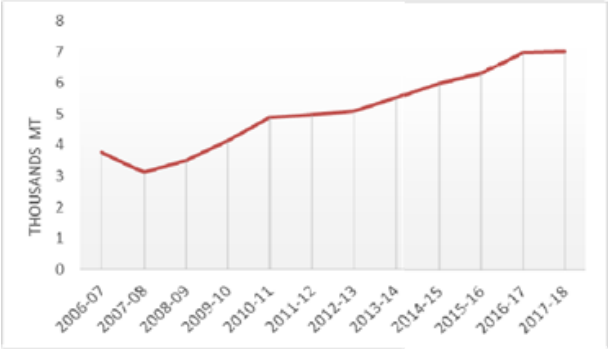


Figure 26: Fish production in Mizoram from 2006-07 to 2017-18

However, the total fish seed requirement of the state is estimated to be around 440lakh fingerling, out of which it has been possible to produce and distribute only 226.24 lakh both from private and government resources. This leaves a shortfall of around 214 lakh fingerlings, which needs to be imported from other states. The demand for fish is likely to further increase with the increase of state's population and earning capacity of the people. As per the State of World Fisheries & Aquaculture Report 2018, yearly per capita fish consumption has grown from 9 kg in 1961 to 20.5 kg in 2017 and as per preliminary estimates (for India – 5 to 10 kg per capita per year). This justifies a major investment for the required development of fisheries in the state to bridge the gap between the demand and supply, besides generating self and regular employment.

GHG Emissions from Agriculture & Allied Sectors

Agriculture activities have a significant impact on the GHGs emission such as methane (CH4), nitrous oxide (N_2O) and carbon dioxide (CO_2)[6]. These are generated mainly due to application of fertilizers, decomposition of biomass & dead plant residues, rice cultivation, livestock rearing, enteric fermentation in ruminants, manure handling, and burning of crop residues (IPCC 2007). Agriculture and allied sectors contributed about 17% to the total GHG emissions from India. The adjoining figure shows the split of various GHG sources in agriculture in Indian Agriculture; Average of 1990 – 2016 data sector. As per the projected trends, emission from agriculture sector is expected to increase by 17% by 2030 under Business-As-Usual (BAU) scenario, as compared to that in 2010[7]. One of the major reasons for increasing GHG emissions is the increasing use of fertilizers along with other agricultural inputs and rising population of livestock. In Mizoram, methane emission is more than 70 kg/ha and nitrous oxide emission is less than 0.5 kg/ha, while the Global Warming Potential (GWP) due to these emissions lies between 500 and 1000[8]. While the high

Figure 27: Relative Contribution of Sources of GHG Emission

[4] 2016. FAOSTAT Agricultural Data. http://faostat.fao.org/
[5] Dept. of Fisheries, Mizoram
[6] FAOSTAT
[7] Pathak H., Greenhouse Gas Emission from Indian Agriculture: Trends, Mitigation and Policy Needs. Centre for Environment Science and Climate Resilient Agriculture, IARI, 2014
[8] Bhatia A, et al. Greenhouse gas emission from rice and wheat-growing areas in India: Spatial analysis and upscaling. Greenhouse Gas, 2012

value of methane emission is due to its pre-dominant rice cultivation and low nitrous oxide emission is due to less use of nitrogenous fertilizers in the state.

5A.2 IMPACT OF CLIMATE CHANGE

As already discussed in the state vulnerability chapter, based on 29 GCMCMIP simulated for Mid Century Scenario, the mean annual, minimum and maximum temperatures are going to increase (RCP 4.5 – Tmax: 1.5°C, Tmin: 1.4°C; RCP 8.5 – Tmax: 3.6°C, Tmin: 3.5°C). However, the rainfall in the state towards mid- century is likely to decrease by 6.8% in RCP 4.5 scenario and by 17.25% in RCP 8.5 scenario. In a study[9], the variation in temporal pattern of rainfall was projected using Standardized Precipitation Index (SPI) for different time scales across Mizoram to assess its possible impacts on agriculture. It showed some significant reduction in post-monsoon and winter rainfall and increasing dryness during winter months. This is likely to intensify acute water shortage in the state, amplify the risk of uncontrolled forest fire and affect the agriculture calendar. Also, the modelling study[10] under A1B scenario shows the increasing agricultural vulnerability that poses a threat to water availability in Mizoram.

An assessment study[11] on impact of climate change on major crops of the northeast region was conducted, where impact on crop yield was studied using PRECIS A1B 2030 scenario[12] and simulations were done using Info Crop model. Considering 90% rainfed cultivation in the state, production of both irrigated and rainfed rice is highly likely to be reduced by almost 25% in some regions. Also, the production of irrigated maize is likely to go down by almost 40% in Siaha and Champhai districts.

Figure 28: Impact of climate change on yield of irrigated & rainfed rice and maize crop in Mizoram, in PRECIS A1B 2030 scenario

In recent years, the frequency of many seed and soil borne diseases of rice, like stem rot, sheath rot, leaf scald, blast disease, bakanae, etc., have increased considerably and a few of them correlate with early winters and high rainfall during panicle formation. All these factors are very likely to affect food security and crop production. Due to changing climate, there is an increase in incidences of insects and pest attacks. These changes can also alter the interactions between the pests and their host plants. As a result, some of the cultivars that are resistant to insect pests, may exhibit susceptible reaction under climate change. Rate of insect multiplication might increase with an increase in CO2 and temperature[13].

Due to increasing cases of crop failure in the recent years, many farmers are forced to give up the traditional varieties and depend on exotic crop and vegetable species that can withstand uncertain whether fluctuations. The erratic rainfall patterns have also left the farmers thwarted about their traditional cropping and Jhum calendar. According to the Compendium of Environment Statistics Report- 2016, total damage due to heavy floods/rains in Mizoram during 2015 was about Rs. 63.60 lakh, out of which crop loss was around Rs. 38.60 lakh.

The productivity, distribution & seasonality of fishes, along with the quality & availability of the habitats that supports them are also sensitive to changing climatic circumstances. The changes in species distribution & migration, habitat fragmentation and decoupling, alteration in sex ratio of few fish species, depletion of dissolved oxygen and changing breeding season are some of the likely impacts on

[9] Saha, S. et al., Spatial variability in temporal trends of precipitation and its impact on agricultural scenario of Mizoram. *Current Sci*ence, 2015
[10] Ravindranath, N. H. *et al.*, Climate change vulnerability profiles for North East India. *Current Sci*ence, 2011, 101(3), 384–394
[11] Kumar et al., Impact of climate change on crop productivity in Western Ghats, coastal and north-eastern regions of India. *Current Sci*ence, 2016
[12] The values are % deviation from current yields. (Kumar, et al.)
[13] Singh S.B. et al., Climate change and agriculture in Mizoram: Issues, Constraints and Strategies. ICAR Research Complex for NEH Region, 2016

fisheries. The changing climate is expected to have severe impact on livestock production system around the world. Increasing heat stress has resulted in hindered growth of animals, reduced reproduction efficiency and decreased production of milk and eggs. Increasing temperatures have also caused physiological disturbances, emergence of new rare diseases, in addition to increased incidences of vector borne diseases in livestock. For instance, PRRS (Porcine Respiratory and Reproductive Syndrome) in pigs and Goat Pox outbreak have recently been observed in Mizoram.

5A.3 KEY ISSUES AND CHALLENGES

Area	Challenges/ Issues
Technical/ Infrastructural	Lack of water harvesting and irrigation infrastructure: About 90% of the state agriculture is rainfed. High water run-off, low water use efficiency and poor channelization of rainwater coupled with high volume erratic rainfalls, possess serious threats to both farm fields as well as state infrastructure.
	Connectivity Problems: Road connectivity is one of the major issues of the state. Farmers face great trouble in traversing from their fields to the nearby markets and towns.
	Post-Harvest Storage Management: As the proper storage facilities such as warehouses and cold storage is very less, there is a huge loss of perishable products like fruits, vegetables, cereals etc. due to delay in transportation, pest and rodent attack etc. As per the 'YES Bank's Cold Chain Opportunities in India' report, the state has about 74,000 MT of cold storage requirement, out of which only 3,000 MT is in operation.
	Low availability of Farm Power: The national average of Farm Power availability is about 1.25 kW/ha, whereas in Mizoram it is only 0.90 kW/ha[14].
Policy & Regulatory	Land Holding System: Due to the existing land holding system in the state where land is owned and transferred by the community, the farmers are not able to access credits due to absence of land titles. In addition, in villages where community institutions have lost control over the land, landlessness has become a great challenge for the farmers.
Institutional	Market Linkage: Due to absence of readily available markets in many regions of the state, the farmers are not getting correct price for their produce. In addition, the marketing emphasis on niche products from jhum fields is low.
	Low Seed Replacement Rate: To get a good harvest, new and improved variety of seeds is required to be introduced. Till date, the seed replacement rate is only 28% in self- pollinated crops and about 84% in hybrid seeds, whereas, the desired rate of seed replacement to get higher production is 33% in self-pollinated crops like rice, 50% in cross-pollinated crops (Maize) and 100% in hybrid seeds[15].
	Shortage of Skilled Human Resource: There is a lack of skilled work force that is equipped with practical knowledge of climate change adaptation and mitigation techniques
Socio-economic/ Cultural	Unsustainable Jhum Practice: In the recent years, Jhum practice is becoming highly unsustainable, as the periodicity of Jhum cycle, which was previously 8 to 20 years, has now been reduced to 3 to 5 years in many regions. This reduced duration is not sufficient for the rejuvenation of soil characteristics like chemical fertility and physical state. This results in poor yield, excessive soil erosion, land degradation, depleting forest cover and increasing soil acidity.
	Decreasing Agriculture Yield: Due to continued practice of unsustainable jhum cultivation and recent abrupt changes in temperature and rainfall patterns; the yield from the jhum fields is hardly sufficient for self-consumption and is often of low quality. As a result, there is a considerable decrease in farmers' income, standard of living and nutrition. Largely, this drives the farmers to dis-continue their traditional knowledge & practices and opt for mono cropping and cash cropping.
	Fish Harvesting Methods: As a part of traditional practice, small fish farmers often drain the entire pond for harvesting fish, instead of using dragnets. This results in water and soil loss.
	Feed & Fodder Shortage: The state is suffering from shortage of feed and fodder

[14] Economic Survey – 2017-18
[15] Economic Survey – 2017-18

	for livestock. One reason for this is the lack of interest of farmers in growing fodders in their fields.
	Lack of awareness on Marketing Strategy: Most of the small and marginal farmers are totally unaware of the current market trends, price and demand of products etc. As a result, they are not able to plan their crops in advance as per demand.
Environmental	Erratic Rainfalls: In the recent past, the rainfall has become highly unpredictable. This results in changing cropping calendar, jhum cycle, topsoil run-off etc., adding to farmer distress.
	Drying of Perennial Water Sources: Many of the perennial streams and small rivers have dried up, resulting in water scarcity for drinking and irrigation purpose.
	Shifting in Cropping Zones: Due to increasing temperature, an altitudinal shift in the cropping region of several fruits and vegetables have been observed.
	Reducing Soil Fertility: The unsustainable agriculture practices coupled with changing environmental conditions have resulted in reduced soil fertility.
	Land Degradation: Land degradation is a global problem, largely related to agricultural use. The major causes include land clearance such as deforestation, agricultural depletion of soil nutrients through poor farming practices, livestock including overgrazing, inappropriate irrigation, urban sprawl and commercial development, etc. According to the Compendium of Environment Statistics Report -2016, about 29.29% of land area in Mizoram (617,826 ha) is degraded. Champhai (58.01%), Serchhip (49.73%) and Lawngtlai (48.18%) districts have highest percentage of degraded lands.
	Increasing Pest Attacks: Due to changing climate, there is an increase in incidences of insects and pest attacks. These changes can also alter the interactions between the pests and their host plants. Rate of insect multiplication might increase with an increase in CO2 and temperature.
	Emergence of new Livestock Diseases: Many new diseases like PRRS and Goat Pox have been observed in the state recent days. This is creating a huge challenge for the department in tackling the situation due to financial and resource constraints, and lack of preparedness for such outbreaks.

5A.4 PROGRESS MAPPING (IN LAST 5 YEARS)

5A.4.1 Physical Progress

Out of 17 activities proposed in SAPCC Phase-1, the line departments have implemented activities listed in the table below. These activities have been undertaken under various ongoing central and state schemes like RKVY, NFSM, NMSA, MIDH, RAD, Soil Health Management (SHM), Soil Health Card (SHC), NMAET, PKVY, PMKSY, Sustainable Agriculture Development through Expansion, Enhancement & Modelling etc.

Sl. No.	Strategies/ Activities	Physical Progress
1	Development of land (Levelling, bundling, etc.) for Wetland Rice Cultivation (WRC) on available lands having 0 - 10% slope and Improvement of existing Wetland Rice Cultivation (WRC).	For economic and efficient use of irrigation water in rice, pulses, cash crops and others; assistance for in situ moisture conservation like land levelling, bunding, etc. - 200 ha of land have been developed.
2	Impact assessment of paddy cultivation through agricultural inputs such as crop varieties, kharif crops and promotion of rainwater harvesting and construction of eco-friendly mini check dams for irrigation.	About 710 number of rainwater harvesting structures have beenconstructed for the purpose of irrigation and storage of rainwater.
3	Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building	To enhance crop productivity, SRI was promoted and demonstrated. Intotal, SRI has been adopted in about 3,550 ha of land.

	to train farmers in latest rice cropping techniques specially evolved to counter adverse effects of climate change.	
4	Optimization of jhum cultivation through conservation of arable land, water utilization management, parallel cultivation of alternative crops and Alternative jhum control to livelihood	The area under jhum cultivation has decreased from 44,947 ha at the beginning of 11th Plan to 19,602 ha during 2016-17, which account for above 56.38% reduction. For this activity, farmers are incentivized through Improved Jhum cultivation, wherein subsidy assistance on critical inputs like improved seed, fertilizers, chemicals, herbicides etc. is provided to them. 8,304 ha of land have been optimized.
5	Construction of Hill slope terraces for conservation of moisture and cultivation of food grain, vegetable, pulses and oil seed crops	Land development including leveling, preparation of bed has beenundertaken under RKVY. Also 1,625 ha land have been converted into permanent cultivation through construction of terraces.
6	Increasing the area under perennial fruit plantation crops and low value high volume crops to help cope with uncertain weather patterns	• During 2016- 2017, more than 1,770 ha area has been covered under Area Expansion Scheme of fruits, vegetables, flowers and spices. • Cultivation of dragon fruit and off-season cabbage have also been undertaken
7	Management of climate change impact on horticulture and Climate risk management studies	Activities such as Protected cultivation, Greenhouse installation, Micro-irrigation (Drip & Sprinkler irrigation), Creation of water sources have been undertaken. Dragon fruit cultivation is helping farmers to adapt to rising temperature and erratic rainfall, while protecting their incomes. New heat-resistant variety of cabbage imported from Japan is being introduced. Two varieties of tomato like- Araka Samrat and Araka Rakshak, which can withstand high temperatures and disease-resistant are also grown in the state.
8	Improving post-harvest management such as cold chain for perishable crops and winter cultivation practices.	Integrated Pack Houses, Refrigerated Vans, Pickup trucks, Satellite units, Cold storage, Low evaporation cool chambers have been set up under RKVY and MIDH.
9	Promotion of organic farming through usage of compost and vermicomposting.	Establishment of new vermi-composting unit, trash bunding, contour bunding, mulching, Integrated Nutrient Management have been undertaken. To develop crop commodity specific organic value chain and address gaps in organic crop production, various activities like wild crop harvesting, organic livestock management, processing, handling and marketing of organic agricultural products have been undertaken. About 2,032 ha of area have been covered.
10	Adoption of Integrated Pest Management for improved crop yield, Preparedness to tackle emerging scenarios of pests and capacity building for stakeholders.	• Promotion of Integrated Pest Management under MIDH (Mission for Integrated Development of Horticulture) has been done. • Plant protection centers have been established and Plant health clinics (3 under RKVY in Lunglei, Kolasib & Serchhip districts and 1 in Aizawl). • Capacity building done under MIDH & RKVY. • To bring down the crop losses, about 25,000 ha of cultivated area have been covered by providing the farmers, with plant protection chemicals including bio-pesticides to enable them to bring down the crop losses in an integrated manner.
11	Research study on livestock	• Establishment of early warning system and capacity

	disease and establishment of early warning system and Capacity building to stakeholders.	building have been undertaken under ASCAD, AICRP on ADMAS and RKVY. • Measures like vaccination are regularly carried out to control the spread of animal diseases.
12	Providing extensive support and services to fishermen through establishment of district level training centers.	• 7,062 numbers of beneficiaries under NLUP and around 553 numbers of beneficiaries under FFDA have been benefited by the training programme.
13	Water bodies conservation for fishery sector and establishment of fishery units in reservoirs and riverine area.	• 2,671.52 ha of new water area (Ponds) have been constructed during 2013-14 to 2017-18 under RKVY, NLUP/NEDP, Blue Revolution and NFDB. • 146 cages have been installed in Serlui B reservoir under RKVY and Blue Revolution.
14	Green the devastated barren wasteland for fodder cultivation (7,000 Hectares).	• At Thenzawl Fodder Farm, works on bench terracing and field channel irrigation is implemented with the purpose of better and more production of fodder and for demonstration to farmers (under RKVY). • Animal Feed Plant is installed at Ramrikawn, Tanhril with the capacity of 8 MT/hour, which is expected to be nearly sufficient for farmers in addition to the production of existing feed plant (under RIDF).

Apart from the above activities, the agriculture department has also started following initiative -

Sustainable agriculture development through expansion, enhancement and modelling in the state of Mizoram (NAFCC funded project for climate change adaptation). The objective of this project is to augment the livelihood of rural communities through enhancing resilience of agriculture crops, livestock and fisheries to climatic variability, through development and application of improved production along with risk management technologies. The major components of the project are:

1. Finalizing household level adaptation interventions, Climate change modelling networking and capacity building & awareness.
2. Soil conservation for improvement of soil and water regime in the hill area.
3. Water Harvesting and Management.
4. Enhancement of Crop Production & Productivity: Mainstreaming innovative agricultural best practices related to climate change adaptation in strategies/policies/projects like SRI, Improved Jhum and Direct Seeded Rice cultivation.
5. Farm Mechanization (Custom Hiring Centres-CHCs).

5A.5 GAP/ BARRIER ANALYSIS

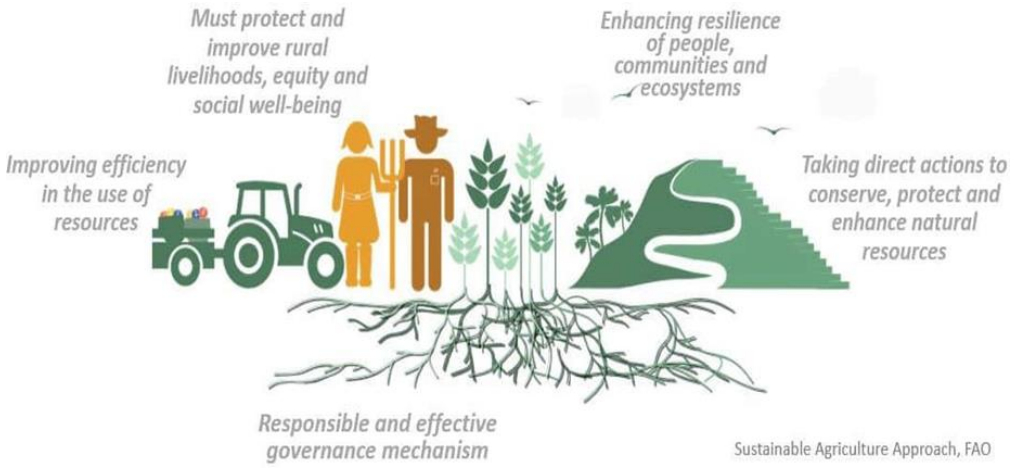
Type	Gaps	Issues
Technical/ Infrastructural	Lack of soil and water conservation measures.	Drying streams, excess run-off of top soil and reducing soil fertility.
	Lack of post-harvest management facilities, value addition/ processing units.	• Lack of market opportunities. Low farmer income. • Spoiling of perishable products/ Less shelf life of produce.
	Connectivity through roads.	
	Low availability of farm power.	Farm machinery cannot be used efficiently
	Lack of infrastructure for irrigation and water storage.	High dependency on rain for agriculture. Almost 90% rainfed agriculture.
Financial	Slow coverage under micro-irrigation.	
	Lack of research on climate change	Less understanding reflects in policy and decision-making.
Policy & Regulatory	No crop insurance (lack of funds with state government, policy gap)	No risk mitigation strategies, farmers have to face loss in case of crop failure.

	Prevailing land holding system, marginal landholding	Farmers do not have credit access, landlessness.
Institutional	Lack of skilled human resource	Shortage of skilled field staff.
	Lack of coordination among the departments	Scheme convergence, low integrated approach.
Socio-Economic/ Cultural	Lack of alternate livelihood	Unsustainable jhum cultivation.
	Feed & fodder shortage	Low animal health and productivity.
	Less awareness on marketing strategy	Farmers are not able to get full benefits of the potentially beneficial market.
Planning	Lack of climate preparedness/ adaptation measures	New and emerging pest and disease outbreaks in agriculture fields as well as in livestock.

5A.6 SECTOR – PRIORITY/STRATEGIES

5A.6.1 Future Plan to Meet NDC and SDG

With the implementation of the New Land Use Policy (NLUP) – the state government's flagship programme, the government has on one hand tried to support farmers engaged in unsustainable 'Jhum practices' towards a more environment friendly and gainful livelihood, while on the other, it initiated the transition from subsistence-oriented agriculture to a more market oriented one. In future, emphasis will be given to enhance the organizational capacity of the agriculture and allied departments to promote sustainable agriculture taking a landscape or systems approach that links agriculture, fisheries, animal husbandry and forest. The approach for sustainable agriculture development for climate change adaptation will try to blend the traditional with the modern and wherever possible, improve the efficacy of existing practices through locally acceptable technological interventions, indigenous innovations and participatory decision-making.



Through the new state policies, growth drivers from agriculture and allied sector would be prioritized in proper sequence that would provide maximum linkages in the economy for improved resource efficiency, inclusive growth and sustainable development of the state in the long run. Effective and result-based measures will be supported for the development of approaches at all levels on vulnerability and adaptation, as well as capacity building for the integration of adaptation concerns into sustainable agriculture development strategy of Mizoram. In agriculture sector, adaptation measures often generate significant mitigation effects. The state is also planning to make generous investments by providing subsidies on fertilizers, water and other agri-input areas where GHG mitigation is significant. Concept of 'green budgeting' will also be introduced in the state. For SAPCC Phase-2, the Government of Mizoram, after having rigorous discussion with the agriculture and allied departments, have come up with several action points. Most of the activities identified have potential to linkages with either centrally or state sponsored schemes like RKVY, MIDH, PMKSY, NMSA, WDPSCA etc.

The department of agriculture and allied sectors has taken the following initiatives to show its commitment towards the Nationally Determined Contributions (NDCs) and the Sustainable Development Goals (SDGs):

Situational Analysis - NDC Perspective

NDC Commitment	Key initiatives by the state
To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularlyagriculture.	• Increasing food production • Developing climate resilient varieties • Promoting soil and water conservation measures • Generation of alternate livelihood, increasing farmer's income • Capacity building

Specific Targets under SDG for the Sector

SDG Goals	Targets	Key initiatives by the state
Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	• By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations. • By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons. • By 2030, double the agricultural productivity and incomes of small- scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.	• Increasing production of agriculture and horticulture crops • Promotion of System of Rice Intensification (SRI), Integrated Farming System (IFS), Integrated Nutrient Management (INM) & Integrated Pest Management (IPM) • Upscaling fisheries and animal husbandry sector • Improved storage facilities
Goal 6: Ensure availability and sustainable management of water and sanitation for all.	• By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	• Soil & water conservation measures. • Upgrading the water-harvesting infrastructure in the state. • Increasing water use efficiency by promoting micro-irrigation techniques.
Goal 13: Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.	• Strengthen adaptive capacity to enhance resilience, Integrate climate change measures into national policies, strategies and planning • Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	• Jhum optimization • Promotion of organic farming • Several measures to reduce GHG emissions from Animal Husbandry sector. • Biogas production • Promoting use of renewable energy.

5A.6.2 Description of Strategies/Activities

AG/01: Research and assessment of climate change impacts on agriculture and allied sectors, Reviewing and promoting indigenous knowledge, Capacity building of farmers in light of climate smart agriculture

Under conditions of changing temperature and precipitation patterns, farmers need to consider both short-term and long-term coping strategies. Increasingly variable climate poses challenge for agriculture and allied sectors, given its dependency on natural resources, especially water for irrigation. Therefore, the department will carry out detailed studies on the impact of climate change on agriculture, horticulture, animal husbandry and fisheries sector, and will incorporate the findings in coming policy and programs. In addition, it is also required to blend the traditional and modern knowledge and improve the existing practices through indigenous innovations and locally acceptable technological interventions. To bridge the knowledge gap viz-a-viz climate change, the government of Mizoram will be undertaking programs, workshops and field schools for sensitization and capacity building of farmers as well as the implementing agencies. These will be focused on knowledge enhancement of stakeholders and to encourage the implementation of sustainable & climate smart agriculture approach in the state.

Direct & Co-benefits:

- Improved policy and contingency planning
- Enhances preparedness towards the climate change impacts

AG/02: Developing data base on genotypes of local crop varieties (mainly rice varieties) and identification of suitable varieties for different agro-climatic zones

The government of Mizoram has already taken initiatives to establish and maintain genetic resource collections of the state's major crop species like rice and maize. In the coming phase, the department will make this more systematic by integrating this data with its geo-coordinates, i.e. availing its precise geographic location. Such organized approach will help in identifying the suitable varieties for different agro-climatic zones. Emphasis will be given on identification of temperature and water stress tolerant varieties, and its other characteristics. Extensive documentation systems will be put in place to maintain and allow the use of these collections efficiently in state-wide plant-breeding programs, designing an effective contingency planning and in recommending different varieties in appropriate climate zones.

Direct & Co-benefits:

- Improved knowledge management in state
- Quick responsiveness in case of contingencies.

AG/03: Soil moisture enrichment and conservation through - Upgrading of rainwater harvesting infrastructure and construction of eco-friendly mini check dams for irrigation

Given that, about 90% of the agriculture land in the state is rainfed and there is an effort towards increasing its food production, it is obvious that the water requirement in the state is going to increase rapidly. Therefore, upscaling of rainwater harvesting infrastructure is one of the key state priorities. In the hilly regions as well as plains, this would act as a boon, as it will improve irrigation in the farm fields, improve access to water and sanitation at the local level, flourish fisheries in the region and would empower the communities by letting them manage their water resources.

The activities which envisage harvesting of run-off water like farm pond, earthen embankment, masonry check dam, farm bunding, contour trench, water absorption trench, gully plugs etc., would be beneficial for providing life-saving irrigation to crops during critical periods. Small structures as recharge pit catch pit and well recharge pit would enable recharging of ground water by catching rainwater. Summer/deep ploughing would maintain the soil moisture and prevent excess evaporation. Beside these, conservation of natural springs in all the villages through PPP mode will also be done.

Direct & Co-benefits:

- Increasing water availability for communities

- Increasing food production
- Improving water use efficiency

AG/04: Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building to train farmers in latest rice cropping techniques.

Adoption of System of Rice Intensification (SRI) and Directed Seeded Rice Cultivation are promising and some of the best practices for raising production and productivity of rice in the state. It is a simple but very effective approach to the current food crisis. In light of the likelihood of rainfall variations and water stress, SRI can prove to be more effective than traditional practice. It reduces water consumption and significantly reduces the greenhouse gases emission from rice cultivation. Mizoram is already implementing SRI in the state with good yield, but it needs to scale up.
The department of agriculture will conduct assessment studies for improving the effectiveness of SRI in the state. Handholding and risk assurance will be facilitated for farmers adopting SRI. In addition, demonstrations and capacity building workshops to train the farmers with the intricacies of SRI will also be conducted.

Direct & Co-benefits:
- Ensure food security in the state
- Reduced GHG emissions from rice cultivation

AG/05: Optimization of jhum cultivation through conservation of arable land, water utilization management and other best practices. Promotion of Home gardens as an alternative livelihood.

The government of Mizoram is determined to offset and improve the unsustainable jhum cultivation in the state. To prevent forest degradation and loss of topsoil, emphasis will be put on conservation measures in arable land such as contour bound, improvement of existing paddy fields, bench terracing etc. Watershed management measures like creation of water bodies, up scaling and upgrading of existing water bodies, catchment area protection will be undertaken. Besides these, encouragement of parallel cultivation of plantation crops like rubber, cashew nuts and slash & burn technology with proper fire lining etc. will also be promoted. Proper capacity building and training will be provided to the farmers for optimizing the production from their jhum fields by agro forestry, vegetable and fruit cultivation, cultivating alder trees, promoting herbicides and organic manuring etc., which regenerate the soil and check erosion. Promotion of home gardens as an alternate livelihood opportunity will ensure the cultivation of native crops, vegetables and fruits that are presently grown in jhum fields. It will also ensure security of tenure for all participating households can safeguard native crop species (nutritional security and an income from surplus) and reduce drudgery for women. Efforts will be made to include promotion of home gardens in different schemes and programs.

Direct & Co-benefits:
- Generate stable and sufficient income for Jhum farmers.
- Land rejuvenation and increasing tree cover.

AG/06: Establishment of Custom Hiring Centres and development of appropriate farm machinery for upland systems.

The department of agriculture has set up various Custom Hiring Centres (CHCs) in which farmers, who could not afford the high cost of machinery and its maintenance, can hire and use the equipment. The CHC for agricultural machineries is seen as an appropriate institutional arrangement, which can promote mechanization of agricultural operations on small farms in the most cost-efficient manner. This will enable farmers to act on crop husbandry for similar crops at the shortest possible time to avoid uncertainties due to climate variability.
In addition, training and support to the farmers will be provided and research will be undertaken on development of appropriate machinery having ease of working in uphill regions.

Direct & Co-benefits:
- Increase in farmer's efficiency.
- More time will be available for other activities.

AG/07: Development of land for WRC (Wetland Rice Cultivation), Construction of Hill Slope terraces for conservation of moisture and cultivation of food grain, vegetable, pulses and oilseed crops

Many communities in Mizoram are experts in cutting beautiful terraces along mountain slopes. This system of cropping is beneficial in retaining fertility of soil, preventing landslides and checking soil erosion. In addition, it is helpful in retaining the moisture of soil and conserving water. The government of Mizoram will implement program, which will lead to permanent cultivation of the land through a transition to terrace farming by construction of terraces on moderate slopes. The development of land is extremely crucial for increasing food production through wetland rice cultivation and growing other major crops.

Direct & Co-benefits:

- Increasing food production.
- Improvement in land and soil properties and water retention capacity.

AG/08: Improvement of post-harvest management system such as cold storages, warehouses, etc. for perishable crops and establishment of infrastructure for achieving sustainable value chain

In the absence of adequate amount of proper storage facilities such as warehouses and cold storage, there is a huge loss of perishable products like fruits, vegetables, cereals etc. due to delay in transportation, pest and rodent attack etc. To overcome this challenge, agriculture and allied departments will increase the number of warehouses, cold storages, integrated pack houses, low evaporation cool chambers, refrigerated vans, pick-up trucks etc. In addition, emphasis will also be given to set up primary processing units at production source in cluster basis and establishing their market linkages.

Direct & Co-benefits:

- Ensuring food safety (stocked food also acts as buffer during emergencies).
- Improved value chain will generate livelihood opportunities

AG/09: Promotion of organic farming through vermi-composting and manure management, Adoption of Integrated Pest Management (IPM) and IFS (Integrated Farming System) for improved yield

As large-scale use of fertilizers and pesticides pose a number of environmental hazards and imbalances in soil nutrient level, organic farming has been highly encouraged. The uses of farmyard manure, compost, bio-fertilizer, bio-pesticides, etc. are highly promoted. However, for farmlands already using heavy chemicals, a transition is required for moving towards organic, which can be taken care by Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) measures.
In addition, Integrated Farming System (IFS) is also highly required for the marginal farmers of the state to generate additional income through diversified sources.
The state realizes the need to continue and expand these measures to enhance the adaptive capacity of the farmers in Mizoram.

Direct & Co-benefits:

- Risk reduction and increase in farmer's income.
- Opportunity for farmers to venture into emerging organic produce market.
- Increasing soil carbon and enhanced carbon sequestration.

AG/10: Management of climate change impacts on horticulture and cash crop plantation. Increasing area under protected cultivation and perennial fruit plantation

As a mitigation strategy, there is a need to increase the area under plantation for perennial fruit as they help in enhancing carbon sinks. The Department of Horticulture has also laid emphasis on increasing the area in respect of low volume –high value crops under protected condition, encouraging winter

cultivation to increase double and multiple cropping and development & expansion of a high market potential fruits like passion fruit, orange, grape, papaya, chow chow (Sechiumedulis), Areca nut (Areca catechu), Hatkora etc.

Direct & Co-benefits:

- Increased farmer's income.
- Agro forestry, increased carbon sink

AG/11: Promotion of Climate Resilient Livestock and Poultry Production, Improvement in nutritional interventions to sustain livestock production

The state is determined to mitigate the negative impacts of climate change by promoting and upscaling climate resilient livestock and poultry. This would include:

- Development of climate resilient animal sheds at community & institutional levels
- Construction of climate smart model swine herd pens or piglet multiplication centres
- Facilitating breeding with heat and disease resistant varieties of livestock
- Capacity building & knowledge management

In addition, new grazing grounds will be introduced, and high-quality feed and forage will be made available for improvement in poultry & livestock health. Proper dietary changes results in reduced methane emission due to enteric fermentation.

Direct & Co-benefits:

- Improvement in animal health and productivity.
- Reduced GHG emissions.

AG/12: Improvement in waste & manure management system, upscaling and maintenance of Biogas production facilities

As per the FAO's report, there is a strong link between resource use efficiency and the intensity of GHG emissions, in a livestock production system. Most methane emissions from manure management are related to storage and anaerobic treatment. Proper handling of the waste and its anaerobic digestion can reduce methane emissions while producing biogas. The department will be constructing biogas plants in the state to reduce methane emissions.

Direct & Co-benefits:

- Reduced GHG emissions.
- Generation of alternate fuel for cooking would reduce the use of logwood.

AG/13: Upgrading of water harvesting infrastructure, Establishment of fishery units in reservoirs and riverine areas

Most of the ponds are seasonal and the duration of water availability highly depends on rains. However, it has been observed that majority of the ponds are prone to damage during monsoon, due to lack of proper diversion channels. Although farmers are advised to construct it, but they often could not afford the cost. Therefore, the department will provide technical as well as financial assistance for construction of such diversion canals to the poor and marginal farmers. In addition, construction of new water area (new ponds) at ideal places, where perennial source of water is available, will be done. This is essential for conservation of water for fishery sector and establishment of fishery units such as Cages Culture, Pen Culture etc.

Direct & Co-benefits:

- Will ensure water security by reducing runoff.

AG/14: Introducing, pilot testing and thereby upscaling of new and innovative fishing technologies like Recirculatory Aquaculture System (RAS), Biofloc Technology, Aquaponics, cage-culture etc.

Introducing innovative fishing technologies such as RAS, Permanent Raceway, Aquaponics etc. is important for tackling food security issue, as these technologies requires less water but have high yield. These new technologies will be taken up by the department on pilot basis and later, will be imparted to the progressive fish farmers.

Direct & Co-benefits:

- Will ensure food security and better nutrition.
- Enhancement of farmer's income and lifestyle.

5A.6.3 Linkage of Proposed Activities

Activity Code	Climate Linkage/ Priority	NDC Linkage	SDG Linkage
AG/01	High	Direct	SDG Goal –13
AG/02	Medium	Direct	SDG Goal – 13
AG/03	High	Direct	SDG Goal – 2, 6
AG/04	Medium	Indirect	SDG Goal – 2, 1
AG/05	High	Direct	SDG Goal – 1, 2, 13, 15
AG/06	Medium	Direct	SDG Goal – 2, 1
AG/07	Medium	Direct	SDG Goal – 2, 1
AG/08	High	Direct	SDG Goal – 2, 1, 3
AG/09	High	Direct	SDG Goal – 2, 13, 1
AG/10	Medium	Direct	SDG Goal – 2
AG/11	High	Direct	SDG Goal – 2, 3, 13
AG/12	Medium	Direct	SDG Goal – 2, 13, 7
AG/13	Medium	Direct	SDG Goal – 2, 14, 6
AG/14	Medium	Direct	SDG Goal – 2, 14

5A.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Code	Activity	Name of Scheme/ Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding in Lakh INR	Implementing Department
AG/01	Research and assessment of climate change impacts on agriculture and allied sectors, Reviewing and promoting indigenous knowledge, Capacity building of farmers in light of climate smart agriculture.	NAFCC, NMSA, NICRA, ATMA	AD	2,340.00				Dept. of Agriculture & allied sectors
AG/02	Developing data base on genotypes of local crop varieties (mainly rice varieties) and identification of suitable varieties for different agro-climatic zones	-	AD	200.00				Dept. of Agriculture
AG/03	Soil moisture enrichment and conservation through - Upgrading of rainwater harvesting infrastructure and construction of eco-friendly mini check dams for irrigation.	PMKSY, RAD, RKVY, State Scheme	AD	4,500.00				Dept. of Agriculture, Soil & Water Conservation Dept.
AG/04	Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building to train farmers in latest rice cropping techniques.	SRI, NMSA, RKVY	AD, MI	2,240.00				Dept. of Agriculture
AG/05	Optimization of jhum cultivation through conservation of arable land, water utilization management and other best practices. Promotion of Home gardens as an alternative livelihood	WDPSCA,	AD, MI	1600.00				Dept. of Agriculture
AG/06	Establishment of Custom Hiring Centers and development of appropriate farm machinery for upland systems.	ATMA	AD	2,850.00				Dept. of Agriculture
AG/07	Development of land for WRC (Wetland Rice Cultivation), Construction of Hill Slope terraces for conservation of moisture and cultivation of food grain, vegetable, pulses and oilseed crops	RKVY	AD	7,312.50				Dept. of Agriculture, Horticulture and Land Resources, Soil & Water Conservation
AG/08	Improvement of post-harvest management system such as cold storages, warehouses, etc. for perishable crops	MIDH, RKVY	AD	2,100.00				Dept. of Agriculture, Horticulture

Code	Activity	Name of Scheme/ Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding in Lakh INR	Implementing Department
	and establishment of infrastructure for achieving sustainable value chain							
AG/09	Promotion of organic farming through vermi-composting and manure management, Adoption of Integrated Pest Management (IPM) and IFS (Integrated Farming System) for improved yield	PKVY, NFSM, RKVY, State Schemes	AD, MI	8,990.00				Dept. of Agriculture, Horticulture
AG/10	Management of climate change impacts on horticulture and cash crop plantation. Increasing area under protected cultivation and perennial fruit plantation.	MIDH	AD, MI	4,789.00				Dept. of Horticulture, Dept. of Land resources, Soil & Water Conservation
AG/11	Promotion of Climate Resilient Livestock and Poultry Production, Improvement in nutritional interventions to sustain livestock production	-	MI, AD	5,500.00				Dept. of Animal Husbandry & Veterinary, Dept. of Agriculture
AG/12	Improvement in waste & manure management system, upscaling and maintenance of Biogas production facilities	National Biogas & Manure Management Program	MI, AD	1,750.00				Dept. of Animal Husbandry & Veterinary, and ZEDA
AG/13	Upgrading of water harvesting infrastructure, Establishment of fishery units in reservoirs and riverine areas.	Blue Revolution, RKVY, FFDA	AD	3,800.00				Dept. of Fisheries
AG/14	Introducing, pilot testing and thereby upscaling of new and innovative fishing technologies like Recirculatory Aquaculture System (RAS), Biofloc Technology, Aquaponics, cage-culture etc.	Blue Revolution, RKVY, FFDA	AD	650.00				Dept. of Fisheries
	Total			**48621.50**				

5B. STATE MISSION FOR GREEN INDIA

5B.1 SECTORAL OVERVIEW

In Mizoram, forest is one of the most important natural resources for the people. According to India State Forest Report (ISFR) 2017, the forest cover in Mizoram is 18,186 sq km, which is 86.27% of the total geographical area of the state and 0.64% of the geographical area of the country. The forest cover in Mizoram is significantly higher in comparison to the national forest cover of around 21.54% of the total geographical area of the country. According to the ISFR 2017, the total carbon stock of the state's forest is 348.48 million tonnes of CO2 equivalent and amounting to 1.34% of the total forest carbon of the country.

In terms of forest canopy density classes, the Mizoram has 131 sq. km of very dense forest, 5,861 sq km moderately dense forest and rest of the area (i.e., 12,194 sq. km) is under open forest. In spite of having low geographical area, the state contributes about 2.33% of the total forest and tree cover as a percentage of national forest and tree cover. The per capita availability of forest and tree cover is 1.71 ha, which is quite high as compared to the other states of the country.

Total geographical area of Mizoram as percentage of the national geographical area	0.64%
Total forest and tree cover of Mizoram as a percentage of the national forest and tree cover area	2.33%
Average per-capita availability of forest and tree cover of the State	1.71 ha

Source: ISFR 2017

By analyzing the trend of these forest types, it is found that, the area under very dense forest showed an increasing trend till the year 2013, after which it started to decrease. On the other hand, the area under Moderately Dense Forest (MDF) decreased from 2009 to 2017. Also, as compared to 2015 assessment the MDF remained almost same while the area under open forest and VDF decreased considerably during the year 2017. In addition, the net decrease in the total forest cover in Mizoram was reported to be 531 sq km. The major reason for this forest degradation is unsustainable shifting cultivation and unplanned developmental activities. In certain pockets, the forest cover has increased due to regeneration of bamboo and other plantations. The year-wise changes in the forest cover are given below.

Year	Very Dense Forest (VDF)	Change in VDF	Moderately Dense Forest	Change in MDF	Open Forest	Change in Open Forest	Forest Cover	Change in Forest Cover
2005	133	-	6,173	-	12,378	-	18,648	-
2009	134	1	6,251	78	12,855	477	19,240	592
2011	134	0	6,086	-165	12,897	42	19,117	-123
2013	138	4	5,900	-186	13,016	119	19,054	-63
2015	136	-2	5,858	-42	12,752	-264	18,748	-306
2017	131	-5	5,861	3	12,194	-558	18,186	-562

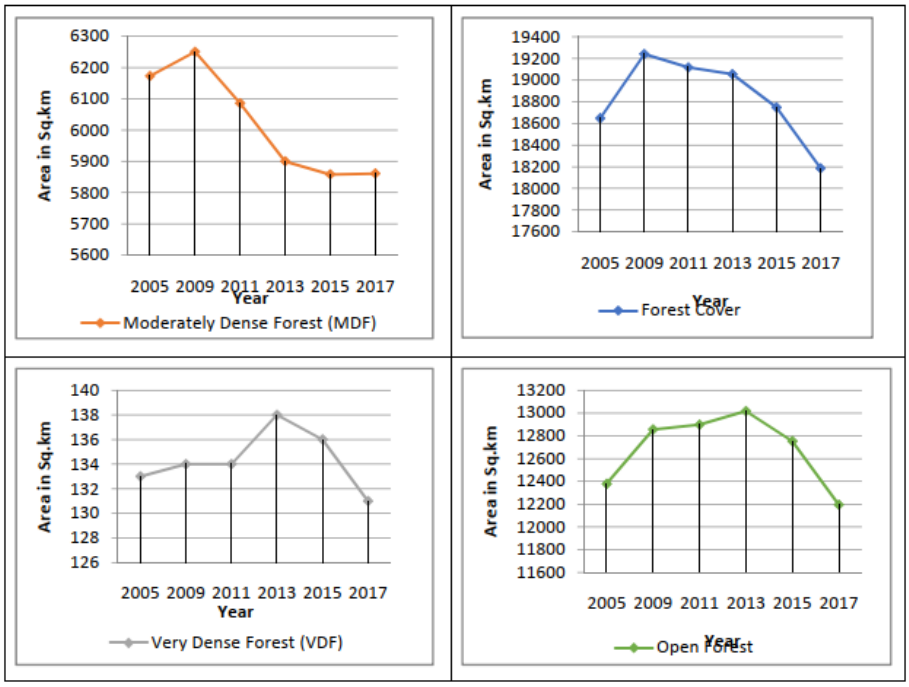


Figure 29: Forest trend in the state

According to a study[16] conducted in 2017, the total value of goods and services of the forest in Mizoram was estimated at Rs. 516.94 crores per year. Out of this, the value of goods collected by the people from the forest is estimated at Rs. 272.09 crores per year, while the total value of the selected services from the forests of the state was estimated at Rs. 243.26 crores per year. According to the same study, the share of fuel wood, to the total value of goods and services, is maximum because almost all the rural households of Mizoram use fuel wood for cooking. In Mizoram, forest fires are one of the major drivers of forest degradation. According to a report published by the state fire and emergency services department, it has been found that from 2011,about 695 cases of forest fires were reported and the total loss of the damaged property was worth Rs. 90 crores. Most of these forest fires were caused by jhum cultivation.

5B.2 IMPACT OF CLIMATE CHANGE

Forest plays an important role in climate change mitigation and adaptation. Forest sequesters and stores more carbon than any other terrestrial ecosystem. Some of the studies suggests that the proportional increase of carbon dioxide in the atmosphere increases the fertilization effect and boosts the growth of the plants (Downing etc. Al 1992)[17]. According to Gregor, the climate change has some positive effects on some of the factors of the forest ecosystem, but the overall effect of global warming is not positive in terms of increase in absorption of carbon (Gregor 1992)[18]. Climate change breaks the equilibrium between trees and their pests. The physically deteriorated trees become less resistant to pests. On the other hand, due to short reproductive cycle, pests are adapting much faster to the changes in weather. In Mizoram, the proliferation of weeds and pests have been observed in wild plants by the scientists[19]. In some of the studies, it has been observed that many of the tree species in Mizoram have changed their trends in the time of flowering and fruiting. Changes in the phenological pattern of the tree species can be considered as an indicator of the changing climate. According to a four-year periodical study report, it was found that 50-80% of Rhododendron species at Phawngpui National Park

[16] ISFR (2005, 2009, 2011, 2013, 2015, 2017)
[17] Downing, John P., Cataldo, Dominic A. (1992). Natural Sinks of CO2: Technical Synthesis from the Palmas Del Mar Workshop. Water, Air, and Soil Pollution 64, 439-453
[18] Gregor, H.D. (1992). The potential role of temperate forests as sinks for CO2 – Examples from the German environmental policy against global warming. Water, Air, and Soil Pollution 64, 197-212
[19] Joshi, A. K. and Joshi, P. K. (2011) A rapid inventory of indicators of climate change in the middle Himalaya, Current Science, 100: 831- 832

in Mizoram have flowering during February-March, which is a strong basis to the impact of weather change in flowering event of this species from spring to winter[20].

Forest plays a vital role in water conservation, as trees and other vegetation cover reduces the run-off and improves the water retention capacity of soil. As per ISFR 2017 assessment, the water body coverage within the forest has increased to 124 sq km in 2015 as compared to 72 sq km in 2005[21]. The changing climate in recent times has led to abrupt rainfall periods. This coupled with changing land use and forest degradation has led to reduced availability of water resources and soil fertility in the state.

Other indirect evidence of climate change in Mizoram are the frequent outbreak of insect and pests, shifting of butterflies to higher elevations, the occurrence of destructive beetles throughout the year, etc. In Mizoram, invasive species like Lantana Camara and others, are increasingly encroaching the native habitats. Due to this, change in species composition in the forest ecosystem disturbs soil nutrient cycle and water use in the forest. Climate change is tied to habitat fragmentation, which affects the movement of wildlife. Wildlife is unable to find safe corridors in the new habitats, and consequently man-animal conflict is increasing.

5B.3 KEY ISSUES AND CHALLENGES

The key issues in the forestry sector can be categorized based on problems faced by the department and other stakeholders. This categorization process helps to determine and address specific problems, both existing and potential ones. The problem may arise from existing practices, resource availability, regulatory interventions and the way natural resources are managed. Some of the forestry issues in the state are as follows:

Jhum Cultivation

More than 60% population in rural areas of Mizoram depends on agricultural sector for their livelihood. Jhum cultivation is one of the age-old agricultural practices in Mizoram. Increasing population pressure in the rural Mizoram demands for more and more cultivable land, and consequently the pressure is shifted to the forest areas of the state. This demand leads to high degree of land fragmentation and forest degradation. Due to burning of the forest areas, the biodiversity and ecological balance in the region is negatively impacted.

High incidence of Forest Fire

Due to the dominance of shifting cultivation, fire outbreak is a common phenomenon in the state. As a result, the state is facing severe forest degradation each year. According to the *Forest Fire Report*, the number of reported incidences of forest fires in Mizoram is among the highest in the country. Moreover, one third of the fire incidences in the northeast region occurs in Mizoram.

Rapid Urbanization in Mizoram

In recent times, the urbanization in Mizoram is increasing at a rapid rate. Due to better livelihood opportunities, the migration from rural to urban areas is taking place. According to the 2011 Census Report, 51.51% people are living in the urban areas and the decadal growth rate of urban population is 27.43% for the decade 2001-2011. In India, the percentage of urban population to the total population is much lower than the state (31.16%)[22]. Urbanization in district headquarters is leading to increased pressure on forestland, which is causing threat to forest conservation. This has not only caused loss of forest area but also depleting the floral and faunal diversity of the state.

[20] Malsawmkima, B. (2014) Flowering phenology and mating system of Rhododendron species at two elevations in Phawngpui National park of Mizoram. Ph.D Thesis submitted to Mizoram University, Aizawl, Mizoram
[21] ISFR 2017
[22] http://www.censusindia.gov.in/2011-prov-results/paper2-vol2/data_files/Mizoram/Chapter_4.pdf

5B.4 PROGRESS MAPPING (IN LAST 5 YEARS)

5B.4.1 Physical Progress

The Department of Environment, Forest and Climate Change of Mizoram along with other line departments have been jointly implementing the activities proposed in the previous plan. The Green India Mission plan of SAPCC was aimed at building the resilience of the natural resource base relating to forestry and mitigating and adapting to the probable impacts of climate change.

This section of the report highlights the key physical progress made and challenges faced during the implementation of planned activities. Major achievements/ physical progress made during this plan period were afforestation and reforestation activities through ANR, AR and other methods in various districts of Mizoram. The department has been implementing various Centrally Sponsored Schemes (CSS) and state-specific programme for environmental conservation with the participation of local people. The state had proposed 13 activities, and all the activities have been implemented.

Sl. No.	Strategies/ Activities	Activities Undertaken
1.	Improvement of forest quality and density in degraded lands and abandoned jhum lands.	Plantation in 52,407 ha areas.
2.	Improvement the productivity of bamboo and promotion of local value addition through establishment of market linkages.	Bamboo plantation in 35,320 ha areas.
3.	Undertaking studies on climate change impacts on NTFP productivity and sustainable harvesting practices for adaptation of climate change.	In 2016, the department conducted one study on NTFP and Traditional Knowledge under the head of research related to climate change (NEDP).
4.	Capacity building of communities/ community forest management institutions for climate change adaptation.	3 numbers of one-week Van Vigyan Kendra (VVK) farmers training (40 persons in each training) and 154 trainings of communities.
5.	Prevention and control mechanism for forest invasive species and its utilization strategies.	In 2013-14, control mechanism adopted for Lantana Camara and other invasive species.
6.	Promotion of forest-based industries	The state has recommended 9 industrial estate, which can accommodate 15 wood-based industries; the state level committee has been constituted.
7.	Formulation of conservation strategies for Orchids and establishment of market linkages for value addition.	To conserve the indigenous orchid species, Mini Orchid House has been established one each at Aizawl Zoo, Champhai and Sairang.
8.	Livelihood improvement activities for forest dependent communities.	Promotion of poultry and piggery farming.
9.	Strengthening of the Forest Department.	• Development of infrastructure. • Improvement in transport & communication. • Procurement of improved tools and technologies.
10.	GIS based Monitoring and Evaluation of the program	Procurement of GPS, DGPS, GIS Mapping, GIS cell development.
11.	Strengthening of Local VSS	Awareness programme, empowerment on resource sustainability.
12.	Publicity /media and outreach	Published quite a number of environmental handouts pamphlets, notebooks, posters, calendars, stickers' folders, music videos, environmental films, documentary, etc. for sensitizing the public.

13.	Establishment of Mission Directorate	Operation and maintenance of listed activities and contingencies.

5B.5 GAP/ BARRIER ANALYSIS

For proper implementation of planned activities, policy-level coordination is required. Some of the activities like controlling of shifting cultivation, implementation of Access Benefit-Sharing (ABS), market linkage of minor forest produce, policy on sustainable orchid collection, etc. need a sound policy framework. Frequent forest fires and encroachment of forest land are the major issues to be addressed. Coordination gap with the line departments (ex: Department of Agriculture, Department of Horticulture, Department of Tourism, etc.) is one of the major implementation issues in Mizoram. Alternative methods of farming have to be promoted to gradually reduce the area under shifting cultivation.

The state government has experienced some challenges during the implementation of planned activities over the last 5 years. The state will pay due attention in the qualitative as well as quantitative aspects of the planned activities. These bottlenecks may be classified into four different categories - financial, institutional, governance, technical and socio-cultural/economic.

Type	Gaps	Issues
Financial	Successful implementation of the planned activities requires sufficient fund mechanisms. Experiences of the department suggest that availability of funds is necessary to implement the planned activities but this is not a sufficient condition for confronting the problems related to deforestation, conservation and protection of forest resources etc. The delivery mechanism is the main determining factor for optimal utilization of released funds.	Less plantation, deforestation, less facilities for conservation and protection of forest resources
Institutional	The Department of Environment, Forest and Climate Change has good institutional coordination mechanism for conservation of forest, biodiversity and wildlife in the state. However, still there is a requirement of interdepartmental cooperation from the line departments and collaboration with the research institutions at the state level as well as at the national level to ensure an effective protection and conservation model for Mizoram forests. In addition, there is shortage of skilled manpower and field staff.	
Policy/ Regulatory	To attract the international fund/ foreign capital for the improvement of forest in the state, good governance system is very much necessary. This means effective rule of law, enforcement of policies, and good decision making by the state governments. In the context of Mizoram, good governance can be defined as the capacity of the government to manage resources proficiently and be able to formulate and enforce policies for implementation of activities on which communities are interested.	Inadequate forest Protection and conservation activities.
Technical	Environment protection has to be the outcome of collaborative effort of the government and local people. Therefore, for conservation and protection of forest resources, it is necessary to develop some ground level technical skill for the local community and some advance technical skill for the forest staffs.	Increasing man-animal conflict, poaching, loss of biodiversity, incidences of forest fires, unsustainable use of forest resources.
Socio-cultural, Economic	Lack of alternative livelihood opportunities in the rural areas.	Unsustainable jhum cultivation, exploitation of forest resources.

5B.6 SECTOR – PRIORITY/STRATEGIES

5B.6.1 Future Plan to Meet NDC and SDG

In the forestry sector, there is a strong synergy between adaptation and mitigation activities. In terms of adaptation, reducing the anthropogenic pressure on forest, increasing connectivity between the forest areas, etc. are the major activities. Increasing the climate resilience in the forestry sector increases the environmental stability. On the basis NDC commitment and SDG target, the government of Mizoram has identified some state specific options for adaptation and mitigation activities in the forestry sector. The identified major mitigation and adaptation options are as follows:

Major Mitigation Options:

- Ecological restoration of forests on degraded lands
- Afforestation and reforestation on degraded land
- Implementation of REDD+ as a part of Himalayan REDD+ to reduce deforestation and forest degradation and prevent of forest fire.

Major Adaptation Options:

- Strengthen conservation and protection initiatives.
- Increasing the density of the forest cover of the State.
- Integrate ecosystem and community-based adaptation approaches in sector strategies to reduce natural resource-based conflicts.

Situational Analysis - NDC Perspective

NDC Commitment	Key initiatives by the State
Government of India's long-term goal is to bring 33% of its geographical area under forest cover.	• Since the year of inception under the National Afforestation Programme, plantations have been carried over more than 63,530 ha through the Village Forest Protection Committees (VFPCs). • Under the Green India Mission plantation have been carried over more than 19,643 ha.
To create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree coverby 2030.	• According to the India State of Forests Report (ISFR) 2017, the total carbon stock of the forest in the state is 95.04 million tonnes carbon (348.48 million tonnes of CO2 equivalent) which is 1.34% of the total forest carbon stock of the country. According to estimates, if the same rate of growth and conservation continues Mizoram will have a carbon sink of 98.10 million tonnes (359,700 million tonnes of CO2 equivalent).

Specific Targets under SDG for the Sector

SDG Goals	Targets	Key initiatives by the State
Goal 15: Protect, restoreand promote sustainable useof terrestrial ecosystems, sustainably manage forests, combat desertification, and haltand reverse land degradation and halt biodiversity loss.	• By 2029-30, promote area under Forest Covered under Conservation of Natural Resources and Ecosystem (CNRE) to 18,500 sq km. • By 2029-30, promote tree covered outside forest area to 617 sq km. • By 2029-30, promote tree/forest covered in degraded area under National Mission for Green India (GIM) to 106.35 sq km.	• Strengthening of National Mission for a Green India, Conservation of forest and forest resources to improve in green cover. • Conservation and protection of existing dense forest, forest produce and enhance the quality of the biodiversity. • Shifting or changing livelihood from agricultural activity.

Goal 13: Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.	• By 2029-30, promote effective carbon trading under National Action Plan on Climate Change (NAPCC) to 164.57 million tonnes.	• Increasing the carbon sink through reducing emissions from Deforestation and Forest Degradation (REDD). • Reducing dependency of people on fuel wood. Encourage, develop and promote renewable energy in the state. • Capacity building of forest staff and village communities and institutional strengthening through improved tools and techniques. • Awareness generation.

5B.6.2 Description of Strategies/Activities

GM/1: Ecological restoration through improvement of forest quality & density, and improvement of livelihood through Bamboo and establishment of market linkages.

Sub Activities:

- Improve density of degraded forest lands and jhum lands to increase green cover for adaptation and mitigation of climate change
- Plantation and management of natural Bamboo to improve productivity for sustained yield

In Mizoram, all-natural resources in and around village belongs to the communities and each member of the village has the right to utilize the land and cultivate it according to the approval of the village council. The recorded forest area of the state is 5,641 sq km (the reserve and unclassed forests are 79.47% and 20.53% respectively). As many as six important forest types have been reported to occur in the Mizoram and out of six types, moist bamboo breaks is one of the dominant types. Mizoram also has degraded forestlands, which can be utilized for plantation purposes. Ecological restoration through reforestation and afforestation of degraded land is important to reduce the impact of climate change. This ecological restoration process will develop through block plantation, agro-forestry, farm forestry, avenue/ roadside plantation, plantation in the urban and peri-urban institutional lands and soil moisture conservation measures. The state has already set up a plan for 45,500 ha plantations on degraded forest land and jhum land, and 1,550 ha of bamboo plantation and management to minimize the negative effects of climate change within the state and improve the livelihood through increasing the productivity of bamboo products.

Direct & Co-benefits:

- Improvement in ecological restoration
- Improvement in sustainable use of forest produce
- Enhancing the livelihood opportunities for local people

GM/2: Conservation and protection of existing dense forest, forest produce and enhancement in the quality of the biodiversity

Sub Activities:

- Conservation of dense forest to enhance its resilience and ecosystem services with stakeholder participation.
- Conservation of NTFPs, Orchids, Medicinal Plants and Aromatic Plant, etc. for Rural Livelihood.
- Harvesting, processing, value addition and marketing of forest produce etc.

Forests provide various goods and services, which support and maintain the earth's life-support systems. To reduce the micro-climatic impact in the region, forest provide support for soil conservation, maintaining of water cycle, controlling floods, enhancement of environmental quality, carbon sequestration etc. In Mizoram, forests play a vital role in the sustenance of rural people and domestic animals. Based on forest policy, the state has emphasized environmental stability and ecological balance of the state. To maintain this stability, preservation and conservation of natural resources are the major objectives of the state. Conservation of the natural heritage of the State through preservation of natural forests with an immense variety of flora and fauna will represent a remarkable step for the conservation of biological diversity and genetic resources of the state. Through conservation, the

incremental benefit of the productivity of forests will meet essential daily needs and encourage the people for efficient utilization of forest produce. The state is blessed with several valuable orchids and medicinal plant species. The occurrence of these species reflects the ecological importance of the sector in the state. To conserve the indigenous orchid and medical plant species, the state has already taken up some conservation efforts.

Direct & Co-benefits:

- Improvement in environmental stability
- Encourage sustainable use of forest produce
- Conservation of biological diversity and genetic resources

GM/3: Capacity building and empowering of institutions for sustainable forest management

Sub Activities:

- Capacity building and modernization of forest personnel, tools and technologies for effective delivery mechanism.
- Empowering institution of VFDCs for sustainable management and utilization of natural resources for livelihood and energy security.

In Mizoram, the forests are the most important natural resources and like all other northeastern states, the forests play a fundamental role in supporting the livelihood of the rural and economically disadvantaged population. Since 1998, Mizoram has shifted from the government-centric approach to people-centric approach for managing its diverse forest resources through Joint Forest Management (JFM). For the involvement of local people, the state has constituted State Forest Development Agency (SFDA), Forest Development Agencies (FDA) and Village Forest Development Committees (VFDCs). Various works have been implemented through CSS. Afforestation activities are mainly taken up by the VFDCs through FDAs. One of the main objectives of these FDAs is to enhance livelihood for the forest fringe communities on a sustainable basis. Environmental protection, as well as forest conservation, has to be the outcome of the collaborated efforts of the government and local people. During the period of 1987 to 2017, about 296 foresters have taken up regular training courses whereas 546 forest guards also completed training on various departmental works. Conservation and preservation of forest resources can be achieved through awareness-raising activities, capacity building, and sensitization programmes etc. The government has planned training programmes for forest staff on modern tools and techniques.

Direct & Co-benefits:

- Skill development of the forest staff communities
- Employment generation and better implementation of adaptation and mitigation activities

GM/4: Prevention and control of forest fire, forest invasive species, etc. for management of biodiversity and ecosystem services

The forest fire is one of the major causes of forest degradation in the State, which happens almost every year due to jhum cultivation. To minimize forest degradation through forest fire, the government plans to undertake forest fire prevention activities like creation and maintenance of fire line, construction of watchtower and water tank, engagement forest protection force etc. The state also plans to identify and prepare an inventory of exotic invasive species.

Direct & Co-benefits:

- Reduce forest degradation and GHG emission.
- Reduction in loss of forest and restore biodiversity.

5B.6.3 Linkage of Proposed Activities

Activity Code	Climate Linkage/ Priority	NDC Linkage	SDG Linkage
GM/1	Very High	Direct	SDG Goal – 1, 6.13, 15
GM/2	Very High	Direct	SDG Goal – 1,2,3,13, 15,
GM/3	Very High	Direct	SDG Goal – 1, 13
GM/4	Very High	Indirect	SDG Goal – 1,3, 13

5B.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State share (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
1	GM/1	Ecological restoration through improvement of forest quality & density, and improvement of livelihood through Bamboo and establishment of market linkages. **Sub Activity**: • Improvement of forest quality and density in degraded lands and abandoned *jhum* lands. • Improvement the productivity of bamboo and promotion of local value addition through establishment of market linkages. • Restructuring land use policy for *jhum* cultivation and habitation on notified forestlands.	NAP, GIM, NABM	AD, MI	52,700.00	52,700.00	-		Dept. of Environment, Forest & Climate Change, Rural Development
2	GM/2	Conservation and protection of existing dense forest, forest produce and enhancement in the quality of the Bio-diversity. **Sub Activity**: • Conservation of dense forest to enhance its resilience and ecosystem services with stakeholder participation.	FFP&MS, IDWH, GIM	AD, MI	41,740.00	41,740.00			Dept. of Environment, Forest & Climate Change, Rural Development, Horticulture, Mizoram Bio-diversity Board

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State share (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
		• Conservation of NTFPs, Orchids, Medicinal Plants and Aromatic Plant etc. for Rural Livelihood, • Harvesting, Processing, value addition, and marketing of forest produce etc. • Protect and enhance quality of biodiversity through preservation and scientific management of Landscapes- NPs, WLS, CCAs, Notified Forest, Safety services, Wetland Unique Landscapes etc. • Enrich vegetation cover/prey base to mitigate habitat fragmentation animal corridors, man-animal conflict, etc. through ANR in degraded areas integrated catchment treatment etc.							
3	GM/3	Capacity building and empowering of institutions for sustainable forest management **Sub activity:** • Capacity building and modernization of forest personnel with modern tools and technologies for effective delivery mechanism. • Empowering institution of VFDCs for sustainable management and	GIM,	AD	9,000.00	9,000.00			Dept. of Environment, Forest & Climate Change

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State share (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
		utilization of natural resources for livelihood and energy security.							
4	GM/4	Prevention and control of forest fire, forest invasive species, etc. for management of biodiversity and ecosystem services.	FFP&MS	AD, MI	8,652.00	8,652.00			Dept. of Environment, Forest & Climate Change
		TOTAL			**1,12,092.00**	**1,12,092.00**			

5C. STATE MISSION FOR SUSTAINING HIMALYAN ECOSYSTEM

5C.1 SECTORAL OVERVIEW

Mizoram falls within the North-East Bio-geographic Zone. The state forms a part of the Indo-Burma biodiversity hotspot and encompasses rich biodiversity. It is home to rich varieties of flora and fauna distributed in its lush green, diversified terrain with steep slopes. The state harbours a large number of endemic plants and animal species. Based on the location, it has a large taxonomic range, with diversity of ecosystems and geographical conditions. As per the *Mizoram State of Environment Report – 2016*, the state has recorded 2,358 plant species and more than 1,440 animal species.

According to the floral diversity of the state, it is found that out of 2,358 plant species, 2,141 belong to *angiosperms* distributed over 176 families and 905 genera. Out of this, 1,627 species belong to dicots and the remaining 500 are *monocots*. The number of *gymnosperms* is quite less i.e. only six species belonging to 6 genera and 4 families; while the number of *pteridophytes* is quite high i.e. 211 species distributed over 35 families and 66 genera.

Table 12: Floral Diversity of Mizoram

Group		Family	Genera	Species
Angiosperms	Monocot	26	200	514
	Diocot	150	705	1,627
	Total	176	905	2,141
Gymnosperms		4	6	6
Pteridophytes		35	66	211

Source: Mizoram State of Environment Report – 2016

Due to topographical variety, climatic variability and different types of forest, the state is rich in the faunal diversity, which is scattered in its forests, hill streams and rivers. Mizoram is also famous for different variety of birds. The state serves as a dwelling unit for several wild animals. However, shifting cultivation, burning of vegetation, excessive hunting, forest fires and land use change, has reduced the population of wild animals. To protect the wild animals and conserve the faunal diversity the state has created various protected areas. Presently, there are 2 National Parks, 7 Wildlife Sanctuaries and one Tiger Reserve Project covering an area of 1,908.75 sq km which constitutes 9.05% of the state's geographical area. According to the *Zoological Survey of India report (2007)*, 1,442 faunal species of fauna have been recorded and this fauna belongs to 891 genera under 295 families. Out of 1,442 faunal species, 520 species are insects, nearly 380 species and subspecies birds scattered throughout the state.

Table 13: Faunal Diversity of Mizoram

Group	Sub- Group	Number of Families	Number of Genera	Number of Species
Vertebrates				
Mammalia		25	61	84
Aves		59	205	380
Reptilia		14	47	71
Amphibia		6	8	13
Pisces		20	49	89
Sub-total (Vertebrates)				**637**
Invertebrates				
Mollusca		17	40	65
Nematoda		34	51	74
Trematoda		8	12	14
Aranae (Spiders)		13	27	44
Acari (Plant mites)		10	22	55
Acari (Ixodid ticks)		1	7	12
	Collembola	3	12	21
	Odonta	12	41	64
	Orthoptera	4	62	91
	Dermaptera	5	13	15
	Isoptera	3	10	15
	Hemiptera	19	56	69
	Coleoptera	7	39	50
	Diptera	15	55	71
	Lepidotera	13	99	145

Sub-total (Invertebrates)				**805**
Total				1,442

Recently 37 species of bamboos have been reported from the state of Mizoram out of which, 20 species are indigenous to the state, while 14 species have been introduced from outside. Mizoram is one of the well-explored area with regards to orchids. So far, about 252 species belonging to 74 genera of orchids are reported from different parts of Mizoram. Cane is also another most important item of NTFP in Mizoram, which is distributed throughout the state. Total 12 species of rattans belonging to four genera viz. *Calamus, Daemanorops, Plectocomia* and *Zalacca* have been recorded and identified from the state. The State Biodiversity Board of Mizoram has constituted 255 Biodiversity Management Committee (BMC) through village level local bodies. In addition, 8 Technical Support Group (TSG) were constituted for 8 districts of the state for the purpose of imparting guidance and technical support to the BMC established within their respective districts.

5C.2 IMPACT OF CLIMATE CHANGE

Climate change is one of the significant environmental challenge in the Himalayan region affecting the ecosystems. Natural ecosystems of the region are closely linked with the climate and dependent on each other. According to the "Millennium Ecosystem Services", climate change has adverse impacts on biodiversity and associated ecosystem goods and services[23]. According to IPCC, amongst all ecosystems of the world, mountain ecosystems are most important because they are most vulnerable and fragile to the impacts of climate change. It is estimated that, about one-tenth of the global population lives in mountain ecosystems[24]. According to the "Convention of Biological Diversity" mountain ecosystems are the most vulnerable ecosystems because of rate of loss of mountain biodiversity is higher than the other biodiversity[25]. According to the researchers, phenology is one of the widely accepted strong ecological indicators to know the impact of climate change on biodiversity and ecosystem processes across the landscapes[26]. Most of the organisms found in the Mizoram are restricted to specific environments and locations like high altitude, dense forests, etc. and most of them are sensitive to changes in weather and the phenology of these plants and animals are affected.

Other indirect evidence of climate change in Mizoram, are the frequent outbreak of insect and pests, shifting of butterflies to higher elevations, the occurrence of destructive beetles throughout the year, etc. In Mizoram, invasive species like Lantana Camara and others are increasingly encroaching the native habitats. Due to this, change in species composition in the forest ecosystem disturbs soil nutrient cycle and water use in the forest. Climate change is tied to habitat fragmentation, which affects the movement of wildlife. Wildlife is unable to find safe corridors in the new habitats, and consequently, man-animal conflict is increasing.

5C.3 KEY ISSUES AND CHALLENGES

The key issues in the forest ecosystem can be characterized based on difficulties that arise in the efficient management of the sector. The problem may arise from unsustainable use of resources, inappropriate or untimely regulatory interventions of natural resource management etc. The issues are as follows:

Jhum Cultivation- More than 60% population in rural areas of Mizoram depends on the agricultural sector for their livelihood. The people of Mizoram are practicing an age-old primitive method for agricultural activity, which is called slash-and-burn or shifting cultivation or jhum. Even though the production from Jhum field is less than WRC, still every year the rural community is continuing the same practice and large areas of forestland are burnt for this purpose. As a result, the ecological balance of the area is negatively impacted. It has highly affected the flora and fauna of Mizoram.

[23] Millennium Ecosystem Assessment, Ecosystems and Human Wellbeing: Synthesis, Island Press, Washington DC, 2005
[24] Rosenzweig, C. et al., Assessment of observed changes and responses in natural and managed systems. In Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of IPCC (eds Parry, M. L. et al.), Cambridge University Press, New York, 2007
[25] ICIMOD, Climate Change Impact and Vulnerability in the Eastern Himalayas, Synthesis Report, 2010
[26] Karl, T. R. et al., Global Climate Change Impacts in the United States: A State of Knowledge Report from the US Global ChangeResearch Program, Cambridge University Press, New York, 2009

Threats to Orchid Resources- Orchids are one of the precious gifts of nature for Mizoram. Around 250-300 species are expected to occur in Mizoram. But now a days, some threats have been found for orchid resources. The threat is mainly from loss of habitat, fire, illicit felling of trees and orchid hunting. Unsustainable harvesting of flowers and other parts of orchids from the wild has damaged much to the resource base of the orchid species.

Threats to Medicinal Plant species- In Mizoram, 236 medicinal plants have been reported out of these, 204 plants grow in the forest areas of the state. Adequate scientific research has not been carried out on the resource mapping and inventory assessment has not been done in the state. In Mizoram, "Indigenous Knowledge system" has not been documented properly. Due to shifting cultivation in the state, the medicinal plant resources have been affected to a large extent.

Population pressure- One of the major causes of deforestation in Mizoram is increasing population pressure in the state. According to the Census report, the population density of Mizoram grew by approximately 30% between 1991 and 2001. For the decade 2001-2011, the decadal growth of population is 22.78%46. Mizoram forest is a home of birds, which include rare species like the hornbills, pea-pheasants, tragopans, flower peckers, barbets; etc. and also the home to tigers, wild boars, leopards, monkeys, barking deer, elephants, etc. Due to deforestation, the state is facing the challenges of wild habitation loss. The population of Sumatran rhino and brow antlered deer have been seriously compromised in Mizoram forest because of disturbance in their habitats.

5C.4 PROGRESS MAPPING (IN LAST 5 YEARS)

The Department of Environment, Forest and Climate Change and Mizoram Biodiversity Board along with other line departments have been jointly implementing the activities proposed in the previous plan (SAPCC Phase 1). The plan for Himalayan ecosystem (SAPCC Phase 1) was aimed to build the resilience of forest ecosystem relating to forest biodiversity to mitigate and adapt to the climate change impacts. This section of the report highlights the key physical progress made and challenges faced during the implementation of planned activities. Major achievements/ physical progress that is made during this plan period were - establishment of Biodiversity Management Committee (BMCs) and Technical Support Group (TSGs) at the village level, wetlands conservation and management, inventory of Medicinal Plants in various districts of Mizoram. The department has been implementing various Centrally Sponsored Schemes (CSS) and state-specific programme for biodiversity conservation and protection with the active participation of local people. The state had proposed 14 activities and out of which, 9 activities have been initiated.

5C.4.1 Physical Progress

Sl. No.	Strategies /Activities	Activities Undertaken
1.	Undertaking study on valuation of forest resources (Non-traded) and climate change impacts on the vulnerable ecosystems	Valuation of forests done, and the estimated value is Rs. 516.94 crores.
2.	Work to establish new systems to support for public awareness building through establishment of ENVIS Centre.	Generate awareness in the line of conservation and effect of climate change on local ecosystems through booklet, pamphlet newsletter, etc.
3.	Monitoring of carbon stock and biodiversity at regular intervals.	The department has estimated the carbon stock. The total carbon stock of forest is 95.04 million tons (348.48 million tonnes of CO_2 equivalent).
4.	Protection of forests and forest land from soil erosion in 135,000 ha.	This activity has been done under wildlife conservation through 7 Wildlife Sanctuaries, 2 National Parks and one Tiger reserve project activities covered 1,908.75 sq km.
5.	Conservation and management of two major wetlands.	Two wetlands of Mizoram (Tamdil and Palak) have been recognized by the Government of India (GoI) and conservation and development activities have been started from 2014-15 under the scheme of National Plan for Conservation of Aquatic Ecosystem

		(NPCA).
6.	Inventorying and conservation of medicinal plants /orchid.	Presently the department is implementing 7 medicinal plants project funded by NMPB through 5 FDAs and mainly focused on resource augmentation and establishment of conservation areas. The department has done one orchid inventory and published a book on "Orchid of Mizoram" the record gives name, description of the orchids with photographs.
7.	Research on Wildlife Populations and Corridors - Mountain Goats, Burmese green Peacock, Malayan Bear.	Raising fruit bearing trees for wild animals, creation and maintenance of waterholes and salt licks, grass land, etc.
8.	Biodiversity Assessment	The State Biodiversity Board of Mizoram had done the assessment (identification of wetland Plants/ flora and fauna, Survey and Identification of Avifauna, Reptiles, Amphibian, and fishes in Palak Wetland).
9.	Documentation and enrichment of biodiversity database through Peoples Biodiversity Register (PBR) at the JFMC level.	The State Biodiversity Board of Mizoram have documented and published 5 PBR viz., Pamchung (2012), Thenhlum (2012), Pangzawl (2015), Laki (2016) and Mizoram, University, Tanhril (2017).

5C.5 GAP/ BARRIER ANALYSIS

Since Mizoram is one of the storehouses of biodiversity of the country, special attention is required for documentation of traditional knowledge in terms of biodiversity conservation and sustainable utilization bio-resources. Thus, there are plenty of opportunities for income generation through value-addition of bio-resources, which can secure the involvement of local community in biodiversity conservation. This would require a state specific policy with relevant perspective so that mountain ecology would not be disturbed. Coordination gap with the line departments (ex: Department of Agriculture, Department of Horticulture, Department of Tourism, etc.) is a common issue for the implementation of planned activities of sustaining Himalayan Ecosystem mission of Mizoram. Adequate scientific research on occurrence of medicinal plants, inventory assessment, marketing of value-added products will reduce the over exploitation of medicinal plants and increase livelihood opportunity of the rural community. Mizoram is very rich in Broom grass, so conservation and proper harvesting of broomstick will provide sustenance to a number of rural poor families.

During implementation of activities in the last 5 years, Mizoram has faced some challenges. To remove these challenges, the department has paid attention to categorize these problems. The department has classified these challenges into four different categories; these are financial, institutional, governance, technical and socio-cultural/economic.

Type	Gaps	Issues
Financial	Successful implementation of the planned activities requires sufficient funds mechanism. Experiences of the department suggest that timely release of funds is necessary to implement the required activities like Accurate/ geocoded information on wildlife migration and routes, Corridor delineation for monitoring wildlife migration for conservation and protection of biodiversity and Himalayan ecology.	Less facilities for Conservation and protection of biodiversity and wildlife etc., Lack of connectivity of corridors for wildlife migration
Institutional	The Mizoram State Biodiversity Board, wildlife division and the Department of Environment, Forest and Climate Change have good institutional coordination mechanism for conservation of Forest, biodiversity and wildlife. However, for the implementation of activities there is a requirement of interdepartmental cooperation from the line departments and collaboration with the research institutions at the State level as well as at the national level to ensure an effective protection and conservation mechanism model for Mizoram forests.	Lack of research and collaboration with research institutions and line departments.
Policy/	To implement the central/state sponsored schemes both the	Inadequate forest

Regulatory	Govt. has developed several guidelines of the activity. In the context of Mizoram, good governance can be defined as the capacity of the government to manage resources proficiently and able to formulate and enforce policies for implementation of activities on which communities are interested. Promotion of good governance is necessary.	protection and wildlife conservation activities.
Technical	For conservation and protection of biodiversity, the following data gap still exists at the state level. These are Location specific and geocoded datasets on flora/ fauna, species/ community wise data on forests, Location specific data on the rate of deforestation/ loss of plant/ animal species, Location specific and geocoded datasets on invasive species, Quantitative information on impact/ adverse effect to other biotas.	Deforestation and loss of biodiversity. Increasing man-animal conflict, invasion of alien species.
Socio-cultural, Economic	Lack of alternative livelihood opportunity in the rural areas.	Illegal collection of orchids, unsustainable collection of medicinal plants, exploitation of flora and fauna through jhum cultivation.

5C.6 SECTOR – PRIORITY/STRATEGIES

5C.6.1 Future Plan to Meet NDC and SDG

Mizoram is facing several environment and developmental challenges due to its topography, difficult terrain, erratic weather conditions, natural hazards and poor infrastructure. Due to poor infrastructure facilities in Mizoram, support through the utilization of natural resources continues to be limited. In terms of adaptation, conservation of biodiversity hotspots, reducing the anthropogenic pressure on flora and fauna, increasing market linkage of NTFPs, etc. should form major activities. Increasing the climate resilience in the ecology increases the livelihood support and creates a sustainable environment. Regarding NDC commitment and SDG target, the government of Mizoram has identified some state specific options for adaptation and mitigation activities in terms of Himalayan Ecology. The identified major mitigation and adaptation options are as follows:

Major Mitigation Options:

- Ecological restoration of forests on degraded lands.
- Implementation of REDD+ as a part of Himalayan REDD+ to reduce deforestation and forest degradation and prevent of forest fire.

Major Adaptation Options:

- Strengthen conservation and protection initiatives.
- Increasing the density of the forest cover of the state.
- Integrate ecosystem and community-based adaptation approaches in sector strategies to reduce natural resource-based conflicts.

Situational Analysis - NDC Perspective

NDC Commitment	Key initiatives by the State
To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly Himalayan Ecosystem.	• In 2017, the total value of ecosystem goods and services of the forest of the state was estimated at Rs. 516.94 crores. • The State Biodiversity Board of Mizoram has constituted a total of 255 Biodiversity Management Committee (BMC) through village level local bodies. In addition, 8 Technical Support Group (TSG) were constituted for 8 districts of the state for the purpose of imparting guidance and technical support to the BMC established within their respective districts.

Specific Targets under SDG for the Sector

SDG Goals	Targets	Key initiatives by the State
Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	• Enhancement of area under Wildlife Sanctuaries and Protected areas. • By 2029-30 promote area under Forest Covered under Conservation of Natural Resources and Ecosystem (CNRE) to18,500 sq km.	• Strengthening of Himalayan Mission, Integrated Development of Wildlife Habitats, Conservation of Natural Resources and Ecosystem to improve in green cover. • Enhance the quality of the bio-diversity through Assisted Natural Regeneration (ANR). • Conservation and protection of biodiversity through research and documentation of biodiversity, and traditional knowledge activities.
Goal 13:Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.	• By 2029-30 promote effective carbon trading under National Action Plan on Climate Change (NAPCC) to 164.57 million tonnes.	• Increasing the carbon sink through reducing emissions from Deforestation and Forest Degradation (REDD). • Reducing dependency of people on fuelwood. Encourage, develop and promote renewable energy in the state. • Awareness generation.

5C.6.2 Description of Strategies/Activities

HM/1: Conservation, protection and enhancement in the quality of the biodiversity

Sub activity:

- Protect and enhance quality of biodiversity through preservation and scientific management of landscapes- NPs, WLS, CCAs, notified forest, safety services, wetland unique landscapes etc.
- Enrich vegetation cover/prey base to mitigate habitat fragmentation animal corridors, man- animal conflict, etc. through ANR in degraded areas integrated catchment treatment etc.

The biodiversity of Mizoram can support the livelihoods of people directly and indirectly through a range of ecosystem goods and services. The state is blessed with several valuable orchids and medicinal plant species. The occurrence of these species reflects the ecological importance of the sector in the state. The economic potential of Himalayan medicinal plants and their contribution towards novel biomolecules is well recognized. To conserve the indigenous orchid and medical plant species, the state has already taken up some conservation efforts. Assisted Natural Regeneration (ANR) is a low-cost ecological restoration programme, which also restores the biodiversity of the region. ANR is an effective technique for conversion of degraded forestland to productive forests. Enrich vegetation covers through reducing the cost of propagation, nursery, and plantation of seedlings. ANR is playing a vital role for landscape restoration. This method can be implemented to regenerate the buffer zone forests surrounding a core-protected area and this will help to restore animal corridors connecting forest patches. In Mizoram, Sun Bear population is severely threatened due to hunting as well as poaching for trade. The department has developed an action plan for the conservation of Bear.

Direct & Co-benefits:

- Improve environmental stability
- Improve sustainable use of forest produce
- Conservation of biological diversity and genetic resources

HM/2: Conservation and protection of Biodiversity through research and documentation of Biodiversity, and traditional Knowledge and diversification of livelihood activities

Sub-Activity:

- Research and documentation of biodiversity, and traditional knowledge good practices on use of bio-resources, monitoring and evaluation of impacts of interventions etc.
- Reduce biotic pressure through awareness education, eco-development, eco-tourism, alternate sources of livelihood, diversification of livelihood activities, alternate sources of fuel energy etc. in fringe villages.

Sustainable development, harvesting and marketing of bio-resources to improve livelihoods of indigenous communities, CBOs, NGOs, to conserve and develop bio- resources, including NTFPs, medicinal plants for employment and economy. Mizoram is one of the biodiversity hotspots areas in North-east India. According to the recent record, there are a total of 2,358 species of plants. The state also has a very rich diversity of medicinal and ethno botanical plants. The Mizoram State Biodiversity Board promotes research and documentation on various aspects of biodiversity. The board has given importance to promote research in the gap areas and assemble existing information to build a sound database on biodiversity. The state will document the traditional conservation practices like sacred groves, ponds and other sacred sites and to identify the areas conserved and managed by indigenous communities for livelihood resources. Best practices will also document for sustainable use of biodiversity in relevant economic sectors.

Direct & Co-benefits:

- Documentation on various aspects of biodiversity.
- Improve livelihood capacity.
- Develop knowledge on sustainable use of biodiversity.

HM/3: Climate proofing of natural resources, enhancing resilience of indigenous communities, stakeholders, etc. through appropriate adaptation and mitigation interventions

The government wants to explore indigenous climate governance system at the state level, which is achievable with the invaluable climate change knowledge of indigenous communities and active participation of the communities. The government has identified three relevant activities in climate mitigation and adaptation these are -

1. Reducing Emissions from Deforestation and Forest Degradation (REDD+), by which the enable communities in the State will get benefit from the climate funds if the communities have actively participated in the enhancement of carbon sink project.
2. Community-Based Adaptation (CBA), a bottom-up approach for effective adaptation with the involvement of the community.
3. Ecosystem-Based Adaptation (EBA) a framework that will serve both the objectives of climate proofing and emission reduction through connecting ecosystem services tied with a proper management system.

Direct & Co-benefits:

- Generate adaptation framework with involvement of community and ecosystems service.
- Improve livelihood capacity.

HM/4: Restructuring land use policy for jhum cultivation and habitation on notified forest lands

Declining biodiversity is a result of land use change, overexploitation of forest resources, anthropogenic activity in the forestry sector etc. Some of the researchers have found that land use change is putting tremendous pressure on biodiversity and structural properties of the ecosystems. Millennium Ecosystem Assessment has also reported that land use land cover change in the terrestrial ecosystem is one of the important drivers of changes in the ecosystem services and biodiversity. Presently, due to Jhum cultivation land use change is a common phenomenon in Mizoram. To conserve the biodiversity and ecosystem services the Government will develop a State-specific land use policy.

Direct & Co-benefits:

- Improve ecological restoration through plantation
- Improve sustainable use of forest produce
- improve the livelihood

5C.6.3 Linkage of Proposed Activities

Activity Code	Climate Linkage/ Priority	NDC Linkage	SDG Linkage
HM/01	Very High	Direct	SDG Goal – 1, 6.13, 15
HM/02	Very High	Direct	SDG Goal – 1,2,3,13, 15,
HM/03	Very High	Direct	SDG Goal – 1, 13, 15
HM/04	Very High	Indirect	SDG Goal – 13

5C.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGE

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
1	HM/1	Conservation and protection of existing dense forest, forest produce and enhance the quality of the Bio-diversity **Sub activity**: • Protect and enhance quality of biodiversity through preservation and scientific management of Landscapes-NPs, WLS, CCAs, Notified Forest, Safety services, Wetland Unique Landscapes etc. • Enrich vegetation cover/prey base to mitigate habitat fragmentation animal corridors, man-animal conflict, etc. through ANR in Degraded Areas integrated catchment treatment etc.	FFP&MS, IDWH, GIM	AD, MI	37,340.00	37,340.00			Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Horticulture, Mizoram Bio-diversity Board
2	HM/2	Conservation and protection of Biodiversity through research and documentation of Biodiversity, and traditional Knowledge and diversification of livelihood activities	CAMPA, GIM, NPCA	AD	17,000.00	17,000.00			Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Agriculture,

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
		Sub-activities: • Research and documentation of Biodiversity, and traditional Knowledge good Practices on use of bio-resources, monitoring and evaluation of impacts of interventions etc. • Reduce biotic pressure through awareness education, eco development, eco-tourism, alternate sources of livelihood, diversification of livelihood activities, alternate sources of fuel energy etc. in fringe villages. • Sustainable development, harvesting and marketing of bio-resources to improve livelihoods of indigenous communities, CBOs, NGOs, to conserve and develop bio- resources, including NTFPs, medicinal plants for employment and economy.							Mizoram Biodiversity Board
3	HM/3	Climate proofing of natural resources, enhancing resilience of indigenous communities, stakeholders etc. through appropriate adaptation and	GIM, NPCA,	AD	5,000.00	5,000.00			Dept. of Environment, Forest & Climate Change, Dept. of Rural

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
		mitigation interventions.							Development, Dept. of Agriculture
4	HM/4	Restructuring land use policy for jhum cultivation and habitation on notified forestlands.		AD, MI			-		Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Horticulture
		TOTAL			**59,340.00**	**59,340.00**			

5D. STATE MISSION FOR HEALTH

5D.1 SECTORAL OVERVIEW

The Government of Mizoram is committed to ensuring good health for its residents. There is a strong realization that only a healthy populace can contribute to economic growth. Efforts by the government of Mizoram towards realizing 'good health' for its people include provision of health infrastructure equitably throughout the state so that promotive, preventive, curative, rehabilitative & palliative health services can be accessed by all.

In this era of Sustainable Development Goals (SDGs), also known as the post-2015 agenda, it has been reiterated that 'good health' is both the means and an end to 'sustainable development'. While SDG-3 is exclusive for 'health', other indicators under SDG-2, SDG-5, etc. are also directly concerned with the health sector, as 'health' is multi-dimensional. It is well established that social determinants of health such as socio-economic status, standard of living, sanitation, water supply, personal hygiene, health awareness, etc. have equal if not more to contribute to public health than clinical services alone. For this reason, environmental health, the overarching factor behind sustainable development is a critical concern for the government of Mizoram. Notwithstanding the roles played by other departments that deal with the social determinants of health such as Social Welfare, Public Health Engineering, Agriculture, etc., the major player for provision of health services in Mizoram is the Department of Health & Family Welfare (DoHFW). Since 2007, National Rural Health Mission (NRHM), which ultimately became the National Health Mission (NHM) with the addition of the National Urban Health Mission (NUHM), has been the major implementer of national health programmes in the state. The other two directorates, Directorate of Health Services (DHS) and Directorate of Hospital & Medical Education (DHME) remain critical players in the state's health system in its totality.

Climate change threatens 'human health'. Ultimately, all efforts in the arena of 'climate change' such as forestry, environment or biodiversity must culminate positively for the singularly most critical factor - 'human health'. The vulnerability and adaptation capability of the state towards preservation of human health in the face of the threats posed by climate change is largely determined by the state of the health system. It is with this realization that the State Climate Resilient Health Mission (SRHM) has prepared this plan with the aim to strengthen structural components of the health system to make it climate resilient.

Health Scenario of the State

Mizoram, like other Indian states, has undergone an epidemiological transition since 1990 in that the epidemiological transition ratio47 that was 1.18 in 1996 was 0.53 in 2016. This means that diseases and illnesses because of Non-Communicable Diseases (NCDs) has increased tremendously over a decade. It is arguable that during the era of the Millennium Development Goals (MDGs), development agenda including the health-related goals were very focused. The Goals were clear-cut and were largely pursued in silos. Reduction of infant and maternal mortality were pursued in earnest. While many countries including India made tremendous progress in reducing both IMR and MMR, it emerged that unless the wider determinants of health including both medical and 'everything else' are addressed, gains that are ushered by focused interventions are unsustainable. According to Sample Registration Survey (SRS), released by the Ministry of Statistics and Programme Implementation (MoSPI), Government of India, the latest IMR of Mizoram as per SRS Bulletin (September 2017), for 3 years up to 2016 is 27 against the national IMR of 34. While the absolute IMR in Mizoram is lower than national IMR, the IMR of 27 in 2016 is higher than IMR in 2006, i.e. 10 years ago, was 25.

Table 14: IMR Trend in Mizoram & India (2003-2016)

Sl. No.	Year	Mizoram	India
1	2003	16	60
2	2005	20	58
3	2006	25	57
4	2007	23	55
5	2008	37	53
6	2009	36	50
7	2010	37	47

8	2011	34	44
9	2012	35	42
10	2013	35	40
11	2014	32	39
12	2015	32	37
13	2016	27	34

Source: Infant Mortality Rate as per SRS reports, MoSPI, Govt. of India

Table 15: District wise Infant death and IMR (Source: Health Management Information System (HMIS), NHM)

Sl. No.	District	2012-13		2013-14		2014-15		2015-16		2016-17		2017-18 (Apr-Dec)	
		Infant death	IMR	Infant death	IMR	Infant death	IMR	Infant death	IMR	Infant death	IMR	Infant death	IMR
1	Aizawl East	138	38	152	41	116	31	52	15	45	14	27	33
2	Aizawl West	115	21	199	34	188	30	120	20	143	25	63	19
3	Champhai	55	24	53	22	77	34	50	25	29	16	27	20
4	Kolasib	40	27	50	35	66	36	21	18	24	20	20	25
5	Lawngtlai	49	28	57	35	61	33	44	26	44	27	34	26
6	Lunglei	76	26	68	25	79	29	72	29	44	19	34	18
7	Mamit	14	12	24	21	39	31	19	16	21	19	20	22
8	Siaha	63	46	107	79	158	113	50	38	36	28	26	27
9	Serchhip	40	36	28	31	38	46	21	28	12	16	12	23
Mizoram		590	28	738	35	822	37	449	22	398	21	263	22

Source: State HMIS

Table 16: District wise Maternal Death and MMR

Sl. No.	District	2012-13		2013-14		2014-15		2015-16		2016-17		2017-18 (Apr-Dec)	
		Maternal death	MMR	Maternal death	MMR	Maternal death	MMR	Maternal death	MMR	Maternal death	MMR	Maternal death	MMR
1	Aizawl East	3	84	2	54	0	0	0	0	2	61	2	242
2	Aizawl West	1	18	2	34	3	48	0	0	4	69	3	90
3	Champhai	1	43	2	83	6	263	1	50	1	55	5	377
4	Kolasib	3	202	0	0	4	216	2	169	2	167	0	0
5	Lawngtlai	2	115	4	248	1	53	1	69	3	182	0	0
6	Lunglei	1	34	2	74	1	39	3	120	2	87	1	54
7	Mamit	0	0	1	87	1	79	2	167	2	180	0	0
8	Siaha	1	73	2	147	5	357	7	539	4	303	1	104
9	Serchhip	1	90	1	110	0	0	1	132	0	0	0	0
Mizoram		13	61	16	76	21	95	17	88	20	104	12	101

Source: Health Management Information System (HMIS), NHM

According to the Mizoram Human Development report published in 2013, the state has a relatively good service delivery system related to childbirth with more than 65% and 80% of the mothers and children getting benefits in rural and urban areas respectively. Associated with the good facilities performance, the MMRs and IMRs are also lower than national average figures. IMR and MMR has been high in Siaha district in previous years but has declined in recent years due to interventions from the Health Department which has been supplemented by concerted effort from all the departments.

Consumption of known risk factors for all kinds of illnesses such as tobacco is a major concern. Global Adult Tobacco Survey (GATS-1), Round I (2009-10) reported that 67.2% of all adults in Mizoram were regular consumers of tobacco. The table below shows that, there was a slight decrease in tobacco consumption according to GATS 2. Mizoram is still the highest consumer of tobacco after Tripura in the country.

Table 17: Tobacco use in Mizoram

Indicators (Mizoram)	GATS 1	GATS 2
Tobacco use in any form	67.2% (Male – 72.5%, Female – 61.6%)	58.7% (Male – 64.9%, Female – 52.4%)
Current tobacco smokers	39.7% (Male – 59.4, Female – 19.0%)	34.4% (Male – 54.1%, Female – 14.3%)

Smokeless	40.7% (Male – 32.6%, Female – 49.1%)	33.5% (Male – 21.3%, Female – 46.0%)
Current dual tobacco users (smoked and smokeless)	13.2%	9.2% (Male – 10.6%, Female – 7.9%)
Mean age of initiation	17.4 years	17.8 years

It is apt to mention incidence of tobacco use in the state profile of the state as it is a significant public health concern for the state. As per the Global Adult Tobacco Survey - 2 conducted in 2019, Mizoram had the 2nd highest prevalence of tobacco consumption in the country. It is widely accepted that tobacco use is a major driver for cancers (of all sites among adult males and females) in Mizoram, and the state has the highest incidence of cancers of all sites in the country as per the finding of the Population Based Cancer Registry (PBCR). Climate Change has been cited as one of the biggest threats to public health in the 21st century. While the effects of natural disasters (extreme weather events) attributable to climate change leading to loss of life and disabilities can be very clearly enumerated, the more subtle but clearly established role of climate change in increasing the impact of risk factors to exacerbate and increase the incidence and prevalence of various kinds of communicable and non- communicable diseases needs to be strongly emphasized. In this regard, Tobacco consumption' being a known risk factor for various kinds of respiratory diseases, cardiovascular diseases and cancers has the potential to amplify the impact of climate change on these diseases. Therefore, a mention of the risk factors that can impact the health effects of climate change has to be made.

From the data, it is therefore not surprising that Mizoram has one of the highest incidences of cancers of various sites such as lung, cervix, breast, esophagus and oral cancers in India. 9 specific health goals have been highlighted in the NITI Aayog's Three Year Action Agenda which is to be achieved by 2020. Mizoram has already achieved some of the targets, which are mentioned below:

Table 18: Achievements of the state against NITI Aayog's Three Yr. Action Agenda

Sl. No.	Targets as per NITI Aayog's Three Year Action Agenda	Achievements of Mizoram
1.	Reduce Maternal Mortality Ratio to 120/100,000 live births	Maternal Mortality Ratio – 101 (2017-18)
2.	Reduce Infant Mortality Rate to 30/1,000 live births	Infant Mortality Rate – 22 (2017-18)
3.	Reduce Under 5 Mortality Rate to 38/1,000 live births	Under-5 Mortality Rate – 23 (2016-17)
4.	Reduce Total Fertility Rate to 2.1	Total Fertility Rate – 2.3 (2015)
5.	Reduce incidence of TB to 130/100,000	35/100,000 in 2017-18
6.	Reduce incidence of Malaria (Annual Parasitic Incidence) to less than 1/1,000 in 90% of districts	3.37/1,000 in 2018
7.	Eliminate Kala Azar (2015 estimate: 80% of endemic blocks have eliminated) and Lymphatic Filariasis	No case of Kala-Azar or Lymphatic Filariasis has been detected in the state
8.	Reduce premature mortality from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases by 1/4th of National Family Health Survey-4 (NFHS-4) levels	-
9.	Reduce Out-of-Pocket Spending (OOPS) to 50% of the total health expenditure	-

Source: HMIS, Economic survey 2017-18, NFHS-4

Therefore, in general, Mizoram has performed relatively well in terms of infant and maternal health services than other parts of India. However, due to epidemiological transition from Communicable to Non-Communicable Diseases is acutely felt in a state where the health system is still not robust in terms of data capture and research. Shortcomings in the health system make it difficult to assess with absolute certainty which parts of the system are most susceptible to the challenges that climate change will bring about. However, in the next section, we will attempt to highlight certain key areas that need 'action' to build a climate resilient health system in Mizoram.

The State is implementing Integrated Health Information Platform (IHIP) through the Integrated Diseases Surveillance Programme (IDSP), National Health Mission (NHM) of Ministry of Health & Family Welfare (MoHFW). The health Department has a strong surveillance mechanism to monitor impact of the diseases and its spread.

Regular Surveillance focuses on monitoring commonly occurring diseases to track their incidence and spread. It includes Vector borne (Malaria, dengue, chikungunya) or water borne diseases (Cholera, typhoid), respiratory diseases (Tuberculosis, influenza), Vaccine Preventable Diseases (Measles, rubella)

Sentinel Surveillance is conducted at select facilities to gather detailed data on specific conditions, enabling targeted interventions. It includes Sexually transmitted diseases/ Blood borne (Hep B and C), or other related high-risk conditions

Regular Periodic Surveillance Monitors trends in non-communicable diseases (NCDs) and state-specific health priorities to inform preventive strategies. Like NCD Risk Factors (Hypertension, diabetes) and State specific diseases (regional prevalence and health priorities)

IHIP portal a good database for climate sensitive illnesses. Depending upon the data and trends analyzed through the IHIP portal, IDSP staff conduct outbreak investigation and management. However, the state needs to develop a comprehensive climate change related early warning system that could also incorporate data from IHIP to facilitate a system to detect climate related hazards early.

5D.2 IMPACT OF CLIMATE CHANGE

According to the World Health Organization's (WHO) Operational Framework for building Climate Resilient Health Systems, climate change can affect human health in the following ways:

1. Direct Effects: Increased number of warm days & nights; heat waves; cold spells – injury & death
2. Indirect effects
    - Through natural systems – changes in temperature, humidity & precipitation; availability of fresh water – increased risks of food, water-borne & vector-borne diseases
    - Through human systems – changes in temperature, humidity & precipitation – low food production leading to malnutrition, decreased labour productivity, etc.

In this section, an attempt will be made to elucidate vulnerability and adaptation capacity of the health system in Mizoram, which will also indicate the rationale behind the 'actions' we have chosen to propose in the action plan.

Direct Effects of Climate Change

Advantage: Mizoram has had the privilege of enjoying a comfortable range of temperature round the year.

Vulnerability: The average annual temperature has been projected to increase. While this increase may not be perceptible for majority of people, there are certain vulnerable groups such as construction workers, workers in quarries or in places where the microclimate is towards the hotter side. Data collection system for morbidities and mortalities, which is robust enough to capture the risk factors behind injuries and deaths, which may be attributable to climate change, is still not available. Therefore, increase in climate change induced deaths and injuries will be difficult to establish. Understanding of climate risk and preparedness to combat climate induced disasters require investing in climate-resilient infrastructure which can help to minimize the impact of climate change and reduces the susceptibility to risk. The preparedness to climate change started with enhancing capacity building at the level of decision-makers and team working on ground, who are at the forefront of workforce acting at the time of emergency.

Adaptation capabilities: There are health programmes such as National Programme for Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS), National Mental Health Programme (NMHP), Comprehensive Primary Health Care (CPHC) and National Programme for HealthCare of the Elderly (NPHCE), which are potential source of interventions for direct effects on vulnerable population such as the elderly or those with longstanding illnesses. CPHC provides a platform for integration of health programmes, which will make health facilities more equipped to deal with illnesses and provide continuum of care. This will also ensure better data capture.

Indirect Effects through Natural Systems

Advantage: Mizoram being a hilly state, many villages in rural areas are able to get water from the hills. However, as with other countries, the challenge of ensuring clean and safe water for human consumption is present. There are many diseases of tropical nature, which have not yet been diagnosed in the state.

Vulnerability: In the absence of adequate water, hygiene suffers. Increasing temperature can lead to changes in adaptation capabilities of microbes, which may lead to increase in food and water borne diseases. Changes in average temperature, precipitation & humidity also leads to accelerated parasite replication and increased biting rates, prolonged transmission seasons, re-emergence of formerly prevalent diseases, changes in distribution and abundance of disease vectors and reduced effectiveness of vector control interventions.

Adaptation: In one way of the other Climate Change contributes to increase in communicable diseases. At present, under National Health Mission (NHM), there are 5 Communicable Disease control programmes, namely, National Vector-Borne Diseases Control Programme (NVBDCP), National Leprosy Eradication Programme (NLEP), Revised National Tuberculosis Control Programme (RNTCP), National AIDS Control Programme (not through NHM) & National Viral Hepatitis Control Programme.

- Vector-borne diseases – Historically, Malaria has been a dreaded endemic disease in Mizoram. However, as the table below indicates, due to distribution of Long-Lasting Insecticidal Nets (LLINs) in 2016 through assistance received from Global Fund for AIDS, Tuberculosis & Malaria (GFATM), there has been a drastic reduction in cases and deaths from Malaria all over the state. This reduction has been sustained through the efforts of the National Vector-Borne Disease Control Programme (NVBDCP).

Table 19: Change in deaths from Malaria in the state

Year	Total Blood Collection	ABER (No. of test per 100 population)	Total Cases	P.f%	API (No. of positive cases per 1,000 population)	Death
2006	205,535	22.69	8,649	80.43	9.55	121
2007	154,045	15.71	5,289	79.20	5.39	75
2008	165,441	16.88	7,361	83.85	7.51	91
2009	171,793	17.52	9,399	78.63	9.59	119
2010	329,771	33.74	15,495	92.42	15.85	31
2011	213,149	17.41	8,861	94.49	8.58	30
2012	163,421	14.29	9,883	95.49	8.38	25
2013	229,818	20.88	11,747	88.02	10.67	21
2014	330,882	29.65	23,105	91.25	20.71	31
2015	310,526	26.85	28,593	86.04	24.72	21
2016	267,747	22.86	7,583	77.90	6.47	9
2017	213,601	17.89	5,715	87.03	4.79	4

NVBDCP in Mizoram is responsible for the prevention & control of Dengue. Dengue has been diagnosed in the state since 2012. As our diagnostic capabilities will increase in the coming years, a greater number of cases may get diagnosed unless urgent and effective actions are undertaken. The table below shows the yearly rates of disease detection in the state.

Table 20: Yearly rate of disease detection in the state

Year	Samples Taken	Confirmed Cases	Death
2012	90	6	0
2013	96	7	0
2014	246	19	0
2015	338	43	0
2016	1,049	580	0
2017	1,015	136	0
Total	1,819	655	0

The state is also at risk of other climate-sensitive vector borne diseases such as Scrub Typhus. While the state is yet to institutionalize diagnosis for Rickettsial infections including Scrub Typhus, a major boost has been received through New Economic Development Policy (NEDP) through which a mass public education campaign will be undertaken.

Sl.		Total No. of Death	G. Total

No.	District	2012	2013	2014	2015	2016	2017	2018	2012	2013	2014	2015	2016	2017	2018	Cases	Death
1	Aizawl East	98	28	85	34	7	101	715	5	2	2	4	0	1	4	1068	18
2	Aizawl West	112	54	50	44	20	17	393	9	0	1	2	1	0		690	13
3	Lunglei	0	47	38	6	7	9	323	0	2	1	1	0	0	1	430	5
4	Siaha	9	10	2				8	0	0	0		0	0		29	0
5	Champhai	20	26	4		41	6	33	2	0	0		0	0		130	2
6	Kolasib	6	0	0				20	0	0	0		0	0		26	0
7	Serchhip	4	3	1	2	12	8	505	0	0	0		0	0	2	662	2
8	Mamit	3	7	0				66	0	0	0		0	0	1	76	1
9	Lawngtlai	0	0	3	2	3		116	0	0	0		0	0		128	0
10	State Referral Hospital Falkawn				62							1	0	0		62	1
Total		252	175	183	150	90	141	2179	16	4	4	8	1	1	8	3301	42

The Integrated Diseases Surveillance Programme (IDSP) has been implemented throughout the state. Data for Scrub Typhus has been generated through the Weekly reporting from IDSP and outbreak investigations. It is critical to strengthen IDSP through structural interventions to boost disease surveillance. It is known that other vector-borne diseases such as Chikungunya and Japanese Encephalitis are also emerging in the state. The state must improve upon its diagnostic modalities for diseases that are yet un-encountered in the state but are already known in other parts of India. The WHO's International Health Regulations (IHR) framework must be implemented in the state to the extent possible.

I. Food-Borne Diseases: Food & Drugs Administration (FDA) section is based at the Directorate of Health Services (DHS) who undertake the task of inspecting food processing, restaurants, food sellers to ensure safety of food laid out for public consumption.

II. Under Reproductive & Child Health (RCH) programme, Integrated Diarrhea Control Fortnight is observed annually. This has had a tremendous impact upon increasing public knowledge about diarrhea management and risk reduction.

Indirect Effects through Human Actions

Malnutrition is the biggest risk factor for morbidity and mortality among pregnant women and children in the state, according to the report, India: Health of the Nation's States released by Ministry of Health & Family Welfare. The status of malnutrition in the state is as follows:

Table 21: Present status of Malnutrition in the state

Sl. No.	Condition	Prevalence in % (NFHS-4) 2015-16	Targets (40% reduction by 2025)
Form of malnutrition in children less than 5 years of age			
1.	Stunting (Height for age)	28.0	16.8
2.	Wasting (Weight for height)	6.1	3.66
3.	Underweight (Weight for age)	11.9	7.14
4.	Anemia in women of reproductive age group		Targets (50% reduction)
5.	Anemia	22.5	11.3
6.	Severe Anemia	8.4 (DLHS-4)	4.2
7.	Exclusive breastfeeding		Target (50% increase)
8.	0-6 months old who are being exclusively breastfed	60.6%	90.9%
9.	Low-birth weight		Target (30% reduction)
10.	Babies with birth weight less than 2.5 kgs	2.9 (DLHS-4)	2%

There are 2 health programmes – Reproductive & Child Health (RCH) & School Health (Comprising of Rashtriya Bal Swasthya Karyakram (RBSK) & Rashtriya Kishor Swasthya Karyakram (RKSK) which are concerned with provision of micronutrient supplementation for pregnant women and children. These programmes are implemented all over the state. National Iodine Deficiency Diseases Control Programme (NIDDCP) also aims at reducing goiter and other iodine deficiency conditions among

children. Screening & diagnosis of children with goiter and counselling for dietary improvements are the components of the programme.

There are many health programmes implemented by Health Department and there are schemes and interventions by other departments that have a direct bearing upon health outcomes of the state. In the Sustainable Development era, as climate change and environmental sustainability is the overarching theme, it may be critical to assess the impact of other department's functions on health outcomes. Major issues of concern related to the sector are described below. Further, these are correlated to the impacts of climate change and identified as thrust areas for proposed actions.

5D.3 KEY ISSUES AND CHALLENGES

Sector	Issues/ Challenges
Financial	A chunk of health financing for supply side of health activities is from Central Government through National Health Mission. Details on health systems financing by various sources is still not available.
Technical	• Insufficient health centers and manpower is also a triggering challenge for the state, and it needs to deal with at a priority basis • Lack of well-equipped health centers and inadequate access to modern technology.
Social- Political	Strategic proximity and long international border are one the major cause for high incidence of HIV cases in the state.
Institutional and Regulatory	• Drug abuse in Mizoram has been a serious challenge for the state. Spread of drug at an alarming rate is also causing serious concern to the youths and the international community • Regional inequality in the provision of rural health care infrastructure.

5D.4 PROGRESS MAPPING (IN LAST 5 YEARS)

5D.4.1 Physical Progress

Out of 11 activities proposed in the health sector of the SAPCC Phase 1, the government of Mizoram has taken up 6 activities and are working on it in during last 5 years. Details of the work done under each activity are mentioned in the table below:

<table>
<tr><th>Sl. No.</th><th>Strategies /Activities</th><th>Activity Undertaken</th></tr>
<tr><td>1.</td><td>Identify extrinsic and intrinsic drivers of malaria and identifying community intervention measures towards control of incidence of malaria.</td><td>The state has worked effectively towards handling the malaria crisis of the state. According to the Health and Family Welfare department, Government of Mizoram, some of the achievements in regard to malaria has been listed:
• Total number of Malaria cases (Pv & Pf) in 2016 was 7583 (71.28% reduction from 2015)
• Number of Malaria Pf cases in 2016 was 5,907 (73.9% reduction from 2015)
• 57.14% reduction in deaths as compared to the previous year (21 deaths in 2015, 9 deaths in 2016)
• 98.41% screening of fever.
• 69.43 % of P.f cases treated with ACT
• In 2015 ABER - 26.85% and API was - 4.72, in 2016 ABER - 22.86% and API -6.47%.
• 2 rounds of IRS (DDT spray) has been carried out with 57.38% coverage in 1st round (March-April) and 59.29% coverage in 2nd round (June-July).
Malaria Control Programme
<table>
<tr><th></th><th></th><th>2016-17</th><th>2015-16</th><th>2014-15</th><th>2013-14</th><th>2012-13</th><th>2011-12</th></tr>
<tr><td></td><td>Per 1000 populatio</td><td>6.47</td><td>24.72</td><td>20.71</td><td>10.67</td><td>8.38</td><td>8.58</td></tr>
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<tr><td></td><td>n</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>ABER</td><td>% of total populatio n</td><td>22.8 6</td><td>26.86</td><td>29.65</td><td>20.88</td><td>14.29</td><td>17.41</td></tr>
<tr><td>Positive</td><td>No.</td><td>7,58 3</td><td>28,593</td><td>23,105</td><td>11,747</td><td>9,883</td><td>8,861</td></tr>
<tr><td>P.F.</td><td>No.</td><td>5,90 7</td><td>24,602</td><td>21,083</td><td>10,340</td><td>9,437</td><td>8,373</td></tr>
<tr><td>Death s</td><td>No.</td><td>9</td><td>21</td><td>31</td><td>20</td><td>25</td><td>30</td></tr>
</table>
</td></tr>
<tr><td>2.</td><td>Study and documentation Of diseases caused by water (water borne) and development of institutional mechanism to reduce the incidence/ outbreaks of such diseases along with awareness generation</td><td>A documentation has been published under Research Gate on “Awareness of vector borne disease among rural population of Mizoram India: reference of Malaria” by Javid Ahmad Dar in 2014.</td></tr>
<tr><td>3.</td><td>Development of institutional framework and infrastructural facilities for early detection of vector borne diseases, including managing outbreaks.</td><td>• 7 new sentinel site hospitals have been identified in 7 districts of Mizoram, barring 2 existing sentinel site hospitals (Civil hospital - Aizawl & Lunglei)
• Fogging and source reduction of dengue has been done at outbreak localities.</td></tr>
<tr><td>4.</td><td>Establishment of pathological laboratory with state of art technology for diseases identification</td><td>• New entomological unit has been set up in the state headquarter with 1 entomologist and 2 insect collectors for entomological surveillance, research-based studies, sensitivity testing, etc</td></tr>
<tr><td>5.</td><td>Public health system infrastructure development for extreme climate risk management and managing outbreaks of major diseases</td><td>• The state government has shown a gradual in case of infrastructural development in the health sector. Achievements of the state in this field is mentioned in the below table:
<table>
<tr><td>Number of Medical Institutions/ Unit:</td><td>Number of Hospitals till 2016</td><td>Number of Hospitals till 2011</td></tr>
<tr><td>Gen. Hospital</td><td></td><td></td></tr>
<tr><td>(a) Government*</td><td>9</td><td>9</td></tr>
<tr><td>(b) Private/ Nursing home</td><td>15</td><td>10</td></tr>
<tr><td>(c) Society / Church</td><td>5</td><td>5</td></tr>
<tr><td>Sub-District Hospital</td><td>5</td><td>5#</td></tr>
<tr><td>Community Health Centre (CHC)</td><td>9</td><td>9</td></tr>
<tr><td>Primary Health Centre (PHC)</td><td>57</td><td>57</td></tr>
<tr><td>Urban Primary Health Centre (UPHC)</td><td>8</td><td>0</td></tr>
<tr><td>Health Sub-Centre (SC)</td><td>372</td><td>370</td></tr>
<tr><td>Health Sub-Centre Clinics</td><td>162</td><td>117</td></tr>
<tr><td>AYUSH Dispensaries</td><td>9</td><td>9</td></tr>
<tr><td>Mobile Medical Unit</td><td>8</td><td>8</td></tr>
<tr><td>Total</td><td>659</td><td>594</td></tr>
</table>
</td></tr>
<tr><td>6.</td><td>Capacity building and training for health workers for sensitization of climate variation and health impacts</td><td>• Trainings of Medical Officer on Dengue treatment and diagnosis have been conducted.
• Several workshops on climate change has been organized by Mizoram science, technology & innovation council to every department to give a brief idea about climate change and its impact.
• 5 days state-level training of RBSK Mobile Health Teams.</td></tr>
</table>

		• 1-day Orientation Training on RBSK for district officials at the state level; • 5 days state-level training of newly recruited RBSK Mobile Health Teams; 2-Days RBSK Community based Training at District Level; 2 days Orientation & Training on RBSK for District Trainers at the state level. • 1-day Re-orientation Training on RBSK/DEIC for DEIC Managers at the state level; 1-day Orientation Training on RBSK for district officials at the state level; 5 days state-level training of newly recruited RBSK Mobile Health Team • 1-day RBSK Facility Based Training for Health Professionals at the District Level.

5D.5 GAP/ BARRIER ANALYSIS

Area	Gaps
Institutional	• Lack of early warning system in the state • Absence of strong surveillance system • Lack of basic information database and lack of easily accessible data
Financial	• Reduced scale of climate finance • Paucity of fund from different schemes is a major gap towards the development of urban areas.
Regulatory/ Policy	• Lack of convergence with the schemes attaining similar goal • Need for inter-departmental co-ordination for better convergence and clarity of goals

5D.6 SECTOR – PRIORITY/STRATEGIES

5D.6.1 Future Plan to Meet NDC and SDG

Situational Analysis - NDC Perspective

NDC Commitment- Health Sector	Key State level initiative to comply with NDC Statements
National Health Mission	• Health sector is considered as one of the major sectors in Mizoram. Therefore, in addition to the eight national level missions for climate change, the state government of Mizoram is taking up with the ninth Mission on Health
National Vector Borne Disease Control Programme (NVBDCP) to deal with vector borne diseases like malaria, dengue, etc.	• The state will be focusing on study and research work on Vector-borne and water-borne diseases, and development of required institutional infrastructure keeping specific focus on climate risk management. • Simultaneously, establish State Climate Change Environmental & Occupational Health Cell.

Specific Targets under SDG for the Sector

Health sector is linked to SDG 3, which is to ensure healthy lives and promote well-being for all at all ages. The targets set by the state are as follows:

SDG Goals	Target	Key Initiatives by the State
Goal 3 - Ensure healthy lives and promote well-being for all at all ages Goal 3.d.1- International	The state has set the following for the health sector by the year 2029 • To reduce Maternal Mortality and Child Mortality. • To reduce HIV/AIDS.	• The state is planning to carry out detailed studies on various vector-borne diseases to well understand the adaptation strategies to deal with them

Health Regulations (IHR) capacity and health emergency preparedness Goal 3.9.1- Mortality rate attributed to household and ambient air pollution Goal 3.9.2- Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services). Goal 13.1- Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	• To reduce malaria related death. • To strengthen health facilities in the State. • 100% coverage of BPL under RSBY. The state has also formulated certain strategies to attain the specified goal • Re-structuring of primary health care by re-modelling PHCs, CHCs, UHCs, DHs and strengthening of health workers under the National Health Mission and NEDP. • Strengthening implementation of Health care schemes such as RSBY, ICDS, National AIDS Control Programme, National Vector Borne Disease Control Programme, Routine Immunization Programme, etc. • To end all preventable maternal death and infant death as one of the commitments of Government of Mizoram and improving reach of health facilities to everyone in the state.	and to reduce the incidence/outbreaks of such diseases • The government of Mizoram is further planning to strengthen the health infrastructure so as to cope with the changing pattern of disease out-break and reduce the IMR and MMR of the state. • Mizoram is also planning to carry out various assessment studies on vulnerability and adaptation • Capacity building of officials and health workers on impact of climate change on human health will also be one of the major activities of the state for the coming years.

5D.6.2 Description of Strategies/Activities

The state has put maximum emphasis on improving health infrastructure, health services through capacity building and carrying out training workshops and sensitization of climatic impacts on health.

HS/1- Study on Vector-borne diseases including malaria, dengue, scrub typhus & other diseases in the context of climate change & development of framework for adaptation measures to control communicable diseases

The government has set a target of eradicating deaths due to malaria by 2029. In order to achieve this target, it is necessary to understand and have knowledge on the issue and its prevention. The state government is, therefore, planning to conduct studies on vector borne diseases and develop an adaptation framework for communicable diseases. This involves improving drainage, better awareness, fumigation and other services.

HS/2- Development of institutional framework and infrastructural facilities including public health laboratory for early detection and managing outbreaks of vector borne diseases.

The state government is already working on development of health infrastructural facilities and effective institutional arrangements. The government is planning to set up health care facilities in some of the remote areas where accessibility has been a hindrance till date. More number of mobile health units are being planned.

HS/3- Study and documentation of water borne diseases and development of institutional mechanism to reduce the incidence/outbreaks of such diseases along with awareness generation

The government is keen to conduct studies and documentation on water- borne diseases to assess the severity and extent of the problem. It is also examining the behavioral pattern of micro-organisms and how they respond to climate variability and change in the state. It will also help the government to cope with the increasing incidences of these diseases.

HS/4- Impact Assessment of heat stress on human health, preparation of adaptation strategy in the form of heat action plan & institutionalization into health information platform

The state is in the process of preparing both preventive and adaptive measures to address heat stress with public awareness and developing standard operating procedures.

HS/5- Conduct Vulnerability & Adaptation study/assessment for health sector towards climate change

The state government has proposed to conduct a vulnerability and adaptation assessment for health sector to better understand the vulnerability of the sector and take necessary actions in order to deal with the changing scenario.

HS/6- Strengthening of health information infrastructure in the state to enable real-time collection of data to identify changing disease patterns with climate change/variation through triangulation with meteorological data

Under NHM, it has created database, but it is in the process of analyzing the disease burden and its linkages to climate parameters.

HS/7- Public health system infrastructure development for extreme climate risk management

Mizoram is a vulnerable state and is very much prone to extreme natural events such as floods, landslides, earthquakes etc. There is an absolute need for ample medical facility to minimize the effect of these events on the lives of the population. Therefore, the government is planning to develop dedicated sections of the health centres which would be equipped enough to handle stressful and vulnerable situation arising out of extreme climatic events.

HS/8- Capacity building and training for health workers for sensitization of climate variation and health impacts

Sensitization of the health workers on climate variation and its impact on human health are important as they build upon community infrastructure and enhance the capacity of the health care workforce and deal with the situation arising from the change in climate and increased vulnerability of the people. The state government has been planning special provision for building the capacity of the health workers and to provide them with adequate training enabling them to deal with the changing scenario. The following research studies have been proposed to better understand the impact of climate change on health and nutrition.

HS/9- Research study on under-nutrition due to effect of climate change on food production

According to the World Health Organization (WHO), climate change is likely to affect the food system as it directly affects the agricultural production. This as a whole would increase the prevalence of malnutrition. Therefore, the state government is planning to undertake research study on under nutrition due to change in food production caused by climate change at ground level.

HS/10- Research study to quantify the health impacts of climate change and determinants of mental health disorders among victims of disasters attributable to climate change.

The findings of the WHO indicate that, the areas that are not fully equipped with health infrastructures will be least able to cope up with climate change impact without proper assistance. In order to cope with the changing health scenario of the state, it is important to have a clear picture of the present condition and the problems associated. Therefore, the govt. of Mizoram is planning to undertake various research activities to quantify the health impacts of climate change. The state government is also keen to undertake various studies and research activities on the determinants of mental health disorders among victims of disasters attributable to climate change.

HS/11- Establishment of State Climate Change, Environmental & Occupational Health Cell

The state has planned to formulate a dedicated cell for climate change, environmental and occupational health.

Long-term plans for Development of Green and Climate Resilient Infrastructure at Healthcare Facilities

Mizoram is also working in Development of Green and Climate Resilient Infrastructure at Healthcare Facilities through various means. Understanding of climate risk and preparedness to combat climate induced disasters require investing in climate-resilient infrastructure which can help to minimize the impact of climate change and reduces the susceptibility to risk. And its preparedness to climate change started with enhancing capacity building at the level of decision-makers and team working on ground, who are at the forefront of workforce acting at the time of emergency.

The Green Infrastructure has significant ability to sequester carbon to aid in mitigating the threats from impending climate change, since the climate change is already underway, both the mitigation and adaptation are therefore a necessary complement to prepare Healthcare facility from climate induced disasters and minimize the impact on population. The measures to be implemented are:

Energy Conservation- It will encompass Energy Audit, Installation of LED lights & solar panels. Energy Audits determine ways to reduce energy consumption per unit of product output or to lower operating costs. an audit programme will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment. LED lights and solar panels are low carbon emission measures, thus reducing carbon footprints. Solarization of health facilities reduces dependence on insufficient or intermittent electricity supply especially in rural areas.

Water Conservation- Rainwater harvesting system can be implemented using surface runoff and roof top water. The roof top water harvesting is more effective where roof itself becomes the catchment area, and water can be collected from the roof of the building. This water can either be stored for utilization, or it can be discharged into an artificial recharge system.

Waste Management- The Bio medical waste generated from the HCFs has to be segregated and transferred to common Bio Medical Waste Treatment Facility (CBMWTF) and other treatment techniques are required to be adopted as per BMW Rules, 2016. The Effluent Treatment Plant (ETP) should be provided in every HCF to treat the chemical wastewater generated from the healthcare facility in order to comply with the effluent standards prescribed under the BMW Rules, 2016.

Smart Buildings- The healthcare facilities should be constructed and designed with patient-centered philosophy in mind. The patient-centered architecture will make it easier for them to participate as partners in their care. The architecture should be pleasant to the patient, and the design of the healthcare facility should prioritize humans over technology. Smart healthcare facilities will provide patients with privacy, comfort, safety, and security while also allowing them to connect with nature. The HCF should be equipped with firefighting equipment and have separate passage for evacuation in case of any fire hazard. The HCF should be planned to ensure the shortest travel of patients and staff.

Green Building- The green building shall be designed, constructed and operated in a manner to have minimum negative impact on external environment. Green buildings protect valuable natural resources while also improving our quality of life. Green Building extends and supplements traditional building design principles such as economy, usability, durability, and comfort

Retrofitting of facility- Healthcare facilities have to adopt measures to withstand the impact of increasing extreme weather events and climate related hazards such as higher rainfall, greater frequency of floods, cyclones, tornadoes, flash floods, longer heat waves etc. The commonly adopted measures include low emission and high reflectance paint and varnishes to main the inside temperature of building, raising the plinth level to minimize the flooding of HCF, maintenance of slope to avoid the stagnation of water.

Selection of healthcare facility- objective of programme is to maximize the conversion of HCFs in to Green and climate resilient facilities. However, selected number of facilities can be converted into Green

and climate resilient facility. The health facilities can be identified based on file climate vulnerability data available for India. The most climate vulnerable district may be identified by the State based on the data, horn which the State can further select health facilities to be developed as green and climate resilient facilities. The algorithm for the selection of facility is shown in Figure 3, Every State should identify at least one facility at primary, secondary and tertiary levels of healthcare for development into green and climate resilient health facilities.

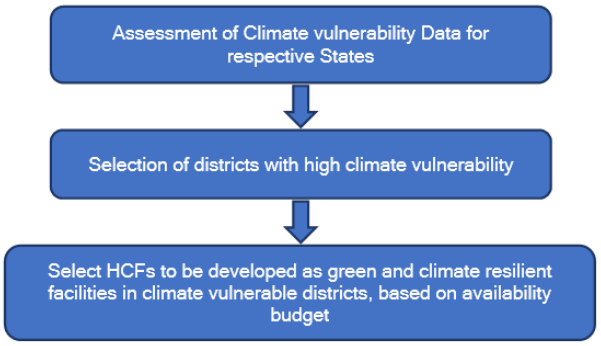


Figure 30: Algorithm for selection of facility

Funding Mechanism- The implementation of Green and Climate Resilient Healthcare Facilities infrastructure activities can be supported through Centrally sponsored schemes, state schemes, locally available funds/MP and ML A local area development schemes/CSR funds etc.

Few other sources of funds and State targets are also mentioned below:

Table 22: Funding source and budget of development of green and climate resilient facility

Green Measure	Supporting Agencies	Estimated Cost	Target	
			2024-25	2025-26
Energy Audit	Bureau of Energy Efficiency (BEE), REDA	• Rs. 5000 for Sub centre • Rs.l0,000 for PHC • Rs.30,000 for CHC • Rs.l,00,000 for DH	Audit in 20% HCF in 20% districts	Audit in 35% HCF in 40% districts
LED lighting	BEE	• Rs.5000 -7000 for Sub Centre • Rs.15000 -17000 for PHC • Rs.25000 -28000 for CHC • Rs.38,000 -40,000 for DH	LED in 10% HCF in 20% districts	LED in 20% HCF in 40% districts
Installation of Solar Panels	Renewable Energy Development Authority (REDA)	• Rs.700,000 for Sub Centre • Rs.1,500,000 for PHC • Rs.4,000,000 for CHC • Rs.7,000,000 for DH	Solarization in 5% HCF in 20% districts	Solarization in 10% HCF in 40% districts
Install Rainwater Harvesting System	Dept, of Public works (PWD)	• Rs.500,000 for PHC • Rs.800,000 for CHC • Rs.1,000,000 for DH	RWH in 5% HCF in 10% districts	RWH in 10% HCF 1 in 30% districts
Installation of ETP	PWD Municipal Authority	• Rs.500,000 (max) for CHC • Rs.1,000,000 (max) for SDH (100beds) • Rs.4,000,000 (max) for DH (500beds)		Costing as per 2022-24 PIP guidance note
BMW Disposal	Common Bio medical Waste Treatment Facility (GBMWTF)			
Retrofitting Healthcare Facility Infrastructure	PWD	• Rs.500,000 for PHC • Rs.l,000,000 for CHC • Rs.2,000,000 for DH	At least 1 climate resilient HCF in 40% of districts	At least 1 climate resilient HCF in 60% of districts

5D.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
1	HS/1	Study on Vector-borne diseases including malaria, dengue, scrub typhus & other diseases in the context of climate change & development of framework for adaptation measures to control communicable diseases.		AD	1,500.00				Health & Family Welfare Dept. and MSPCB[54]
2	HS/2	Development of institutional framework and infrastructural facilities including public health laboratory for early detection and managing outbreaks of vector borne diseases.		AD	2,500.00				Health & Family Welfare Dept.
3	HS/3	Study and documentation of water borne diseases and development of institutional mechanism to reduce the incidence/outbreaks of such diseases along with awareness generation.		AD	3,500.00				Health & Family Welfare Dept.
4	HS/4	Impact Assessment of heat stress on human health, preparation of adaptation strategy in the form of heat action plan & institutionalization into health information platform.		AD	500.00				Health & Family Welfare Dept.
5	HS/5	Conduct Vulnerability & Adaptation study/assessment for health sector towards climate change.		AD	1,000.00				Health and family Welfare Dept.
6	HS/6	Strengthening of health information infrastructure in the state to enable real-	Ayushman Bharat	AD	1,400.00				Health & Family Welfare Dept.

		time collection of data to identify changing disease patterns with climate change/variation through triangulation with meteorological data.							
7	HS/7	Public health system infrastructure development for extreme climate risk management.		AD	40,000.00				Health & Family Welfare Dept.
8	HS/8	Capacity building and training for health workers for sensitization of climate variation and health impacts.		AD	1,600.00				Health & Family Welfare Dept.
9	HS/9	Research study on under nutrition due to effect of climate change on food production.		AD	500.00				Health & Family Welfare Dept.
10	HS/10	Research study to a) Quantify the health impacts due to climate change and b) Determinants of mental health disorders among victims of disasters attributable to climate change.		AD	200.00				Health & Family Welfare Dept.
11	HS/11	Establishment of State Climate Change, Environmental & Occupational Health Cell.		AD	200.00				Health & Family Welfare Dept.
		Total			**52,900.00**				

5E. STATE MISSION STRATEGIC KNOWLEDGE FOR CLIMATE CHANGE

5E.1 SECTORAL OVERVIEW

Strategic Knowledge for climate change attempts to make a dynamic knowledge system that would help in attaining the objective of ecologically sustainable development. It also aims to develop a better understanding by bridging up, acquiring, and upgrading information and knowledge available from the discipline of climate science, analyzing the impacts of climate change at the local level. The Strategic Knowledge Mission aims to address a number of issues by identifying the impacts of different climate-sensitive actions and inculcate adaptation and mitigation solutions. It helps to better understand the local level vulnerability through improved climate modeling and international collaborations.

People who are relying on natural resources for their livelihood will be mostly affected by the impacts of climate change. The impact of continuous climate change can move a larger portion of people to the poverty zone due to weakening of their individual adapting capacities over time. Sometimes, due to climate uncertainty, it becomes difficult to forecast climate extreme events, which interfere in the development process. Under strategic knowledge, the state involves itself in the creation of adaptation capacity for the population who are more vulnerable to build their capacity for resilience.

Mission Objectives:

- To keep track of climate variability and prepare forecasting of climate change in the state.
- To identify different climate-sensitive actions, evaluate the impacts of climate change, and study the vulnerability of different sectors and the adaptation practices.
- To merge the evaluation process of vulnerability, knowledge, and data sources to prepare adaptation and mitigation projects for different climate-sensitive areas.
- To sensitize and build the capacity of government officials in climate-responsive policy formulation and to help development agencies collaborate with the state government for developing new adaptation and mitigation measures.
- To strengthen the knowledge and awareness of people to enable individual adaptation actions at their own level, reducing the risk.
- To promote indigenous knowledge for climate adaptation practices.
- To empower regional cooperation by building a common framework for sharing information to reduce sector vulnerability.

The main objective of the "State Mission on Strategic Knowledge" is knowledge generation and dissemination. This is achieved by identifying knowledge gaps and bridging these gaps. It is very important to build institutions for conducting more in-depth research and studies on climate change at the state level. The issue of bridging gaps will be addressed through the creation of knowledge networks. Strategic knowledge should not be considered only for knowledge generation but also for capacity building of the people. It is also important to acquire indigenous knowledge from the local people for natural resource management and climate change adaptation. This method is beneficial because gathering knowledge from local experienced people and including that as a part of strategic knowledge will show all the actions that the Mizoram requires dealing with climate change.

5E.2 KEY ISSUES AND CHALLENGES

Sector	Issues/ Challenges
Financial	• Paucity of funds for carrying out research activities in the area of climate change and modelling, etc.
Technical	• Lack of sufficient scientific information data base at local level • Need for a common data platform for standardization of the assembled information. • Fragmented knowledgebase and inadequate knowledge on the impacts of climate change in different sectors making it difficult to predict at micro-level. • There is an inadequacy of technical and scientific studies and research in order to adapt with the changing climate scenario.

Social- Political	• Lack of proper connectivity with national and international network • Lack of proper networking and continuity among community of practitioners. • Many times, research is not based on the priority of the community • Knowledge gap amongst policy makers on climate change issues.
Institutional and Regulatory	• Absence of Research centers for extraction of ground level data largely affects the knowledge up-gradation at the state level. • Absence of organized multi-disciplinary research capabilities as well as strong and vibrant watch institutions. • Lack of a systemic institutional mechanism for collating, synthesizing and delivering knowledge products for decision-making.

5E.3 PROGRESS MAPPING (IN LAST 5 YEARS)

5E.3.1 Physical Progress

The state government of Mizoram had undertaken 2 major activities out of total 3 activities which were listed in the previous SAPCC (Phase 1). A lot of emphasis has been given on building the capacity of the locals as well as the officials for building their resilience towards climate change. The achievements of the state under the strategic knowledge mission have been listed in the table below:

Strategies /Activities	Activity Undertaken
Activity 1: Development of Knowledge Management on Climate Change and facilitating its operation for initial period	• The State Climate Change Cell was established. • The department has undertaken collection and compilation of Meteorological data on a regular basis. • District wise assessment of vulnerability due to climate change was done on water resources, human health, socio-economic and biophysical sectors. • Analysis of 30 years data of winter temperature of Aizawl district in January 2016 was undertaken and was broadcasted in news channel and newspaper (Local and National). • Booklet on 'Meteorological data of Mizoram' and 'Climate Profile of Mizoram' was published. • An awareness creation leaflet on 'Climate (Sik leh sa) leh Mizoram' was prepared for sensitization of personnel at grassroots level. • Brochure on Mizoram Climate Change Cell was prepared to highlight activities of Mizoram State Climate Change Cell.
Activity 2: Capacity Building on Climate Change	
Sub Activity 2.1: Capacity building of personnel in the service department	• MoU has been signed with Administrative Training Institute, GoM for institutionalizing capacity building on climate change adaptation planning in service departments. 3 different training programmes were organized for different levels of government officials (Legislatures & Bureaucrats, State Level Officials, District Level Officials) on climate change adaptation planning. • 2 number of workshops and 1 seminar on climate change related issues were organized for different stakeholders such as line departments, NGOs, Academicians and Research Scholars on the issues of climate change on vulnerability, herpetofauna, health, water resources, forest and agriculture. • Capacity building for journalists on climate reporting in the Himalayas was organized through 3 days' workshop. • Sensitization workshop on climate change was organized in 7 district colleges of the state. • Awareness programme in 3 district headquarters for Government line Department, Village Councils, NGOs and students. • Photography competition on climate change was held in November 2016- January 2017.

The State Knowledge Cell has carried out various training programmes and capacity building in climate change.

Sl No	Topic	Date(s)	Duration	No of Participants	Level of participation
1.	Level 3 training programme for district level officials on Capacity Building programme on Climate Change Adaptation Planning	4th to 7th September 2018	4 days	44	District officials of different line departments
2.	Workshop on Assessment of Vulnerability due to Climate Change in Indian Himalayan Region with Respect to Mizoram	1.11.2019	1 day	35	Different Government Line Departments, faculties from academic institutions within the state and NGOs
3.	Workshop on District Level Climate Vulnerability Assessment of Mizoram at Lunglei	25.6.2019	1 day	200	Government Line Departments, faculties from academic institutions within the District and NGOs
4.	Level 4 training of trainers on Capacity Building programme on Climate Change Adaptation Planning:	18th to 20th November 2019	3 days	4	MZU faculty, ATI faculty and SCCC personnel
5.	Capacity building programme on Climate Change & Plant Biodiversity	26.11.2021	One day	82	Faculties, students, research scholars from colleges and universities, scientific organizations and institutions
6.	Capacity building programme on Climate Change & Wildlife	27.1.2022	One day	36	Faculties, students, research scholars from colleges and universities, scientific organizations and institutions
7.	Awareness programme on Climate change	25.2.2023	One day	200	Students and teachers of four different schools within E. Lungdar town
8.	Workshop on Climate Change Education at Natural History Museum of Mizoram, Mizoram University	21.3.2023	One day	208	Four different schools and one college
9.	National seminar on land use and bio resource management for sustainable livelihood	27.03.2023 to 28.3.2023	Two days	120	Mizoram University faculties, students and research scholars
10.	Lecture on Climate Change in the observance of World Environment Day at State Council of Educational Research and Training (SCERT)	5.3.2023	One day	80	Students and faculties from 37 schools within Aizawl city.
11.	A lecture was conducted on Environment & Climate Change, Issues & Challenges at the Mandatory Foundation Training for Group D staff, at Administrative Training Institute (ATI), Government of Mizoram.	19.7.2023	One day	50	Group D staff of different government departments.
12.	Lecture on the topic “Climate Change” was conducted at the Basic Service Rules & Financial Rules Training for pay level 4, 5, 6 at ATI, MINECO.	22.9.2023	One day	68	Pay Level 4, 5 & 6 employees from different government departments
13.	District level Capacity Building Programme on Climate Change for teachers and faculties of	10.10.2023	One day	38	Teachers and lecturers from different schools

	education institutions at Khawzawl, Khawzawl District				
14.	District level Capacity Building Programme on Climate Change for teachers and faculties of education institutions at Champhai, Champhai District	11.10.2023	One day	109	Teachers, lecturers and faculties from different schools and colleges within Champhai town area
15.	Seminar on Biodiversity Richness and Climate Change Impact on Biodiversity in Mizoram was organized at Mizoram University	16.11.2023	One day	120	Faculties, research scholars and students of the Mizoram university
16.	Workshop on Climate Change and Capacity building programme on Climate Vulnerability Assessment at Govt. Kamalanagar College, Chawngte, Chakma Autonomous Council, Lawngtlai District	15.2.2024	One day	209	Students & faculties of all department of the college
17.	Workshop on Climate Change and Capacity building programme on Climate Vulnerability Assessment at Govt. Saiha College, Siaha district	7.3.2024	One day	135	Students and faculties of all department of the college
18.	Workshop on Climate Change and Capacity building programme on Climate Vulnerability Assessment at Govt. Lawngtlai College, Lawngtlai District	14.3.2024	One day	60	Students and faculties of all geography department of the college
19.	Awareness programme on Climate Change	27.3.2024		25	MBA students from ICFAI University
20.	Climate Change lecture in Two-days international Workshop on Psychological Adaptation, Disaster Mitigation and Preparedness of Climate Change Affected Communities	15.4.2024	Two days	50	Students and faculties of School of Social Science, Mizoram University
Awareness Programmes					
1.	Sensitization Workshop on Climate Change in Secretariat Conference Hall, New Capital Complex	5.4.2018	One day	29	Government Line Departments, faculties from academic institutions within the states
2.	Sensitization Workshop on Climate Change at Government Lawngtlai College	12.7.2018	One day	94	Faculties and students of Government Lawngtlai College
3.	Sensitization Workshop on Climate Change at Government Saiha College	16.7.2018	One day	157	Faculties and students of Government Saiha College
4.	Sensitization Workshop on Climate Change at Government Mamit College	24.7.2018	One day	133	Faculties and students of Government Mamit College
5.	Sensitization Workshop on Climate Change at Government Serchhip College	1.8.2018	One day	346	From faculties and students of Government Serchhip College
6.	Awareness programme on the science of climate change at Mamit	30.3.2019	One day	75	Government officials, village council members, NGOs
7.	Awareness programme on the science of climate change at Kolasib	16.4.2019	One day	192	Government officials, village council members, NGOs

8.	Awareness programme on the science of climate change at Champhai	25.4.2019	One day	170	Government officials, village council members, NGOs
9.	Awareness programme on the science of climate change at Siaha	10.10.2019	One day	75	Government officials, village council members, NGOs
10.	Awareness programme on the science of climate change at Lawngtlai	11.10.2019	One day	110	Government officials, village council members, NGOs
11.	Climate Change Awareness Through Cleaning of River/Stream (Luipui Stream)	26.2.2022	One day	12	Mission Veng Youth Adventure Club
12.	Climate Change Awareness Through Cleaning of River/Stream (Tuikual Stream)	26.3.2022	One day	NA	General PYD Choir, UPCNEI
13.	Climate Change Awareness Through Cleaning of River/Stream (Tuikual Stream 2)	26.3.2022	One day	NA	Dinthar PYD Member
14.	Climate Change Awareness Through Cleaning of River/Stream (Chite Stream)	26.3.2022	One day	NA	Pentecostal Youth Department, Bethlehem
15.	Climate Change Awareness Through Cleaning of River/Stream (Venghlui Stream)	26.3.2022	One day	NA	Kristain Thalai Pawl group, Venghlui Branch
16.	Climate Change Awareness Through Cleaning of River/Stream (Chawlhhmun Stream)	26.3.2022	One day	NA	Section III, Young Mizo Association, Chawlhhmun Branch, Aizawl
17.	Climate Change Awareness Through Cleaning of River/Stream (Saitual River)	9.4.2022	One day	NA	Environment Protection Society (Saitual), Saitual, Village Sanitation Committee (Saitual) and General Public
18.	Cycle rally for reducing carbon footprint and climate change awareness drive	19.3.2022	One day	80	Mizoram Cycling Association
19.	Jhumland Photography Competition	March to April 2022	Two Months	75	Mizo Photographers Association and General Public
20.	Short video competition on human triggered climate change	March to April 2022	Two Months	12	General Public
21.	Climate change thematic 3D Model exhibition	5.7.2022	One day	21	High schools from all over Mizoram and 200 visitors
22.	Painting competition on Climate Change	21.3.2022	One day	35	High schools within Aizawl
23.	Talks on environmental concern with special reference to climate change in Mizoram	15.3.2022	One day	4	Invited speakers
24.	Panel discussion on Climate change Mitigation and Adaptation in Northeast India at All India Radio - Akashvani – Northeast	2.6.2023	One hour	NA	NA

Training conducted on programme Organised by others

1. Mizoram State Climate Change Cell (SCCC) representative delivered a talk on topic Overview of Climate Change and Climate Scenario of Mizoram at “Sustainable Mountain Development summit VI” organised by Mizoram Sustainable Development Foundation at Mizoram University, Mizoram during 20th to 22nd September, 2017
2. Mizoram State Climate Change Cell (SCCC) representative presented a talk on topic Overview of Climate Change and Climate Scenario of Mizoram at Seminar on "Climate Change Adaptation &

Disaster Risk Reduction" at 20th Mizo Academy of Sciences General Body Meeting at Auditorium, Administrative Training Institute, Aizawl, Mizoram on 3rd November, 2017.

3. Mizoram State Climate Change Cell (SCCC) representative gave a Lecture on topic Overview of Climate Change and Climate Scenario of Mizoram at training programme "Environment, Climate Change and Disaster Management" during 16th -18th January 2018 at Administrative Training Institute, Govt. of Mizoram.
4. Mizoram State Climate Change Cell (SCCC) representative gave a Lecture on topic Overview of Climate Change and Climate Scenario of Mizoram at the Inhouse Training of Officials of Disaster Management and Rehabilitation Department, Government of Mizoram during January 2018.
5. Mizoram State Climate Change Cell (SCCC) representative delivered a presentation on topic Overview of Climate Change and Climate Scenario of Mizoram at "State level workshop & Round table discussion on combating Climate Change" organised by Mizoram Sustainable Development Foundation on 20th April, 2018.
6. Mizoram State Climate Change Cell (SCCC) representatives presented two talks on topic 'Overview of Climate Change' and 'Climate Profile of Mizoram' at one day Capacity Building and Training Programme on Climate Change under NEDP for Govt. Officials in Lunglei at DC Conference Hall, Lunglei, Mizoram on 22nd May 2018 organized by Dept. of Environment, Forest & Climate Change. Govt. of Mizoram.
7. Mizoram State Climate Change Cell (SCCC) representative delivered a presentation on topic Overview of Climate Change and Climate Scenario of Mizoram at "Awareness campaign on Climate Change for the farmers of Mizoram" organised by All Mizoram Farmers' Union on 19th February, 2019.
8. Mizoram State Climate Change Cell (SCCC) representatives presented two talks on topic 'Overview of Climate Change' and 'Climate Profile of Mizoram' at "Seminar on Climate Change" organised by State Council of Educational Research and Training (SCERT) on 16th September 2019.

5E.4 GAP/ BARRIER ANALYSIS

Area	Gap
Institutional	• Need for appropriate financial management & regular data collection practice.
Financial	• Reduced scale of climate finance • Paucity of fund from different schemes is a major gap
Regulatory/ Policy	• Lack of convergence with the schemes attaining similar goal. • Lack of programme level details in state budget. • Need for inter-departmental co-ordination for better convergence and clarity of • goals.

5E.5 SECTOR – PRIORITY/STRATEGIES

5E.5.1 Future Plan to Meet NDC and SDG

Specific Targets under NDC for the Sector

The Nationally Determined Contribution majorly aims at reducing national emission and adapt to the impacts of climate change. The basic objective of the NDC is to achieve the vision of a sustainable lifestyle and climate justice to protect the poor and vulnerable from adverse impacts of climate change. Various commitments have been made by the government to achieve the targeted goal. Key commitments under the NDC pertaining to the Strategic Knowledge sector are outlined in the table below:

NDC Commitment	Key State level initiative to comply with NDC Target
To build capacities, create domestic framework and international architecture for quick diffusion of	• The government is quite responsive towards building the capacity of the state through awareness generation and bringing in the climate change issue in the educational platform • Emphasis is led on capacity building and awareness creation of the

cutting-edge climate technology in India and for joint collaborative R&D for such future technologies.	local people for easy and smooth development of the state as well as keeping the tradition and values of the communities intact • Infrastructure development of monitoring centers for minimizing the effect of climate change on people and their livelihood. • Taking up research activities for better understanding of the climate change scenario of the state and developing measures to adapt and mitigate the situation.

Specific Targets under SDG for the Sector

SDG Goals	Key Initiatives by the state
Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development.	• As per the state's vision document, the government has not set any target for the specified goal for 2030. • However, the government is working at the grass-root level towards achieving the SDG goal. It has collaborated with Department of Science and Technology, Government of India, ICIMOD, IIT Guwahati, Indian Institute of Science, GIZ and SDC for climate change awareness, adaptation planning, • research and development.

5E.5.2 Description of Strategies/Activities

SK/N/1- Development of knowledge management system on climate change and facilitating its operation

The state government is working extensively towards development of knowledge management system. In the last 5 years, the government has taken up activities such as establishment and strengthening the climate change cell both in terms of induction of additional qualified human resource and equipment. The state has been working on collection and compilation of meteorological data of Mizoram and will take up the activity in the near future. The state will also work towards establishment of a knowledge portal, which will help in easy accessibility of the data.

Direct & Co-benefits:

- Employment generation
- Easy accessibility of data
- Increased scientific approach towards climate change adaptation and mitigation

SK/N/2- Capacity Building and awareness generation programmes on climate change

According to the Paris agreement, each country has accepted certain commitments, which can be attained by working at grass root level. To fulfill these commitments, each state work towards its various education, training and awareness programmes at regional levels. The government of Mizoram has also undertaken these initiatives in order to give public access to information on climate change and its effects through newsletters and case studies. Public awareness will help in capacity building to enable to participate fully and to implement the commitments effectively.

Direct & Co-benefits:

- Improve understanding of the opportunities and challenges of formulating politically feasible and effective climate policies.

SK/N/3- Research and Monitoring of climate change impact on different sector

According to the National Mission on Strategic Knowledge for Climate Change, research work on climate change and its impact is a major component. The government of Mizoram is actively working in this line for improved understanding of climate impacts and vulnerability. This would help the governance to respond appropriately in addressing climate sensitive issues. Therefore, the state

government is taking initiatives and investing a lot focusing on climate sensitive research work in different sector.

Direct & Co-benefits:

- Provide a thorough understanding of indicators of the impacts and consequences of climate change
- Help in creating the knowledge base important for decision support in context of climate mitigation and adaptation practices
- Help to understand how climate uncertainties merge with the socio-economic and ecological uncertainties.

SK/N/4- Establishment of Early warning/information system:

The government of Mizoram is planning to come up with an organized early warning system to tackle possible extreme event. The state is also aiming at having at least 8 automated weather stations for 8 district headquarters for accurate weather monitoring. The state is aware of the fact that a detail weather monitoring is required in order to understand climate change, its impact and then adapt with the changing dynamics.

Direct & Co-benefits:

- Provides a detailed and accurate weather data helpful for research work and decision-making.
- Provide a safer and better lifestyle to the people.

The Department also proposes soft measures to better integrate climate change into knowledge mission and educate the mass.

Objective/Task	Quantified deliverables for Monitoring
Institutional Capacity building ***Proposed Activities*** (i) Assessment of training needs (ii) Training programmes for academicians and research scholars at university and colleges (iii) Training programmes for other scientific research organizations (iv) Training programmes for personnel from government training institutions.	Number of institutions represented by different persons trained.
Training programmes for stakeholders ***Proposed Activities*** (i) Assessment of training needs (ii) Sensitization programmes for legislators and bureaucrats (iii) Training programmes for different levels of government officials (iv) Training programme for community level policy implementing agencies	• Specific training modules based on needs formulated • Number of different institution/organizations represented by different persons trained.
Public awareness for community ***Proposed Activities*** (i) Developing awareness material (ii) Awareness programme for village panchayats and community (iii) Awareness programme for NGOs (iv) Sensitization programme for students (v) Organizing thematic competitions, events (vi) Broadcasting climate sensitive information and study output through media and other online activities.	• Varieties of awareness materials developed • No of organizations, schools, colleges represented in awareness programmes organized. • No of broadcast and regularity of such action.

Annual Action Plan for Strategic Knowledge Mission

2024-2025

- Village level Climate Vulnerability Assessment: Health, Agriculture & integrated biophysical & socioeconomic sector
- Studying of traditional knowledge systems for community participation in adaptation, mitigation and coping mechanisms inclusive of farming and traditional health care systems.
- Publication Biannual Newsletter

2025-2026

- Capacity building for stakeholders: Legislators, teachers of different districts.
- Awareness programmes:
- Model based Climate Change impact on Hydrology
- Climate modelling & projection for the state of Mizoram
- Adaptation project proposal development
- Publication Biannual Newsletter

2027-2028

- Adaptation project implementation
- Exploration and design of early warning system
- Publication Biannual Newsletter

2028-2029

- Adaptation project implementation.
- Monitoring of Early warning system
- Publication Biannual Newsletter

2029-2030

- Adaptation policy document.
- Publication Biannual Newsletter

5E.6 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Fundingin Lakh INR	Implementing Department
1	SK/N/1	Development of Knowledge management on Climate Change and facilitating its operation for initial period		AD	260.00				MISTIC[55], DST
2	SK/N/2	Capacity Building on Climate Change & Awareness Programmes		AD	780.00				MISTIC, DST
3	SK/N/3	Research and Monitoring		AD	920.00				MISTIC, DST
4	SK/N/4	Establishment of Early warning /information system		AD	1,310.00				MISTIC, DST
		Total			**3,270.00**				

5F. STATE WATER MISSION

5F.1 SECTORAL OVERVIEW

Water is a prerequisite component for sustenance of life. The accessibility to good quality and quantity of water is very important for improving the quality of life and economic development of the nation. Water is an important element and plays a major role towards national food security. The largest consumer of water resources is the agricultural sector and any inconsistency in water supply might derail the developmental agenda.

Climate change is already a pressing issue encapsulating a wide variety of phenomena, which includes change in average temperature, precipitation and frequency, or severity of extreme events. Water sector being linked to all the aforesaid climate change indicators is therefore the most vulnerable sector from the climate change context. Hence, it is vital to address the issues of climate change and its impacts on water and also develop adaptive capacities and enhance the resilience of the dependent sectors towards responding to the aforementioned impacts.

Mizoram is endowed with enough amount of fresh water in the form of perennial rivers and springs to meet the present demand but accessibility to good quality and quantity of water is a major challenge when impact of climate change is concerned. Ensuring availability of drinking water both in terms of adequacy and quality, on sustainable basis, is the major challenge. Because of being located in a fragile ecosystem, Mizoram is more prone to the effects of climate change. The land terrain being mountainous, piped water supply is the main source of water in most of the habitations of Mizoram. Water supplying is also a major concern because of the hilly terrain and most of the piped water supply systems are gravity based. Due to uneven precipitation that varies from season to season, there is erratic flow of water and occurrence of natural disaster like floods, landslides etc. Increased intensity of floods affects the quality of groundwater. Heavy rainfall may also result in higher runoff. The change in rainfall pattern also affects the agricultural productivity. Some of the schemes being implemented by the Irrigation & Water Resources Department include Minor Irrigation Scheme, Command Area Development & Water Management Scheme and Anti Erosion Scheme and projects under Repair, Renovation & Restoration (RRR) of Water Bodies and National Hydrology Project. “Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)” has been formulated with the vision of extending the coverage of irrigation ‘Har Khet ko pani’ and improving water use efficiency ‘More crop per drop' in a focused manner with end-to-end solution on source creation, distribution, management, field application and extension activities.

Rainfall

The Figure shows the rainfall pattern of Mizoram from 2011 to 2016. The year 2011 has observed a good amount of rainfall. The pattern of rainfall shows a decrease in the year 2014 followed by gradual increase from 2015.

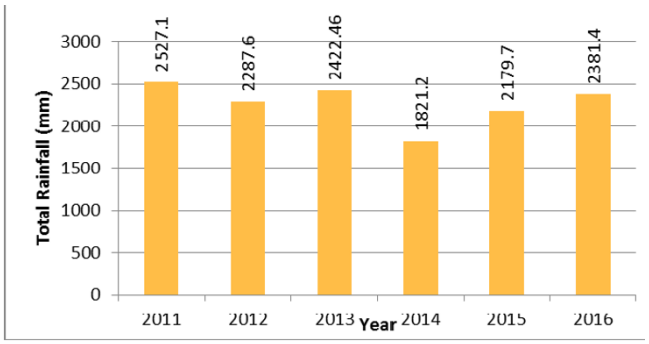


Figure 31: Yearly Rainfall pattern in the state

The adjacent figure shows the monthly average rainfall of Mizoram in 2017. From the adjacent figure, it can be observed that, the trend of rainfall gradually increases from February; reaches maximum during the month of June to August, and then it is at decreasing trend until the end of the year. Mean annual rainfall for RCP 4.5 scenario is projected to decrease significantly by about 6.8% towards mid-century. For RCP 8.5 scenario, rainfall is projected to increase by about 17.25% towards both mid-century and late century. The maximum decrease in rainfall is expected in Aizawl and Lunglei under RCP 4.5 mid- century scenario.

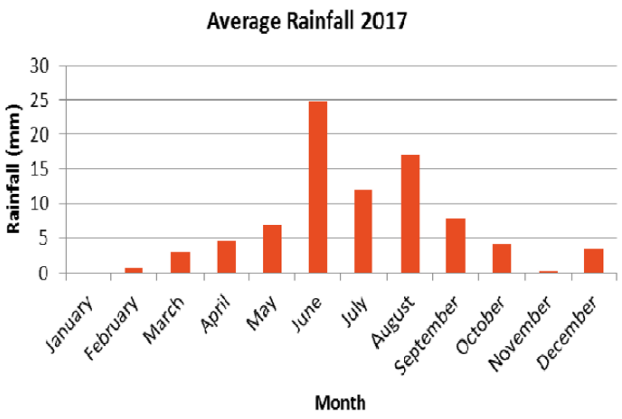


Figure 32: Average Monthly Rainfall in 2017

Area (sq km)	21,087
Physiography	21 major hills ranges are there in the state. Hills are extremely rugged and steep. Three order of soil taxonomy-Entisols, Inceptisols and Ultisols available in the state.
Drainage	Six most importa t drainage systems- Tlawng drainage system, Tuirial drainage system, Tuivawl drainage system, Tiau drainage system, Chhimtuipui rainage system and Khawthlangtuipui rainage system.
Rainfall (mm)	2,794 (Average annual)

Major sources, which replenish ground water, are rainfall and other phenomenon such as canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures. Mizoram is underlain by sedimentary rocks of tertiary age, which have been firmly folded in a series of anticlines and synclines. The occurrence of ground water takes place under confined and unconfined conditions in sandstones, sandy shales and so on. Mizoram is a habitation of springs. These springs are broadly used by individuals for local needs. Ongoing study proposes that, there is great extent of tapping ground water in the riverbeds having sumps associated with infiltration galleries.

Table 23: State Ground Water Profile as on March 2013

Annual Replenishable Ground water Resource	0.03942 BCM
Net Annual Ground Water Availability	0.03548 BCM
Annual Ground Water Draft	0.00104 BCM
Stage of Ground Water Development	2.90%
Artificial Recharge to Ground Water (AR)	Feasible AR structures: 500 check dams, 1,000 weirs, 1,000gabion structures, 300 rooftop harvesting, and 200 development of springs.

Table 24: State-wise ground water resources availability

State	Annual Replenishable ground water resource				Total (In BCM)	Natural Discharge during non-monsoon season (In BCM)	Net Annual Ground Water Availability (In BCM)
	Monsoon Season		Non-monsoon				
	Recharge from rainfall (In BCM)	Recharge from other source	Recharge from rainfall (In BCM)	Recharge from other source			
Mizoram	0.02899	Negligible	0.01042	Negligible	0.03942	0.00394	0.03548

Table 25: State-wise ground water resources utilization and stage of development

State	Annual Ground Water Draft (In BCM)			Projected Demand for Domestic and Industrial (In BCM)	Ground Water availability for future irrigation (In BCM)	Stage of Ground Water development (%)
	Irrigation	Domestic and industrial uses	Total			
Mizoram	0	0.00104	0.00104	0.00238	0.0331	2.9

Surface Water The total river length in Mizoram is 1,395km. The important rivers flowing in the northern region of the state are Tlawng, Tut, Tuirial and the Tuivawl, that flow northwards and eventually fall in the Barak river in Cachar district of Assam. River Koldoyne (Chhimtuipui), which have origin in Myanmar, is an important river that flows in south Mizoram and have four tributaries- the Mat, the Tuichang, the Tyao and the Tuipui. River Karnaphuli flows in the western region of the state.

5F.2 IMPACT OF CLIMATE CHANGE

Climate change is manifested through higher temperature and higher water stress. Increasing frequency of extreme weather events such as floods and landslides poses a significant challenge on the water sector as a whole. The rising intensity and frequency of extreme events is one of the critical risks for the development of the state as well as signifies higher economic loss.

Sector	Impact of climate change	Issues
Water System	Increased precipitation coupled with variation of the precipitation pattern.	• Increased intensity of flood has an extensive pressure on the infrastructures, which are mainly exposed such as pumping stations and water treatment centers. • Quality of water supplied to the public is also compromised due to contamination of water pipelines due to damage caused by the extreme events.
Health	• Contamination of water resources due to floods and landslides • Climate extreme events	• Due to increased precipitation and inadequate facility for draining the excess water, there is increased breeding of water borne insects. This in turn results in increased incidence of water borne and water related diseases like malaria, jaundice, etc. • Disruption in public health services and infrastructure leads.
Social	• Increased water stress due to erratic rainfall pattern	• The state is majorly dependent on Agriculture for its livelihood. A major water stress situation is being developed due to uneven distribution of rainfall. Due to less rainfall in certain years, longer dry spells, early withdrawal of monsoon or its late arrival, which are fallout of climate change, affects the lifestyle of the population in a larger extent.

5F.3 KEY ISSUES AND CHALLENGES

Sector	Issues/ Challenges
Financial	• Fund allocation for various schemes and projects are mostly centrally funded and therefore, the sectoral development has a dependency on the central for its developmental progress • Inadequate infrastructure enhances states budget in a state supported implementation project.

Technical	• The terrain is mountainous and the rivers flow at much lower level compared to cropped land, which is a limitation for construction of medium or major irrigation projects. • The state's irrigation potential is to be developed mainly through minor irrigation projects. Even for this, not all potential and suitable sites for minor irrigation schemes are identified. • Rural drinking water supply services by the government in many villages often depend on local streams. • Road network is poor. Many potential sites for water projects cannot be accessible throughout the year. • Landslides and landslips frequently damage intake points and channels convening water in water projects. • Hydrological database is very poor which an impediment for harnessing of state's water resources. • Unavailability of electricity at sites where water can be pumped is a major backlog in the state and affects the water security as well.
Social-Political	• Traditional methods of water storage are still in practice and sufficient to meet the domestic water requirement. • Unattended waste disposal into the water bodies cause a huge amount of pollution and thus increasing the growing stress of water scarcity.
Institutional and Regulatory	• Inadequate institutional strength is a bottleneck in expeditious investigation, planning, DPR preparation and construction of irrigation projects. • Reduction in stream flow is observed in many streams, which is a challenge and needs to be addressed by initiating properly designed programmes/project in Mizoram. • Because of imminent constraints like aforesaid, the development of irrigation command in the state is rather slow against the potential created in last 20-30 years. • There is a potential need for scientific capacity building for integrated water resource management. • Unavailability of data related to hydrological advancement creates inconvenience for further development. • Lack of well-equipped irrigation infrastructures affects the food security of the state. • There is no state water policy in Mizoram, which affects the sustainable development of the resource.

5F.4 PROGRESS MAPPING (IN LAST 5 YEARS)

5F.4.1 Physical Progress

A total of 11 activities were proposed under SAPCC Phase 1 (2013-18) for water sector. However, the state government had taken up 4 high priority activities in last 5 years. Details of the progress of each activity undertaken is mentioned below:

Sl. No.	Strategies/Activities	Activities Undertaken
1.	Activity 2: Finalization of plan for conservation and preservation of water resources.	The Memorandum of Understanding was signed with the Young Mizo Association. This association is the most prominent non-profitorganization in Mizoram to work towards preservation of the existing water sources and to take up various measures to increase the water sources.
2.	Activity 3: Formulation of State Water policy	The Irrigation & Water Resources Department has initiated formulation of "State Water Policy" which is facilitated by GIZ CCA NER. A task force comprising of all the stakeholder departments has been constituted by the government for formulation of Mizoram State Water Policy.

3.	Activity 7: Community tank management for combating water borne diseases	Water storage tanks which are properly covered are included in all the water supply schemes. In case of schemes for piped water supply, the treated water is stored in a service reservoir tank from which the water is supplied to the public. In case of scheme for rainwater harvesting, rainwater is collected inthe community reservoir and the stored water is then distributed to the public. The amount spent on the construction of the tank cannot be calculated as it is usually included in the water supply scheme and the amount differs according to the size of the scheme.
4.	Activity 9: Renovation and development of traditional water harvesting system with scientific intervention in district level.	Rainwater harvesting schemes are taken up in places where piped water supply schemes are not feasible. The rainwater is collected ina huge reservoir during rainy season and this stored water is used during lean period.

5F.5 GAP/ BARRIER ANALYSIS

Sector	Gap Analysis
Institutional	• No proper planning towards the conservation and judicious use of the resource • Limited usage of modern technology reduces the work efficiency • Lack of micro-level data affects the ground level development • Lack of infrastructural development
Technical	• Lack of sufficient information data base • Inadequacy of more technical and scientific studies • Irrigation potential identified is not being tapped as per requirement
Financial	• Inadequacy of fund from different schemes is a major gap towards the development
Regulatory/ Policy	• No convergence with the schemes achieving similar objective • Absence of multi-disciplinary approach

5F.6 SECTOR – PRIORITY/STRATEGIES

5F.6.1 Future Plan to Meet NDC and SDG

The major focus of adaptation strategies for water sector is enhancing the efficient use of water, ensuring access and tackling the adverse impact of climate change. Adaptation of a better lifestyle against the climate change impact by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management is the basic aim of the Nationally Determined Contributions (NDC). The government of Mizoram is taking up the following activities that are aligned with the NDC to show its commitment towards the NDC and the Sustainable Development Goals (SDGs)

NDC statement as adaptation strategy	Key state level initiative to comply with NDC statements
"Pradhan Mantri Krishi Sinchayee Yojana" launched to promote efficient irrigation practices.	• The state government will also take a major step towards climate adaptation by using solar energy for enhancing water supply system to micro/minor irrigation.
Neeranchal is a new programme to give additional impetus to watershed development in the country	• The state government is planning to work towards developing and protecting the catchment area of spring-sheds. • The govt. of Mizoram is planning to take up mapping and monitoring of surface water resource.

National Bureau of Water Use Efficiency (NBWUE) proposed for promotion, regulation and control efficient use of water.	• The government will be working towards augmentation of ground water through artificial recharge structures. • Advancement of water security of the Aizawl city is being planned to be taken up.

Specific Targets under SDG for the Sector

SDG Target	State Target	Key Initiatives at state level to comply with SDG Commitments
Goal 6: Ensure availability and sustainable management of water and sanitation for all.	The government is targeting to achieve providing drinking water supply to 80% of rural habitations by 2024-25 and 100% by 2029-30.	• To ensure universal and safe drinking water and proper sanitation facilities for all through state initiative programme. • Improving water supply quality and lengthening water supply duration by implementing and strengthening the project undertaken by SIPMIU. • Effective implementation of National Schemes such as National Rural Drinking Water and National Urban Drinking water programme.
By 2030, achieve universal and equitable access to safe and affordable drinking water for all.		
By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.		
By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.		
By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.		
By 2030, implement integrated water resources management at all levels, including through trans boundary cooperation as appropriate.		

5F.6.2 Description of Strategies/Activities

WR/N-1 - Development and protection of catchment area of spring-sheds and water supply sources to enhance natural purification; minimize evaporation and increase ground water recharge of major utilized river basins in Mizoram.

Mizoram depends on ground water and natural springs. However, due to growing urbanization and changing lifestyles of people, the state is facing a gradual increase in water demand. With the increasing demand, water security is becoming an issue and is likely to be exacerbated due to climate change, land use changes including increased diversion, pumping and groundwater exploitation, pollution of surface and ground waters, and degradation of natural recharge areas. It has become increasingly important for the government to protect the water supply sources in order to have a steady supply of water. The government of Mizoram is, therefore, planning to take up activities for the protection of

natural spring-shed catchment areas and other water supply sources through possible convergence with MGNREGA. Protection and management will start at the village level through government support and capacity building and creating awareness at a larger community level.

WR/N-2 - Setting up of High-Resolution Hydro-Meteorological Observation Network including gauging stations for current water supply sources.

Accuracy of data and information on precipitation, runoff, water quality, sedimentation, and other climate parameters is of utmost importance for the accurate estimation of both quality and quantity of water resources and thus for making decisions on integrated water resources development and management. This is required for a state like Mizoram, which is quite vulnerable to changing climatic conditions and has an increasing water demand. Therefore, the state government is planning to set up a hydro-meteorological observation network of higher resolution to accurately record and build the data set.

WR/N-3 - Preparation of GIS-based maps of Urban Drinking Water Supply.

The government of Mizoram has set a target to attain 100% supply of drinking water in the urban areas. For this, pipelines are being laid and related infrastructure for storage treatments, etc., are being taken up. Considering the future repair work and safeguarding of the pipelines during road construction, the government is planning to start a GIS-based data system after proper mapping of the same. Initiatives will first be taken in Aizawl city and subsequently in Kolasib, Lunglei, and other urban areas.

WR/N-4 - Preparation of GIS-based maps of Rural Drinking Water Supply.

Mizoram has 708 villages and 738 habitations. Under rural water supply schemes, all habitations need to be covered. The government is planning to take up GIS mapping of sources, intake points, pipelines, and standpoints during 2019 to 2023 that will help in meeting SDG goals and the national target of providing the entitled water supply to the rural population.

WR/N-5: Hydrological Mapping and Monitoring of Surface Water Resources for climate change impact assessment and for adaptation measures in Mizoram

Systematic mapping and monitoring of surface water are essentially important for the rational utilization of the resource. In a state like Mizoram, it becomes necessary to monitor and manage the surface water due to the geographical and geological structure of the place.

The government is working towards taking up Synthetic Aperture Radar (SAR) technology for monitoring the surface water resources. A SAR is a coherent airborne or spaceborne side-looking radar system that utilizes data acquisition along the flight path of the platform to simulate an extremely large antenna or aperture electronically and generates high-resolution remotely sensed imagery.

WR/N-6: Conservation of water through artificial recharge to ground water in Mizoram

Based on groundwater prospect mapping, the government is planning to take up artificial recharge of groundwater wherever needed. In urban areas, the government will take up the installation of private tube wells. Such places may face lowering of the water table, so it is advisable to initiate recharging activities in the state.

WR/N-7: Establishment of sewage treatment plants in the state

The basic aim of establishing sewage treatment plants is to remove as much of the contaminants as possible from the wastewater before it is discharged back into the environment. It is very important to include sewage treatment facilities for maintaining the river water of the state. Therefore, the government is planning to set up sewage treatment plants in different districts of the state, including Aizawl.

WR/N-8: Rainwater harvesting through construction of storage dams at several places for providing water security

Rainwater harvesting is a technique used for collecting, storing, and using rainwater for domestic and other uses. The rainwater is collected from man-made structures above ground surfaces. In spite of

good rainfall in the state, there is an acute shortage of water, especially during the lean period. Due to this abundant rainfall, the storage capacity needs to be large in volume with the aim of supplying water during the entire dry season. Considering the annual rainfall and type of buildings in Mizoram, traditional methods of rainwater harvesting have been implemented in the majority of the households since time immemorial. However, due to lack of storage facilities and insufficient harvesting structures, the majority of the volume of rainwater is lost as runoff. To capture the larger part of the rainfall, to store in appropriate reservoirs, and to recharge the springs in the lower elevation, construction of storage dams is highly crucial for domestic, industrial, and agricultural purposes. This will help the community in terms of adaptation to climate change in various sectors.

5F.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

Code	Activity	Name of Scheme/ Programme from which the fund can be accessed	Type	Proposed Budget (2018-23) in Lakh INR	Amount likely from Central Scheme (2018-23) in Lakh INR	Amount likely from State Budget (2018-23) in Lakh INR	Gap Funding (in Lakh INR)	Implementing Department
WR/N-1	Development and protection of catchment area of spring-sheds and water supply sources to enhance natural purification; minimize evaporation and increase ground water recharge of major utilize river basins in Mizoram		AD	6,600.00				PHED, IWRD
WR/N-2	Setting up of High-Resolution Hydro-Meteorological Observation Network including Gauging stations for current water supply sources		AD	1,620.00				PHED
WR/N-3	Preparation of GIS based maps of Urban Drinking Water Supply		AD	1,313.25				PHED, MIRSAC
WR/N-4	Preparation of GIS based maps of Rural Drinking Water Supply		AD	1,013.52				PHED, MIRSAC
WR/N-5	Hydrological Mapping and Monitoring of. Surface Water Resources for climate change impact assessment and for adaptation measures in Mizoram		AD	1,938.44				PHED, IWRD
WR/N-6	Conservation of water through artificial recharge to Ground Water in Mizoram		AD	62,840.00				PHED
WR/N-7	Establishment of a sewage treatment plants in the state		AD, MI					PHED, UD&PA
WR/N-8	Rainwater harvesting through construction of storage dams at several places for providing water security		AD, MI	6,000.00				PHED
	TOTAL			**81,325.21**				

CHAPTER 6: CLIMATE CHANGE STRATEGY - MITIGATION

Mitigation strategy is critical to meet the climate goals under the Paris agreement and NDC. Several initiatives need to be fast tracked at the state level. Mitigation strategy as planned in the state involves pushing for higher share of renewable in the state especially hydro, solar and biomass-based energy including energy from the waste. The state is also strengthening the State Designated Agency (SDA) to implement the comprehensive energy efficiency plan for the state. It also has integrated several energy and waste management solutions in Smart City Plan and AMRUT to mitigate the emissions. Sectoral plans under agriculture, forestry and water sector have investments that are likely to have several mitigation co-benefits.

Chapters covered under Mitigation Strategy are:

6A: State Mission on Energy

- 6A.1: State Mission for Enhanced Energy Efficiency
- 6A.2: State Solar Mission

6B: State mission on Sustainable Habitat

6A. STATE MISSION ON ENERGY

SECTORAL OVERVIEW

India is facing formidable challenges in ensuring access to reliable, equitable, clean and affordable modern energy services for a considerable section of deprived and under-privileged population. At the same time ensuring long term energy security in line with the economic development and environmental needs is also difficult. The situation in the state is a clear reflection of the national perspective of energy drudgery and in some cases are further worse. The unreliable and inadequate access to modern energy sources has already taken a toll on the state's developmental agenda. This situation can derail the state's developmental agenda in case the state is unable to ensure rapid and sustainable transformation in the energy sector without compromising the climate goals. The section below intends to map the sectoral scenario against the indicators of (1) energy security (2) energy equity and (3) environmental sustainability of energy services.

Energy Security- The section intends to map the ability of the sector to meet the present and future energy demand. Diversity of the primary and secondary energy supply, demand-supply scenario, energy consumption in relation to GDP, import dependency and preparedness in terms of infrastructure and human resource capital are selected as the indicator for mapping of energy security.

Diversity of Primary Energy Supply

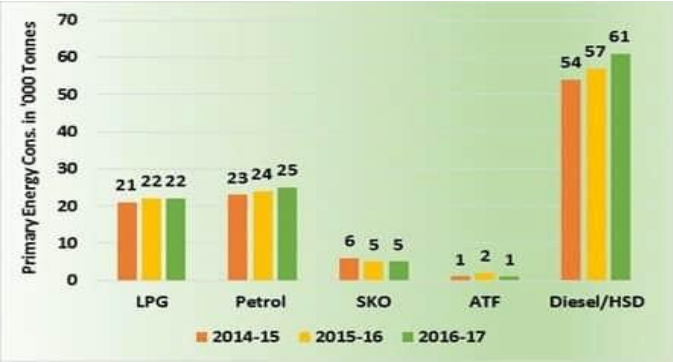


Figure 33: Primary Energy Consumption in last 3 years

The primary energy requirement of the state is entirely met through procurement. The higher import dependency of the country for fossil fuel and the price volatility are likely to impose serious threat to the state's energy security concern.

Trajectory of Energy Demand (CAGR) between 2010-11 to 2016-17			
LPG	Petrol	Diesel	SKO
2.47%	7.72%	6.85%	-2.99%

Diversity of Electricity Supply

The state is heavily depending upon the central sector power station, even for meeting up of the restricted power demand. Of the total power allocation of 150 MW, the state's share from hydro based units accounts for only 20%. The state hydropower unit being mostly run of river units generates power in tune of about 15 MW. The higher import dependency and lower reliability of state-owned unit are the biggest challenge for the state.

Figure 34: Electricity supply sources of the state

Electricity Demand-Supply Scenario

The state power sector is crippled by the persistent demand-supply gap coupled with poor financial health and lack of institutional capacity of the state utility. The demand-supply gap both in terms of peak and total electricity demand and its trajectory is presented in the table below and figure alongside:

Demand -Supply Gap in terms of un-met peak and total electricity demand (in %)

Table 26: Electricity Demand Supply Scenario

Year	Total Demand (MU)	Total Supply (MU)	Peak Demand (MW)	Peak Supply (MW)
2017-18	497	488	05	96
2016-17	513	499	98	98
2015-16	471	455	02	101

Figure 35: Trajectory of Electricity Demand -Supply Scenario

Electricity Consumption and GSDP Growth Relationship

The per capita electricity consumption has grown at a CAGR of 5.19% between 2012-13 and 2016-17. The growth is limited due to the restricted electricity demand in the state. The per capita growth of GSDP has however been substantial during the same period and is in tune of 16.25%.

Figure 36: Electricity Consumption and GSDP Growth Relationship

Synopsis of the Findings

1. 100% import (from outside the state's boundary) dependency for primary energy and 80% for electricity requirement is a serious threat for state's energy security.
2. The higher dependency on hydropower units (50% of the total power allocation is from hydropower units) has an implication of lean period power deficit. This might further exacerbate the current demand -supply gap and trigger the energy security concern.
3. Per-capita energy consumption has a dichotomous relationship with the GSDP growth and is expected to increase substantially in line with the projected future GSDP growth.

Energy Equity- The section intends to map the current situation of access to reliable and affordable energy for domestic and commercial use.

Access to Primary and Secondary Energy- Both household electrification and LPG penetration status in the state are comparatively higher

Figure 38: Household Electrification Status as on Sep 2018

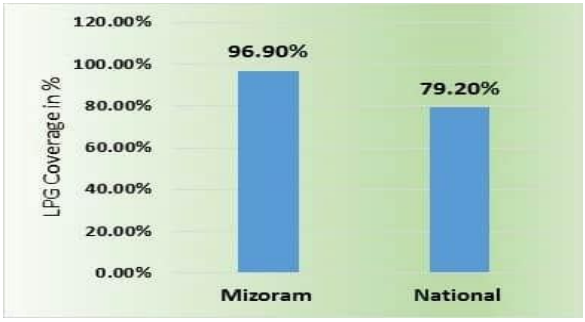


Figure 37: LPG Penetration Status as on Sep 2018

The higher electrification rate and outreach of the state utility is reflected in the figure above. The higher penetration of LPG is reflected in the figure above. However, the same is not a reflection of reliability of supply (especially across rural areas). The per capita consumption of electricity is substantially lower than national level, however growth trajectory is higher.

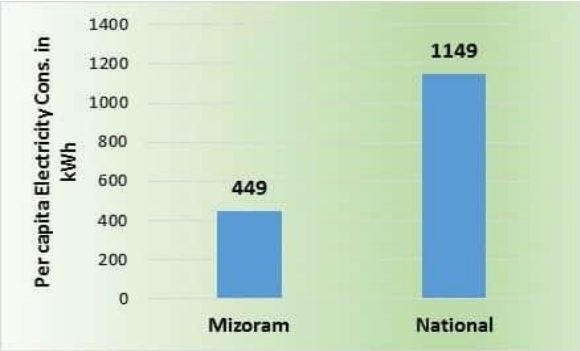


Figure 40: Per capita Electricity Consumption in 2017-18

Figure 39: Trajectory of Per-capita Electricity Consumption

The per-capita electricity consumption in the state is only 39% of national per-capita consumption and owes to lower industrial and commercial sectoral growth. The growth in per-capita electricity consumption at a CAGR of 11.29% at state level is higher than national per-capita growth of 4.68% (CAGR).

Figure 42: Per capita Sales of Petroleum Products in 2016-17

Figure 41: Trajectory of Per-capita Petroleum Product Consumption

The per-capita sales of petroleum product in the state is around 76% of the national average. The sales growth in the state at CAGR 3.23% is in alignment to national growth of 4% (CAGR).

Efficiency of Energy Use- The lower average energy consumption in the state is a clear indication of energy in-equity and disparity.

Figure 44: Per-capita Energy Consumption (2016-17)

Figure 43: Energy Intensity

Per-capita energy consumption in the state is only 25% of the national average. The lower energy intensity of the state in comparison to the national is not an indicator of the efficient use of energy but is a factor of lower per-capita energy consumption and higher GSDP.

Reliability of Power Supply

Attractiveness of State Power Utility

Financial position- The outstanding liabilities of the Power Department of Mizoram is nil (UDAY MoU).
ACS-ARR Gap- The ACS-ARR gap stands at nil (UDAY MoU) outlining the stable financial position of the state DISCOM.
Institutional Capacity- The state ranks 16 in terms of pending connection (56% of the connection pending).
Infrastructural Capacity- The AT&C losses are in tune of 34.08%

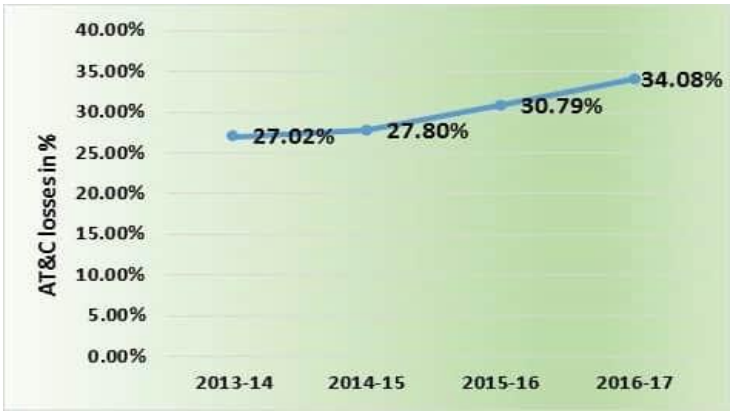


Figure 45: AT&C losses of the state

Affordability of Electricity Supply

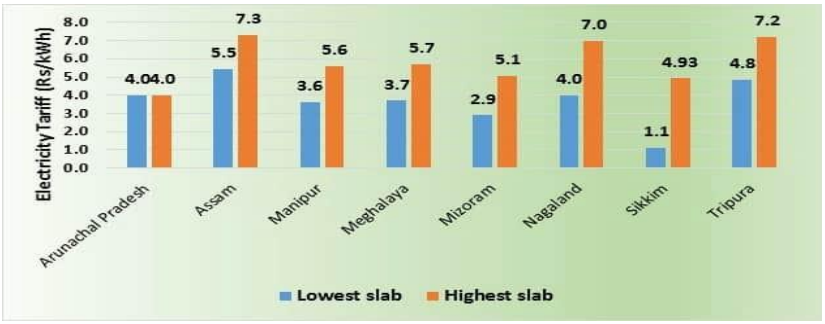


Figure 46: Electricity Tariff of all NE states

Both the lower and higher slab of electricity tariff in Mizoram is comparatively lower than the other north- eastern states barring Sikkim for (both lower and higher slab) and Arunachal Pradesh (only for higher slab).

Environmental Sustainability

The section is intended to map the sustainability of the sector from environmental and natural resource perspectives**.**

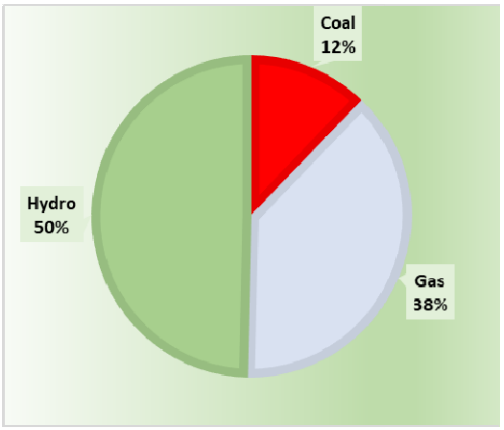


Figure 48: Power Generation mix of the state

	As per NSSO-68 round survey, 60.20% of the rural household and 5.80% of the urban household depends upon firewood for cooking.
	Firewood used for cooking purpose are mostly collected at free (statistics of legal trading and illegal seize is presented below).
	Firewood usage is around 268.1 kg/household /month (IFMR).
	Firewood used in traditional cookstove with operating efficiency in the range of 6-10% not only results in wastage of wood but is the major source of indoor air pollution leading to diverse range of health issues amongst women and children including mortality.

Figure 47: Firewood Use Scenario for Cooking

Table 27: Statistics of firewood consumption (Exclusive of free collection and illegal felling of trees)

Year	Firewood (kg)	Charcoal (kg)	Equivalent woodamount (kg)	Total Quantum offirewood (ton)
2016-17	1,082,000	75,200	225,600	1,308
2016-17(Illegal Seize)	653,500	8,998,800	26,996,400	27,650
2015-16	1,962,000	1,591,200	4,773,600	6,736
2014-15	1,831,000	1,232,400	3,697,200	5,528

Table 28: Emission from Energy Use and Emission Intensity

Particulars	Unit	2016-17
Emissions against cumulative electricity consumed (including AT&C losses)	tCO_2	260,287
Emission from mobile consumption		
On-road transportation	tCO_2	231,099
Off-road transportation	tCO_2	8,137
Emission from stationary combustion (Industrial and commercial)		
Emission from combustion of dies l, petrol and bitumen	tCO_2	46,909
Emission from stationary combustion (Domestic and commercial)		
Emission from combustion of LPG and SKO	tCO_2	81,663
Emission from combustion of wood	tCO_2	0
Total Emission	tCO_2	628,095
Emission intensity (At Constant Price)	kg CO_2e/ 1,000	4.60

Assumption

- Based on the allocation of electrical energy and the specific emission factor of each power plant, the emission factor is calculated at 0.54 tCO_2/MWh.
- The emission from combustion of firewood is estimated to be zero, as f_{NRB}[57] is assessed as negative.

Type	No. of HH using firewood	Firewood consumption (tonne/yr.)	Cumulative firewood consumption (tonne/yr.)
Rural	71,575	234,136	257,329
Urban	7,947	23,193	

State Context in Terms of Coherent Policy and Regulatory Framework

The coherent policy at the state level which could boost the renewable energy generation and reduce emission intensity in line with the vision of the GoI is outlined below:

Energy Efficiency

1. Energy Conservation Building Code (ECBC) and UJALA

The state is yet to notify ECBC and incorporate ECBC in municipal building bye-laws. The state has implemented EESL's UJALA programmes for LED bulbs, LED tubes and Energy Efficient (EE) fans.

2. Street Lighting National Programme (SLNP), Municipal Energy Efficiency Programme (MEEP), including energy efficient pumps

The programmes are aimed at retrofitting of existing street light fixture with energy efficient LED fixture and replacement of inefficient drinking water pumps operated by the Urban Local Bodies (ULBs) with energy efficient pump-sets. The state is yet to roll-out SLNP and MEEP. Stand-alone demonstration initiative has been undertaken but yet to cater in the state as a whole.

3. Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (EV) - (FAME)

The programme is aimed at working out of EV policies and promoting purchase of subsidised passenger Electric Vehicles. The scheme is yet to be rolled out in the state.

4. Demand Side Management (DSM)

The state has notified DSM regulations but the regulation is yet to be adopted across the sectors.

Note: PAT has not been referred above due to the absence of designated industrial consumer in the state.

Renewable Energy

Wind	Solar PV	Net Metering	Solar Thermal	Small Hydro	Biomass	MSW	Integrated RE	Micro /Mini grid
	√	√	√	√			√*	
√ - Policy available, √* - Small hydro and Solar PV are not covered under integrated RE policy								

In addition to the Renewable Energy Policy, notified in 2003, the state Govt has notified the State Solar Power Policy -2017 with an aim of creating an enabling environment for prospective solar power developers to harness solar power in the best possible manner. The state solar power policy also allows the open access of power. In addition, the Joint Electricity Regulatory Commission (JERC) has also notified Net Metering regulations for promotion of rooftop solar units across the state.

Electricity Duty Exemption	Stamp Duty Exemption	Wheeling Charges Waiver	Security Package	T&D Charges Waiver	Allowance of Contract Demand	Banking Facility	Royalty on Water Usage	Moratorium on Free Power	Industry Policy Incentives
S, AR	S	S (2%)	S		S, AR	S, AR			S, AR
S- Solar, AR- All Renewable									

Renewable Purchase Obligation (RPO)- Although the RPO mechanism was introduced to ensure shift towards renewable energy; but, the obligated entity of the state has failed to comply to the target. Of the 8.75% non-solar RPO target and 0.25% solar RPO target in 2015-16, the compliance met by the state is only 44%.

IMPACT OF CLIMATE CHANGE

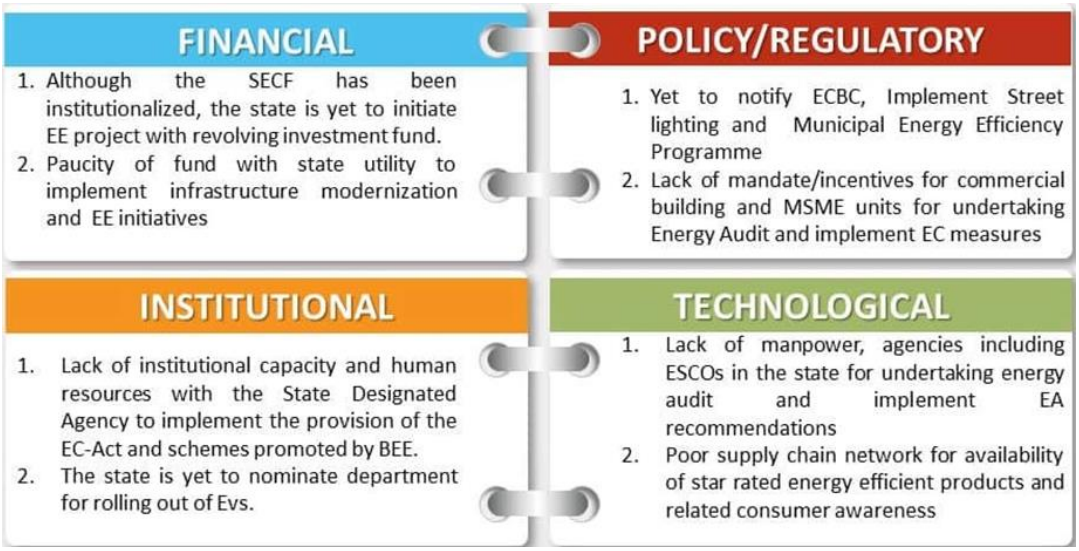
Energy production and use accounts for substantial portions of the total GHG emissions and is regarded as the major driver behind the human induced climate change. Unlike the impact of climate change in undermining prosperity and hampering sectoral growth, the energy sector is equally impacted. The impact of and from the sector to climate change cause and effect is outlined in the section below:

Impact of Energy Sector on Climate Change	Impact of Climate Change on Energy sector	
A. Consumption of energy (both on primary and secondary form) during 2016-17 has resulted in emission of 628,095 tCO_{2e}. B. A considerable section of rural and indigenous population in the state depends upon firewood for cooking. The depletion of forest/ vegetation for sourcing of firewood for cooking or for preparation of charcoal reduces the sequestration potential.	Supply sector	A. The state power sector is highly dependent on hydropower projects of which substantial proportion is from the run-off river. Projected climate variability (rainfall) could severely affect hydro power plants and could jeopardize the power supply scenario. The possible impacts of climate change on hydro power sector is as follows: • Variation in temperature and precipitation (in the catchment area) could alter future hydraulic condition including availability of water resources and impact future generation from the hydro units. • Climate extreme events like flood resulting in higher discharge or drought might affect the infrastructure and generation. • Variation in discharge leading to higher sediment risk could affect the turbine and reduce the efficiency of the turbine and generator. B. With substantial dependency of the state on the farm allocation of the central sector thermal power generation unit located in other states, projected increase in temperature coupled with the likelihood of water scarcity might impact the power generation of the units and enhance the existing energy demand supply gap of the state and increase dependency on unscheduled power procurement leading to financial bleeding of DISCOM. C. Climate extreme events might impose serious threat to energy access to far off remote villages including access to firewood.
	Demand Sector	Increase in temperature has a dichotomous relation with increase in energy demand to meet up the cooling load.

6A.1 STATE MISSION FOR ENHANCED ENERGY EFFICIENCY

6A.1.1 KEY ISSUES AND CHALLENGES

The key issues hindering the adoption/mainstreaming of energy efficiency measures are outlined below:



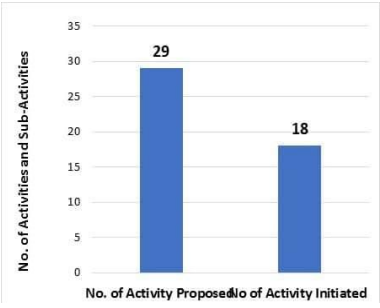
6A.1.2 PROGRESS MAPPING (IN LAST 5 YEARS)

6A.1.2.1 Physical Progress

The following section presents the synopsis of the overall achievement of the physical target specified under the SAPCC Phase 1.

S. No.	Category of Activities (including sub activities)	Activity Proposed	Activity Undertaken	
1	High Priority Activity	21	16	76.19%
2	Medium Priority Activity	8	2	25.00%
S. No.	Type of Activities (including sub-activities)	Activity Proposed	Activity Undertaken	
1	Research, Policy Action, Capacity building, Pre-investment study and Demonstration Project	18	11	61.11%
2	O&M and Investment Project	11	7	63.64%

Status of implementation of EE interventions proposed under SAPCC



The following section detailed out the accomplishment as against each of the activities and sub activities proposed under the SAPCC Phase 1 and is taken up for implementation during 2013-18.

S. No.	Strategies /Activities	Activities Undertaken
1.	**Activity 1: Awareness creation and manpower deployment for enhance the energy efficiency measures**	
	Sub-Activity 1.3: Awareness creation among the citizens on the need of energy efficiency measures, use of star rated devices in everyday life as also for wider dissemination of	The activity undertaken as a part of the awareness creation objective include 1. Organized sensitisation workshop/awareness campaign a. Awareness campaign across 40 schools and colleges in the state. b. Sensitisation of 20 numbers of NGOs. c. Awareness campaign at Lunglei town with more than 200 participants and at Kawnpui town with more than 150

	opportunities for diffusion of energy efficiency measures in infrastructure and other socio-economic sectors through all feasible routes, viz. awareness campaign and workshop, print and electronic media, State Nodal Agencies, Village panchayats, CBOs, NGOs	participants. 2. Observed Energy Conservation Day across the state involving (a) delivering of message on importance of adoption of EC measures through Doordarshan and All India Radio, (b) Video conferencing between school student and Central Ministry, GoI, (c) Display of banners with message on energy conservation day and its relevance at prominent places and community events. 3. Published energy conservation related message in local newspaper both in English and vernacular. 4. Published EC related message in popular publications (magazine and souvenir) by the Govt, NGOs and others. 5. Circulated IEC materials related to energy conservation amongst school students, Govt officials and other consumer segments. 6. Displayed banners related to tips and benefits of EC at prominent places and special events. 7. Conducted TV show at Doordarshan and All India Radio to enhance awareness and sensitisation of consumer segment relating to EC measures. Facilitated video conferencing between policy makers and representatives of educational sectors (students, teacher etc.).
	Sub Activity 1.4: Support schools, education institutions in preparing and introducing, curriculum on energy efficiency measures and preparation of book.	1. Board of School education has introduced a chapter on energy conservation at school level up to class VIII. 2. Establishment of Energy Club at school level. The energy club has been responsible for - a. Development of energy conservation guidelines and other IEC materials for sensitisation and capacity building of the school student and teachers on the aspects of energy conservation. b. Undertaking sensitisation and capacity building of members of energy club. These trained resources were thereafter used for sensitisation of other consumers across different segment. c. Facilitating energy audit of schools and residential establishment through members of energy club. 135 numbers of energy club were institutionalised across same number of schools, involving 2,700 student, parents and teachers.
2.	**Activity 2: Market Transformation of Energy Efficiency applications through policy measures under National Solar Mission**	
	Sub Activity 2.1: Development of fiscal instrument, policies and plans to promote energy efficient system	1. Institutionalised and operationalised State Energy Conservation Fund (SECF). 2. Development of Sector Specific Energy Conservation Plan.
3.	**Activity 3: Up-gradation of transmission and distribution network for minimization of energy losses**	
	Sub Activity 3.1: Assessment of T&D infrastructure and development of action plan for improvement of T & D network and setting target for AT&C loss reduction	Detailed study to assess the current AT&C losses and strategies to be adopted for reduction of the AT&C loss to 15% has been carried out under UDAY scheme and reported under “Power for All” report published under UDAY jointly by the state govt. and the Ministry of Power.
	Sub Activity 3.2: Up-gradation of HT & LT lines and replacement of Distribution Transformers	1. Renovation and modernisation of 132 kV sub-station at Bukpui. 2. Augmentation/Up-gradation of distribution network in Lawngtlai and Champhai district.

	with star rated transformers	
	Sub Activity 3.3: Reduction of AT & C losses by 100% consumer metering of the consumers with a connected load of 20 kW and above and introduction on-line remote monitoring	1. Around 98% of the consumers with connected load of 20 kW is covered under consumer metering. 2. R-APDRP has been covered under 9 districts encompassing following functions (a) Integration of IT application in energy accounting and consumer metering (adoption of IT applications for meter reading, billing & collection; energy accounting &auditing; MIS; redressal of consumer grievances), metering of Distribution Transformers and Feeders, (b) Renovation, modernization and strengthening of 11 kV level sub-stations, Transformers/Transformer centres, Re-conductoring of lines at 11 kV level and below, replacement of electromagnetic energy meters with tamper proof electronics meters etc. 3. Rolling out of IPDS encompassing following activities (a) Strengthening of Sub-transmission and Distribution network in urban areas (b) Metering of feeders / distribution transformers / consumers in urban areas and (c) IT enablement of distribution sector and strengthening of distribution network.
4.	**Activity 4: Penetration of energy efficient devices in domestic and public utility systems facilitated by financial, supply chain and market incentives**	
	Sub Activity 4.1: Introducing energy efficient lighting in domestic sector by supply and installation of CFLs lights and replacement of incandescent lamps in 1.5 Lakh domestic consumer.	1. DELP Programme a. Number of CFL distributed – 6.15 Lakh b. Number of LED tube-light distributed – 36,125 c. Number of energy efficient fan distributed – 1,579 2. LED village programme (Demonstration Programme) - 180 consumers across Muthi village, Mizoram was provisioned with a. 570 Number of LED Bulbs (8 W) b. 250 Number of LED Tube Light (20 W) c. 15 Number of LED street Light (45 W) with Bracket
	Sub Activity 4.2: Deployment of energy efficient lighting in public systems by replacing existing 250 HPSV lamps with 90W LED streetlights in 5,500 no. of electric poles	Replaced 350 numbers of 250 W and 150 W HPSV street light with LED street lights by 45 W LED street lights at Aizawl, Lunglei, Kolasib, Champhai, Serchhip and Mamit.
5.	**Activity 5: Unlocking the energy efficiency activity in IGEA mode project**	
	Sub Activity 5.1: Implementation of energy efficiency measures through demonstration projects in 7 No. of government buildings in Mizoram under IGEA mode where energy audit is already carried out by the Nodal Department.	Implemented IGEA recommendations at Assembly House, Civil Hospital, Secretariat Block-C, Raj Bhavan, Tourist Lodge, State Guest House and Chief Minister Secretariat Complex.
6.	**Activity 6: Institutional development and strengthening of Energy departments for Energy Efficiency promotion**	
	Sub Activity 6.1: Restructure and functional re-organization including enhancing the human	1. Appointed M/s Darashaw & Company for manpower support from 2014-15 to 2015-16. 2. Appointed two numbers of human resources towards accomplishing its function of implementation of the provisions

	resources of the energy departments including SDA to achieve efficient functioning, promotion and implement energy efficiency activity in the state.	of EC Act.
	Sub Activity 6.3: Training of the working group members and their representative from deferent departments and organizations on sector specific climate change issue and enhance the knowledge about the policy measures	Capacity building of the members of Electrical Inspectorate for training and sensitization programme.
7.	**Activity 7: Increase Hydro power generation by supporting private or public investors in setting up projects and undertake demonstration project**	
	Sub Activity 7.1: Detailed reconnaissance study on water availability and hydrology data evaluation for identification of new hydro projects and demarcation of hydro power sites with specific capacity mapping	1. DPRs prepared for the following hydro power project sites with total capacity 29 MW (i) Tuirini SHP (25 MW) (ii) Iva SHP (3 MW) (iii) Ngengrual SHP (1 MW) (iv) Tuikum SHP (3.5 MW) (v) Tuisih SHP (2 MW) (vi) Khawchhaktuipui SHP (3 MW). 2. Site identified for the following hydel projects for which DPRs are to be prepared with total capacity 166 MW (i) Tuichang HEP (106 MW) (ii) Tuipui HEP (60 MW).
	Sub Activity 7.2: Promotion & facilitation of hydro power project Implementation by providing adequate support from the state government in terms of clearance, land acquisition, power Transmission network development.	1. Tuirial HEP (60 MW) constructed by NEEPCO during Dec 2017. 12% free power from this HEP and purchase of power generated by Tuirial HEP will help the state to meet its power demand. 2. Construction of 4 MW Kawlbem SHP, 5 MW Tlawva SHP, Tuiriza SHP & Tuiching SHP with cumulative capacity of 9.20 MW is in progress. 3. The government signed MoUs for construction of Tuivai HEP (210 MW) and for Tuirini HEP (24 MW) which is to be implemented through external assistance from BRICS New Development Bank (NDB). 4. Allocation has been done for the following hydro power project to Independent Power Producers (IPP) with total capacity of 2,107 MW- (i) Kolodyne Phase-II (460 MW) (MoU signed with NTPC) (ii) Bairabi Dam Project (80 MW) (MoU signed with M/s SPL) (iii) Tuivawl HEP (42 MW) (MoU signed with M/s SPML) (iv) Mat HEP (75 MW) (MoU signed with NEEPCO) (v) Chhimtuipui HEP (635 MW) (MoU signed with NEEPCO) (vi) Lungreng HEP (815 MW) (MoU signed with NEEPCO) (vii) Tlawng HEP (54 MW) (MoU signed with Shyam Mitalic & Energy).
	Sub Activity 7.3: Declaration of water policy and mandate of siltation and pollution control in water bodies of hydro power projects. Two demonstration projects to be undertaken in existing	Drafting of state water policy is under process.

	hydro projects.	
	Sub Activity 7.4: Demonstration hydro project in already identified project sites - Setting up of 100 kW micro hydel project in Tuiching river which is located in north of Champhai District. Setting up of 100 kW micro hydel project in Tuiriza River which is located in Aizawl district.	Completed commissioning of 100 kW hydro project in Tuiching river at Champhai district and 100 kW hydro project in Tuiriza river in Aizawl district.
8.	**Activity 8: Life cycle analysis of existing hydro power plant and implementation of R&M measures.**	
		1. O&M of Serlui "A" and Serlui "B" hydro power project. 2. Renovation and modernisation of Teirei SHP 3. Renovation and modernisation of Tuipanglui SHP 4. Renovation and modernisation of Tuirivang SHP
9.	**Activity 13: Enactment of mandatory use of energy efficient lights by reviewing standards & rules for public lighting, bill boards or hoardings for advertisement, commercial area lighting such as shopping malls, shops, etc.**	
		Issue of notification by the Power and Electricity department, mandating procurement of star rated energy efficient electrical appliances in all govt. departments and adjoining offices (dated May 2013). The notification - a. Mandatory use of CFL and electronic choke in all new govt. and corporation /autonomous body's buildings and replacement of defunct incandescent bulbs and conventional chokes in existing govt. buildings with CFL and electronic choke. b. Mandatory use of star labelled distribution transformer of up to 200 kVA for new installations.

Assessing the Mitigation Contribution of SAPCC implementation

Activity	Capacity Addition during 2013-18	Annual GHG Avoidance
Hydro power project	60.1 MW	114,098 tCO_2
UJALA initiative	Dissemination of bulb, tubes and fans	66,134 tCO_2 (The estimate is obtained from the Ujala portal)
Demonstration Project	Installation of streetlight and dissemination of LED bulbs	90 tCO_2

Assessing Co-benefits of SAPCC Implementation

1. Improved access to energy has addressed various dimension of development including poverty alleviation, improved communication and information outreach, driving regional development.
2. It is also increasing community resilience to climate variability and change (assessment based on DFID Resilience framework method).
3. Job creation at various stages of renewable project development and operationalisation (including operation and maintenance support).
4. Supply chain development for product spares and local enterprise/franchisee opportunities.

6A.1.3 GAP/ BARRIER ANALYSIS

The gap analysis is carried out in light of the identified barrier forbidding implementation of actions proposed under the SAPCC Phase 1 and infrastructural, institutional, policy and financial scenario to be in place for institutionalizing of the action proposed under SAPCC.

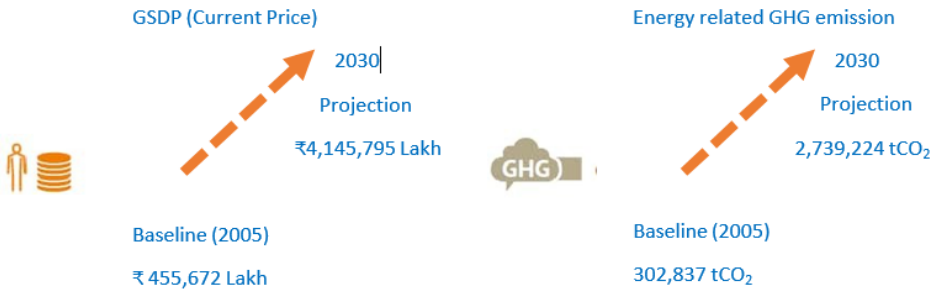
Area	Gaps	Strategies
Finance	• In-spite of access to finance being the major challenge in implementing the climate actions, limited endeavor has been noticed in identifying the source of special funds and tapping them (concessional credit line, enabling provision of green cess, VGF, CEF, private sector investment including FDI etc).	Mobilizing climate finance to implement key adaptation and mitigation measures including programme/scheme-based financing, ODA, MDB flows, and creating enabling environment towards catalyzing private sector fund flows.
Capacity	• Lack of skilled resources towards augmenting technology upgradation for EE projects. • Lack of infrastructural capacity of the state utility and intend for large-scale market adoption of solar rooftop.	Creating an enabling ecosystem for enhanced private sector engagement and investment can motivate the youth for skill enhancement, which can thereafter be supported by the Govt through establishment of related institutions.

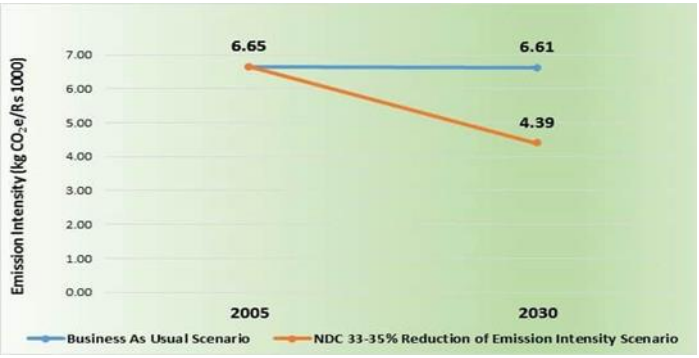
6A.1.4 SECTOR – PRIORITY/STRATEGIES

6A.1.4.1 Future Plan to Meet NDC and SDG

Nationally determined contribution (NDC)

Reduce emission intensity by 33-35% by 2030 from 2005 level. The growth in some of the key factors affecting the emission intensity is outlined below:





Based on the projected energy consumption (primary and secondary source) and GSDP (current price) during 2030 the Emission Intensity (EI) is estimated to be 6.61 kgCO2eq/Rs. 1,000 in the business as usual scenario. However, the NDC recommends for 33-35% reduction in the EI from 2005 level. The roadmap for compliance to the NDC.

Figure 49: Projected and Targeted Emission Intensity

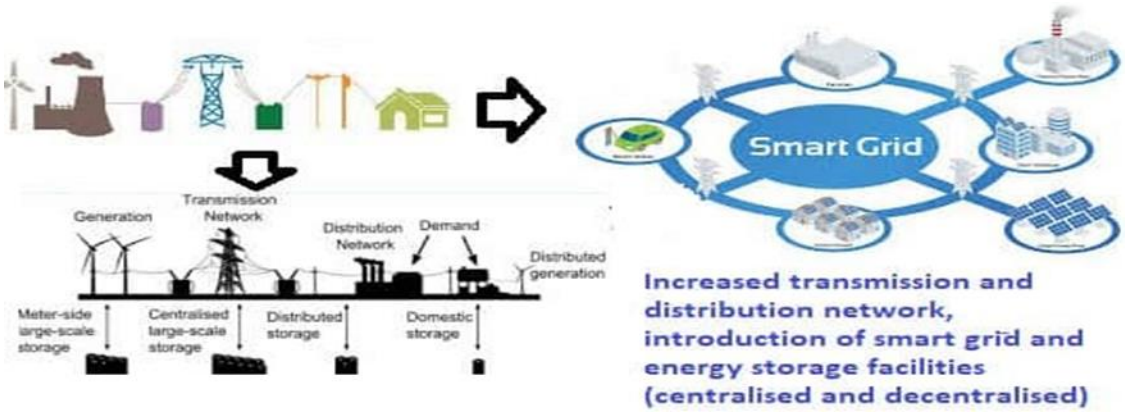


Figure 50: Key factors impacting the emission intensity

Increased investment in transmission and distribution sector to address the sectoral capacity bottlenecks. Increased share of electricity storage facilities and introduction of smart grid solution.

Specific Targets under SDG for the Sector

The target set out by the state govt. as part of the Goal 7 under the national commitment of the Sustainable Development Goals.

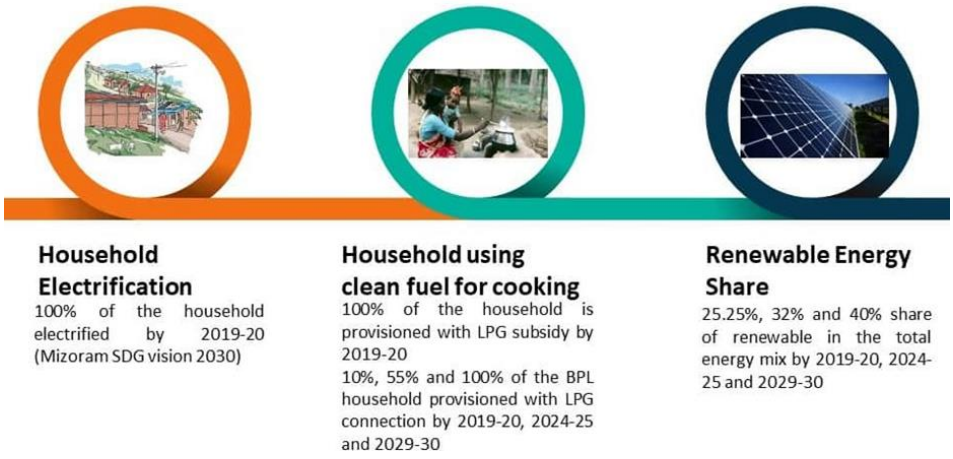


Figure 51: SDG Goals for Energy sector

Synthesising SDG (Goal 7) and NDC Commitment

Both SDG's and NDC's targets are aimed at the overarching objective of integrating decarbonisation growth strategy with developmental planning, ensure access to affordable and sustainable energy source and ensure inclusive and sustainable development towards sustained economic growth and shared prosperity. In the light of the above context the energy sector of the "State Action Plan on Climate Change" intends to integrate the specific objectives of both the developmental goals along with other developmental priorities of the state towards an inclusive plan document.

Issues	SDG Objective	NDC Objective	Development Priorities
Access to affordable and reliable energy	Double the global rate of improvement in energy efficiency	Decrease energy intensity 33-35% by 2030 from 2005level.	Address the existing energy demand supply gap, taking a toll on both developmental and economic growth and reduce financial loss of the utility. Energyloss due to inefficient use is one of the critical factors to the energy availability issue.

6A.1.4.2 Description of Strategies/Activities

EE-1: Promotion of Energy Conservation (EC) and adoption of Demand Side Management measures across sectors

Energy conservation refers to reduction in consumption of energy for same product or service. Adoption of energy conservation and demand side management measures is identified as a key decarbonization strategy and most economical way of managing the peak and total energy demand without bleeding the budget starved state power department. Moreover, reduction of end use energy consumption will also reduce the associated AT&C losses and facilitate demand management. From end consumer point, adoption of EC measures reduces overall energy bills.

Description		Unit	2018-19	2019-20	2020-21	2021-22	2022-23
Projected Electricity requirement		MU	681	738	800	866	940
Energy sales across key sector (domestic, commercial, industrial and municipal sector)		MU	426	462	501	542	589
Commercial building (NPC Study)	Share of energy consumption	%	10.04%	10.04%	10.04%	10.04%	10.04%
		MU	42.79	46.37	50.27	54.42	59.07
	EC potential @19.69%	MU	8.43	9.13	9.90	10.71	11.63
Industrial (Mostly MSME)	Share of energy consumption	%	3.10%	3.10%	3.10%	3.10%	3.10%
		MU	13.23	14.34	15.54	16.82	18.26
	EC potential @7.14%	MU	0.94	1.02	1.11	1.20	1.30
Municipalities	Share of energy consumption	%	16.25%	16.25%	16.25%	16.25%	16.25%
		MU	69.30	75.10	81.41	88.13	95.66
	EC potential @20.58%	MU	14.26	15.45	16.75	18.13	19.68
Domestic	Share of energy consumption	%	71%	71%	71%	71%	71%
		MU	301.1	326.3	353.7	382.9	415.6
	EC potential @20% through DELP, S&L, SEEP and awareness	MU	60.21	65.25	70.74	76.57	83.11
Total EC Target		**MU**	**83.84**	**90.86**	**98.50**	**106.62**	**115.73**

The EC Action plan is developed with an objective of effective management of national and state's energy resource through institutionalizing of enabling policies, mainstreaming of financial and fiscal measures, development of skill and supply chain and creation of an enabling market ecosystem.

Proposed Action and Climate Change Linkage:
Reduction of energy use without effecting the developmental agenda and economic growth will entitle the state to reduce its energy intensity. With a considerable proportion (50%) of the current fixed power allocation to the state being from coal and gas-based power generation unit, a reduction of energy draw will result in avoidance of associated GHG emission.

EE-1.1: Promoting and mainstreaming adoption of Energy Conservation measures across commercial buildings including public and pvt. sector building (both in existing and upcoming buildings)

Rationale
Commercial consumer is the second largest consumer of electricity in the state after domestic sector and a potential segment for mainstreaming of energy conservation (EC) measures. With exponential growth in the requirement of commercial and retail space along with growth of hospitality sector; the electricity consumption form the commercial buildings is likely to pose serious concern for the state electricity scenario. With EC potential in range of 30-40% across commercial building segment (as per BEE), adoption of EC measures in existing building and integrating the concept of energy efficient design could result in substantial energy savings.

Sub-Activity:
Existing building

1. Mandatory energy audit of commercial building including Govt offices.

2. Implantation of EC measures at public sector building including promotion of star rating scheme in commercial building.
3. Promotion of market-based mechanism/ESCO in the state for implementation of energy efficiency measures across commercial building segment.

Energy Efficiency improvement in Upcoming/New building through mandatory enforcement of ECBC

1. Customisation of ECBC to suit local climatic conditions, set up of ECBC committee and notification of ECBC through state gazette.
2. Develop enabling mechanism and process of mainstreaming ECBC, integrating ECBC under state general development control rule/ULB's building Bye-law, revision of SoR.
3. Enhance capacities and expertise of the implementing agencies (ULBs), builders, architects/planners and building material suppliers.
4. Institutionalise mechanism for enforcement and compliance checking through ULBs and electrical inspectorate and set up of robust M&V system.

General

5. Sensitisation of commercial building sector stakeholders for adoption of EC measures including promotion of super-efficient household appliances.
6. Rolling out of financial and fiscal incentives for large-scale adoption of EC measures across building sector.

Direct & Co-benefits:

- Avoided GHG emission: 27,025 tCO2e for the plan period
- Development of market for energy efficient building materials and create engagement opportunities of experts
- Scheme/programme level convergence and enabling policy/regulatory support. The aforesaid activity has been planned in line with the following programmes/schemes: ECBC, Star rating of building.

Progress in the Strategy

Govt, of Mizoram notify the Mizoram Energy Conservation Building Code Rules, 2022 vide No. B. 16012/11/2021-P&E, dt. 13.3.2023

The rules shall apply to every building (new/upcoming), including those which is used or intended to be used for Non-Residential purposes, having:

i) Connected load of 50 kilowatt (kW) or above; or
ii) Contract demand of 60 kilo-Volt-Ampere (kVA); or
iii) Built-up Area of 1000 sq. m and above

Action Plan- ECBC to be included in Building by laws (under consideration)

EE-1.2: Mainstreaming of DSM measures with focus on Mu-DSM segments

Rationale

A significant amount of municipal budget is spent in provisioning of basic services like street lighting and drinking water supply. With limited budget of the ULBs and lack of knowledge on the benefit of technology upgradation, most of the ULBs are operating its inefficient streetlight and drinking water pumps leading to financial loss of the institution and increased energy intensity of the state. The EC potential across street lighting sector is in tune of 25-60%58 and that across drinking water supply sector in range of 15-40%59. Implementation of EC measures will result in energy and cost saving for the ULBs and will contribute to the GHG reduction initiative of the country.

Sub-Activity:

1. Mandatory Investment Grade Energy Audit (IGEA) of street lighting unit and water pumps under public water works.
2. Training and capacity building of the ULBs and PHED on the aspect of EC measures.
3. Promotion of market-based mechanism/ESCO in the state for implementation of energy efficiency measures across municipal street lighting and retrofitting of inefficient pumps with efficient pumps.

Direct & Co-benefits:

- Avoided GHG emission: 45,743 tCO2e for the plan period
- Development of supply chain for energy efficient street lighting and water pumping system and promotion of localized enterprise opportunities for O&M
- Scheme/programme level convergence and enabling policy/regulatory support
- The aforesaid activity has been planned in line with the following programmes/schemes: Mu-DSM

Progress in the Strategy

Tripartite MoU (BEE, SDA, DISCOM) signed on 15th September, 2023 on DSM scheme. DSM Cell already created in DISCOM, draft DPR is under consideration.

Action Plan- DPR of DSM measures under consideration

EE-1.3: Institutionalize and rolling out of S&L programme and adoption of EC measures across domestic segment

Rationale

Domestic segment is the single largest consumer of electricity in the state and owes the major share of electricity consumption. With the electricity consumption mostly epicentre around lighting, ventilation and appliance load, adoption of energy efficient appliance could result in substantial energy savings across the domestic segment.

Sub-Activity:

1. Mainstreaming of Ujala scheme and Super-Efficient Equipment Programme (SEEP) by extending its outreach and strengthening its supply chain coupled with consumers' awareness/sensitisation.
2. Notification by the appropriate authority along with periodic upgradation of standards towards mandatory adoption of star labelled product in the government buildings or government aided office/institutional buildings and inducting performance standard of electrical appliances proposed under the Standard and Labelling programme as a part of public procurement guidelines/SoR.
3. Creating a market demand for adoption of star labelled products through sensitization and awareness & Introduce robust regulatory instrument to prohibit manufacture, sale, purchase and import of notified equipment's and appliances not confirming to the standards.

Direct & Co-benefits:

- Avoided GHG emission: 193,142 tCO2e for the plan period
- Development of supply chain for energy efficient product and promotion of localised enterprise opportunities for O&M
- Scheme/programme level convergence and enabling policy/regulatory support
- The aforesaid activity has been planned in line with the following programmes/schemes: Standard and Labelling, UJALA.

Progress in the Strategy

- SDA organized Retailer Training Programme (RTP) on Standard & Labeling (S&L) Programme in 7 Districts (Lunglei, Kolasib, Serchhip, Saitual, Khawzawl, Hnahthial and Champhai) for dealer/retailers of electrical goods
- SDA conduct check testing for selected appliance as per the guidelines received from BEE

Action Plan- Check testing conducted - 2 Nos. of samples purchased and sent to designated laboratory. Market Surveillance - Under consideration

EE-1.4: Institutional strengthening of the State Designated Agency and enhance consumer awareness

Rationale

Within the framework of cooperative federalism, the State Designated Agency (SDA) has been entrusted with the role of coordinating, regulating and enforcing the provision of EC Act 2001 at the

state level. However, most of these organisations due to its constitutional genesis have very limited experience in energy efficiency and conservation, considering that their main areas related to be an inspectorate giving approvals under the relevant legislations. Institutional strengthening of the SDA is therefore crucial towards enhancing understanding, capacity and knowledge about energy efficiency require for mainstreaming of the provision of EC-Act and other schemes and programmes of BEE. Apart from institutional strengthening of the nodal agency, enhanced sensitisation and awareness of the consumers is equally important for mainstreaming of the energy conservation initiatives.

Sub-Activity:
Institutional strengthening of SDA

1. Development of State Energy Conservation Policy.
2. Providing manpower (energy professionals) support to the SDA.
3. Empanelment and capacity building of energy professionals (Certified Energy Managers and Certified Energy Auditors).
4. Organize workshops at regular intervals involving empanelled energy professionals, designated consumers, industry representatives, DISCOMs and ESCOs at regular interval.
5. Strengthening the information dissemination system through up-gradation of the existing web platforms /official portal.

Sensitisation and consumer awareness

1. Design and printing of promotional material for distribution among various stakeholders.
2. Conduct awareness programs and painting/ essay competitions on EE in educational institutions.
3. Conduct training programs for government departments.

Mainstreaming of energy conservation measures

1. Re-estimation of sector-wise energy conservation potential, assessment of specific policy and regulatory challenges in implementation of EC measures and formulate State Energy Conservation Policy.
2. Formulate and facilitate implementation of pilot and demonstration projects in municipal sector, commercial sector, domestic sector and target projects like LED village campaign.
3. Enhancement of laboratory facilities for testing of energy efficient appliances: Laboratory capacity building program.
4. Provision of incentives to manufacture under Super-Efficient Equipment Program (SEEP).
5. Creation of Partial Risk Guarantee Fund (PRGF) and Venture Capital Fund (VCF) towards investment facilitation for EC activities.
6. Implementation of EC activities across public sector including public sector building and municipal pumping system.
7. Capacity building of the state power utility and urban local authority/PHED for implementation of sector specific DSM measures.
8. Facilitate international cooperation/cooperation with funding agencies for mobilisation of technical and financial support for creation of an enabling environment towards mainstreaming of energy efficiency measures across the sectors.
    - Scheme/programme level convergence and enabling policy/regulatory support
    - The aforesaid activity has been planned in line with the following programmes/schemes: Institutional strengthening of SDA by BEE.

Progress in the Strategy

SDA organized energy conservation awareness campaign at students (school & colleges) and general public (NGOs)

Action Plan- as per BEE instruction and funding

EE-1.5: Financial turn-around and improvement of the technical and operational efficiency of the state power utility

Rationale

Although without any outstanding liabilities (as on Sep 2015) and zero ACS-ARR gap, the state power utility is crippled with paucity of fund. The lower budget allocation and a considerable section of the allocated budget as earmarked for the directorial and administrative expenditure; the state power utility has limited financial resource left out for augmentation and modernisation of existing power infrastructure (generation, transmission and distribution sector) and creation/extension of infrastructure.

The AT&C loss is a critical determinant of the performance and financial health of the power department. In the unbundled state power utility, the high AT&C losses over 36% has exacerbated paucity of the financial position of the state power utility. Reduction of AT&C losses will empower the state power department for investing in upgradation of the existing transmission and distribution infrastructure on one hand and on other hand invest on deployment of generation unit towards enhancing state's energy security. In this context, the Govt of Mizoram has signed a Memorandum of Understanding (MoU) with the Ministry of Power, GoI towards reducing of the transmission and AT&C losses, improve financial health of the state power utility and facilitate upgradation of infrastructure.

Quantitative target	
AT&C loss reduction target by 2019-20	15%
Reduction of transmission loss	2.5%
Distribution transformer and feeder level metering by 2019	100%
Qualitative target	
Periodic revision of electricity tariff for financial turn-around of the state power utility	
Increase hours of power supply and ensure reliability of supply (reduction of SAIFI and SAIDI)	

Sub-Activity:

1. Implement Mu-DSM measures (including replacement of existing streetlights).
2. Improving efficiency of state power generating unit (hydro).
3. Undertake energy audit of distribution network over 11 kV.
4. Implementation of DT metering, feeder level metering and implementation of feeder improvement programme including network strengthening and optimisation.
5. Installation of smart meter for all consumers other than agricultural consumers.
6. Implementation of ERP system for better and effective inventory management towards reduction of cost and improvement of operational efficiency.

Direct & Co-benefits:

- Financial turn-around of the DISCOM
- Increase access to affordable and reliable power
- Reduce electricity demand supply gap
- Reduction of stressed assets and increase capital investment for infrastructure augmentation and modernization
- Improve energy efficiency and reduce emission intensity
- Scheme/programme level convergence and enabling policy/regulatory support
- The aforesaid activity has been planned in line with the following programmes/schemes: UDAY, IPDS, PSDF.

EE-1.6: Strengthening of electrical infrastructure and enabling IT services

Rationale

Transmission and distribution are the most critical segment of the power sector supply chain. The state is served through interstate and intrastate transmission network of 132 kV which is currently inadequate for meeting the existing power requirement60. The system is expected to be further stressed for evacuation of power from upcoming power-generation unit. Availability of the robust sub-transmission and distribution network along with adequate metering arrangements are the most critical components for efficient management of the distribution system. The distribution network in the state is currently inadequate to service the existing and planned outreach of the electrical service efficiently.

The state critically lacks effective metering of consumers as well as distribution points, which is important towards ensuring of proper accounting, billing, and assessment of load pattern. Such

metering is also critical for identifying high loss pockets towards initiating of remedial measures towards reduction of losses. Existing infrastructure as reported under (AR 2016-17):

132 kV line	66 kV	33 kV	11 kV	LT	132 kV substation	33 kV substation	Distribution Transformers
742.95 km	111.42 km	1,125.61 km	4,821.38 km	3,111.65 km	10 number	53 number	1,907

Target

1. 100% household electrification.
2. Reduction of transmission losses and AT&C losses.
3. IT enablement of service sector including introduction of smart metering at consumers as well and distribution level.

Sub-Activity:

1. Expedite necessary help (i.e. Right of Way clearance, Forest clearance if any, land acquisition etc) to STU for installation of new sub-station and associated transmission lines.
2. Facilitate investment (budgetary provision) and financial tie-up with financial institutions.
3. Facilitate technology tie-ups.
4. Strengthening of sub-transmission and distribution networks in the urban areas including renovation and modernisation of existing sub-station and electrical lines.
5. IT enablement of distribution sector and consumer services (ERP, customer care service).
6. Reduction of distribution losses.

Direct & Co-benefits:

- Improve energy access including reliability of supply
- Improve energy efficiency and reduce emission intensity

Progress in the Strategy

- Infrastructure Work (Loss Reduction) under Revamped Distribution Sector Scheme (RDSS) is going on, LoA issued to M/s Satnam Global Infraprojects Ltd. On 28.02.2023 and the progress of the work is 30.19%.
- 2) LoA for System Integrator (SI) of implementation of utility billing system in Mizoram (IT/OT) under RDSS was issued to M/s Inventive Software Solutions (P) Ltd. On 05.08.2024

Action Plan- infrastructure Work (Loss Reduction) under Revamped Distribution Sector Scheme (RDSS) to be completed by February 2025. 2) System Integrator (SI) of implementation of utility billing system in Mizoram (IT/OT) under RDSS to be completed by 05.08.2025

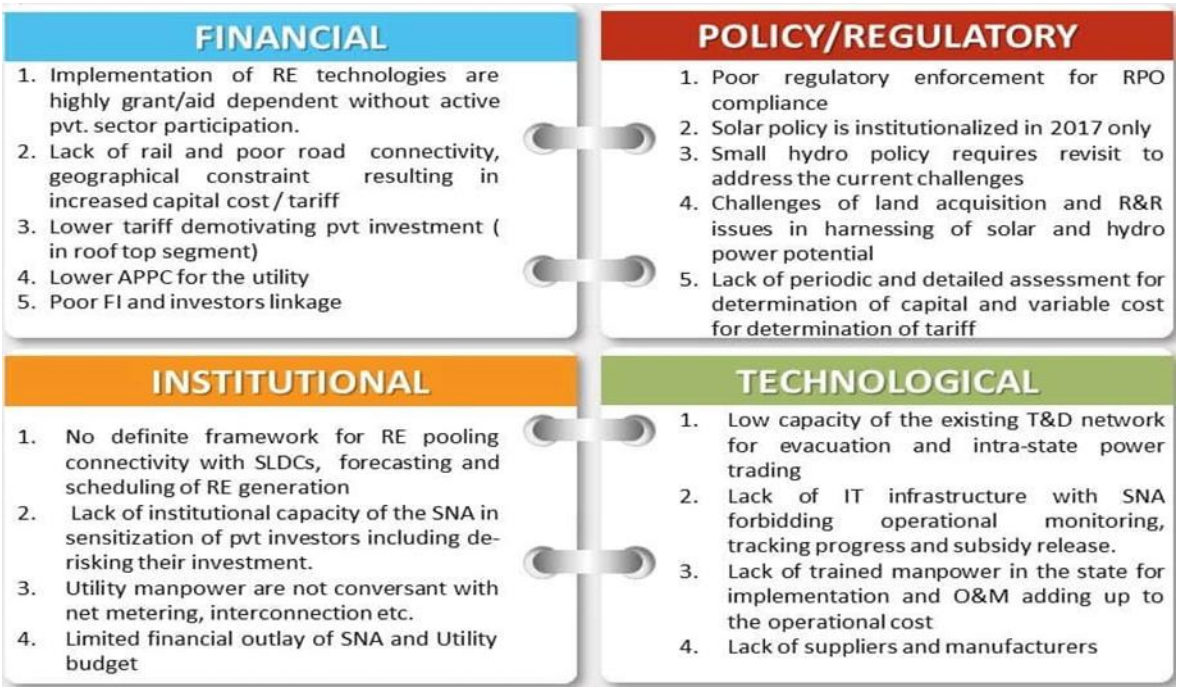
6A.1.5 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Programmes/ Schemes from which fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central Scheme (2021-30) in Lakh INR	Amount likely from State budget (2021-30) in Lakh INR	Gap Fundingi n Lakh INR	Implementing Agency
	EE-1	**Promotion of energy conservation and adoption of demand side management measures across sectors**							
1	EE-1.1	Promoting and mainstreaming adoption of Energy Conservation measures across commercial buildings including Public and Pvt. Sector building (both in existing and upcoming buildings).	ECBC, Star rating of building	MI	1,000.00	200.00	240.00	560.00	SDA, Urban Dept
2	EE-1.2	Mainstreaming of DSM measures with focus on Mu-DSM segments	Mu-DSM	MI	600.00		40.00	560.00	Power Dept.
3	EE-1.3	Institutionalize and rolling out of S&L programme and adoption of EC measures across domestic segment.	Standard and Labelling, UJALA	MI	200.00	140.00	60.00		SDA, Power Dept., Urban Dept.
4	EE-1.4	Institutional strengthening of the State Designated Agency and enhance consumer awareness.	Institutional strengthening of SDA by BEE	AD,MI	100.00	60.00		140.00	SDA
5	EE-1.5	Financial turnaround and improvement of the technical and operational efficiency of the state power utility.	UDAY, IPDS, PSDF	MI	17,832.00	15,157.20	2,674.80		Power Dept.,
6	EE-1.6	Strengthening of electrical infrastructure and enabling IT services.	IPDS	MI & AD	3,834.00				Power Dept.
		TOTAL			**23,566.00**	**15,557.20**	**3014.80**	**1260.00**	

6A.2 STATE SOLAR MISSION

6A.2.1 KEY ISSUES AND CHALLENGES

The key issues hindering promotion of solar and renewable energy technologies in the state are outlined below



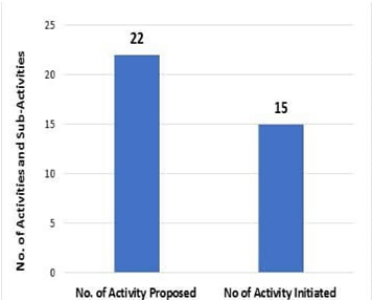
6A.2.2 PROGRESS MAPPING (IN LAST 5 YEARS)

6A.2.2.1 Physical Progress

The following section presents the synopsis of overall achievement of the physical target specified under the SAPCC Phase 1.

S. No.	Category of Activities (including sub activities)	Activity Proposed	Activity Undertaken	
1	High Priority Activity	18	14	77.78%
2	Medium Priority Activity	4	1	25.00%
S. No.	Type of Activities (including sub-activities)	Activity Proposed	Activity Undertaken	
1	Research, Policy Action, Capacity building, Pre-investment study and Demonstration Project	16	10	62.50%
2	O&M and Investment Project	6	5	83.33%

Status of implementation of Solar Mission interventions proposed under SAPCC



The following section detailed out the accomplishment as against each of the activities and sub activities proposed under SAPCC Phase 1 and is taken up for implementation during 2013-18.

Sl. No.	Strategies/ Activities	Activities Undertaken
1.	**Activity 1: Up scaling Renewable Energy Application for meeting up decentralized distributed or Off - grid area energy demand**	
	Sub Activity 1.1: Maximizing use of stand-alone solar power packs of	ZEDA, govt. of Mizoram has been instrumental in promotion of standalone solar power packs to address

	250 Wp for decentralized power generation through pilot scale implementation of 100 systems under JNNSM scheme.	the lack of access/un-reliable access to electricity in rural areas. The stand-alone system disseminated includes 1. 83 number of 500 Wp system and 2. 6,176 number of 100 Wp system Note: Initiative undertaken has surpassed the target set under the SAPCC
	Sub Activity 1.2: Promotion and facilitate installation of standalone off - grid solar power plant with capacity range below 100 kW with targets of 0.80MW by 2016-17 and 1.60 MW by 2021- 22	ZEDA has facilitated deployment of 20 numbers of smallsolar power plant in rural areas with cumulative capacity of 0.519 MW.
	Sub Activity 1.3: Electrification of un- electrified villages and hamlets by non- conventional energy sources and undertake electrification of 10 villages through solar and other renewable energy systems to meet the power demand of the remote villages.	The activity undertaken includes- • Development of Mini-Grid SPV Power Plant at Vathuampui and Sailam (Rs. 41.85 lakh is allocated during 2017-18 under NEDP). Site identification and development of DPR for 500 kW_p solar power plant at 50 locations with a cumulative capacity of 25 MW_p and estimated cost of Rs. 317.50 Crore. Thepower generating station are planned to be connected to the grid as and when available to ensure higher/better plan load factor.
2.	**Activity 2: Unlocking grid interactive solar power generation and supplement the conventional grid power under National Solar Mission**	
	Sub Activity 2.1: Undertake a demonstration project of install 1 MW grid interactive solar power plant at Lengpui, Aizawl by 2013	ZEDA has undertaken enormous stride to unlock the 9.09 GW_p solar power potential in the state and has exceeded the implementation target. Moreover, the state was able to accelerate the private sector participation. The initiative undertaken includes - 1. Development of 20 MW Mega Solar Park at Vankal – Developed infrastructure (mega solar park) and enabled favourable policy for private developers to set up solar power generation in the state. (Of the estimated cost of infrastructure development of Rs. 1,707.15 lakh and Rs. 1,318.00 lakh is earmarked during 2017-18 under NEDP). 2. Development of Grid Connected Rooftop Solar Power Plant at 132 kV Sub-Station at Luangmual, Khawiva and Sihhmui (Out of Rs. 276.89 lakh of estimated cost Rs. 138.45 lakh is earmarked under NEDP 2017-18) DPR for 2×5 MW Grid Connected Solar Power Plant amounting to Rs. 139.92 crore at Thenzawl, Mizoram is submitted to the Ministry of Finance through MNRE to befunded by Japan International Cooperation Agency (JICA) under Japanese Grant Aid programmes.
	Sub Activity 2.2: Facilitate in installation of 2 MW grid connected solar plant of capacity 100 kW - 2 MW by 2022	The initiative involves construction of 2 MW_p Grid Connected SPV power plant at Tlungvel. This project with an estimated cost of Rs. 1,400.00 lakh is planned to be executed by ZEDA.
3.	**Activity 5: Institutional development and strengthening of ZEDA for promotion of renewable energy applications**	
	Sub Activity 5.1: Restructure and	ZEDA has initiated the process of restructuring and

	functional re-organization including increase of human resource strength at ZEDA to achieve efficient functioning and increase implementation of renewable energy projects.	functional re-organizing of the department including increase of human resource strength in 2018.
	Sub Activity 5.2: Training of the working group members and their representative from ZEDA and other concerned departments and organizations on sector specific climate change issue and enhance the knowledge about the policy measures.	The state climate change cell has facilitated training of ZEDA staffs and senior officials on sector specific climate change issue to enable departmental ownership in planning and implementing mitigation initiatives.
4.	**Activity 6: Awareness creation and manpower development for enhancement of the renewable energy application**	
	Sub Activity 6.2: Curriculum or technical course development with ITIs and other technical institutions in the state for production, engineering, installation and maintenance activities of renewable energy systems	Dedicated and customized course has been designed for training on installation, operation and maintenance of the solar system at National Institute of Electronics and Information Technology (NIELIT). The course has been designed and supported by the Skill Council for Green Jobs under NSDC.
	Sub Activity 6.4: Support schools, education institutions in preparing and introducing, curriculum on renewable energy applications and preparation of book.	A chapter has been introduced up to class VIII by Board of School Education, Mizoram on Renewable energy and Energy conservation.
5.	**Activity 7: Market Transformation of Renewable Energy applications through policy measures**	
	Sub Activity 7.1: Modification of existing power policy particularly power generation to investment friendly policy for promotion of solar thermal and other renewable energy application in PPP, IPP mode and other options. Inclusion of climate change and CDM aspects in the State Power Policy.	The state govt. of Mizoram has published "Solar Power Policy of Mizoram" during March 2017 through the gazette notification. The policy applicable for grid-connected projects, grid connected roof top projects and off-grid projects has ensured a favourable regulatory and risk-free investment environment for investor, developers and supply chain stakeholders to harness state's solar power potential efficiently. The policy includes market creation initiatives of mandatory solar rooftop installation at govt. building and setting of RPO targets, reduce consumer investment risk by ensuring net metering facilities, regulation for transmission and distribution charges, electricity duties, settlement of energy charges and other fiscal & financial incentives to outline few key features.
	Sub Activity 7.2: Development of fiscal instrument to promote renewable energy systems and preparation of operation plan for power trading.	Mizoram Solar Power Policy has outlined the following fiscal benefits- 1. Electricity Duty exemption for captive consumption, sale to distribution licensee and third party sell in all respect of all solar power projects (SPPs) set within the state. Also, electricity duty to be waived for the new manufacturing facilities and ancillaries of

		SPPs. A reduction in contract demand to the extent of 50% of the installed capacity of the SPP shall be permitted by the Distribution Licensee.
	Sub Activity 7.3: Declaration of tariff policy for solar and other renewable power purchase and incorporation of zero transmission /wheeling charges for transmission of renewable power to the grid.	1. Joint Electricity Regulatory Commission for Manipur and Mizoram has notified Tariff Order for Rooftop Solar Plants in Mizoram for FY 2018-19. The tariff policy outlines the assumptions of fixed and variable cost component of solar power generation, transmission and distribution. 2. The state solar policy however has recommended for a wheeling charge of 2% of the energy supplied to the grid.
	Sub Activity 7.4: Modification of building bye- law according to state profile for mandating use of solar water heater and renewable energy systems for lighting in the common or open space of govt. and commercial establishments.	"The Aizawl Municipal Council Building Regulation" published in "The Mizoram Gazette" during 2013, recommends for installation of solar water heater in all buildings under the following categories: hospitals and nursing homes, guest houses, tourist lodges, bungalows, schools, colleges, training centres, barracks of armed forces and polices, functional buildings of airports like waiting rooms, rest rooms, caterings units, community centres and all Govt. buildings which are in need of hot water.
	Sub Activity 7.5: Create demand for renewable energy services through pilot scale demonstration projects in the state government and public sector establishments	The initiatives undertaken includes - 1. Installation and commissioning of solar rooftop power plant at E-in-C office. 2. Installation and commissioning of 3 number of wind- solar hybrid system (8 kW) at Govt. Middle School, Cheural. 3. Installation & commissioning of 3 number of wind solar hybrid system with capacity of 5 kW each at Diary Middle School, Tuipang, Govt primary school -II, Pukpui and Govt high school, Pukpui.
6.	Activity 10: Installation and promotion of solar pumps for agriculture practice in hilly and remote areas as a demonstration project	Annual Report of MNRE specifies implementation of 37 numbers of solar water pumps in the state.

Other activities implemented by the nodal department but not suggested under SAPCC Phase 1 is detailed below. These activities have contributed substantially to the climate change concern by reducing the GHG emission from combustion of fossil fuel and improved standard of living amongst the under deprived and under privileged populations.

The activities include:

- Dissemination of 8,331 number of solar lanterns and 5,395 number of home-lighting system between 2013-2018.
- Implementation of 5,056 numbers of solar streetlights

Assessing the Mitigation CONTRIBUTION of SAPCC implementation

Activity	Capacity Addition during 2013-18 (commissioned unit)	Annual GHG Avoidance
Off gird solar power project	1.18 MW	1,009 tCO_2

6A.2.3 GAP/ BARRIER ANALYSIS

The gap analysis is carried out in light of the identified barrier forbidding implementation of actions proposed under the SAPCC Phase 1 and infrastructural, institutional, policy and financial scenario to be in place for institutionalising of the action proposed under SAPCC.

Area	Gaps	Strategies
Institutional and Policy	• Siloed approach by the departments in addressing the climate change • challenge making little sense, given the short window of opportunity for tackling of the interlinked challenges of climate change, inequality rise, social instability in light with the developmental agenda of the govt. • Lack of coordinated actions amongst the departments and agencies institutionalizing different developmental and climate resilient project in the state. • Lack of integration of the climate concern in departmental planning and budgeting • Lack of advocacy and required push of the key policy. • Lack of role clarity amongst the nodal department and limited top-down enforcement towards institutionalizing climate actions. • Despite the strong basis of integration at the objective level of the two developmental agendas (SDG and NDC), lack of convergence at the federal level has destined the agendas to be implemented separately through different arrangements and by distinct institutions without any synergies.	• Developing strong political and governance will through sensitization and awareness of the key stakeholders for streamlining of key policy and regulatory measures towards low carbon economic growth. • Enhance regulatory strength of the nodal department for institutionalizing cross-departmental project level convergence and mainstreaming adaptation and mitigation to climate change in developmental policy and planning. • Mainstream the concept of climate proofing in developmental planning and government scheme. • It is imperative that a more joined up approach to implementation be framed with cross fertilization of the national climate goals and SDG relevant targets.
Finance	• In-spite of access to finance being the major challenge in implementing the climate actions, limited endeavor has been noticed in identifying the source of special funds and tapping them (concessional credit line, enabling provision of green cess, VGF, CEF, private sector investment including FDI etc).	• Mobilizing climate finance to implement key adaptation and mitigation measures including programme/scheme-based financing, ODA, MDB flows, and creating enabling environment towards catalyzing private sector fund flows.
Capacity	• Lack of skilled resources in operationalization ofrenewable energy project. • Lack of infrastructural capacity of the state utility and intend for large-scale market adoption of solar rooftop.	• Creating an enabling ecosystem for enhanced private sector engagement and investment can motivate the youth for skill enhancement which can thereafter be supported by the Govt through establishment of related institutions.

6A.2.4 SECTOR – PRIORITY/STRATEGIES

6A.2.4.1 Future Plan to Meet NDC and SDG

Nationally determined contribution (NDC)

A. NDC target: Reduce emission intensity by 33-35% by 2030 from 2005 level. The growth in some of the key factors impacting the emission intensity is outlined below -

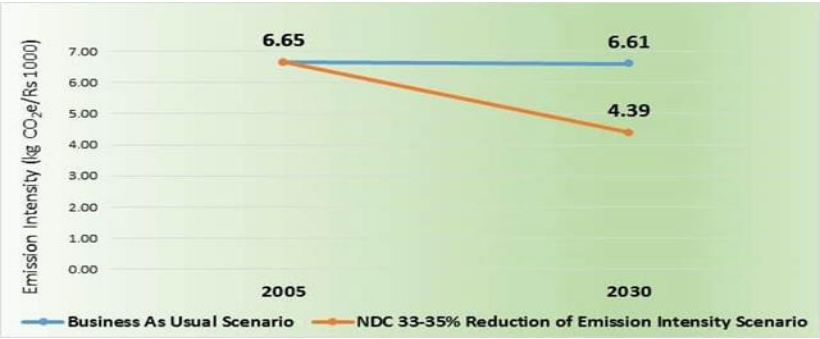


Figure 52: Emission Intensity (Projected &Targeted)

Based on the projected energy consumption (primary and secondary source) and GSDP (current price) during 2030 the Emission Intensity (EI) is estimated to be 6.61 kgCO2eq/Rs. 1,000 in the BAU scenario. However, the NDC recommends for 33-35% reduction in EI from 2005 level.

B. NDC Target: Achieve 40% cumulative power installed capacity from non-fossil-based energy resources by 2030

Electricity demand is projected to rise several folds by 2030 due to expected transition in the urban and rural lifestyle, projected increase in individual/family income, higher technology infiltration and predicted industrial growth. The electricity demand is expected to escalate to 1,817 MU and 344 MW respectively. With the existing (including allocated) and planned hydro and solar based power generation capacity in/with the state, the installed capacity from renewable out of the total power mix are expected to be above 40% by 2030. The roadmap is strategized with the objective of creating an enabling ecosystem to foster higher adoption of renewable energy technology or promote green investment in the state and enhance the share of renewable above 40% in the total power generation mix.

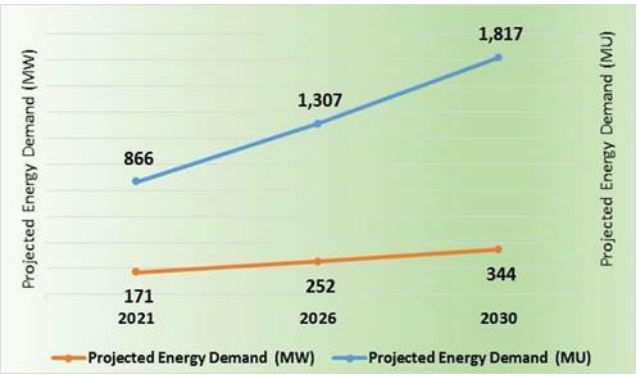
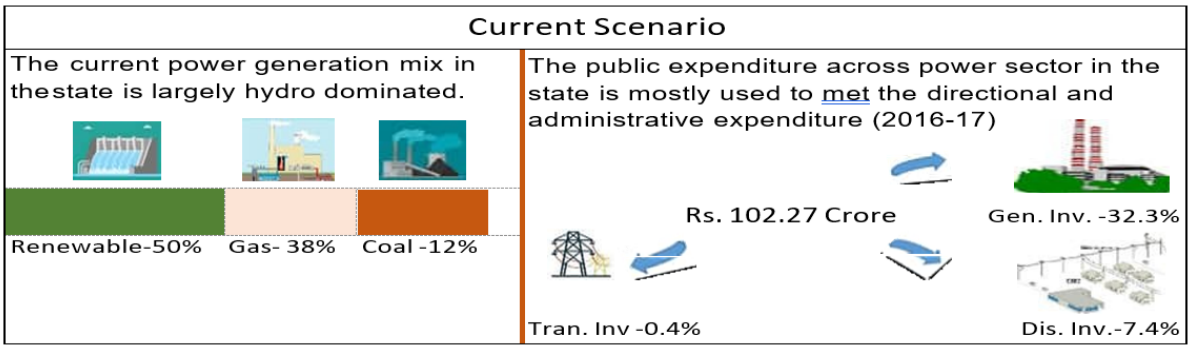


Figure 53: Long-Term Projection of Energy Demand

State level Renewable Energy Capacity Addition Target 2021-22

Solar		Hydro	Wind and Biomass
Roof top	Ground-mounted	SHP	
50 MW	22MW	25 MW	0 MW



Future Proposition to meet NDC Target: Increase share of renewable energy-based power generation options (Solar, Hydro and Wind) both centralised and decentralised

Areas	National	State level
Policy and regulatory	1. Institutionalizing regional or national balancing markets to address the intermittency issues of renewable energy generation. 2. Framing of regulatory mechanism/framework for inter-state balancing, forecasting and scheduling. 3. Lower inter-state transmission charge to encourage regional balancing.	1. Enforcing RPO regulation through institutionalization of appropriate penalties and enforcement mechanisms. 2. Introduction of appropriate level of feed-in- tariff support to flexible generation like gas- based units, pump storage units. 3. Periodic revision of RPO targets. 4. Promote distributed solar projects through innovative business model. 5. Streamline ease of doing business options for attracting Pvt.Sector investors.
Institutional	1. Creation of ancillary markets to pool surplus RE power and development of a platform that would enable RE resource surplus and deficit states to trade and balance their RE targets.	1. Institutional capacity building of stateutilities for grid management, metering and settlement. 2. Development of Renewable Energy Management Centre at the state level to facilitate integration of large share of RE capacities into the grid.
Technological	2. Development of inter-statetransmission infrastructure /dedicated transmission corridor for RE power evacuation. 3. Development of forecasting tools for RE resources.	1. Strengthening of communication channel between RE pooling substations and SLDC. 2. Focus on centralized and decentralized energy storage options.

Specific Targets under SDG for the Sector

The target set out by the state govt. as part of the Goal 7 under the national commitment of the Sustainable Development Goals.

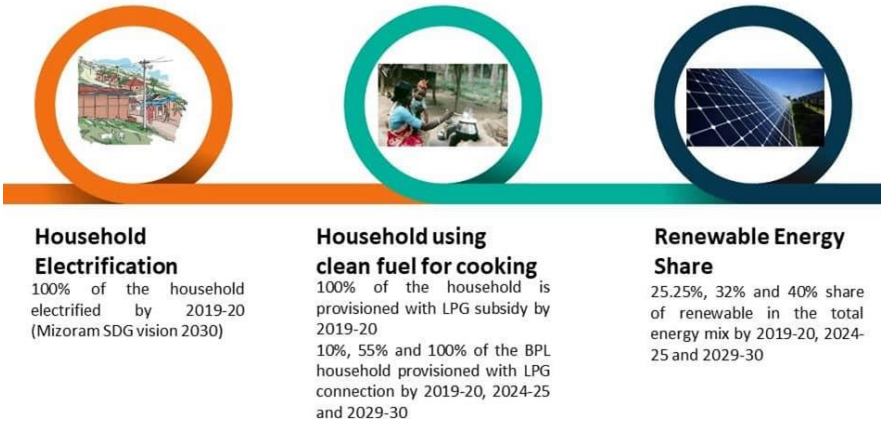


Figure 54: SDG Goals for Energy sector

Synthesising SDG (Goal 7) and NDC Commitment

Both SDG's and NDC's targets are aimed at the overarching objective of integrating decarbonisation growth strategy with developmental planning, ensure access to affordable and sustainable energy source and ensure inclusive and sustainable development towards sustained economic growth and shared prosperity. In the light of the above context the energy sector of the "State Action Plan on Climate Change" intends to integrate the specific objectives of both the developmental goals along with other developmental priorities of the state towards an inclusive plan document.

Issues	SDG Objective	NDC Objective	Development Priorities
Energy Security	Increase substantially the share of renewable energy	40% of the total capacity from renewable	Reduce the dependency of the state utility on the central sector power plant, which is already capped.
Access to clean energy for cooking	Ensure universal access to affordable, reliable and modern energy services	Decrease energy intensity 33 - 35% by 2030 from 2005 level.	Prevent forest degradation due to unscientific extraction of firewood and address the health issues of woman and children from indoor pollution.

6A.2.4.2 Description of Strategies/Activities

RE-1: Increase penetration of grid interactive renewable energy technologies

Planned grid interactive renewable energy capacity addition in the existing state's power generation/allocation mix, is likely to address the concern over state's energy security, lower the dependency on central sector generating unit and lower financial loss which state's "Power Department" is presently grappling with for sourcing unallocated power, especially during the lean season. Addition of the generation capacity will empower the state power department to support commercialisation and industrialisation in the states, which was mostly restricted due to the unavailability of quality and uninterrupted power supply. Proposed action and climate change linkage: RE based capacity, addition will reduce the dependency on the conventional fossil fuel-based power plant to meet up electricity requirement and will thereby avoid associated GHG emission resulting from generation of electricity in the conventional power plant. CO2 emission from combustion of fossil fuel is the largest contributor of GHG emission that drives anthropogenic climate change. Improved electricity access on the other hand will foster socio-economic development and enhance adaptive capacity of the population.

RE-1.1: Facilitating Deployment of Grid-Interactive Solar Roof-Top Systems, Ground Mounted Solar Power Plants and Solar Park in the state.

Rationale

As a part of the GoI's ambitious renewable energy capacity addition commitment of 175 GW by 2022, year-wise, technology-wise and segment-wise target has been allocated to all the states. A cumulative target of 92 MW of solar energy-based capacity addition has been proposed for Mizoram as against the cumulative potential of 9.09 GW. The solar energy-based capacity addition target for the plan period, has been conservatively set with due consideration of the possible financial allocation from the state and central budget, likelihood of infrastructure development (transmission and distribution infrastructure), operationalisation of favorable and enabling policies for attracting private sector investment, development of supply chain and availability of skilled resources.

Segment-wise grid interactive solar based capacity addition target for the plan period 2018-2023					
Grid interactive rooftop solar power system	50 MW	Ground mounted solar power project	22 MW	Solar Park	20 MW
Cumulative solar based generation capacity addition target - 92 MW					

Sub-Activities

1. Enabling deployment of 50 MW grid interactive solar rooftop power systems
    a. Sector-wise (Domestic, institutional, commercial, public sector and industrial facilities) solar rooftop potential mapping and detailed assessment of grid infrastructure requirement for integration of proposed capacity addition.

b. Mandating deployment of solar rooftop systems across all public buildings including govt offices.
c. Enhancing private sector participation in solar rooftop system deployment through (i) operationalisation of enabling policy/regulatory ecosystem in terms of favourable tariff policy, gross and net metering framework, standardised and easy grid inter-connectivity facilities, (ii) improve power quality, grid availability, reduce SAIFI and SAIDI,(iii) operationalisation of third party business model (RESCO) by reducing developer's investment risk, (iv) enabling easy access to affordable finance (loans from public and private sector bank under priority sector lending), (v) sensitisation of the private sector for investment in rooftop solar power.
d. Capacity building of stakeholders (utilities, suppliers, financial institutions) and strengthening of the supply chain (manufacturers, distributors and O&M vendors).

2. Enabling deployment 22 MW ground mounted solar power plant
   a. Facilitating deployment of ground mounted solar power unit through private sector participation through (i) operationalisation of enabling policy/regulatory ecosystem of favourable tariff/feed -in-tariff (with/without VGF), (ii) easing out of approval process (single window clearance), (iii) provisioning of adequate infrastructure facilities (land bank, evacuation facilities, improve power quality, grid availability, (iv) easy access to affordable (concessional) finance. This includes arrangement for concessional line of credits (World Bank, Kfw, ADB etc.) for solar developers investing in solar power projects in the state.
   b. Selection of private developers/investors on BOO basis through competitive bidding.
   c. Promotion of grid connected solar power plant on IPP mode.
   d. Supporting setting up of grid connected solar power plant under VGF mechanism of MNRE.

3. Enabling deployment of 20 MW Solar Park (already identified)
   a. Finalisation of implementation and financial/investment model for the identified solar park sites.
   b. Determination of tariff for sale of power from solar park through PPA.
   c. Deployment of required transmission and evacuation facilities.
   d. Selection of solar power developers through competitive bidding and facilitate signing of PPA.

4. Augmenting grid infrastructure for accommodating variable energy generation unit
   a. Deployment of sensors for generating real-time and location wise high-resolution data on grid conditions coupled with centralised RE generation forecasting facilities, data analytics and control system to enable system operators to respond faster to changed grid condition.
   b. Upgradation of grid operation protocols to enable lower time scheduling and dispatch of all resources connected to the grid through automated incorporation of RE forecasts.
   c. Expand balancing areas.
   d. Promote flexible demand and access to supply resources (e.g., demand response, gas turbines, hydroelectricity, etc.) to ensure continued stability of the grid at each moment.

5. Creation of enabling market environment for reducing investors risk and facilitate private sector participation.
6. Developing of appropriate policy instruments
   a. Developing framework for RE balancing market and dedicated platform for RE trading.

Direct & Co-benefits:

1	Reduced greenhouse gas emission	78,335 tCO_2/annum
	Life cycle GHG emission (25 years)	19,58,386 tCO_2
2	Direct and indirect employment	Short term employment for business development, design and preconstruction and construction to commissioning – 797-864 Long term employment – 54-212
3	Energy security	Will contribute to 37% and 27% of the peak power demand in 2025-26 and 2030

Scheme/programme level convergence and enabling policy/regulatory support

The aforesaid activity has been planned in line with the following programmes/schemes: Grid connected rooftop and small solar power plant programme, Development of Solar Parks and Ultra Mega Solar Power Projects, JERC (Rooftop Solar Grid Interactive system based on Net metering) Regulations and RPO and Open Access.

Solar Rooftop System- 1) Total Capacity of 1329kWp commissioned from Residential + Govt, buildings during Rooftop Solar Phase-I. 2) Total Capacity of 680kWp commissioned from Residential buildings during Rooftop Solar Phase- 11. PM Surya Ghar: Muft Bijli Yojana (Rooftop Solar Scheme) in progress.

Ground mounted Solar Power Plant- 2MW Grid Connected SPV Power Plant at Tlungvel commissioned on dt.04 12.2020. 2)10MW Solar Power Plant at Thenzawl in progress (40% completed). 3) Installation of 10MWp Grid-Connected SPV Power Plant, Keifang in progress. 4) Expression of interest (EOI) for setting up of Grid- connected SPV Power Plant at 84 nos. of locations in the State of Mizoram in progress.

Solar Park- 20MW Vankal Solar Park commissioned on dt.16.02.2023

Action Plan- a) Installation of 20MWp Grid- Connected SPV Power Plant, North Vanlaiphai,
b) Installation of 5MWp Grid- Connected SPV Power Plant, Sumsuih.

RE-1.2: Harnessing state's hydro power potential through development of hydro power units and modernisation of existing hydro plants

Rationale

30 MW small hydro-based capacity addition target has been proposed for Mizoram under 175 GW renewable energy-based capacity addition commitment of the GoI by 2022. The allocated target is in line with the estimated SHP capacity hydro-based power generation potential of 169 MW in the state.

Target capacity addition under the plan period

The targeted capacity addition through hydro-based units has been conservatively fixed considering the uncertainty of development owing to various hindrances from land acquisition to financial allocation

Hydro based capacity addition target for the plan period 2018-2023	
Small/Mini/Micro hydro power project 1. Mini and micro hydro power project to be implemented by – ZEDA 2. Small hydro power project to be implemented by the Power department of Mizoramwith a cumulative target of 30 MW a. 3 MW -Iva SHP b. 2 MW - Ngengrual SHP c. 1 MW -Khawiva -II SHP d. 24 MW -Tuirini SHP	30 MW
Modernisation of the existing hydro projects of 10 MW cumulative capacity	
The above target is in addition to the ongoing hydropower project currently being developed/under implementation by the power department.	

Sub-Activity

1. Identification of micro, mini and small hydropower project sites through in-depth and scientific resource assessment methodologies and preparation of site wise investment package.
2. Implementation hydropower project through private sector investment or in public-private partnership mode.

Direct & Co-benefits:

1	Reduced greenhouse gas emission	62,441 tCO_2/annum
	Life cycle GHG emission (35 years)	21,85,445 tCO_2
2	Direct and indirect employment	Direct employment– 8, Indirect employment – 2
3	Energy security	Will contribute to 13.10% and 9.59% of the peak power demand 2025-26 and 2029-30

- Scheme/programme level convergence and enabling policy/regulatory support

- The aforesaid activity has been planned in line with the following programmes/schemes: Grid interactive Hydro Power Project up to 25 MW (SHP programme).

RE-2: Promotion of off-grid power generation unit and decentralised renewable energy products

Enhanced energy access amongst the deprived and unprivileged population in the state will result in social upliftment, economic development, improved agricultural productivity and reduce drudgery of rural population with specific to women and children.

Proposed action and climate change linkage:

1. RE based decentralised power generation, option (wind aerogenerator with solar hybrid) in the remote pockets will empower rural community in opting for alternate livelihood options, leading to enhanced economic stability and adaptive capacity of the marginalised population.
2. Access to clean electricity (decentralised solar power generating unit) will also avoid the consumption of diesel/kerosene used for purpose of lighting/ mechanised activities and its associated emission.
3. Promotion of improved biomass cook stove will reduce deforestation and degradation of forest and support carbon sequestration along with reduction of drudgery of woman and children population.
4. Promotion of solar water pump in the un-electrified areas will improve the irrigation outreach and will reduce the risk of crop failure in the projected situation of rainfall variability.

RE-2.1: Promotion of solar-wind hybrid technology by installation of 500 kW solar-wind hybrid plant

Rationale

Small wind aerogenerators in hybrid mode with solar panels has been promoted by MNRE to meet the decentralised electricity requirement of the community users. Planned implementation through grant in aid support from the MNRE, the department will help in promoting and mainstreaming of the alternate technology options in the remote area with limited and poor access to electricity.

Target capacity addition under the plan period

The targeted capacity addition is planned as a research and development initiative by the department.

Wind aerogenerator with solar hybrid	500 kW

Sub-Activity

1. Detailed assessment of the potential of aerogenerator in the state along with identification of potential sites preferably in the remote pocket with issues of energy access.
2. Implementation of solar-wind hybrid unit of cumulative 500 kW capacity across the state.
3. Mainstreaming of similar technology options.

Scheme/programme level convergence and enabling policy/regulatory support. The aforesaid activity has been planned in line with the following programmes/schemes: Small Wind Energy & Hybrid Systems and SADP.

RE-2.2: Increase penetration of improved cookstoves in rural areas

Rationale

Access to clean cooking options is an indicator of the energy poverty of the nation. Even with higher LPG penetration in the state, the unreliability of the supply still exists. Moreover, the issues of higher cost of LPG in comparison to freely available firewood makes firewood a preferred choice amongst the rural households and especially amongst the economically backward class of the society. Most of these households using firewood depends upon traditional biomass based cookstove. With combustion efficiency below 10%, use of traditional cookstoves results in detrimental health impact amongst the women and children due to emission of smoke and suspended particulate matters along with drudgery involved in fetching firewood from forest. The Improved Cookstove (ICS) programme was designed to address the health and welfare concerns of the weakest and most vulnerable sections of the society along with emission reduction like GHG and other pollutants and reduce degradation of plant diversity.

Dissemination target under the plan period

Number of households to be provisioned with Improved cookstoves	5,000

Sub-Activity

1. Strengthening local supply chain for supply, installation and post installation O&M of ICS.
2. Dissemination of 5,000 ICS to rural households across the state with focus on forest infringe areas.
3. Demand creation through sensitisation of the local people on importance and benefit of ICS usage.
4. Promotion of energy plantation in non-forest areas and degraded areas for meeting household fuel wood requirement.

Direct & Co-benefits:

1	Reduced firewood usage	Around 2,000 tonnes of firewood saving annually
2	Livelihood creation	Establishment of ICS supply chain will foster enterprise activities

Scheme/programme level convergence and enabling policy/regulatory support. The aforesaid activity has been planned in line with the following programmes/schemes: National Biomass Cookstoves Programme (NBCP).

Progress in the Strategy- 2000 Nos. achieved. 100% completed

RE-2.3: Dissemination of 750 HP small solar water pumps for irrigation and 125 HP micro solar water pumps for domestic/community application

Rationale

Assured irrigation is the key to food and nutritional security, especially under the projected climate change regime. The negligible agricultural sector electricity consumer in the state clearly demonstrates the poor irrigation outreach and predominance of diesel-powered unit wherever applicable. The promotion of solar water pump is intended to enhance the irrigation outreach and at the same time sensitise farmers on the benefit of solar water pump usage for its adoption. Promotion of solar water pump usage for community as well as domestic application is also intended to improve domestic/community access to drinking water.

Dissemination target under the plan period. The dissemination target under the plan period is mentioned below

Solar pump for Irrigation purpose	750 HP
Solar pump for community use and domestic drinking water supply	125 HP

Sub-Activity

5. Strengthening of SWP supply chain and awareness creation to enhance market demand SWP.
6. Sensitisation of the farm sector and rural household sector on the benefit of use of solar water pumps.
7. Facilitate financial integration/ease of access to finance to support farm sector/household in adoption of solar water pumps.
8. Facilitate installation of 750 HP small solar water pump for irrigation purpose.
9. Facilitate installation of 125 HP micro solar water pump for domestic and community application.

Direct & Co-benefits:

1	Address food and nutritional security concern	Assured irrigation will not only enhance agricultural productivity but will also address the concern over crop failure
2	Access to water	Solar based drinking water pump can ensure drinking water supply and reduce drudgery of women mostly engaged in fetching of water.

Scheme/programme level convergence and enabling policy/regulatory support. The aforesaid activity has been planned in line with the following programmes/schemes: Solar Pumping Programme - MNRE

6A.2.5 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Programmes/ Schemes from which fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central Scheme (2021-30) in Lakh INR	Amount likely from State budget (2021-30) in Lakh INR	Gap Funding in Lakh INR	Implementing Agency
	RE-1	**Increase penetration of grid interactive renewable energy technologies**							
1	RE-1.1	Facilitating deployment of Grid-interactive solar rooftop systems, Ground mounted solar power plants and Solar park in the state.	Grid connected rooftop and Small solar power plant programme, Development of Solar Parks and Ultra Mega Solar Power Projects, JERC (Rooftop Solar Grid Interactive system based on Net metering) Regulations and RPO and Open Access	MI	2,53,040.00	1,89,900.00	19,000.00	44,140.00	ZEDA, Power Dept. JERC
2	RE-1.2	Harnessing state's hydro power potential through development of new hydro power units and modernisation of existing hydro plants.	Grid interactive Hydro Power Project up to 25 MW (SHP programme)	MI	80,434.94	4,200.00	61,007.48	15227.48	ZEDA, Power Dept.
	RE-2	**Promotion of off-grid power generation unit and decentralised renewable energy products**							
3	RE-2.1	Promotion of solar-wind hybrid technology through pilot installation of 500 kW solar-wind hybrid plant.	Small Wind Energy & Hybrid Systems & SADP	MI	5,040.00	1,500.00	1,500.00	2,040.00	ZEDA

S. No.	Code	Activity	Name of Programmes/ Schemes from which fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central Scheme (2021-30) in Lakh INR	Amount likely from State budget (2021-30) in Lakh INR	Gap Funding in Lakh INR	Implementing Agency
4	RE-2.2	Increase penetration of Improved Cookstoves in rural areas.	National Biomass Cookstoves Programme (NBCP)	MI	214.00	100.00	100.00	14.00	ZEDA, Forest Dept.
5	RE-2.3	Dissemination of 750 HP small solar water pumps for irrigation and 125 HP micro solar water pumps for domestic/community application.	Solar Pump (Kusum/MNRE solar pump subsidy scheme)	MI	1060.00	315.00	525.00	220.00	ZEDA, Agri & Irrigation Dept.
		TOTAL			**3,39,788.94**	**1,96,015**	**82,132.48**	**61,641.48**	

6B. STATE MISSION ON SUSTAINABLE HABITAT

6B.1 SECTORAL OVERVIEW

Climate change and its effect are intrinsically linked with unsustainable, unplanned and rapid urbanisation. Urban areas in an eco-fragile terrain are mostly affected by the major, naturally occurring variations in climate conditions including climate extreme events. The state's urban population belonging to economically disadvantaged sections (21.5% of BPL population in 2010) challenged by the insecurity of tenure, livelihoods, safety, health, limited access to appropriate housing infrastructure and incapable of accessing basic services, the urban cities are most vulnerable to the impacts of climate change. The most important factor of urbanisation is the migration of people from rural to urban areas. With the increase in number of migrations, there is increasing pressure on urban infrastructure and services, increase in consumption of energy and associated greenhouse gas emissions. Rapid urbanization possesses a major threat, which makes people more vulnerable to the effect of climate change.

General Statistics		
Mizoram is one of the most urbanized states in India with 52% urban population (Census 2011). Note: Among all the districts, district Aizawl has the highest populationdensity of 113 persons per sq km.	Total Population	1,097,206
	Urban Population	571,771
	Urban Male Population	286,204
	Urban Female Population	285,567
	Urban Pop Growth Rate	29.65%
	Urban Sex Ratio	998
	Urban Literacy Population	484,841
	Urban Literacy Rate	97.63%
	Male Literacy Rate	97.98%
	Female Literacy Rate	97.02%

Source: Census 2011

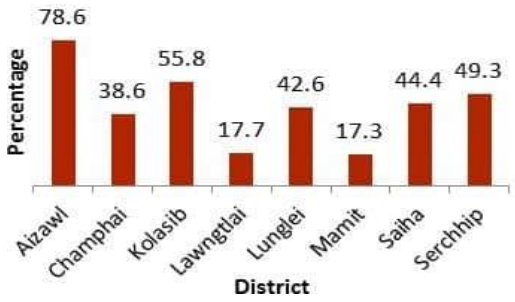
District-wise share (%) of urban population	
There are 23 notified towns in Mizoram after the addition of a newly notified town- Lawngtlai as per the Census 2011. Aizawl is the only Class I town of the state having an urban population of 3.14 lakh which is about 28.70% of the total population of the state. Mamit district has reported the lowest urban population of 17.27% (Census 2011).	

Figure 55: District-wise share (%) of urban

Table 29: Urbanisation Statistics of the state

RYU	India Total	India Urban	Level of Urbanization	Mizoram Total	Mizoram Urban	Level of Urbanization
	in million		*in %*	*Figure in Absolute*		*in %*
1961	439.09	78.94	18.00	266,063	14,257	5.34
1971	548.23	109.11	19.90	332,390	37,759	11.36
1981	683.33	159.46	23.30	493,757	121,814	24.67
1991	846.39	217.55	25.70	689,756	317,946	46.20
2001	1,028.61	285.36	27.80	888,573	441,006	49.63
2011	1,210.20	377.01	31.20	1,097,206	580,106	52.10

Source: Singh, Arun. (2017). Urbanization in Mizoram: Characteristics and Correlates. The Geographer

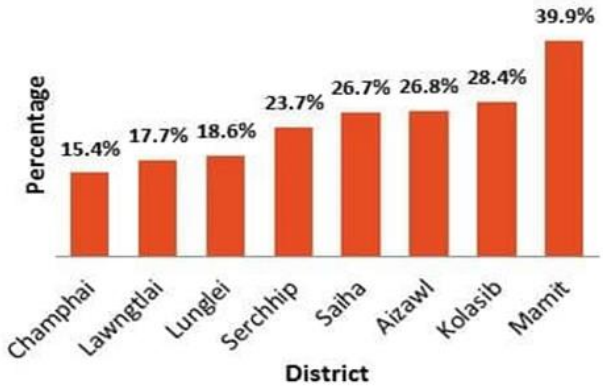
District-wise percentage change in urban population of Mizoram in the last decade	
The adjacent graph represents the maximum growth of urban population in Mamit district and minimum growth across Champhai district in the last decade. Because of rapid growth of population coupled with urban conglomeration, the urban regions have developed beyond their carrying capacities and the profound pressure is felt on the urban infrastructures, livelihood of the people and various environmental components, especially the land and water. The urban issue focuses on the main public services like drinking water supply, sanitation, urban transport and solid waste management.	

Figure 56: District-wise percentage change in urban population of Mizoram in the last decade

Urban Transportation and Climate Change

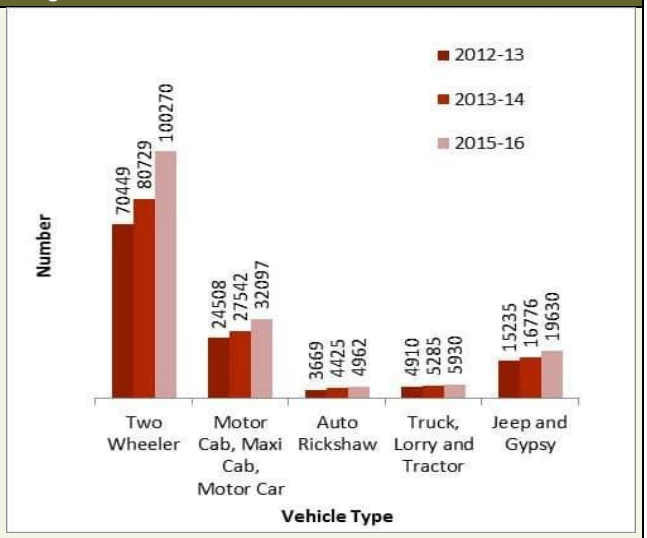
Vehicular mix and growth in Mizoram	
The adjacent graph shows the vehicular mix and growth of private vehicles in the state. From the adjacent figure, it can be observed that, two wheelers have undergone a noteworthy and fastest growth whereas motor cars along with other private vehicles like truck; lorry, jeep and gypsy have a steady growth. A considerable section of the aforesaid vehicular inventory is present in the state capital of Aizawl. The rapid growth in the number of vehicles, especially in the urban areas, coupled with unplanned and poor road infrastructure in the state, the urban transportation facilities are jeopardised with the issues of traffic congestion. Most of the roads in Mizoram are not suitable for heavy vehicles.	

Figure 57: Vehicular mix and growth in Mizoram

Drainage infrastructure: With increase of urban populations in the state, the issues of overcrowding, availability of public health care facilities, sanitation and waste management facilities have been exacerbated. Some of the urban sanitation services include activities like sewerage and drainage system, liquid waste management system, septage management system and storm drainage system management. Sanitation is a major concern in the urban areas of the state due to lack of proper drainage facilities. The domestic effluents flow into the nearby streams and rivers leading to contamination of the water. The problem of water logging is caused due to absence of proper and planned storm water drainage. The unplanned urban development has led to the frequent problems like blockage in drains and rainwater flow.

Drinking Water Distribution of urban household by source of drinking water

The adjacent chart shows the percentage distribution of urban household by source of drinking water. The state is having numerous springs and rivers and this forms the main source of urban water supply. The inconsistency in the supply arises from erratic flow of water that changes from season to season. Owing to the topography of the region, drinking water is mostly supplied to the household through piped network on the gravity flow principal.

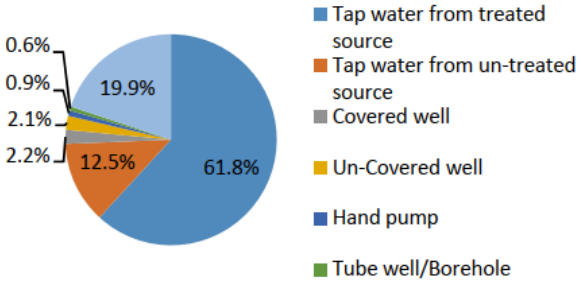


Figure 58: Drinking Water Distribution of urban household

Percentage distribution of urban household by location of drinking water

The adjacent chart shows the percentage distribution of urban household by location of drinking water. As per Census 2011, most of the households are having their location of drinking water within the premises followed by households having the source of drinking water location near premises.

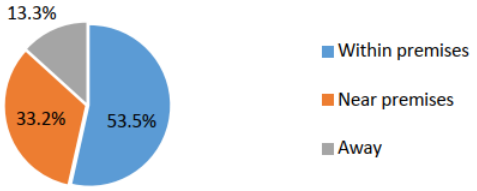


Figure 59: Percentage of urban household by location of drinking water

Sanitation Facilities: As per Swachh Bharat Mission, the total individual household (urban) latrine application till date in the state is 2,650 numbers. Out of this figure, the total constructed toilet was 2,194 numbers. The number of cities declared Open Defecation Free (ODF) is 23. The state is already declared 100% ODF. The number of wards for 100% door to door waste collection is 264.

Solid Waste Management

Waste Disposal Statistics 2016

Cumulation of waste leads to issues like health hazards, soil and water contamination, etc. Solid waste management activities include identification, operationalization and periodic up-gradation of landfill sites, transfer stations and proper collection and disposal of solid waste. The difficult terrain of Mizoram is the most critical and problematic issue for proper operationalization of solid waste management facilities in the state. Non-systematic collections of waste and improper disposal are resulting in spillage and contamination of ground water. As outlined in the adjacent graph, Aizawl district ranks first among all districts in waste disposal tonne per day followed by district Lunglei.

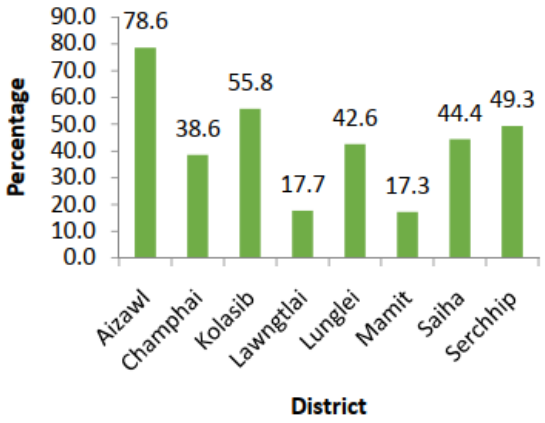


Figure 60: Waste Disposal Statistics 2016

Climate Induced Disaster: The state of Mizoram is highly vulnerable when it comes to disaster. This is because the state lies in the most severe seismic zone i.e. Zone V of Seismic zone that is referred as Very High Damage Risk Zone.

Landslide is another major issue of the state. Climate change has further aggravated the situation. Due to incessant and erratic rainfall, landslide has become a serious hazard of the state. Landslide not only disrupts communications, damages property but also cause loss of human and animal lives. The state also suffers from cyclones and strong windstorms. Mizoram has been registered with the highest wind speed in the country. This has an adverse effect on constructions made up of wood, thatched roofs and other weekly constructed infrastructures causing loss of property as well as lives.

6B.2 IMPACT OF CLIMATE CHANGE

Urban sector will be increasingly compromised by climate change impact. The state's economy mostly depends on the resilience of urban infrastructure systems. Vulnerability of the urban dwellers depends on urban infrastructure services and these services are dependent on each other. For example, interruption in electricity supply can affect the water treatment, waste treatment and public health services, thus, affecting the lives of urban dwellers. Impact of climate change also depends on the coping capacity of the vulnerable population. Climate change impact on various sectors is discussed below:

Sector	Impact of Climate change	Issues
Urban Planning	Climate Change has affected the precipitation pattern, nationwide. High intensity rainfall within a short span of time is being observed more often in the state of Mizoram. Mizoram has been ranked as the state with highest windstorm velocity as high as 198 km/hr	• The variability in the rainfall pattern change triggers high intensity flood. The frequent urban flood results in risk of inundation of the low-lying areas. • Increased precipitation can result in land subsidence due to water logging, rendering the land unsuitable for development • Increased storm events and high intensity flood hugely interrupts the transport & communication, energy & water supply system in urban areas due to breakdown of power transmission lines, water pipelines and road infrastructures. • With increased urban population and infrastructure, habitat destruction is also another issue of the state.
Water System	Increased precipitation coupled with variation of the precipitation pattern.	• With constant growth of urban population and increasing demands arising from higher standards of living, the stress on water system is increasing. On the other hand, increase in urban population tends to increase liquid waste load and the pressure on the drainage system of the area. The situations coupled with increased precipitation can result in contamination of water bodies. • Various climatic hazards also damage the water pipelines, sewerage lines and other infrastructures causing contamination of water supply system. This adversely affects the availability of fresh water to the local people.
Energy	• Climate extreme events including flooding • Increase in temperature	• Fuel supply system in Mizoram is mostly through uncovered pipelines. Increased intensity of extreme events such as flash floods, storms, etc. causes breakdown of these pipelines and power transmission lines causing major inconvenience to the inhabitants. • Rise in temperature in the urban areas due to climate change and congestion leads to higher energy demand creating a continuous stress on the energy supply system of the state.
Health	• High intensity floods resulting in contamination of water	• Increased incidence of water borne and water related diseases like malaria. • Disruption in public health services and

	resources and supply system • Climate extreme events	infrastructure leads.
Social System	Climate change impacting the livelihood and food security issues	• Rur-ban influx is one of the major impacts of the climate change on the sector. Dependence of rural community on natural resources is affected by the climatic changes, thus potentially causing rur-ban influx. • Urban poor has the highest impact of climate change due to limited access to safe and healthy dwellings and therefore are at the greater exposure to hazard risk of flood, landslide and other hazards.

6B.3 KEY ISSUES AND CHALLENGES

Sector	Issues/ Challenges
Financial	1. Development of the state is majorly dependent on central assistance and funds from various funding agencies, which at times is not adequate for the state's developmental requirement. 2. Paucity of funds from these areas causes a major setback in the development 3. There is no substantial investment at the state level.
Technical /Infrastructural /Resource	1. Hilly and difficult terrain tends to increase the power consumption of the state 2. Solid waste management is not properly effective in the state and about 16.73% of the household do not even participate, there is no operator yet in the state for PPP mode of solid waste management. 3. There is no sewage system in the state. Households have septic tanks, which are not often cleaned. 4. Unfettered flow of rural migrants' results in congestion, slum development and environmental degradation. This also induces a constant pressure on basic infrastructure. 5. Difficult terrain is yet another major issue of the state, which hinders the rapid growth of the state. 6. Lack of awareness about modern technologies also creates a hindrance in the state's economic as well as social growth. 7. Lack of sustainable infrastructure to support the rapid urbanization. 8. Poor road condition and connectivity adds to the cost of urban living 9. Unsystematic and haphazard extension of buildings and encroachment of government land contributes to congestion and traffic problems
Socio- Political	1. There is high level of inequity that affects overall, adaptive capacity of the state 2. Brain drain due to lack of opportunity and employment 3. Pressure on urban land availability due to unplanned settlement 4. High urban population explosion exerts humongous pressure on housing space making living conditions unsustainable 5. The multiplicity of local bodies obstructs efficient planning and land use 6. Lack of well thought out strategies and policies for effective integration and balanced development in the region 7. Lack of responsive approach towards the changing needs of people at policy level
Institutional and Regulatory	1. Lack of efficient traffic management system and regular increase in the number of on- road vehicle has led to traffic congestion and increased vehicular emission. 2. Lack of strict laws to control the vehicular emission of old and obsolete vehicles 3. Lack of training or capacity building activities of the designated personal 4. Lack of skilled personnel and inadequate manpower is a serious issue in the state 5. Lack of awareness of specific role and duty of specified personal so creates a threat in marinating the rule and regulation of the place.

6B.4 PROGRESS MAPPING (IN LAST 5 YEARS)

6B.4.1 Physical Progress

Out of 16 activities proposed in the previous State Action Plan on Climate Change in the sustainable habitat sector, the government of Mizoram has taken up 12 activities and are working on it in during last 5 years. Details of the work done under each activity are mentioned in the table below:

S. No.	Strategies /Activities	Activity Undertaken
1.	Activity 1: Capacity building and research initiatives on Climate Change impacts and preparedness	
	Sub Activity 1.1: Awareness generation and capacity building in climate changes impacts and preparedness	Various capacity building programs and awareness generation programmes related to climate change and environmental protection issues were organized under various missions. • **Swachh Bharat Pakhwadas** ENVIS Centre, Mizoram put up an effort for successful implementation of Swachh Bharat Pakhawadas during 1st -15th June, 2016 by taking up following activities: - i) Cleanliness drive at City Park, Aizawl: Cleanliness drive at City Park, Aizawl was carried out on 3rd June, 2016 at 3:00 pm by ENVIS and MPCB Staff in collaboration with Eco clubs. ii) Cleanliness drive at Aizawl Zoological Park: On 10th June, 2016 ENVIS Team along with officers and staff from Mizoram Pollution Control Board carried out cleaning up of litters within Aizawl Zoological Park. iii) Hoarding: Hoardings in connection with Cleanliness were prepared as part of implementation of Swachh Bharat Pakhwadas and were put up at City Park, Aizawl on 3rd June, 2016 during cleanliness drive observed atthe Park. • **Swachh Bharat Pakhwadas, 1-15th August, 2016** As part of observation of National Youth Day, 2016 a fortnight cleanliness drive was initiated. In this regard ENVIS Centre, Mizoram had team upwith some Eco-Club schools within the city for carrying out cleanliness drive activities and taking mass pledges to Clean India. • **National Youth Day, 2017** With the aim to create awareness on 'Digital payment' as part of observation of National Youth Day, 2017 Mizoram State Pollution Control Board in association with ENVIS Centre prepared a write up on the subject which is distributed to eco-clubs within the state. • **World Environment Day, 2017** On 5th June, 2017 ENVIS Centre, Mizoram in collaboration with its host institute i.e. Mizoram Pollution Control Board organized a seminar cum cleanliness drives at Hmuifang Tlang in observation of World Environment Day, 2017. Eco-Clubs from 9 different schools as invited attended the programme. Report on observation of World Environment Day, 2017 is uploaded on the Centre's website. • **Green Mizoram Day, 2017** On 9th June, 2017 a clean-up cum tree planting programme was organizedin the afternoon at the new office building site of Mizoram Pollution Control Board located at New Secretariat Complex, Khatla, Aizawl by ENVIS Centre, Mizoram and its host institute. • **Green March** In implementing MoEF&CC's project 'Green March' ENVIS Team performed cleanliness drive on 17th August, 2017. Non-

		biodegradable wastes like plastic bottles, bags, containers, sweet wrappers, etc. are picked up along the roadside and also at City Park, the only park available within the city and is much visited by people of all ages. • **World Ozone Day, 2017** ENVIS Hub in association with its host institute organized various activities for observation of World Ozone Day, 2017 as slogan and painting competition for eco-clubs, awareness campaign at schools, publication of pamphlets and articles. • **Swachhta Hi Seva** On 2nd Oct., 2017 cleanliness campaign with the theme "Swachhta Hi Seva-Cleanliness is Service" was jointly organized at Aizawl Zoological Park, Sakawrtuichhun by ENVIS Centre Mizoram, Mizoram Pollution Control Board and Eco-Clubs Mizoram with Department of Environment, Forests & Climate Change, Govt. of Mizoram as the main sponsor. The cleanliness campaign was attended by several officers and staff under the Department of Environment, Forests & Climate Change, Govt. of Mizoram, ENVIS Team and eco-clubs from different school along with their teachers. • **Global Hand Washing Day, 2017** On 12th and 13th October, 2017 as part of observation of Global hand Washing Day, 2018 eight (8) schools within Aizawl City were visited where lectures were given and practical hand washing was observed. Flyer highlighting proper steps of hand washing were distributed to the students. Also, hand-towels and liquid hand wash were also handed over to all the school visited. • **World Wetlands Day, 2018** ENVIS Hub in collaboration with Government J. Thankima College, 2 Days State Level Workshop on 'Environmental Education: Issues and Challenges' was successfully organized for College students during 1st & 2nd February, 2018 as part of observation of World Wetlands Day, 2018. • **Preparation of Pamplets/ Booklets/ Leaflets** 1 pamphlet on 'Motor Khu' (vehicular exhaust emission), 1 pamphlet on 'Damdawi In Bawllhhlawh - Bio- Medical waste Management' and 6 pamphlets on highlights of 6 new rules notified in 2016 like Solid Waste Management Rules, Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, - E-Waste (Mgt) Rules, Construction and Demolition Waste Management Rules, Bio-Medical Waste Management Rules & Plastic Waste Management Rules, 2 pamphlets on Ozone (O3), Fire crackers and 1 Manual for National Green Corps (Eco- Club) have been prepared
	Sub Activity 1.2: Capacity building for departments on advance solid waste management	The Urban Development & Poverty Alleviation Department has made various efforts to address the issue of Solid Waste Management. Some of the critical measures includes – a) Advocating and mainstreaming of Mizoram Urban Sanitation & solid waste management Policy, 2011. b) Initiated implementation of pilot project on Solid Waste Management at Aizawl under Asian Development Bank support and at Kolasib under Swachh Bharat Mission (Urban). c) Preparation of DPR for Solid Waste Management Project at Lunglei. The DPR has been approved under MoDONER (NLCPR). d) Under State programme, various solid waste management project has been taken up such as Zero Waste Management, improvement of dumping grounds etc.

	Sub Activity 1.3: Capacity building on water management and efficient distribution of supply and delivery	1. Training programmes have been organized regularly by the PHED, UD& PA Dept., Government of Mizoram in partnership with different partner training entities on water management and efficient distribution of water. 2. Inclusion of water management and distribution strategies in the State annual plan of Mizoram AMRUT mission 2015-2019. 3. Active implementation of water management under AMRUT Mission has been undertaken by the PHED. 4. Provision for improvement of pipes, Leakage prevention, metering, and increase in coverage of water distribution are some of the initiatives undertaken under the proposed actions.
	Sub Activity 1.4: Capacity building on Urban Management	1. Capacity Building trainings for officials of the government of Mizoram has been organized at different levels by the UD & PA Dept. under various missions. 2. Topics like urban Land management were covered aiming for better and sustainable use of lands and resources available to people. 3. Exposure visits were also held under the CCBP JNNURM during the year 2013.
2.	**Activity 2: Improvement in water usage management for urban drainage to reduce climate change impacts**	
	Sub Activity 2.1: Liquid waste management through improved sewage design for addressing climate change impacts	1. Implementation of sewerage network system is not feasible due to soil sustainability /topographical/geographical conditions and lack of funds. The manufacturing and implementation of bio digester tank have been initiated. It is projected to convert 12,000 conventional septic tanks into bio digester tanks by the end of the mission period. 2. Trainings on waste management facilities have been organized for officials. 3. Sewerage treatment plant, bio digester etc. and network has been implemented and initiated by SIPMIU which is PSU under the UD & PA department.
	Sub Activity 2.2: Developing models of urban storm water flows and capacities of existing drainage system	• The state is working towards achieving 100% coverage of storm water drain network. Mizoram has already achieved 65% coverage and is expecting to reach 100% by 2030. • Development of the existing natural drains is also been taken up by the government for increasing the drainage capacity.
3.	**Activity 3: Development of climate friendly waste management systems and improvement of aesthetics**	
	Sub Activity 3.1: Development of Climate friendly waste management system	1. Scientific Solid Waste Management Project has been started at Aizawl. 2. Scientific Solid Waste Management Project has been initiated at Kolasib. 3. DPR for scientific solid waste management project at Lunglei has been approved. 4. Zero Waste management have been promoted from state project, i.e. New Economic Development Program. 5. Purchase of Street Dustbins were also done from the NEDP. The Secretary of Higher & Technical & the School Education Department, Govt. of Mizoram and the DIG, Assam Rifles, Aizawl were requested on 15.02.2018 to compost leaf litters along with other biodegradable wastes within their premises and stop burning of wastes. In 2013-14, DC was requested to enforce the provision of the Rule and AMC was requested to depute for PWM and inform the Board of the officer appointed. In 2014-15, a Press Release was made on salient features of the Rules through I & PR Department, Govt of Mizoram and AMC was requested to comply and farm action plan on PWM and to incorporate in the municipal bye – laws. Further, AMC

		was requested for necessary action on banning of packaging materials for Gutkha, pan masala. ATR was submitted to CPCB. 6. In 2016-17, One Day Orientation programme was organized to sensitize staff of MPCB on 17th June, 2016 for implementation of the rules. Pamphlets on highlights of important provisions the Rule published for awareness in and distributed among the concerned State Govt. departments and the public 7. In 2017-18, ATR on implementation of PWM Rules, 2016 submitted to EF&CC
	Sub Activity 3.3: Reduction of vector borne disease from unmanaged dumping grounds	Various measures have been taken up for improvement of solid management centre under NEDP (9 towns in Mizoram) Under NEDP, the state has initiated many construction activities to avoid water clogging and stagnation of water which is a major breeding ground for a number of vector borne insects. Some of the initiatives are: a) Construction of Link Drain near Saithanchhunga's house at Chanmari West. b) Construction of drain near Rochungnunga's house at Chanmari c) Construction of drain near Singhmuaka's house at Chanmari, Aizawl. d) Construction of Drain between Edenthar Tuikhur to PuHrangliana house at Edenthar e) Construction of link drain near Primary School at Bung Bangla. f) Construction of RCC Step Cover Drain at Shalom Veng.
	Sub Activity 3.4: Improvement of collection efficiency and resource recovery	The state government has made effort to improve collection efficiency and has provided garbage trucks to cities and towns. Allocation was also made for improvement of collection in the district headquarters. • Improvement of collection in the district headquarters) Purchase of garbage tripper for district headquarters). • Purchase of garbage tripper for Aizawl City (SIPMIU). • Purchase of garbage tripper for Kolasib Town (SWM Project under SBM)
4.	**Activity 4: Reduction of Disaster risk through climate change adaptation**	
	Sub Activity 4.1: Formulation of building guidelines with the provision of promoting traditional houses for different agro climatic zone, flood plains and in consideration of the seismic vulnerability of the state	1. In Aizawl city, the Aizawl Municipal Corporation has enforced Building regulations and building permissions have been issued in line with the provisions for safety construction of building keeping in mind the topography, disaster vulnerability and preparedness. 2. The Central Pollution Control Board published a Final document on Revised Classification of Industrial Sectors in February 2016. The 53rd Board meeting held on 14th September, 2016 adopted the document and informed the CPCB accordingly on 22nd March, 2017. A consent management Committee was also constituted within the Board under the Chairmanship of the Member Secretary to review and to speed up the Consent mechanism. 3. Inventory of Industries was also initiated during the year. The MPCB staff conducted the inventory in Aizawl in a phase manner. However, the Board could not proceed on to other districts due to financial and manpower constraints. Majority of the industries in the state are MSMEs like Furniture Workshops, Steel Fabrication, automobile repairing works, bakery etc., there is no data on emission on records.
	Sub Activity 4.2: Developing climate Responsible master plans for selected city/towns (CDP)	Master Plans have been prepared for all most all the city and towns in Mizoram by the "Town and country planning office" of the UD & PA dept. Climate responsible plan has been given uttermost priority under the preparation of master plan.

	Activity 6: Improvement of vehicular pollution control mechanism for reduction of GHG emissions Improve enforcement to control vehicular pollution	1. Vehicle inspection license and certification centre (I & C centre) to be established at a distance of 3 km away from Aizawl to keep a check on vehicular emissions. 2. The Mizoram Pollution Control Board was identified as an authorized testing agency in the state by the state government. The vehicular emission testing was officially started at four stations in Aizawl city since 7th January 2013. Currently there are five (reduced to 4 since middle of 2018) permanent testing sites and mobile testing rest of the Districts capitals on regular basis.

6B.5 GAP/ BARRIER ANALYSIS

Area	Gaps
Institutional	• There is a lack of integration of climate concerned issues in the departmental planning and budgeting • Lack of strict building byelaws • Need for appropriate financial management & data collection practices • Lack of skilled people for the developmental work resulting due to migration of youths of the state.
Financial	• Reduced scale of climate finance • Lack of budgetary and accounting procedure • Paucity of fund from different schemes is a major gap towards the development of urban areas • Lack of substantial investment across many levels of government
Regulatory/ Policy	• Lack of convergence with the schemes attaining similar goal • Difficulty in benchmarking climate linked activities creating a challenge in analysis of state-level policy as well as planning and modelling future climate related spending • Need for inter-departmental co-ordination for better convergence and clarity of goals

6B.6 SECTOR – PRIORITY/STRATEGIES

6B.6.1 Future Plan to Meet NDC and SDG

A sustainable lifestyle and climate justice to protect the poor and vulnerable from adverse impacts of climate change is the basic objective, which the NDC aims to achieve through various commitments. Since the NDC commitments are yet to be state specific, state level targets are conceived in line with the national commitment. Key commitments under the NDC pertaining to urban sector are outlined in the table below:

Specific Targets under NDC for the Sector

NDC Commitment – Urban Sector	A Key State level initiative to comply with NDC Target
To put forward and further propagate a healthy andsustainable way of living based on traditions and values of conservation andmoderation.	• The state is taking initiatives for a sustainable and cleaner way of living by taking up the idea of scientific solid waste management system. • Keeping a check on emission status of the state by adopting improved sewage design and sustainable liquid waste management. • Policy level initiatives for providing a well-planned and safer living condition for the urban poor. • Taking up usage of unconventional energy/fuel in the line of “waste to energy” concept.
To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding	• Adopting for a cleaner path by maintaining the ODF status • Initiatives to provide safer lifestyle to the people by

level of economic development.	providing climate resilient infrastructure to the locals.

Specific Targets under SDG for the Sector

SDG Goals	Target	Key Initiatives by the State
Goal 6: Ensure the availability and sustainable management of water and sanitation for all	By 2029, the state has set a target to achieve: • 100% habitations connected with safe drinking water supply. • 100% coverage of sanitary toilet facility.	• Under the AMRUT mission, the state is promoting setting up of bio-digester for efficient management of the septage waste. • Target to reach 100% habitation connected with safe drinking water supply. • The state is planning to achieve 100% coverage of storm water drain network by the end of AMRUT Mission. • Development of natural drains and improvement of existing roadside drains. • The government will focus on keeping the "Open Free Defecation" status. The state will focus on achieving 100% coverage of sanitary toilet facility.
Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	By 2029, the state has set a target to achieve: • To promote connectivity by providing all weather roads to all City, Towns and Industrial Centre's. • To improve digital connectivity. • To establish Innovation facility Centre/ Innovation Hub.	• The state will take up the development of urban infrastructure under NEDP. • The state will promote connectivity by providing all weather roads to all city, town & industrial centres.
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	By 2029, the state has set a target to achieve: • Achieve 100% door to door waste • Collection in Towns and Cities. • 100% municipal solid waste treatment • Effective implementation of NMT to improve pediatrician/ urban mobility	• Under the Pradhan Mantri Awas Yojana-Housing for all (Urban) scheme, the government will work towards providing the basic amenities to its citizen before 2023. • The state would take up the constructions of resilient infrastructures in order to provide a safe and better settlement of people. • The state will take up "waste to energy" for sustainable utilization of the waste.

6B.6.2 Description of Strategies/Activities

SH/N/1: Scientific Treatment of solid waste management, Collection and Conversion of domestic and agricultural waste to energy (Biogas)

The growth of population and higher standard of living is a direct indication of higher energy consumption as well as higher waste generation. In this scenario, converting waste into energy is a major combat to deal with the worsening situation. This problem can be mitigated through adoption of environment-friendly waste-to-energy technologies for safer and reduced disposal of waste. Waste to energy will address two of the major goals - waste management as well as energy security.

The state government is planning to convert the collected domestic waste to energy by waste combustion before disposal. This would not only produce energy but also reduce the volume of the waste generated by 87%. The state government is targeting to achieve 100% door to door waste collection in towns and cities along with 100% municipal solid waste treatment by 2030.

SH/N/2- Provision for basic amenities like water, sanitation and electricity to all urban household by 2030 (70% by 2023).

A total number of 29,334 houses have already been constructed under Pradhan Mantri Awas Yojana-Housing for all (Urban) scheme by 2017-18.The state government is further planning to take up the initiative for providing facilities of water, sanitation and electricity to at least 70% of the urban population by end of the year 2023 and 100% by end of 2030. The urban housing shortage in Mizoram during 2012 was 0.02 million. The government is targeting 11 cities out of 23 selected cities, in the state of Mizoram covering about 1.23 crore of population under PMAY. According to the state vision document, 69.56% of urban habitation has drinking water supply facility. The government has set a target of achieving 100% supply of drinking water to all household as well as 100% coverage of sanitary toilet facility to all household by 2030. These facilities will be implemented through the state initiative programme and effective implementation of the national schemes such as National Urban Drinking water programme and Swachh Bharat Mission.

SH/N/3- Maintaining the "Open Defecation Free" status of all towns

Mizoram was declared “Open Defecation free” in July 2018, with all the eight-districts attaining 100% sanitation coverage under Swachh Bharat Mission. However, the state might lose the current “Open Defecation” free status in light of rapid urbanisation, projected to increase to 9.36 lakh by 2030 against the present urban population of 5.71 lakh in 2018 unless appropriate action be taken up to resolute the issues. In order to maintain the status in the coming years, the government is planning to launch solid as well as liquid waste management programmes in all the eight districts with support of the “Ministry of Drinking and Water Sanitation” and will be targeting at 100% coverage of sanitary toilet facility under Swachh Bharat Mission.

SH/N/4- Development of Urban Infrastructure under state programme and central assistance

The New Economic Development Policy (NEDP) is a comprehensive growth strategy for Mizoram. The policy lays emphasis on sustainability, industry, innovation, infrastructural growth, inclusiveness and

partnership, which includes the 17 goals of SDG. NEDP was formulated to push the Mizoram economy to a higher growth trajectory and to transform it from sustenance to market economy. It also addresses climate change, environmental issues and industrial development of the state. The government will undertake major infrastructural projects like construction of link roads, market yards, cold storage and warehouses under the state programme and central assistance.

SH/N/5- Construction of disaster resilient structure such as storm water drainage, retaining walls, etc.

In accordance to various seismic assessment and flood disaster assessment, the government is now working towards construction of disaster resilient structures that can cope with the highly vulnerable situation and can withstand the effect of disaster to a greater extent. The government has taken some major initiatives in regard to urban storm water flow in the SAPCC Phase1. Apart from that, the state is keen towards initiating more activities towards improvement of urban drainage network. This is of utmost importance because improved storm water flow would eliminate the road and traffic congestion problem and will ensure a healthy and safe living environment. In the next phase, the state government is also planning to introduce systemic post disaster recovery of the infrastructure caused after major disaster. A predictable mechanism(s) for systematically assessing damages and losses and financing infrastructure recovery after disasters of varying magnitude can also be developed for a sustainable lifestyle.

SH/N/6- Strengthening of urban livelihood and economy through women participation

Recognising the contributions of women and strengthening them, across sectors and at all levels can lead to successful, long-term solutions to climate change. Studies show that, women's contribution and innovations have transformed lives and livelihoods, and increased climate resilience. Mizo women constitute a major work force in the state. Women work participation rate is 540 per 1000 population as per 2015-16 record. However, their participation in the process of economic development was not given due importance. Therefore, the state government is keen towards the upliftment of women through various schemes and missions such as skill development mission in order to strengthen their livelihood. The government will also be initiating effective implementation of National schemes such as "Beti Bachao Beti Padhao". Some of the major initiatives that the state government is targeting to achieve by 2030 are:

- Encourage ownership of land/ property in the name of women.
- To setup Women Helpline in all districts of the state.
- To reduce crime against women to 5 cases per lakh of population.

SH/N/7- Reduction in use of old and obsolete vehicle

Pollution caused by the automobiles is one of the major sources of air pollution in the state and the ever- increasing vehicular population posed a continued threat to the ambient air quality. According to ENVIS Center, Mizoram, the level of Respirable Particulate Matter (RSPM) and Suspended Particulate Matter (SPM) in some districts has increased in an alarming rate. The government is therefore, planning to take necessary steps towards controlling the ever-increasing vehicular population and increased rate of emission. The government is trying to impose restriction on vehicles that are more than 15 years old because of higher emission.

SH/N/8- Adoption of rainwater harvesting techniques

Mizoram receives an average annual rainfall of 2,564 mm. However, most of the precipitation received is unutilized because of the terrain. Lack of rainwater conservation also adds to the situation. Aizawl have approximately 10,000 rainwater harvesting tanks at individual household levels which has been constructed mostly at their own expenses. However, commercialization of rainwater harvesting has not been done in the state at higher level. The government is therefore, planning to take up water harvesting practice in the urban areas in a larger prospective. Some model projects are to be initiated at different locations to monitor the effect on a large-scale basis.

SH/N/9- Monitoring of Vehicular Emission in 6 districts of the state

A study established the deterioration in ambient air quality. One of the prominent contributors is the increase in vehicular population subsequently leading to increased vehicular emission. Further, as per the Hon'ble Supreme Court order, it has made mandatory for all vehicles to obtain Pollution under Control Certificate (PUCC) while applying/ renewing of the vehicle insurance. Since, no permanent testing sites are established in all the districts, the vehicle owners are facing problem in obtaining the PUCC. Four vehicular emission-testing sites were established in Aizawl and one in Lunglei district. However, emission testing in the remaining 6 districts of the state are done on mobile basis in every six months, which have proved to be a tedious and laborious task for the board due to lack of staff strength and financial constraint. The increasing number of vehicle population in these districts and public demand has made the testing unavoidable.

SH/N/10- Inventorization of E- waste generation in the state and Inventorization of occupiers and bio-medical waste generation, treatment & disposal.

Though e-waste management in most of the states is at nascent stage, Mizoram seems to be one of those regions where there has been very little action on the issue of e-waste. The consumers fail to properly implement the rule efficiently due to lack of awareness among them not to forget the producers who have totally failed to do their part. There isn't any well-defined mechanism for collection and processing of e- waste in the state as a result of which large quantity of the wastes end up in landfills or informal sector. With little awareness and large usage of electronic goods, the toxic waste issue has the potential to damage the fragile environment of the region. In order to create awareness among the consumers, Inventorization regarding the type and amount of wastes being generated in the state is required. Inventorization of Occupiers under the Bio-medical rule is one of the duties mandated by the State Pollution Control Board (SPCB). As of now, Inventorization has only been carried out for Aizawl district in 2008. Due to fund constraint and lack of staff strength, further Inventorization could not be conducted by the SPCB. Hence, in order to implement the rule properly and check the compliance status Inventorization is of utmost importance.

SH/N/11- Conduct regular air quality monitoring (manual) covering all districts following CPCB's guidelines on ambient air quality monitoring

In addition to existing 11 nos. of Air Quality Monitoring stations in 4 districts of the state, 8more stations shall be established to cover the remaining 4 districts (2 stations at each district).Air quality monitoring shall be conducted from these 19 stations during next 5 yrs. to study the trend of air quality in all districts of the state.

SH/N/12- Set up of Continuous Ambient Air Quality Monitoring Station (CAAQMS) at Aizawl city for continuous, real time basis monitoring with public display facility.

So far, air quality monitoring has been carried out in Mizoram on manual basis, which generates data only 2 to 3 days post to sampling date. Real time monitoring system that continuously monitor air quality is desired to set up in Aizawl city. The total cost of CAAQMS is about Rs.1.1 crore with Annual maintenance contract at about Rs. 14.5 lakh per year.

SH/1- Awareness generation and capacity building on climate change impacts and preparedness:

The government of Mizoram is already intensively working towards the awareness generation and capacity building towards the climate change and it impact. There is an absolute necessity for continuous efforts to be made towards building the preparedness of urban people to adapt with the impacts of climate change.

1. Organize training programmes for staff of health care facilities and common bio-medical waste treatment facilities: The Bio-medical Waste Management is still a new concept to the people of Mizoram even the workers of hospitals are hardly aware of the necessities of managing bio-medical wastes though effort were given by the SPCB to create awareness amongst hospital authorities in form of meetings, discussions etc. During inspection carried out by the SPCB, it

was found that most of the hospital's waste management was very unsatisfactory and rather disappointing in some units. It was noted during the inspection that, proper training for various groups of workers like doctors, nurses, health workers and laboratory technician and cleaners is highly necessary. It is however not possible to conduct such extensive training at the present financial strength.

2. Organize training / awareness programmes for public and bulk consumers on E- waste management: At present most of the electronic wastes generated at household level or in government departments or institutions are either sold to unauthorized scrap dealers or dumped as such in land filling. Awareness regarding importance of the proper management of e-waste is highly required. However, SPCB has acknowledged the setting up of collection center at Aizawl and has issued written intimation to bulk consumers and electronic repairing unit to dispose of their e- waste in the collection center but, not much cooperation is noticed. Therefore, the SPCB highly feels the necessity to organize training or awareness in each district capital of the state.
3. Training and Awareness Programme on Solid Waste Management: There is no scientific treatment of wastes in the state. However, Sanitary Land filling system is under construction. Once the landfill site is ready, itis expected to be more systematic. However, to implement this project and make use of the landfill site as envisaged in the project, segregation of waste is the first necessity, which may be more effective at sources. To educate the masses to ensure proper segregation, grass root level mass awareness campaign through Press/Media and Local Councils and trainers' training of all stakeholders are felt necessary for proper solid waste management. Training and Awareness on Solid Waste Management would be conducted in two (2) stages at different specified timings-
    - Trainers' Training for officials from stakeholder departments like Trade & Commerce, UD&PA, SIPMIU, and Municipal Council including Local councils.
    - Awareness Programme: -
        - Through Newspaper and Electronic media like local Television in the form of article/editorial/news item.
        - Through local Councils, in form of two awareness campaigns in each locality with resource persons.
        - A review meeting will also be held to oversee the progress made from the training and awareness campaigns.

SH/2- Capacity building of the departments on advance solid waste management

As mentioned above in this section, the state is taking initiatives towards scientific treatment of waste and taking up "waste to energy" idea, it becomes highly necessary for the government to provide the departments with the basic awareness and capacity to cope with the changing ideas and system. This will help the department to understand the administration systems for waste management and related activities (multidisciplinary and cross sectoral). Therefore, the department of UD & PA has taken up the activity for the next phase of the planning.

SH/3- Capacity building on water management and efficient distribution of water supply and delivery

The abovementioned activity has been undertaken by the government in the last 5 years. Many activities have been carried out towards building the capacity of the departments and as well as the urban dwellers on water management and efficient distribution of supply and delivery. However, the government feels a definite need to again take up the activity for proper functioning of the same. Therefore, the government has proposed a budget of Rs. 35 crores for the capacity building under AMRUT, NERCCDIP, NLCPR schemes.

SH/4- Liquid waste management through improved sewage design to address climate change impacts and development of climate friendly waste management system

A fair amount of work has already been undertaken by the government of Mizoram in the last 5 years including implementation of bio-digester. However, the government is planning to carry forward the

activity to the next phase. The government is planning to implement a greater number of bio-digester in different location for effective management of liquid waste.

SH/5- Develop climate responsible master plans for selected city/towns (CDP)

The state has prepared climate responsible master plans for most of the cities and towns of Mizoram in the last phase. The government is planning to complete the preparation of City Development Plan (CDPs) for all cities and towns of the state, giving priority to climate linkage actions.

6B.7 PROPOSED ACTIVITY SYNOPSIS: IMPLEMENTATION ARRANGEMENT AND BUDGET

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
1	SH/N-1	Scientific Treatment of solid waste management, Collection and conversion of domestic and agricultural waste to energy/Biogas.	SBM (U)	MI	2,36,000.00				UD& PA, MPCB &EF&CC Dept., AMC.
2	SH/N-2	Provision for basic amenities like water, sanitation and electricity to all urban household by 2030 (100% by 2023).	PMAY (U), Swachh Bharat, NUDWP	AD	430,000.00				UD& PA, PHED & P&E Dept.
3	SH/N-3	Maintaining the "Open Defecation Free" status of all towns.	Swachh Bharat	AD	1,000.00				UD& PA
4	SH/N-4	Development of Urban Infrastructure under state programme and central assistance.	SEDP	AD, MI	3,12,000.00				UD& PA, PWD, Transport Dept., PHED & P&E Dept.
5	SH/N-5	Construction of disaster resilient structure such as storm water drainage, retaining walls, etc.	AMRUT	AD	3,26,648.40				UD& PA, DM&R, District Administration, PHED & PWD
6	SH/N-6	Strengthening of urban livelihood and economy through women participation.	DAY-NULM	AD	16,000.00				UD& PA, Social Welfare Dept.
7	SH/N-7	Reduction in use of old and obsolete		MI					Transport Dept

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
		vehicle.							
8	SH/N-8	Adoption of rainwater harvesting techniques.	Mizoram Pollution Control Board (MPCB)	AD					UD & PA, PHED
9	SH/N-9	Monitoring of Vehicular Emission in 6 districts of the state.		MI	91.38				PCB &Transport Dept.
10	SH/N-10	Inventorization of E- waste generation in the state and Inventorization of occupiers and bio-medical waste generation, treatment & disposal.		AD, MI	73.00				PCB, UD&PA
11	SH/N-11	Conduct regular air quality monitoring (manual) covering all districts following CPCB's guidelines on ambient air quality monitoring.		AD, MI	480.00				MPCB
12	SH/N-12	Set up of Continuous Ambient Air Quality Monitoring Station (CAAQMS) at Aizawl city for continuous, real time basis monitoring with public display facility.		AD, MI	380.00				MPCB
13	SH-1	Awareness generation and capacity building in climate changes impacts and preparedness.	SBM (U), AMRUT	AD	1,470.00				UD& PA

S. No.	Code	Activity	Name of Scheme /Programme from which the fund can be accessed	Type	Proposed Budget (2021-30) in Lakh INR	Amount likely from Central scheme (2021-30) in Lakh INR	Amount likely from State Budget (2021-30) in Lakh INR	Gap Funding In Lakh INR	Implementing Department
14	SH-2	Capacity building of the departments on advance solid waste management.	SBM, NERCCDIP, NLCPR	MI	2,000.00				UD& PA
15	SH-3	Capacity building on water management and efficient distribution of supply and delivery.	AMRUT, NERCCDIP, NLCPR	MI	7,000.00				UD& PA
16	SH-4	Liquid waste management through improved sewage design to address climate change impacts and development of climate friendly waste management system.	AMRUT, SBM (U)	MI	7,104.86				UD& PA, MPCB & EF&CC Dept
17	SH-5	Developing climate responsible master plans for selected city/towns (CDP)	SEDP	AD, MI	64.00				UD& PA
		TOTAL			**13,40,311.64**				

CHATPER 7- CROSS CUTTING: GENDER

7.1 SECTORAL OVERVIEW

India being a democratic country still struggles with gender inequalities beyond the arena of equal economic growth and access to educational resources. Not just India, even after the commemoration of International Women's Day by the United Nations, the critical feminist movement has been largely overlooked in developmental issues, across the world. This differentiation based on sex, socially constructed predefined gender roles has been engraved in India's socio-cultural fabric that has its deep cultural and historical lineage.It is imperative to integrate and address gender concerns in the context of climate change. Gender is a crosscutting issue, and it is well known that women suffer climate impacts relatively more than men do because they have less opportunities, authority and resources, which enable them to adapt to the unavoidable impacts of climate change. Effective participation of women becomes imperative while adaptation to climate change as they can provide solutions required in enhancing their resilience. Hence, for effective action on all aspects of climate change, the effective participation of women is necessary.

Table 30: Share of Women in Mizoram

Percentage Share of Women Population			Sex Ratio		
Rural	Urban	Total	Rural	Urban	Total
23.35	26.06	49.38	952.00	998.00	976.00

Source: Census 2011

The State observed growth in female literacy rate from 86.75% (in 2001) to 89.27% (in 2011). Women are considered to be as changing agents when executing climate impact solutions. The long-established knowledge, which they hold, helps to adapt to impacts of climate change. Women have important impact on consumption patterns and lifestyle choices also.

Table 31: Comparison of Literacy Rates

2001			2011		
Female	Male	Total	Female	Male	Total
86.75	90.72	88.80	89.27	93.35	91.33

Source: Census 2011

The State has observed increase in Maternal Mortality Rate (MMR) from 2012-13 to 2016-17. Women are more prone to the increased occurrence of vector-borne and water-borne diseases because of climate change. Improper health diet as well as lack of access to good health services results in weakness, maternal mortality, reduced physical and mental capacity, etc. It is important to monitor health inequalities while gender mainstreaming through proper coverage of health services.

Table 32: Maternal Mortality Rate (MMR) in Mizoram

2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
61	76	95	88	104	101

Source: Health Department, Mizoram

7.2 IMPACT OF CLIMATE CHANGE

Women are highly vulnerable and susceptible to the impacts of climate change, owing to their intrinsic physical characteristics. The ability to cope up and adapt to various climate related hazards is different for men and women in a similar circumstance.

Climate Change Impacts	Women's Vulnerabilities
Lower food production	• Least to eat; sleep on an empty stomach • Need to take on additional work as wage laborwhich also led to more feminization of agricultural labor
More natural disasters-cyclones, floods, water-	• Longer distances to walk to get water and fuel- wood • Loss of fodder and livestock

logging and droughts; infrequent rains; intense rains	• Drought/ infrequent spells of rains- harder ground to do agricultural work on • Intense rains- more weeds and weeding is a woman's job
Higher summer temperatures; longer summers	• Lower milk production among animals • More tiring work in fields • Longer waking hours to work in the field early morning and late evening to beat the heat
Social Impacts	• Higher indebtedness- women go to take loans and have the responsibility to pay off loans • Greater poverty and frustration among men leads • to increase in domestic abuse/violence

Source: Engendering the Climate for Change, Policies and practices for gender-just adaptation by Aditi Kapoor

Sector-wise Impacts

Sector	Drivers	Impacts
Agriculture and Allied	Food productivity	• Women shoulder more time and work burden • Low productivity leads to household conflict, alcoholism and abuse
Health	Food and Nutrition Security	• Maternal Mortality • Women being providers culturally, are disproportionately impacted due to food/nutrition stress
Energy	Fuel wood	• Women's burden of collecting fuel resources is increasing in the wake of receding forests and higher crop loss
Disaster/ Hazard	Change in productive role	• Loss in Livelihood • Women are also unfairly affected by climate-induced natural disasters such as droughts, cyclones and floods and need relief • and rehabilitation packages made to address their needs
Social	Work-force composition	• Wage loss, marginalization and subsistence farming • The workforce composition changes, wage differential increases, sometimes extra work burden

7.3 KEY ISSUES AND CHALLENGES

Area	Issues/Challenges
Policy & Regulatory	• Gender is a sector, which is not included in the Nationally Determined contribution of the country and there for the State lacks any fix targets • for development in Gender equality
Socio economic/ Cultural	• Women appraisal and inclusivity in the societal development is negligible • Presence of Inequality in rural areas of the State
Environmental	• Women along with children and aged people are the most vulnerable to natural hazards owing to their physical strength and characteristics

7.4 GAP/ BARRIER ANALYSIS

- Need of awareness and capacity building regarding climate change.
- Need of gender-based research and participatory planning to design the policies and programmes
- Proper collection and mapping of gender disaggregated data
- Lack of accepting the contributions of women as decision makers, stakeholders and experts across sectors and at all levels that can lead to long-term solutions to climate change
- Women hold the knowledge and understanding of what is required to adapt to changing climate conditions, and to arise with practical solutions but their knowledge is often not utilized.

7.5 GENDER MAPPING

Gender inequality enhances the vulnerability and risk. The relationship of women with climate sensitive sectors have been mapped to emphasize this point. The conceptual framework as integrated in the vulnerability framework is given below:

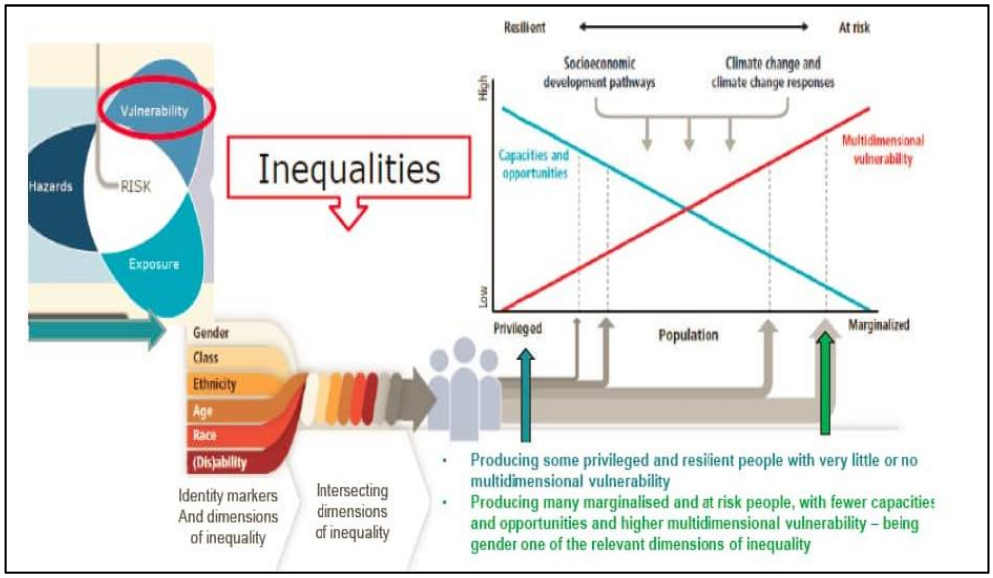


Figure 61: Gender Mapping
Source: GIZ, Gender Training Manual

Mainstreaming Checklist

It is important to integrate gender concerns in adaptation and mitigation strategies and the following checklist can help in the integration process.

- Assess the different implications of policy and Programme interventions suggested in the SAPCC for women and men from the outset.
- Assess women and men's technology choices, uses and needs.
- Assess women and men's knowledge concerning the climate change risks, changes in local environment, weather, strategies and coping mechanisms in response.
- Ensure that these assessments are informed by a gender expert to support in developing a gender analysis and by consultations with women and men on priorities, strategic needs and options for action.
- Based on this analysis, refine-targeted objectives for incorporating gender equality and women's empowerment into policies' and programmers' plans and budgets.
- Use female project implementers, extension agents and trainers to ensure that women participate equally in knowledge access and training.
- Set targets for female participation in activities.
- Make women's equality, access to information, economic resources and education a priority.
- Monitor and evaluate changes in gender relations using gender-sensitive indicators.
- Monitor beneficiaries and results of projects using sex-disaggregated data.
- Proactively seek out and engage with appropriate women's rights organizations and female community leaders when selecting partner

The figure below shows the gender mainstreaming process at various levels.

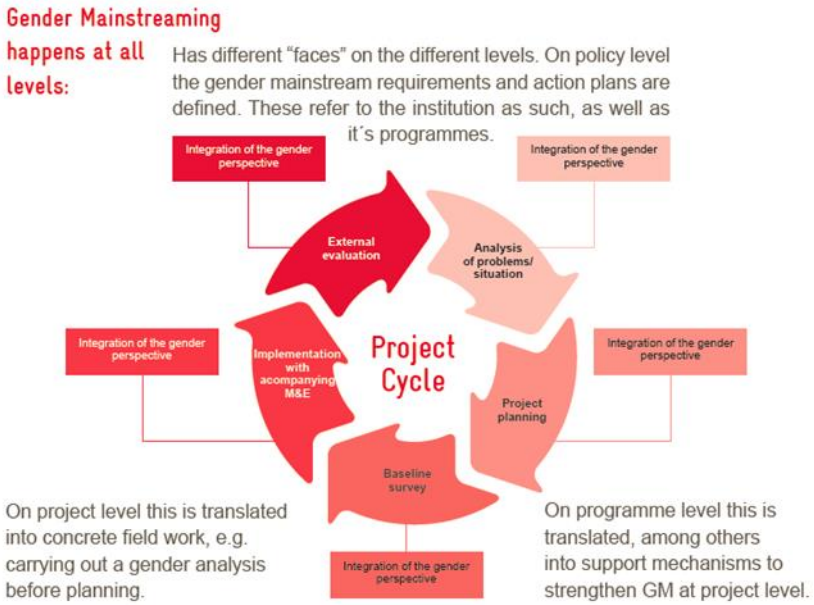


Figure 62: Gender Mainstreaming process

CHATPER 8- FINANCING SAPCC

8.1 FINANCING GATEWAYS FOR SAPCC

India's climate adaptation gap by 2030 is going to be around 1 trillion USD68. Therefore, creative financing strategies by the states, is the need of the hour. It has become apparent since the SAPCC 1.0, that the additional finance is hard to come by. Therefore, high impact areas need to be identified and tagged from the State's ongoing sectoral activities for mainstreaming. In addition, more and more private sector involvement should be pooled in for high priority activities in a systematic way including public-private partnership mechanism. Apart from this, additional climate finance can be accessed from-

- International Climate Funds (Green Climate Fund (GCF), Global Environment Facility (GEF), Adaptation Fund);
- Bilateral Cooperation (additional financial and technical support for climate change outcomes from SDC, GIZ, JICA and DFID);
- Multilateral facility (loan and grant projects through WB, ADB, UNDP, etc.) and
- National Climate Funds (National Adaptation Fund for Climate Change, Small Grants programme, mission-specific allocation and regular schematic allocation having climate relevance).

The approach taken for financing mechanism is explained in the table below. Various types of financing windows are listed down and source of fund against each of them is figured. Many kinds of instruments can be used to access the funds. The key sectors in which the funds can be used is also mentioned in the table along with the modalities and challenges faced in the process.

Financing Window	Source of Fund	Instrument	Key sectors	Access modalities and challenges
International climate fund (budget additional)	Green Climate Fund GCF)	Loan and grant, guarantee, equity	Food and water, health, Livelihood, infrastructure and built environment, ecosystem (for both adaptation and mitigation)	Micro up to 10 million USD • Small (10-50) • Medium (50-250) • Large (>250) National Designated Authority (MoEF&CC) as focal point Through (Direct Access Entity and multilateral access entities) approved as NIE or MIE by NDA (MoEF&CC) 1-2 years, elaborate process
	Adaptation Fund	Grant, But Loan as co-finance (by NIE or MIE) Maximum up to 50% of the project cost	Natural resource systems (addressing climate risks), ecosystem, hazard	Regular project size >1 million USD Small <1 million USD Through NDA through NIE and MIE 8-12 months Maximum cap for country 10 million USD (India exhausted)
National Fund	GEF	Grant	Based on the sectors under the star allocation for both adaptation and mitigation. 1) Food systems, Land Use and Restoration; 2) Sustainable Cities; and 3) Sustainable Forest Mgmt. (under GEF 7	Full sized project > 2 million USD Medium size (up to 2million USD) Enabling activity (strategy development under a convention) Minimum 12 months

			series)	
	NAFCC	Grant, Co-finance, convergence fund from state	Agriculture, horticulture, agro-forestry, environment, allied activities, water, forestry, urban, coastal & low-lying system, disaster management, human health, marine system, tourism, habitat sector and other rural livelihood sectors to address climate change related issues. Climate scenarios, capacity building, consultation, monitoring	Though no upper limit specified typical maximum for a state is about Rs 25 crore. Through NIE, Typically, 6 months for preparation and sanction Maximum preparation cost is Rs 10 lakh, NIE fee capped at 3% of the project cost
National Fund	Program/ Projects linked to clear climate outcomes	Loan, Grant	Sectoral (both for adaptation and mitigation)	On state partnership basis and through the concurrence of national government
INGOs	Program/ Projects linked to clear climate outcomes	Grant	Sectoral (both for adaptation and mitigation)	On state partnership basis and through the concurrence of national government
CSR	Program/ Projects linked to clear climate outcomes	Grant	Sectoral (both for adaptation and mitigation)	As per statutory requirement under Company Act for the eligible companies, private foundations with voluntary pledge with programmatic convergence
Budgetary (National	Regular schematic (may not be additional)	Budget (grant in aid) state, central and centrally sponsored schemes	Sectoral (both for adaptation and mitigation)	Some of the schemes are listed in the report, not all required/ proposed strategies/ priorities are covered under the scheme guideline. This needs to be classified as climate relevant and possible have a climate tag for reporting. Currently, thereis no standard approach available
Budgetary (Mission-specific)	As per mission guideline	Both demand-driven and as per target	Sectoral (both for adaptation and mitigation)	Some of these have been specified in the report

8.1.1 Steps for accessing funds

There are four broad steps to be taken for the financing in climate change domain. Typical process to be followed in the climate finance area is explained stepwise in the table below:

Step 1a: Identify high impact/ high priority activity/ strategy having linkage to SDG/ NDC	Identify relevant schemes in the state budget and put in the right demand (some examples have been given in the report). The expenditures can be treated a climate relevant expenditure based on how many components of the project activities have been covered.
Step 1b: identify activities linked to national missions	Draw down resources form relevant mission based on the demand/ target
Step 2: There is no correspondence or availability offunds from state budget/national missions	Map to CSP, external aided projects or sources under bi-lateral or multilateral cooperation. Prepare proposal under the formats/processes given by the agency. The lead department/ agency can initiate the process.
	Look for grants from CSR and INGO sources
Step 3: There is correspondence or0020availability of fundsfrom special climate funds available nationally	For NAFCC, prepare project concept note, do a preliminary go-no go check with NIE If agreed go ahead with the detailed project report and submit through NIE to National Designated Authority Executing agency signs the grant agreement and project cycle operation starts. Baseline and end line assessment conducted by external agencies track outcomes as per the project result framework
Step 4: There is correspondence or availability of fundsfrom special climate funds available internationally	Assess the concept based on the result/impactareas and investment criteria (for GCF) • Impact potential • paradigm shift potential • sustainable development potential • needs of the recipient • country/state ownership • efficiency and effectiveness Submit proposal to NDA through NIE or MIE asper the format. Once approved by relevantboard sign subsidiary agreement with NIE/MIE Executing agency starts the project cycle operation.

8.2 FINANCIAL ALLOCATIONS UNDER SAPCC – I

The following section gives the sector-wise allocation of the amount allocated against the activities that were proposed in SAPCC-1

8.2.1 Sustainable Agriculture Mission

Sl. No.	Strategies /Activities	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Amount allocatedduring 2013-18 in Lakh INR
1.	Development of Land (Levelling, bundling, etc.) for WetlandRice Cultivation (WRC) on available lands having 0-10% slope and Improvement of Existing Wetland Rice Cultivation (WRC).	4,200.00	80.00

2.	Developing database on genotypes of local crop varieties(mainly rice varieties) and identification of suitable varieties for different agro-climatic zones.	25.00	-
3.	Impact assessment of paddy cultivation through agricultural inputs such as crop varieties, kharif crops and promotion of rainwater harvesting and construction of eco-friendly mini check dams for irrigation.	750.00	639.00
4.	Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building to train farmers in latest rice cropping techniques specially evolved to counter adverse effects of climate change.	50.00	497.00
5.	Optimization of jhum cultivation through conservation of arable land, water utilization management, parallel cultivationof alternative crops and Alternative jhum Control to Livelihood.	493.00	332.16
6.	Construction of hill slope terraces for conservation of moistureand cultivation of food grain, vegetable, pulses and oilseed crops.	3,175.00	4,901.31
7.	Increasing the area under perennial fruit plantation crops andlow value high volume crops to help cope with uncertain weather patterns.	7,240.00	6,062.92
8.	Management of climate change impact on horticulture and Climate risk management studies.	14,840.00	12,427.30
9.	Improving post-harvest management such as cold chain for perishable crops and winter cultivation practices.	8,592.00	7,195.11
10.	Promotion of organic farming through usage of compost and vermicompost.	300.00	352.83
11.	Adoption of Integrated Pest Management for improved cropyield, preparedness to tackle emerging scenarios of pests and capacity building for stakeholders.	692.50	829.91
12.	Research study on livestock disease and establishment of early warning system and Capacity building to stakeholders.	759.70	3,760.04
13.	Study of impact of climate change on the indigenous fauna of aquatic ecosystem and open waters.	5.00	-
14.	Water storage and providing proper diversion channels to theexisting ponds for drainage of catchment runoff during sudden heavy rains.	525.00	-
15.	Providing extensive support and services to fishermen through establishment of district level training centres.	51.00	120.00
16.	Water bodies conservation for fishery sector and establishment of fishery units in reservoirs and riverine area.	252.50	6,905.80
17.	Green the devastated barren wasteland for fodder cultivation (7,000 Hectares).	112.00	554.33
Total		**42,062.70**	**44,657.71**

Analysis of Climate Expenditure

The above section presents the budget proposed under Mizoram SAPCC Phase -1 for proposed activities during 2013-14 to 2017-18 and the amount actually spent during the same time. In addition, the amount allocated for other activities of agriculture and allied sectors (Agriculture, Horticulture, Soil & Water Conservation, Animal Husbandry & Veterinary and Fisheries) during 2013-14 to 2017-18 sums up to Rs. 1,89,321.3069. Thus, about 23.59% of the total budget is directly climate linked. However, there might be other activities also, which are climate linked and not listed in the proposed activities of SAPCC Phase-1.

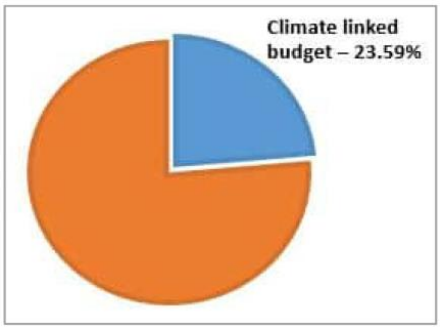


Figure 63: Climate Linked Budget spent in Agri and allied sector

8.2.2 Green India Mission

The following table shows the amount spent by the department on proposed activities during 2013-14 to 2017-18.

Sl. No.	Activities / Strategies	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Allocation /Expenditure during 2013-18 in Lakh INR	% Share
1.	Improvement of forest quality and density in degraded lands and abandoned jhum lands.	20,000.00	5,309.77	26.55%
2.	Improvement the productivity of bamboo and promotion of local value addition through establishment of market linkages,	250.00	3,365.19	1346.08%
3.	Undertaking studies on climate changeimpacts on NTFP productivity and sustainable harvesting practices for adaptation of climate change,	800.00	27.00	3.38%
4.	Capacity building of communities/ community forestmanagement institutions for climate change adaptation	70.00	105.75	151.07%
5.	Prevention and control mechanism for forest invasive species and its utilization strategies.	65.00	30.00	46.15%
6.	Promotion of forest-based industries	75.00	0.00	0.00%
7.	Formulation of conservation strategies for Orchids and establishment of market linkages for value addition	200.00	12.00	6.00%
8.	Livelihood improvement Activities for forest dependent communities	3,600.00	110.00	3.06%
9.	Strengthening of Forest Department	1,000.00	1,961.79	196.18%
10.	GIS based Monitoring and Evaluation of the program	200.00	36.00	18.00%
11.	Strengthening of Local VSS	1,000.00	183.34	18.33%
12.	Publicity /media and Outreach	200.00	127.82	63.91%
13.	Establishment of Mission Directorate	900.00	150.00	16.67%
	TOTAL	**28,360.00**	**11,418.66**	**40.26%**

Analysis of Climate Expenditure

In forestry sector, the entire allocation by the department is considered climate linked. The amount spent by the department on the proposed activities from 2013-14 to 2017-18 are:

Year	Amount Spent in 2013-14 to 2017-18 (in Lakh INR)
2013-14	4,054.84
2014-15	2,821.44
2015-16	1,691.01
2016-17	2,293.41
2017-18	557.97
Total	**11,418.66**

The entire activities have been implemented at a total cost of Rs. 11,418.66 lakh which has been supported by the state as well as central fund. During this plan period, the state received only 40.26% of the total budgeted amount for the activities undertaken. In terms of the expenditure of the received fund, the overall programme is on track and lot of work has been done as per the planned activities.

8.2.3 Mission on Sustaining Himalayan Ecosystem

The following shows the amount spent by the Department of Environment, Forest and Climate Change (during 2013-14 to 2017-18) to implement the listed activities in SAPCC Phase 1 (2013-18).

Sl. No.	Activities / Strategies	Proposed Budget (as in SAPCC 2013- 18) in Lakh INR	Allocation /Expenditure during 2013-18 in Lakh INR	% Share
1.	Undertaking study on valuation of forest resources (Non-traded) and climate change impacts on the vulnerable ecosystems.	80.00	-	
2.	Work to establish new systems to support for public awareness building through Establishment of Envis Centre.	100.00	12.10	12.10%
3.	Monitoring of carbon stock and biodiversity at regular intervals.	130.00	-	
4.	Protection of forests and forest land from soil erosion in 135,000 ha.	8,100.00	17.26	21.31%
5.	Conservation and Management of two major wetlands	200.00	410.69	205.35%
6.	Inventorying and Conservation of Medicinal Plants /Orchid.	1,000.00	647.86	64.79%
7.	Research on Wildlife Populations Corridors - Mountain Goats, Burmese green Peacock, Malayan Bear.	200.00	24.00	12.00%
8.	Biodiversity assessment	500.00	-	
9.	Documentation and enrichment of Biodiversity database through Peoples Biodiversity Register (PBR) at the JFMC level.	1,000.00	-	
TOTAL		**11,310.00**	**1,111.91**	**9.83%**

The above table shows the amount allocated against the proposed activities, which were implemented during 2013-14 to 2017-18. However, the actual budget against all the activities proposed in SAPCC Phase 1 was Rs. 13,120.00 lakh.

Analysis of Climate Expenditure

In the Mission for Sustaining Himalayan Ecosystem, the entire allocation by the Department of Environment, Forests and Climate Change is considered climate linked. The amount spent by the department on the proposed activities from 2013-14 to 2017-18 are:

Year	Amount Spent (in Lakh INR)
2013-14	288.32
2014-15	246.20
2015-16	270.70
2016-17	73.27
2017-18	233.42
Total	**1,111.91**

The entire activities have been implemented at a total cost of Rs. 1,111.91 lakh which has been supported by the state fund and central fund. During this plan period, the state has received only 9.83% of the total budgeted amount for the activities undertaken. In terms of the expenditure of the received fund, the overall programme is on track and lot of work has been done as per the planned activities.

8.2.4 State Health Mission

S. No.	Strategies /Activities	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Allocation / Expenditure during2013-18 in Lakh INR
1.	Identify extrinsic and intrinsic drivers of malaria andidentifying community intervention measures towards control of incidence of malaria.	350.00	3,530.00 (Activities under NHM)
2.	Study and documentation of diseases caused by water (water borne) and development of institutional mechanism to reduce the incidence/ outbreaks of such diseases along with awareness generation.	3,500.00	0
3.	Development of institutional framework and infrastructural facilities for early detection of vector borne diseases, including managing outbreaks.	1,000.00	0
4.	Establishment of pathological laboratory with state of art technology for diseases identification.	1,500.00	0
5.	Public health system infrastructure development forextreme climate risk management and managing outbreaks of major diseases.	20,000.00	11,098.81 (Activities under NHM)
6.	Capacity building and training for health workers forsensitization of climate variation and health impacts.	800.00	79.80 (Activities under NHM)
TOTAL		**27,150.00**	**14,708.61**

The above table shows that, the amount allocated against the proposed activities that were implemented during 2013-14 to 2017-18. However, the actual budget against all the activities proposed in first phase of SAPCC was Rs.30,150.00 lakh.

8.2.5 Mission on Strategic Knowledge on Climate Change

Sl. No.	Activities/ Strategies	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Adjusted Allocation (2013-18) in Lakh INR
1.	Development of Knowledge Management on Climate Change and facilitating its operation for initial period	1,000.00	68.27
2.	Capacity Building on climate change • Capacity building of personnel in the servicedepartment • Exposure visit for capacity building	300.00	16.60
Total		**1,300.00**	**84.87**

A total amount of Rs. 84.87 lakh has been spent during the last 5 years for undertaking the activities proposed in the SAPCC Phase 1. It is observed that, only 6.53% of the total budget proposed for the aforesaid activities have been allocated and utilized. However, the state government is far more concerned and conscious about the climate change scenario of the state and is working towards adapting the situation through various activities and initiatives. It is to be noted that, the above table shows the amount allocated against the proposed activities that were implemented during 2013-14 to 2017-18. However, the actual budget against all the activities proposed in first phase of SAPCC was Rs. 1,400.00 lakh.

8.2.6 State Water Mission

Sl. No.	Strategies / Activities	Proposed Budget (asin SAPCC 2013-18) in Lakh INR	Adjusted Allocation /Expenditure (2013-18) in Lakh INR
1.	Finalisation of plan for conservation and preservation of water resources	16,000.00	-
2.	Formulation of State Water P olicy	10.00	-
3.	Community tank management for combating water borne diseases	10,000.00	243.00
4.	Renovation and development of traditional water harvesting system with scientific intervention indistrict level	8,000.00	846.89
Total		**34,010.00**	**1,089.89**

The above table shows the amount allocated against the proposed activities that were implemented during 2013-14 to 2017-18. However, the actual budget against all the activities proposed in the SAPCC Phase 1 was Rs. 46,974.00 lakh. The above table shows that, only 3.20% of the total proposed budget has been utilized/ allocated during last five years. This is because of only two activities out of the eleven proposed activities have been implemented. Although, Figure below Climate Linked Budget spent under water sector some amount of work has been initiated under two other activities, but no fund release has been done so far as the activities are at very initial stage.

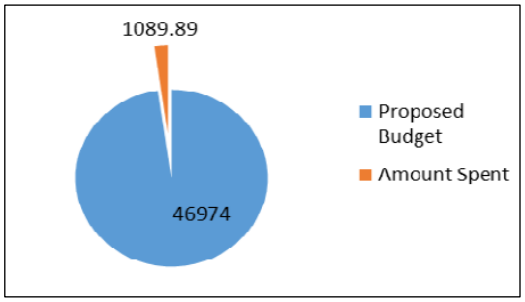


Figure 64: Climate Linked Budget spent under water sector

Analysis of Climate Expenditure

A cumulative amount allocated under the state water budget for climate linked activities as well as for other activities during the period 2013-14 to 2017-18 was Rs. 13,000 crores. From the above-mentioned section, it can be concluded that, only 2.32% of the total water sector budget has been utilized for implementing climate-linked activities as proposed in the last SAPCC.

8.2.7 Mission on Enhanced Energy Efficiency

The table below presents the synopsis of the overall financial allocation/expenditure during SAPCC Phase 1 (2013-2018) for implementation of certain activities and sub-activities proposed under the last SAPCC.

Sl. No.	Strategies /Activities	Proposed Budget(as in SAPCC 2013-18) in Lakh INR	Allocated / Expenditure during 2013-18 in Lakh INR	% Share
High Priority Action				
1.	Awareness creation and manpower deployment for enhance the energy efficiency measures	60.00	73.66	123%

2.	Market Transformation of Energy Efficiency applications through policy measures	10.00	473.00	4730%
3.	Up-gradation of transmission and distribution network for minimization of energy losses	5,075.00	4,470.27	88%
4.	Penetration of energy efficient devices indomestic and public utility systems facilitated by financial, supply chain and market incentives	2,455.00	112.30	5%
5.	Unlocking the energy efficiency activity in IGEA mode	10.40	10.73	103%
6.	Institutional development and strengthening ofEnergy departments for Energy Efficiency promotion	110.00	56.00	51%
7.	Increase Hydro power generation by supportingprivate or public investors in setting up projects and undertake demonstration project	50,461.10	12,491.00	25%
Total Budget outlay (for 21 high priority action including both activities and sub-activities)		58,181.50	17,686.96	30%
Medium Priority Action				
8.	Life cycle analysis of existing hydro power plant and implementation of R&M measures.	0	2,323.56	
Total Budget Outlay		**58,181.50**	**20,010.52**	**34%**

Assumption

- The additional allocation and expenditure under component 2 owe to the creation of the State Energy Conservation Fund of Rs. 425.00 Lakh.
- Under component 3 only the allocation/expenditure for improvement, augmentation and upgradation of transmission and distribution network are considered. New constructions of transmission and distribution network are not considered under the budget estimate.
- The expenditure of the central govt./EESL or the private expenditure involved in sourcing of energy efficient lighting and ventilation options under DELP is not accounted under the expenditure assessment. The expenditure involved under the demonstration project/pilot is only considered.

Analysis and Observations

- The component wise allocation/expenditure clearly revels higher thrust of the department on awareness, sensitisation and outreach activities.
- Creation of State Energy Conservation Fund corpus will entitle the department in executing innovative demonstration towards mainstreaming of technology measures.
- Substantial amount of investment has been incurred for augmentation of the transmission and distribution network and construction of hydropower projects.

Mapping Progress against Indicator

Year	Share of Renewable	Access to Electricity	Per Capita Consumption (kWh)
2012	46.94%	94.3% village electrified (2012-13)	263
2018	49.63%	100% village Electrified (Aug 2018)	449
Note: The existing share of RE to increase with the commissioning of existing central sector hydropower unit and state-owned hydropower unit. Even considering the simultaneous growth of energy demand and the timeline of commissioning for different RE project under conceptualization and implementation, the share of renewable will be above 50% during the next five-year SAPCC cycle.			

8.2.8 State Solar Mission

The table below presents the synopsis of the overall financial allocation/expenditure during 2013-18 for implementation of certain activities and sub-activities proposed under the SAPCC Phase 1.

Sl. No.	Strategies/ Activities	Proposed Budget (as in SAPCC 2013-18) in Lakh INR	Allocated / Expenditure during 2013-18 in Lakh INR	% Share
1.	Up scaling Renewable Energy Application formeeting up decentralized distributed or Off - grid area energy demand	9,167.50	2,834.17	31%
2.	Unlocking grid interactive solar power generation and supplement the conventional grid power under National Solar Mission	6,500.00	2,856.45	44%
3.	Reduce anticipated energy and peak demand through promotion and implementation of pilot SWH application by undertaking installation of 100 Nos. of 100 LPD systems and 100 Nos. of 200 LPD systems across various demand segments.	80.00	0.00	0%
4.	Develop RE systems supply chain through empanelment of renewable energy technology manufacturers /distributors with ZEDA and support in development of their set-up in the state	0.00	0.00	NA
5.	Institutional development and strengthening of ZEDA for promotion of Renewable Energyapplications	35.00	0.00	0%
6.	Awareness creation and manpower development for enhancement of the renewable energy application	25.00	0.00	0%
7.	Market Transformation of Renewable Energy applications through policy measures	10.00	111.27	1113%
Total Budget Outlay		**15,817.50**	**5,801.89**	**37%**

Assumption

The cost component includes actual expenditure /allocation and does not considers the estimated cost of interventions, or cost of the project submitted for approval.

Analysis and Observations

- The difference in the budget owes to the substantial reduction in the capital cost of solar powered system.
- Most of the proposed implementation project has been initiated.

8.2.9 Sustainable Habitat Mission

Sl. No.	Strategies /Activities	Proposed Budget (as in SAPCC 2013- 18) in Lakh INR	Allocation / Expenditure during 2013-18 in Lakh INR
1.	Capacity building and research initiatives on Climate Change impacts and preparedness	130.00	4,157.20
2.	Improvement in water usage management for urban drainage to reduce climate change	60,000.00	9,551.95

	impacts		
3.	Development of climate friendly waste management systems and improvement of aesthetics	70,100.00	3,762.53
4.	Reduction of disaster risk through climate change adaptation	580.00	14.00
5.	Improvement of vehicular pollution control mechanism for reduction of GHG emissions	600.00	78.9
Total		**131,410.00**	**17,564.58**

The above table shows the amount spent on the proposed actions in the SAPCC Phase 1. A total amount of Rs. 17,564.58 Lakh (approx.) has been spent during 2013-18 out of the total proposed budget of Rs. 131,410 Lakh (approx.). This indicates that only 13.37% of the proposed budget has been spent on various climate-concerned activity. It is to be noted that the above table shows the amount allocated against the proposed activities that were implemented during 2013-14 to 2017-18. However, the actual budget against all the activities proposed in first phase of SAPCC was Rs. 131,460.00 lakh.

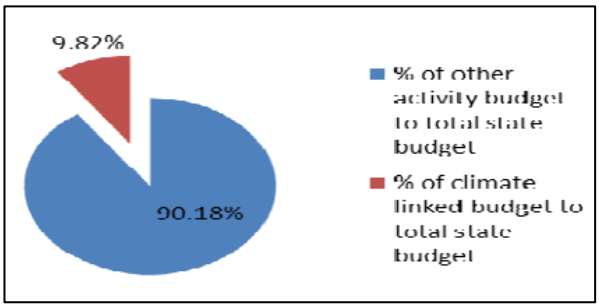


Figure 65: Climate Linked Budget spent under urban sector

Analysis of Climate Expenditure

The state received a total budget of Rs. 1,780.90 crore under the Urban Development and Transport department of the state during last 5 years (2013-18). However, only 12.80% of the total budget is used under the SAPCC Phase 1 responses.

8.3 SYNTHESIS

In the SAPCC Phase – I, 91 climate actions were proposed. The tentative budget to implement these actions was Rs. 3,675.20 crores for five years. The estimated adjusted allocation as deciphered from various sources seem to be Rs. 1,164.5 crores which is about 31% of what was needed.

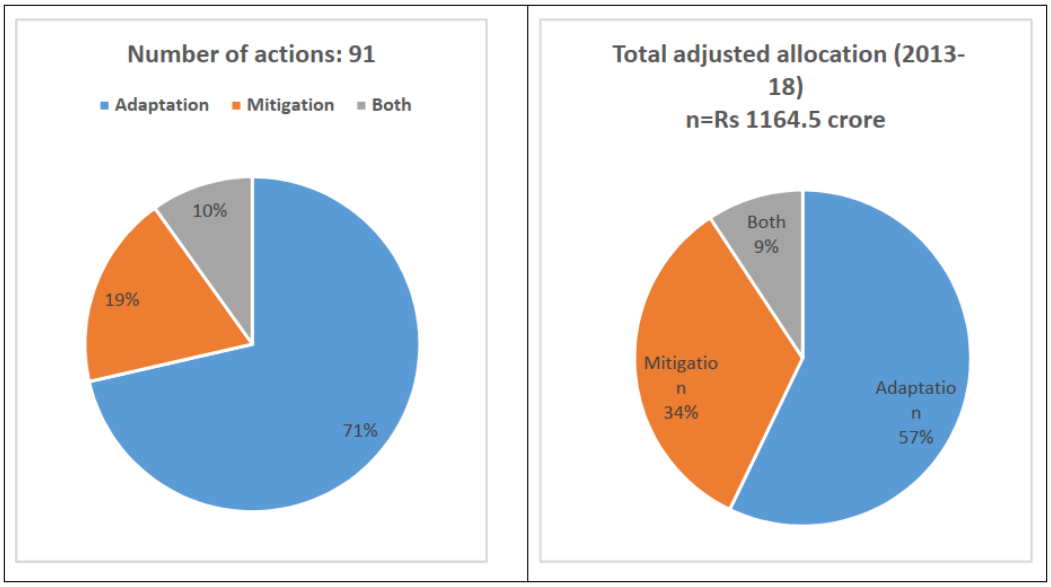


Figure 66: Breakup of climate actions (2013-18)

Out of the proposed actions in the previous SAPCC (Phase 1), 71% were for adaptation, 19% for mitigation and 10% had characteristics of both. Similarly, in terms of adjusted allocation, 71% of adaptation actions had 57% of the total adjusted allocation in terms of budget, 19% mitigation actions had 34% of the total allocation and balance was for both.

In terms of the nature of activity, more than 31% of the activities were investment oriented, 19% were for capacity building, 14% were meant for policy related actions & studies and 28% for research and assessment. 8% of the total are pilot actions.

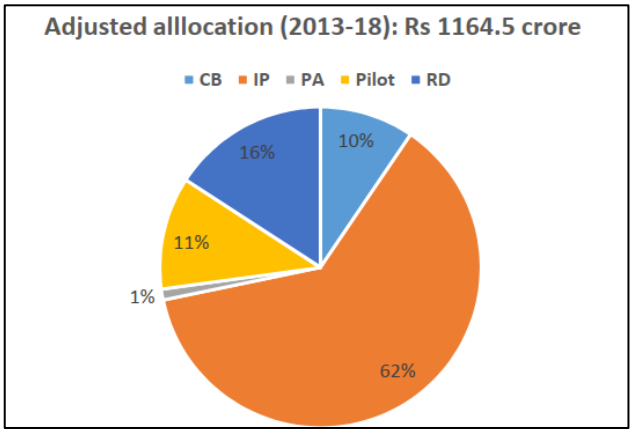


Figure 67: Allocation by nature of activities

In terms of allocations, 62% are investment oriented (including infrastructure creation), 10% for capacity building, 16% for research and 1% for policy related actions, 11% for pilot and demonstration type of activities. However, in the absence of detailed budget coding, the exact break up is difficult to estimate.

The table below gives the sector wise break up:

Sector/ Mission	Proposed Budget (as in SAPCC 2013-18) in lakh INR	Adjusted allocation past 5 years (2013-18) in lakh INR
State Mission for Sustainable Agriculture	42,062.70	44,657.71
State Mission for Green India	28,360.00	11,418.66
State Mission for Sustaining the Himalayan Ecosystem	13,120.00	1,111.91
State Mission for Health	30,150.00	14,708.61
State Mission on Strategic Knowledge for Climate Change	1,400.00	84.87
State Water Mission	46,974.00	1,089.89
State Mission for Enhanced Energy Efficiency	58,181.50	20,010.52
State Solar Mission	15,817.50	5,801.89
State Mission on Sustainable Habitat	131,460.00	17,564.58
TOTAL	**367,525.70**	**116,448.64**

The above table shows, the investment focus has been more on the agriculture sector, which has strong relevance with the NDC and is highly affected by climate change. Investment in power infrastructure for energy efficiency has received the second highest allocation, which will contribute to the NDC goals. Similarly, rapid urbanisation in the state also shows third highest allocation to urban sector. This has both adaptation benefit and mitigation co-benefit. The fifth highest allocation has been to forestry sector, which has strong bearing on addressing climate variability, soil conservation as well as it helps in creating the carbon sink.

8.4 SUMMARY OF PRIORITISED INTERVENTIONS

After the discussion with all relevant stakeholders and departments, 73 planned activities have been identified in nine sectors. The tentative budget to implement these actions over the period from 2021-2030 is 20,612 crores.

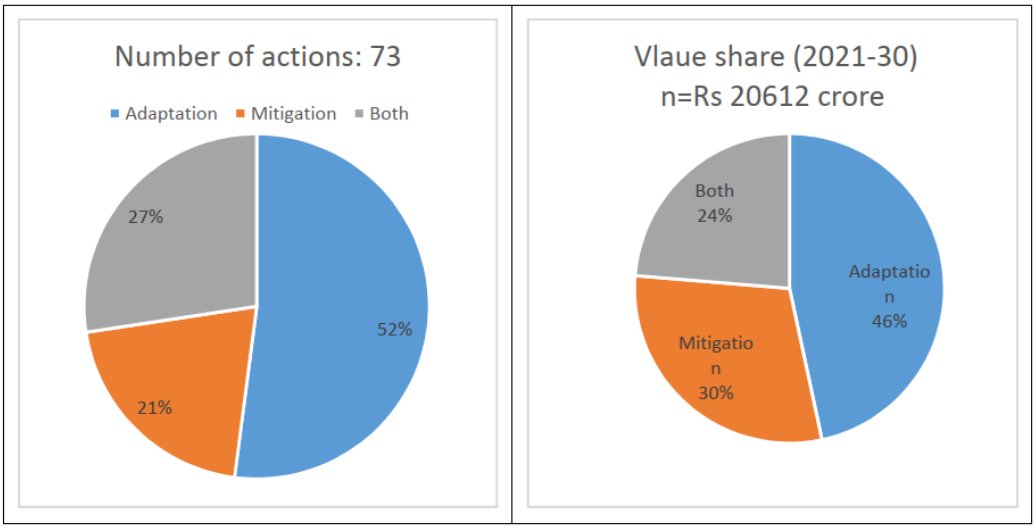


Figure 68: Breakup of climate actions (2021-30)

Out of the new action points proposed, in SAPCC (Phase 2), 52% are for adaptation, 21% for mitigation and 27% are having characteristics of both. In terms of allocated amounts, 46% budget proposed will be used for undertaking adaptation activities, 30% for mitigation activities and 24% will be spent on activities which are having both adaptation and mitigation benefits. In terms of the nature of activity, more than 31% of the activities were investment oriented, 19% were for capacity building, 14% were meant for policy related actions & studies and 28% for research and assessment. 8% of the total are pilot actions.

In terms of nature of activity, 48% are investment oriented (including infrastructure creation), 14% for capacity building, 19% for research and 18% for policy related actions and 1% for pilot and demonstration type of activities.

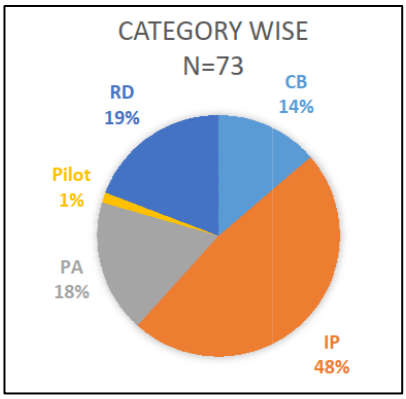


Figure 69: Allocation by nature of activities

SDG-NDC Linkage of Proposed Activities

Of the73 planned activities that have been identified in nine sectors for prioritisation, the financial allocation have been proposed merging similar activities. The key method of prioritisation is driven by the following:

- The adaptation activities that addresses high vulnerability and fits in to the impact chain (as relevant to sector)
- Low carbon development linked to mitigation activities
- There are some activities where adaptation and mitigation both possible, the co-benefit approach has been taken.

Further sharpening has been done based on their linkages to SDG-NDC, funding linkage and implementation potential. The details have been given in annexure 3.

Though for prioritization of activities, a multi criteria-based analysis-based score card was used, first the activities have been screened based on vulnerability/impact as well as low carbon development process. Thereafter, NDC-SDG linkage was assigned highest weight of 50%. Implementation potential based on low barriers was assigned 30% weight and funding linkage was assigned 20% weight (since our funding is mostly schematic and climate relevance for proposed activities is still not standardized). The activities based on this were scaled as (1) meagre (2) reasonable (3) significant. The weighted averages were used for ranking and prioritization.

Table 33: SDG-NDC linkage of proposed activities

Sector		SDG- NDC				Total
		None	Meagre	Reasonable	Significant	
State Mission for Sustainable Agriculture	Number	0	0	5	9	14
	% of Total	0.0%	0.0%	8.1%	12.2%	20.3%

State Mission for Green India	Number	0	0	1	3	4
	% of Total	0.0%	0.0%	1.4%	4.1%	5.4%
State Mission for Sustaining the Himalayan Ecosystem	Number	0	0	4	0	4
	% of Total	0.0%	0.0%	5.4%	0.0%	5.4%
State Mission for Health	Number	0	3	4	4	11
	% of Total	0.0%	4.1%	5.4%	5.4%	14.9%
State Mission on Strategic Knowledge for Climate Change	Number	1	1	2	0	4
	% of Total	1.4%	1.4%	4.1%	0.0%	6.8%
State Water Mission	Number	0	3	4	1	8
	% of Total	0.0%	4.1%	5.4%	0.0%	9.5%
State Mission for Energy (Enhanced Energy Efficiency & Solar)	Number	0	2	0	9	11
	% of Total	0.0%	2.7%	0.0%	12.2%	14.9%
State Mission on Sustainable Habitat	Number	0	2	8	7	17
	% of Total	0.0%	4.1%	10.8%	8.1%	23.0%
Total	**Number**	**1**	**11**	**28**	**33**	**73**
	% of Total	**1.4%**	**16.4%**	**40.6%**	**42.0%**	**100.0%**

From the above table it can be inferred that more than 80% of the planned activities across eight sectors have reasonable and significant linkages to SDG and/or NDC. Agriculture, Energy, Urban and Forestry sectors have such linkages. These sectors significantly can contribute to climate goals under NDC as well as have reasonable co-benefits. Since majority of the activities are having significant linkages to SDG and NDC, a further analysis was done to identify funding linkage.

Table 34: Funding Linkage

SDG-NDC Linkage		Funding				Total
		None	Meagre	Reasonable	Significant	
None	Number	0	1	0	0	1
	% of Total	0.0%	1.4%	0.0%	0.0%	1.4%
Meagre	Number	4	7	1	0	12
	% of Total	5.4%	9.5%	1.4%	0.0%	16.2%
Reasonable	Number	8	6	11	4	30
	% of Total	10.8%	9.5%	14.9%	5.4%	40.5%
Significant	Number	3	10	7	11	31
	% of Total	4.1%	13.5%	9.5%	14.9%	41.9%
Total	**Number**	**15**	**24**	**19**	**15**	**73**
	% of Total	**20.3%**	**33.8%**	**25.7%**	**20.3%**	**100.0%**

The above table shows that only 46% of the proposed activities, which have reasonable and significant funding linkages, have SDG/NDC link. Overall, more than 80% of the activities have SDG/NDC linkage. The activities those have no SDG/NDC linkage have any funding. Only 3.8% of the planned activities have meagre funding linkage and meagre linkages to SDG or NDC.

Table 35: Implementation and Funding linkage

Implementation		Funding				Total
		None	Meagre	Reasonable	Significant	
None	Number	7	3	0	0	10
	% of Total	9.5%	4.1%	0.0%	0.0%	13.5%
Meagre	Number	5	16	6	1	28
	% of Total	6.8%	21.6%	8.1%	1.4%	37.8%
Reasonable	Number	3	5	12	7	28
	% of Total	4.1%	8.1%	16.2%	9.5%	37.8%
Significant	Number	0	0	1	7	8
	% of Total	0.0%	0.0%	1.4%	9.5%	10.8%
Total	**Number**	**15**	**24**	**19**	**15**	**73**
	% of Total	**20.3%**	**33.8%**	**25.7%**	**20.3%**	**100.0%**

Only 9.5% of the proposed activities have no funding and no implementation linkage. A detailed score card of activities has been presented in Annexure 3 of the report. The proposed budget for 2021 to 2030 is given in the below table with the probable linkages to funding and gaps.

Table 36: Proposed Budget for years (2021-2030)

Sector	Proposed Budget (as in SAPCC 2021-30) in Lakh INR	Sources	Gap Funding in Lakh INR
State Mission for Sustainable Agriculture	48,621.50	Central and State Schemes	
State Mission for Green India	112,092.00	Central and State Schemes	
State Mission for Sustaining the Himalayan Ecosystem	59,340.00	Central and State Schemes	
State Mission for Health	52,900.00	Central and State Schemes	
State Mission on Strategic Knowledge for Climate Change	3,270.00	Central and State Schemes	
State Water Mission	81,325.21	Central and State Schemes	
State Mission for Enhanced Energy Efficiency	23,566.00	Central and State Schemes	1.260.00
State Solar Mission	339,788.94	Central and State Schemes	61,641.48
State Mission on Sustainable Habitat	1,340,311.64	Central and State Schemes	
TOTAL	**2,061,215.29**		**62,901.48**

CHATPER 9- IMPLEMENTATION MECHANISM

9.1 IMPLEMENTATION ARRANGEMENT OF THE SAPCC

A Climate Change Council has been set up as the apex authority for taking all the strategic decisions on climate change for the state. The council is headed by the Chief Minister. The operating arm of the Climate Change Council is the Executive Council chaired by the Chief Secretary of the state. A nodal Climate Change Cell within the Department of Environment, Forest and Climate Change has been established for overseeing the implementation of the SAPCC. Additionally, a Climate Change Knowledge Management Cell has also been set up in the state under the Mizoram State Council for Science & Technology that is mandated to provide the knowledge management components envisaged in the SAPCC. The responsibility for various missions will rest under individual departments, which shall strive to attain all listed objectives within stipulated timeframes and ensure their vertical integration with the National Mission objectives under the National Action Plan on Climate Change.

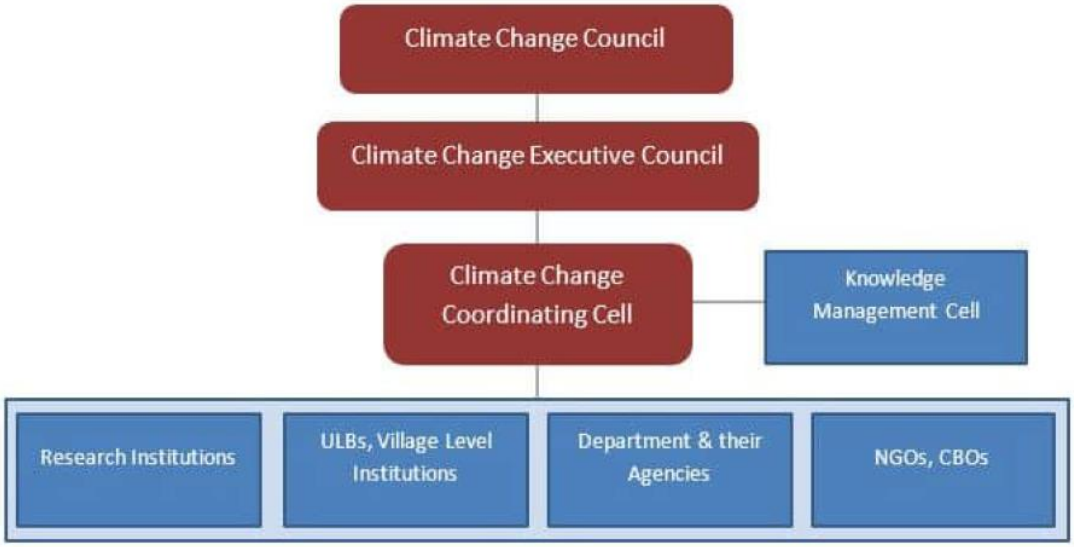


Figure 70: Implementation Arrangement of Mizoram SAPCC

9.2 IMPLEMENTATION FRAMEWORK

The State is committed to ensuring that SAPCC implementation is complemented by a robust framework and mechanisms not only as a means of ensuring that the detailed operational plans are implemented as planned, but more importantly, as a tool for systematic review and programme improvement as the needs of the State evolve with implementation regularly. In effectively implementing the climate relevant strategies for achieving the desired outcomes, the interdepartmental coordination is going to play a crucial role. The proposed strategies will require a sincere effort along with a systematic and synchronised approach.

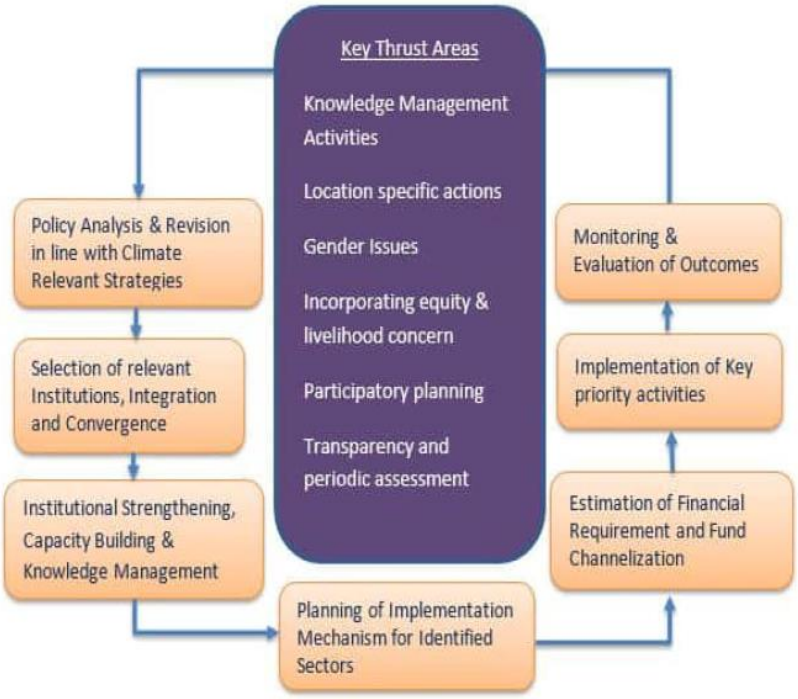


Figure 71: Implementation framework of Mizoram SAPCC

The above shown implementation framework broadly highlights an approach that the line departments will undertake. With every proposed activity, the principle-implementing agency along with supporting departments have also been identified. However, if required, further alliance with other departments as well as agencies is also possible depending on the scale and or planned intervention. While implementation of the SAPCC activities, the key thrust areas needs to be given due attention at every stage of the intervention. These include preservation and promotion of ITK (Indigenous Traditional Knowledge), access and benefit sharing, gender concerns, livelihood of the people, participatory planning, transparency etc. Periodic assessment and monitoring should also be conducted, and lessons learnt through implementation, needs to be fed back into the system to ensure effective outcomes.

9.3 PROPOSED ACTIVITIES & IMPLEMENTING AGENCIES

Climate policymaking requires integrative thinking. For example, anticipated changes in water availability driven by climate change will spill over to decisions about urban development, agriculture, and forest and broader land use considerations. To address these linkages, climate policymaking must aim at integration, where different sectoral perspectives and priorities will need to be brought into conversation with the science of climate impacts. This will enable a shift in bureaucratic incentive to reward integration rather than defence of existing perspectives. If climate adaptation policy is to be informed by a multiple stressor and multiple objective approach and if it is to take seriously the challenge of integrative and transformative change, then the institutional framework for climate policy must match these objectives. However, the optimal design of climate-focused institutions is not obvious. Governance in India (and its states including Mizoram) is organized around sectors, while climate change is, by definition, a cross- sectoral challenge. Hence, the section below attempts to mainstream climate change within existing departments by pointing out the activities that are cross departmental in each of the seven sectors listed in SAPCC. Strengthening of the coordinating body is essential which will happen if it is consistent with internal bureaucratic norms.

State Mission for Sustainable Agriculture

Code	Activity	Implementing Agencies
AG/01	Research and assessment of climate change impacts on agriculture and allied sectors, Reviewing and promoting indigenous knowledge, Capacity building of farmers in light of climate smart agriculture.	Dept. of Agriculture & allied sectors

AG/02	Developing data base on genotypes of local crop varieties (mainlyrice varieties) and identification of suitable varieties for different agro-climatic zones	Dept. of Agriculture
AG/03	Soil moisture enrichment and conservation through - Upgrading ofrainwater harvesting infrastructure and construction of eco-friendly mini check dams for irrigation.	Dept. of Agriculture, Soil &Water Conservation Dept.
AG/04	Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building to train farmers in latest rice cropping techniques.	Dept. of Agriculture
AG/05	Optimization of jhum cultivation through conservation of arableland, water utilization management and other best practices. Promotion of Home gardens as an alternative livelihood	Dept. of Agriculture
AG/06	Establishment of Custom Hiring Centers and development of appropriate farm machinery for upland systems.	Dept. of Agriculture
AG/07	Development of land for WRC (Wetland Rice Cultivation), Construction of Hill Slope terraces for conservation of moisture and cultivation of food grain, vegetable, pulses and oilseed crops	Dept. of Agriculture, Horticulture and Land Resources, Soil & Water Conservation
AG/08	Improvement of post-harvest management system such as coldstorages, warehouses, etc. for perishable crops and establishment of infrastructure for achieving sustainable value chain	Dept. of Agriculture, Horticulture
AG/09	Promotion of organic farming through vermi-composting and manure management, Adoption of Integrated Pest Management (IPM) and IFS (Integrated Farming System) for improved yield	Dept. of Agriculture, Horticulture
AG/10	Management of climate change impacts on horticulture and cash crop plantation. Increasing area under protected cultivation andperennial fruit plantation.	Dept. of Horticulture, Dept. of Land resources, Soil &Water Conservation
AG/11	Promotion of Climate Resilient Livestock and Poultry Production, Improvement in nutritional interventions to sustain livestockproduction	Dept. of Animal Husbandry & Veterinary, Dept. ofAgriculture
AG/12	Improvement in waste & manure management system, upscaling and maintenance of Biogas production facilities	Dept. of Animal Husbandry & Veterinary, and ZEDA
AG/13	Upgrading of water harvesting infrastructure, Establishment of fishery units in reservoirs and riverine areas.	Dept. of Fisheries
AG/14	Introducing, pilot testing and thereby upscaling of new and innovative fishing technologies like Recirculatory Aquaculture System (RAS), Biofloc Technology, Aquaponics, cage-culture etc.	Dept. of Fisheries

State Mission for Green India

Code	Activity	Implementing Agencies
GM/1	Ecological restoration through improvement of forest quality & density, and improvement of livelihood through Bamboo and establishment of market linkages.	Dept. of Environment, Forest & Climate Change, Rural Development
GM/2	Conservation and protection of existing dense forest, forest produceand enhancement in the quality of the Bio-diversity.	Dept. of Environment, Forest & Climate Change, Rural Development, Horticulture, Mizoram Bio-diversity Board
GM/3	Capacity building and empowering of institutions for sustainableforest management	Dept. of Environment, Forest & Climate Change
GM/4	Prevention and control of forest fire, forest invasive species, etc. formanagement of biodiversity and ecosystem services.	Dept. of Environment, Forest & Climate Change

State Mission for Sustaining Himalayan Ecosystem

Code	Activity	Implementing Agencies
HM/1	Conservation and protection of existing dense forest, forest produce and enhance the quality of the Bio-diversity	Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Horticulture, Mizoram Biodiversity Board
HM/2	Conservation and protection of Biodiversity through research and documentation of Biodiversity, and traditional Knowledge and diversification of livelihood activities	Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Agriculture, Mizoram Biodiversity Board
HM/3	Climate proofing of natural resources, enhancing resilience of indigenous communities, stakeholders etc. through appropriate adaptation and mitigation interventions.	Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Agriculture
HM/4	Restructuring land use policy for jhum cultivation and habitation on notified forestlands.	Dept. of Environment, Forest & Climate Change, Dept. of Rural Development, Dept. of Horticulture

State Mission for Health

Code	Activity	Implementing Agencies
HS/1	Study on Vector-borne diseases including malaria, dengue, scrub typhus & other diseases in the context of climate change & development of framework for adaptation measures to control communicable diseases.	Health & Family Welfare Dept. and MSPCB (Mizoram State Pollution Control Board)
HS/2	Development of institutional framework and infrastructural facilities including public health laboratory for early detection and managing outbreaks of vector borne diseases.	Health & Family Welfare Dept.
HS/3	Study and documentation of water borne diseases and development of institutional mechanism to reduce the incidence/outbreaks of such diseases along with awareness generation.	Health & Family Welfare Dept.
HS/4	Impact Assessment of heat stress on human health, preparation of adaptation strategy in the form of heat action plan & institutionalization into health information platform.	Health & Family Welfare Dept.
HS/5	Conduct Vulnerability & Adaptation study/assessment for health sector towards climate change.	Health and family Welfare Dept.
HS/6	Strengthening of health information infrastructure in the state to enable real-time collection of data to identify changing disease patterns with climate change/variation through triangulation with meteorological data.	Health & Family Welfare Dept.
HS/7	Public health system infrastructure development for extreme climate risk management.	Health & Family Welfare Dept.
HS/8	Capacity building and training for health workers for sensitization of climate variation and health impacts.	Health & Family Welfare Dept.
HS/9	Research study on under nutrition due to effect of climate change on food production.	Health & Family Welfare Dept.
HS/10	Research study to • Quantify the health impacts due to climate change and • Determinants of mental health disorders among victims of disasters attributable to climate change.	Health & Family Welfare Dept.
HS/11	Establishment of State Climate Change, Environmental & Occupational Health Cell.	Health & Family Welfare Dept.

State Mission on Strategic Knowledge for Climate Change

Code	Activity	Implementing Agencies
SK/N/1	Development of Knowledge management on Climate Changeand facilitating its operation for initial period	MISTIC (Mizoram Science, Technology & Innovation Council), DST
SK/N/2	Capacity Building on Climate Change & Awareness Programmes	MISTIC, DST
SK/N/3	Research and Monitoring	MISTIC, DST
SK/N/4	Establishment of Early warning /information system	MISTIC, DST

State Water Mission

Code	Activity	Implementing Agencies
WR/N- 1	Development and protection of catchment area of spring-sheds and water supply sources to enhance natural purification; minimize evaporation and increase ground water recharge of major utilize river basins in Mizoram	PHED, IWRD
WR/N-2	Setting up of High-Resolution Hydro- Meteorological ObservationNetwork including Gauging stations for current water supply sources	PHED
WR/N-3	Preparation of GIS based maps of Urban Drinking Water Supply	PHED, MIRSAC
WR/N-4	Preparation of GIS based maps of Rural Drinking Water Supply	PHED, MIRSAC
WR/N-5	Hydrological Mapping and Monitoring of Surface Water Resourcesfor climate change impact assessment and for adaptation measures in Mizoram	PHED, IWRD
WR/N-6	Conservation of water through artificial recharge to Ground Water in Mizoram	PHED
WR/N-7	Establishment of a sewage treatment plants in the state	PHED, UD&PA
WR/N-8	Rainwater harvesting through construction of storage dams at several places for providing water security	PHED

State Mission for Enhanced Energy Efficiency

Code	Activity	Implementing Agencies
EE-1	Promotion of energy conservation and adoption of demand side management measures across sectors	
EE-1.1	Promoting and mainstreaming adoption of Energy Conservation measures across commercial buildings including Public and Pvt. Sector building (both in existing and upcoming buildings).	SDA, Urban Dept.
EE-1.2	Mainstreaming of DSM measures with focus on Mu-DSM segments	Power Dept.
EE-1.3	Institutionalize and rolling out of S&L programme and adoption of EC measures across domestic segment.	SDA, Power Dept., Urban Dept.
EE-1.4	Institutional strengthening of the State Designated Agency and enhance consumer awareness.	SDA
EE-1.5	Financial turnaround and improvement of the technical and operational efficiency of the state power utility.	Power Dept.
EE-1.6	Strengthening of electrical infrastructure and enabling IT services.	Power Dept.

State Solar Mission

Code	Activity	Implementing Agency
RE-1	Increase penetration of grid interactive renewable energy technologies	
RE-1.1	Facilitating deployment of Grid-interactive solar rooftop systems, Ground mounted solar power plants and Solar park in the state.	ZEDA, Power Dept. JERC
RE-1.2	Harnessing state's hydropower potential through development ofnew hydropower units and modernization of existing hydro plants.	ZEDA, Power Dept.
RE-2	Promotion of off-grid power generation unit and decentralized renewable energy products	
RE-2.1	Promotion of solar-wind hybrid technology through pilot installation of 500 kW solar-wind hybrid plant.	ZEDA
RE-2.2	Increase penetration of Improved Cookstoves in rural areas.	ZEDA, Forest Dept.
RE-2.3	Dissemination of 750 HP small solar water pumps for irrigation and 125 HP micro solar water pumps for domestic/ community application.	ZEDA, Agri & Irrigation Dept.

State Mission on Sustainable Habitats

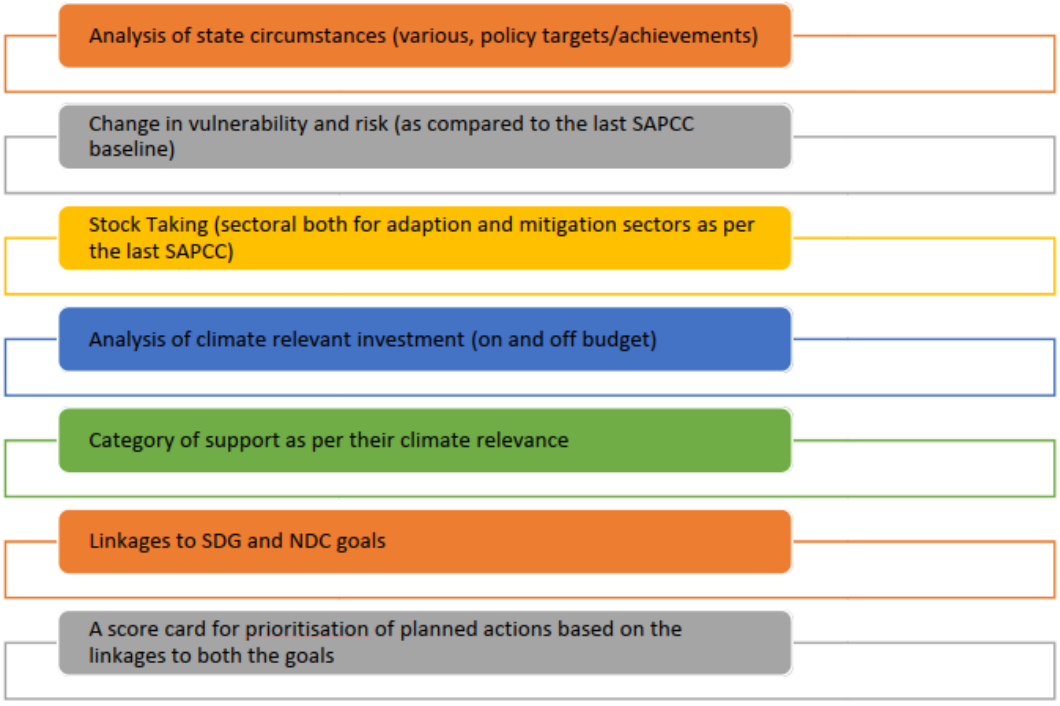
Code	Activity	Implementing Agencies
SH/N-1	Scientific Treatment of solid waste management, Collection and conversion of domestic and agricultural waste to energy/Biogas.	UD&PA, MPCB & EF&CC Dept., AMC.
SH/N-2	Provision for basic amenities like water, sanitation and electricity to all urban household by 2030 (100% by 2023).	UD&PA, PHED & P&E Dept.
SH/N-3	Maintaining the "Open Defecation Free" status of all towns.	UD&PA
SH/N-4	Development of Urban Infrastructure under state programme and central assistance.	UD&PA, PWD, Transport Dept., PHED & P&E Dept.
SH/N-5	Construction of disaster resilient structure such as storm waterdrainage, retaining walls, etc.	UD&PA, DM&R, District Administration, PHED & PWD
SH/N-6	Strengthening of urban livelihood and economy through women participation.	UD&PA, Social Welfare Dept.
SH/N-7	Reduction in use of old and obsolete vehicle.	Transport Dept.
SH/N-8	Adoption of rainwater harvesting techniques.	UD&PA, PHED
SH/N-9	Monitoring of Vehicular Emission in 6 districts of the state.	PCB &Transport Dept.
SH/N-10	Inventorization of E- waste generation in the state and Inventorization of occupiers and bio-medical waste generation, treatment & disposal.	PCB, UD&PA
SH/N-11	Conduct regular air quality monitoring (manual) covering all districts following CPCB's guidelines on ambient air quality monitoring.	MPCB
SH/N-12	Set up of Continuous Ambient Air Quality Monitoring Station (CAAQMS) at Aizawl city for continuous, real time basis monitoring with public display facility.	MPCB
SH-1	Awareness generation and capacity building in climate changes impacts and preparedness.	UD&PA

CHATPER 10- MONITORING & EVALUATION

10.1 MONITORING & EVALUATION FRAMEWORK

Key objective of monitoring of SAPCC is to include elements related to NDC that has implication on GHG effects, sustainable development impacts, and implementation progress of various actions relating to vulnerability reduction. Our GHG emission inventory is national in nature and reported as part of BUR process. Various mitigation actions that has impact on our GHG emissions (e.g. enhanced share of renewable, better energy efficiency, etc.) needs to be captured at state level (if already implemented or even if it is planned). At the national level of course, energy intensity, NAMA, etc. can be measured, for project level aggregation NCDMA registry; international climate finance (mitigation) tracking tools can be used. For adaptation, possible tracking for SDG at the national/state level, reduction in vulnerability in specific sectors/projects are possible.

The Paris Agreement has necessitated countries to have harmonized measurement and reporting systems for the countries as per their NDC mitigation commitments. Indian NDC also has several areas in adaptation that needs systematic monitoring and assessing the change in vulnerability due to the investments made. Some of these investments are through the budget and some others are off budget supported through bi-lateral and multilateral agencies, philanthropic bodies, and national and international climate funds. All these information have to be consolidated nationally and a seamless harmonization of measurement and reporting is required at state level. In the SAPCC, the attempt has been made to follow a structured process of monitoring which is given as follows.



10.1.1 Logical Framework for Monitoring and Evaluation

For monitoring and evaluation process, it is important to aggregate project level output/ outcome indicators and thus develop an M & E framework of multiple projects to a few state level/ national level indicators. Depending on the purpose of the indicator, the type of indicators could be as follows:

- Climate Impact-Indicators that depict a particular climate change risk/impact
- Adaptation Measure-Indicators that depict the adaptive measures undertaken
- Adaptation outcome-Indicators that depict the outcomes of the adaptive measures
- Process-Indicators that depict the policies/processes in place that facilitate implementation of adaptation measures

Given below is the logical framework for developing macro level Indicators:

Access Climate Change Risks	What are the climate change risks and impact in a region that an adaptation measure is addressing?
Assess effectiveness of adaptation measure and impact of state/ national policy on it	What adaptation measures are being taken to address climate change risks? How state/ national policies are impacting the effectiveness of adaptation measure?
Assess results of adaptation measure	What are the quantifiable outcomes of adaptation measures?

10.1.2 Institutional Mechanism for Monitoring & Evaluation

There is an institutional mechanism to be followed for uniform reporting to MoEFCC. The following diagram shows such a process.

Key to M&E system is the proper institutional arrangement. The M&E system will be grounded in the existing institutional framework driven by the focal department/climate change cell within the focal department with higher level political and executive bodies providing policy guidance and governance. The cell/focal department will act as the technical secretariat and will interface with executing departments/line departments for data collection. Each department may constitute a small working group with at least one member in the working group dealing with departmental finance. The working group can be headed by a nodal officer who will interface with the cell/focal department for data/MIS updation.

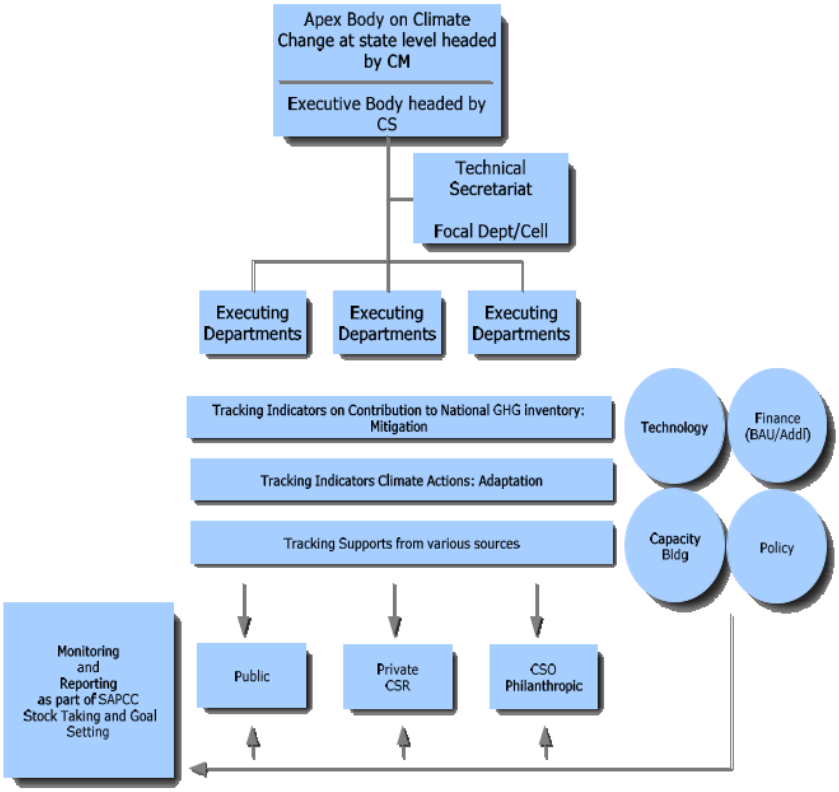
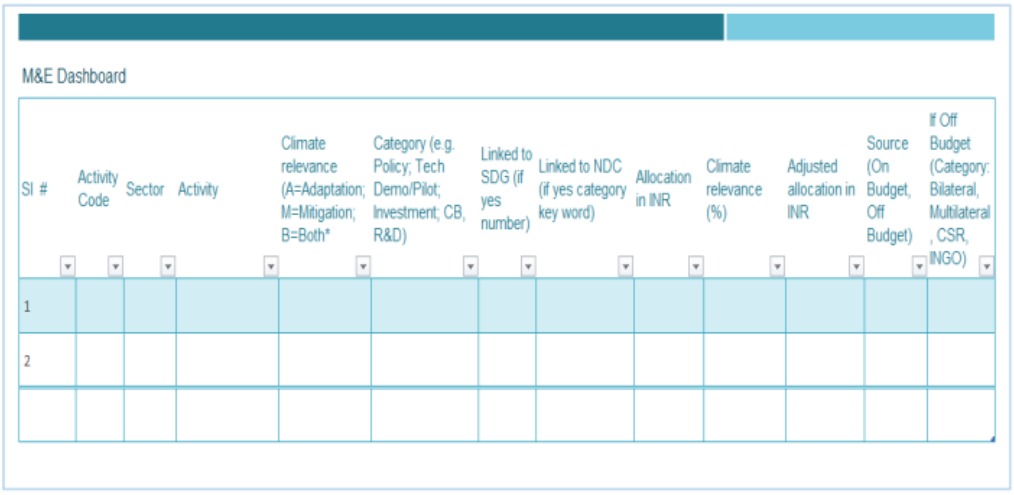


Figure 72: Institutional Mechanism for M&E

The working group members and nodal officers must be trained by the focal department on kind of data requirement and their frequency. In addition to the line department officials, members drawn from the finance, statistics and planning should also be part of the training process. The M&E protocol will be

activity/strategy based and indicators (both categorical and outcome wise) that should fit this protocol have been shown below:



Based on the above approach, the state had

- 12 no of mitigation actions
- 44 no of adaptation actions
- 17 no of adaptation actions with mitigation co-benefits
- Climate relevant budget for adaptation, allocation, and their breakup. However, in the absence of budget coding, the climate relevance percentage can be subjective.
- Categories of actions

10.1.3 Indicator system

The indicators can be classified broadly into the following categories (a) output indicator – as outlined in the physical progress (b) process indicators (c) outcome indicators (aggregation of a and b). The other ways to classify indicators can be as follows:

Category	Explanation	Remark
Climate Impact	Indicators that depict a particular climatechange risk/impact	Only after ex-ante and ex-post assessment, periodicity as per the project, may be very long term in case of adaptation
Adaptation Measure	Indicators that depict the adaptive measuresundertaken	This can be easily tracked inform of relevant activities leading to adaptation
Adaptation Outcome	Indicators that depict the outcomes of theadaptive measures	Aggregate indicator as definedin the project logical framework/ result framework
Mitigation Measure	Indicators that depict the mitigation measures undertaken	This can be easily tracked inform of relevant activities leading to mitigation
Mitigation Outcome	Indicators that depict the outcomes of the mitigation measures	Aggregate indicator as definedin the project logical framework/ result framework
Process Indicator	Indicators that depict the policies/ processes in place that facilitate implementation of adaptation/ mitigation measures	Can be reported in form of presence and absence of certain polices or activities that may lead to outcome but not necessarily always leads to a positive outcome, in case of adaptation sometimes may lead to mal adaptation another sector

Some of the examples of indicators are listed below:

Sector	Indicators	Level	Remarks (periodicity and challenges)
Agriculture and allied	Reduced key risks and adverse impactsof climate change	Outcome	Aggregate indicator, impactindicator-medium to long-term Periodicity
	Irrigation Intensity or % of area under irrigation	Output	May be annual, easy to report
	Cropping intensity	Outcome	Annual easy to report
	Agricultural insurance policy including new crops	Process	Presence of the policy will reduce the risk
	Crop diversification (areas under different crops)	Both output and process	Paddy to Non-paddy may reduce the risk due to climate
	% of individuals who have diversified sources of income	Outcome	Challenges in attribution of rise in income, sometimes direct cashtransfer an adaptive policy may result in temporary rise in income
Water	Enhanced food and water security	Outcome	Aggregate indicator, impactindicator-medium to long-term periodicity
	Rise in ground water level	Output	May be short to medium term(pre-monsoon post monsoon reporting possible)
	State water policy addressing climate risks specific to the state	Process	Presence of the policy
Forest	Increased ecosystem resilience in response to climate variability and change	Outcome	Aggregate indicator, impact indicator- long-term periodicity can be combined from various provisioning services
	Increase in plantation area	Output	Short term (if area) to mediumterm (if based on survival percentage)
	Incentive or Policies on tree outside forest, urban forestry	Process	Presence of the policy
Energy	Reduction in energy intensity of state GDP	Outcome	Short to medium term considering all factors and leakage
	Share of renewable energy in the energy mix of the state	Output	Easy to report
	Implementation of energy conservation building code in public building	Process	Easy to report from compliance
Urban Habitat	% Reduction in Migration of local population directly and indirectly dependent on concerned sectors for their livelihoods	Outcome	Aggregate indicator (short to medium term reporting possible after survey)
	Open defecation free status	Output/ Process	Short term
	Amount of solid waste converted to energy	Output	Short term
	Smart city policy on bi-cycle tracks or car-pooling	Process	Short term, presence of policy

The above list is only indicative, and the process of indicator selections should be possible after wider consultation with departments. First priority is climate relevant scheme specific indicators (mostly output indicators) that the department report as routine. The second is project level indicators as defined in the result framework. The third is sector/mission level indicators as defined under mission document or state/national priority (e.g. doubling farm income, reduction of energy intensity of GDP). The following diagram captures the aggregation process.

10.1.4 Tools and methods for harmonization

Key aspects in this is to choose indicators/proxy that has relevance to SDG/INDC. IPCC defined methods on emission inventory (since the state level inventory is not available, proxies on share of renewable, energy efficiency, etc. can be reported). For project level emission reduction, Co-benefit tracking tools, sustainable development potentials can be tracked and consolidated. If required state share reflected in NAMAs can be reflected. For adaptation investments change in vulnerability (mostly the change in adaptive capacity and sensitivity) to be tracked. Those should follow IPCC AR5 methods and tools (presented in the vulnerability section). This tracking can be spatial or temporal.

The project level vulnerability reduction can be tracked against committed targets based on the project level assessment reports. Policy level assessment can be done by tracking policy goals and targets for various sectors. Finance data for effective harmonization requires budget coding, without that, the nodal department can discuss with technical working groups to fix climate relevance % based on scheme components.

Data management System

- Collect a relevant economic and social data to develop the state circumstances (macro)
- Collect departmental level data based on the proposed strategies by the departments and their output and outcome
- Collect project level data from project MIS (may be externally aided and off budget projects)
- Delegate responsibility for the collection of particular data sets to authorized individuals and agencies of the government.
- Work with industry associations/ NGOs for collecting relevant data having impact on NDC/SDG

Capacity Building: Generally, awareness and capacity to plan and deliver on climate change strategies is low at cutting edge. Therefore, efforts should be made to demystify the climate strategies proposed by the departments at regular interval. The process will be facilitated by the focal department and technical working group members (both department and inter-department) will take part in it. This process should be a quarterly affair each year.

Data frequency: The data sets should be divided into two categories (a) static e.g. GDP data (b) dynamic data. In essence, nothing is static, but some statistics are annual or more. The dynamic datasets change more frequently. However, for such data sets monthly or quarterly cycle of updation will be adequate.

Data consolidation and validation: The data will be validated by the focal department/cell in assistance with experts and the nodal officers who in turn will provide clarification if any after due consultation with sectoral working group members.

Reporting: The dashboards for key indicators will have regular updation. The climate strategy and action plans should be revised every five years, as is the process now. The monitoring of results will be part of that stocktaking.

10.2 TARGETS FOR 2029-30

The targets under few missions/policies, which have been decided by the Government of Mizoram, are as follows:

Mission/ Policy	Targets for 2029-30

Poverty & Food Security	• BPL Households - 3%
	• Priority Household – 1.97%By 2029:
	  • 100% coverage of poor and vulnerable households under Health Care
	  • Scheme, Right to Education and Food Security
	  • 100% coverage of Individual Household Latrines within the State
	  • To build resilience of the poor and those in vulnerable situations and
	  • reduce their economic, social and environmental shocks and disasters

National Mission on	• Antyodaya Anna Yojana – 1.61% • % of children under 5 years: Stunned <10; Wasted <1; Underweight <2.5

Sustainable Agriculture	• Net sown area – 18 sq km By 2029: • Nutrition for all who are in the age group of 0-6 • Nutrition for all pregnant and lactating mothers • 100% coverage of poor and vulnerable Women under food security • Increase agricultural productivity through better irrigation and technology
Health Mission	• Maternal Mortality rate (per lakh pregnant women) – 70 • Child Mortality Rate under age 5 (per thousand lives birth) – 20 • Neo Natal Mortality Rate (per thousand) – 6 • Annual Malaria Death – 1 By 2029: • To reduce HIV/AIDS • To reduce malaria related death • To strengthen health facilities in the State • 100% coverage of BPL under RSBY
Drinking Water &Sanitation	• Rural Drinking Water Supply – 100% By 2029: • 100% coverage of rural and urban habitation with drinking water supply • 100% habitations connected with safe drinking water supply • 100% coverage of sanitary toilet facility
Swachh Bharat Mission	• Achieve 100% door to door waste Collection in Towns and Cities • 100% municipal solid waste treatment
Carbon Sink/ Green IndiaMission	• Area under Forest Cover under Conservation of Natural Resources and Ecosystem (CNRE) – 18,500 sq km • Tree cover outside forest area – 617 sq km • Tree cover in degraded area under GIM – 106.35 sq km
Strategic Knowledge for Climate Change	• Effective Carbon Trading under NAPCC – 164.57 MT
Sustainable Habitat	• All weather Road under PMGSY – 650 km • National Highway under NHDP – 1,490 km • State Highway under NHDP – 200 km • District Road – 1,600 km • Village Road – 1,940 km • Town Road – 730 km By 2029: • To promote connectivity by providing all weather roads to all City, Towns and Industrial Centre's • To improve digital connectivity • To establish Innovation facility Centre/ Innovation Hub • Effective implementation of NMT to improve urban mobility
Solar Mission	• Share of Renewable Energy in Total Energy Mix – 40% • Solar Energy Install – 2,000 kWp By 2029: • Electricity access for all household • To promote solar and renewable energy

10.3 PRIORITY ADAPTATION ACTIONS

The first five high priority activities under State Mission for Sustainable Agriculture are:

Soil moisture conservation and enrichment through upgrading of rainwater harvesting infrastructure and construction of eco-friendly mini check dams for irrigation.
Assessment study and demonstration of Systematic Rice Intensification (SRI) cultivation and Capacity building to train farmers in latest rice cropping techniques.
Improvement in waste & manure management system, upscaling and maintenance of Biogas production facilities
Promotion of organic farming through vermi-composting and manure management, Adoption of Integrated Pest Management (IPM) and IFS (Integrated Farming System) for improved yield.
Management of climate change impacts on horticulture crops. Increasing area under protected cultivation and perennial fruit plantation.

The high priority activities under State Mission for Green India are:

Ecological restoration through improvement of forest quality and density of the forests and improvement of livelihood through productivity of Bamboo and establish market linkages.
Conservation and protection of existing dense forest, forest produce and enhance the quality of the Biodiversity.
Prevention and control of forest fire, forest invasive species, etc. for management of biodiversity and ecosystem services.
Capacity building and empowering of institutions for sustainable forest management.

The high priority activities under State Mission for Sustaining the Himalayan Ecosystem are:

Climate proofing of natural resources, enhancing resilience of indigenous communities, stakeholders etc. through appropriate adaptation and mitigation interventions.
Restructuring land use policy for jhum cultivation and habitation on notified forestlands.
Conservation, protection and enhance the quality of the bio-diversity.
Conservation and protection of Biodiversity through research and documentation of Biodiversity, and traditional Knowledge and diversification of livelihood activities.

The high priority activities under State Mission for Health are:

Study on Vector-borne diseases including malaria, dengue, scrub typhus & other diseases in the context of climate change & development of framework for adaptation measures to control communicable diseases
Study and documentation of water borne diseases and development of institutional mechanism to reduce the incidence/outbreaks of such diseases along with awareness generation
Strengthening of health information infrastructure in the state to enable real-time collection of data to identify changing disease patterns with climate change/variation through triangulation with meteorological data.
Research study on under nutrition due to effect of climate change on food production.
Establishment of State Climate Change, Environmental & Occupational Health Cell.

The high priority activities under State Mission on Strategic Knowledge for Climate Change are:

Development of knowledge management system on climate change and facilitating its operation
Capacity Building and awareness generation programmes on Climate Change
Research and Monitoring of climate change impact in different sector
Establishment of Early warning/information system
Development of knowledge management system on climate change and facilitating its operation

The high priority activities under State Water Mission are:

Preparation of GIS based maps of Urban Drinking Water Supply
Preparation of GIS based maps of Rural Drinking Water Supply
Hydrological Mapping and Monitoring of Surface Water Resources for climate change impact assessment and for adaptation measures in Mizoram
Conservation of water through artificial recharge to Ground Water in Mizoram
Establishment of a sewage treatment plants in the state
Rainwater harvesting through construction of storage dams at several places for providing water security

10.4 PRIORITY MITIGATION ACTIONS

Since little investment in the previous plan has gone to mitigation, related actions most of the actions need to be covered considering the NDC goals.

The following are the key priorities under State Mission for Enhanced Energy Efficiency:

Mainstreaming of DSM measures with focus on Mu-DSM segments.
Financial turnaround and improvement of the technical and operational efficiency of the state power utility.
Promoting and mainstreaming adoption of energy conservation measures across commercial buildings including public and Pvt. sector building (both in existing and upcoming building)
Institutionalize and rolling out of S&L programme and adoption of EC measures across domestic segment.

The following are the key priorities under State Solar Mission:

Promotion of solar-wind hybrid technology through pilot installation of 500 kW solar-wind hybrid plant.
Increased penetration of Improved Cookstoves in rural areas.
Facilitating Deployment of Grid-Interactive Solar rooftop systems, Ground-mounted solar power plants and Solar Park in the state.
Harnessing state's hydropower potential through development of new hydropower units and modernization of existing hydro plants.
Dissemination of 750 HP small solar water pumps for irrigation and 125 HP micro solar water pumps for domestic/ community application.

The following are the key priorities under State Mission on Sustainable Habitat:

Scientific Treatment of solid waste management, Collection and conversion of domestic and agricultural waste to energy (Biogas)
Provision for basic amenities like water, sanitation and electricity to all urban household by 2030 (70% by 2023).
Maintaining the "Open Defecation Free" status of all towns
Development of Urban Infrastructure under state programme and central assistance
Monitoring of Vehicular Emission in 6 districts of the state
Conduct regular air quality monitoring (manual) covering all districts following CPCB's guidelines on ambient air quality monitoring
Liquid waste management through improved sewage design to address climate change impacts and development of climate friendly waste management system