



सत्यमेव जयते

Department of Sciences
& Technology
Government of India



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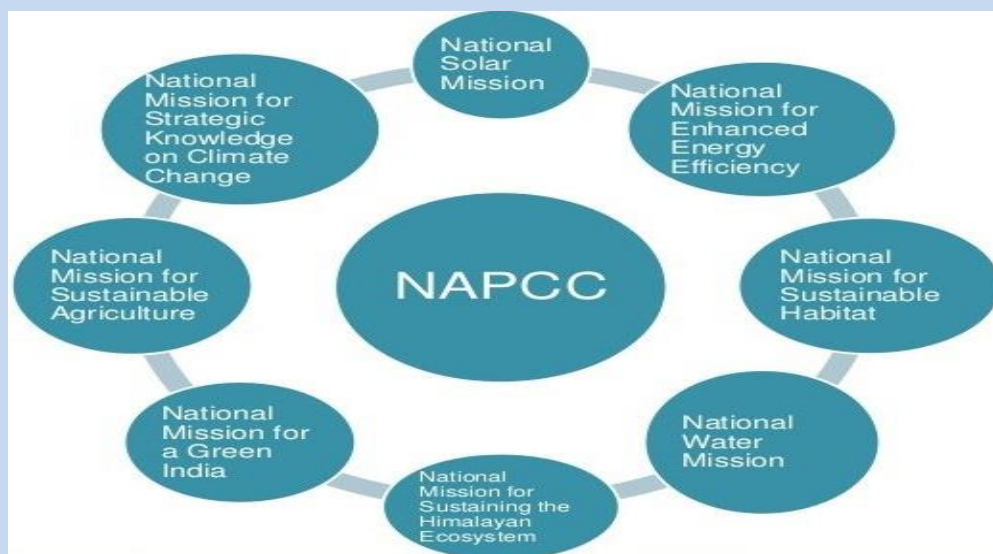
Government Of India



Department of Science & Technology **Ministry of Science & Technology** **Government of India**

Department of Science & Technology (DST) was established in May 1971, with the objective of promoting new areas of Science & Technology and to play the role of a nodal department for organizing, coordinating, and promoting S&T activities in the country.

Climate Change Programme (CCP)- under Climate Change Programme of National Adaptation Plan on Climate Change, there are eight(8) missions





Department of Science & Technology
Ministry of Science & Technology
Government of India

NMSHE NATIONAL MISSION FOR
SUSTAINING THE HIMALAYAN
ECOSYSTEM



STATE CLIMATE CHANGE CELL ARUNACHAL PRADESH



National Mission for Sustaining the Himalaya Ecosystem (NMSHE)

Conceptualized & Supported by

**Department of Science & Technology (DST),
Ministry of Science & Technology,
Government of India.**

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Formulated by

**State Climate Change Cell, Arunachal Pradesh
Department of Enviroment, Forests& Climate Change Cell
Government of Arunachal Pradesh
Supported by DST**

National Mission for Sustaining the Himalaya Ecosystem (NMSHE)

Union cabinet of India on 28th February, 2014 approved the Mission document on the National Mission for Sustaining the Himalaya Ecosystem (NMSHE) which has been launched under the National Action Plan on Climate Change (NAPCC).

The National Mission for Sustaining the Himalayan Ecosystem (NMSHE) is one of the eight missions under the National Action Plan on Climate Change (NAPCC).

These eight (8) missions' are-

- ⇒1. National Solar Mission**
- ⇒2. National Mission for Enhanced Energy Efficiency**
- ⇒3. National Mission on Sustainable Habitat**
- ⇒4. National Water Mission**
- ⇒5. National Mission for Sustaining the Himalayan Eco-system**
- ⇒6. National Mission for a Green India**
- ⇒7. National Mission for Sustainable Agriculture**
- ⇒8. National Mission on Strategic Knowledge for Climate Chang**

The Himalayan ecosystem being fragile and sensitivity to Climate Change, the national mission will focus on the rapid generation of four types of national capacities, which deal with:

- Human and knowledge capacities
- Institutional capacities
- Capacities for evidence based policy building and governance
- Continuous self-learning for balancing between forces of Nature and actions of mankind
- Himalayan Glaciers and the associated hydrological consequences
- Biodiversity conservation and protection
- Wildlife conservation and protection
- Traditional knowledge societies and their livelihood and planning for sustaining the Himalayan Ecosystem.

National Missions for Sustaining the Himalayan Ecosystem(NMSHE)-

It is one of the most important missions networking various sectors which contribute to the sustainable development of the country by enhancing the understanding of climate change impacts.

Its likely impacts and adaptation actions required strategic capacity building for the Himalayas region on which a Significant proportion of India's population depends for sustenance.

It seeks to facilitate formulation of appropriate policy measures and time-bound action programmes to sustain ecological resilience and ensure the continued provisions of key ecosystem services in the Himalayas. It also intends to evolve suitable management and policy measures for sustaining and safeguarding the Himalayan ecosystem along with developing capacities at the national level to continuously assess its health status.

Recognizing the importance of scientific and technological inputs required for sustaining the fragile Himalayan Ecosystem, the Ministry of Science and Technology has been given the nodal responsibility of coordinating this mission. However, the mission involves valuable cooperation of Indian Himalayan States, the Planning Commission and the Ministry of Environment, Forests and Climate Change to achieve its goals.

Introduction to State Climate Change Cell(SCCC) Arunachal Pradesh& Its Portal-

The *Arunachal Pradesh State Climate Change Cell (SCCC)* was established on **20th October 2010** under the department of Environment , Forests& Climate Change, the then Dept.of Environment and Forests Govt. of Arunachal Pradesh under National Mission for Sustaining the Himalayan Eco-system (NMSHE), which is one of the eight missions under National Action Plan on Climate Change (NAPCC), **supported by Department of Science and Technology(DST),Government of India** to address the issue through data base generation & vulnerability Assessment and to closely coordinate withall the recommended actions with the allied sectors and also to work towards resource mobilization to implement different components of the action plan in a systematic and time bound manner and developed web portal(apclimatechange.in)for State Climate Change Cell for sharing relevant & important information .

STATE CLIMATE CHANGE CELL(SCCC)- ARUNACHAL PRADESH.

State Climate Change Cell was established on 20th October 2010 in the Department of Environment & Forests, Govt. of Arunachal Pradesh under National Mission for Sustaining the Himalayan Eco-system(NMSHE)which is one of the Eight(8) missions under National Action Plan on Climate Change supported by Department of Science & Technology (DST), Govt. of India.

OBJECTIVES AND MAJOR GOALS

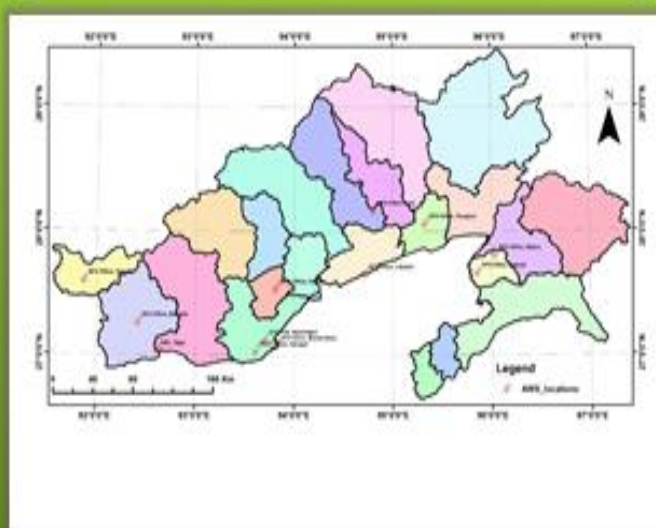
Vulnerability and Risk Assessment of various Sectors of the State due to Climate Change.

Institutional capacity building to attain the capacity to handle Climate Change programmes.

Training programmes for stakeholders including govt.officials, researchers and find the solutions to address the problems of Climate Change.

Involving masses to work for minimizing the impact of Climate Change through awareness programme.

Locations of Automatic Weather Stations(AWS) installed in Arunachal Pradesh.



Useful Links in Arunachal Pradesh State Climate Change Cell website-



Govt of Arunachal Pradesh	www.arunachalpradesh.gov.in
Govt of India	www.india.gov.in
Ministry of Environment, Forests & Climate Change	www.moef.nic.in
Environment & Forests, Arunachal Pradesh	www.arunachalforests.gov.in
India Meteorological Department	www.imd.gov.in
United Nations and Climate Change	www.un.org/climatechange/
Intergovernmental Panel on Climate Change	www.ipcc.ch/index.htm
World Meteorological Organization	www.wmo.int
Arunachal Environmental Information System (ENVIS) Hub	www.arpervis.org.in

Through various programmes Under NMSHE, the state will strengthen the existing Climate Change Cell in the Department of Environment, Forests & Climate Change, Govt. of Arunachal Pradesh. The Cell exists as a multi Stakeholder platform and will coordinate with various departments on various missions.

The Cell is expected to build human capacity, generate additional resources for the state, in preserving the ecosystem and enhancing resilience. The Cell has already recognized certain research bodies, institutions, bi-lateral and multi-lateral institutions and developed working relations to upgrade institutional capacity, research capacity and will continue widen its reach in the Climate Change knowledge space. Its ambitious plan include building a robust monitoring, reporting and verification infrastructure in the state that will track ecosystem health, plan adaptation and mitigation actions, promote indigenous knowledge, develop an early warning system with a blend of scientific and local knowledge base. The Cell targets to develop project proposal of the identified action plans, effective work plan for Climate Change sensitive sectors along with budget analysis, evaluation & monitoring (E&M) report for periodic progress to the

departments, state leadership, regional bodies like DONEAR, MoEF, DST, etc. The Cell aims to develop virtual network as well as active participation through workshops, seminars, interaction with local communities, etc. The Cell also targets to

develop an e-learning system on Climate Change sensitive sectors and simple module for the line departments, NGOs, common people, etc., so that active participation from different sections of people in ecosystem development, adaptation and mitigation interventions.

Climate Change Projections(Temperature and Precipitation projections).

- The annual average maximum temperature in Arunachal Pradesh is likely to rise by 1.62°C and by 2.03°C by 2021-2050 under RCP 4.5 and 8.5 scenarios respectively.
- By the end of century, the annual average maximum temperature may rise up to 3.06°C and 6.61°C as projected under RCP 4.5 and 8.5 scenarios respectively.
- The annual average minimum temperature in the state is projected to increase up to 1.31°C and 1.63°C for RCP4.5 and RCP8.5 respectively by 2021-2050.
- As projected the temperature may further rise up to 2.43°C to 4.27°C under RCP4.5 and 8.5 scenarios, respectively by 2071- 2100.
- Annual average rainfall in Arunachal Pradesh is projected to decrease to an extent upto by 1.27 per cent towards mid-century and increase about 2.80 per cent towards the end of century under RCP4.5 .
- For RCP8.5 scenario annual precipitation is projected to increase marginally by 2.07 per cent towards mid-century and 0.12 per cent towards end-century map the seasonal rainfall projections for winter (January, February), summer (March, April, May), monsoon months (June, July, August, September) and post-monsoon (October, November, December).
- The average annual maximum temperature during the baseline is recorded at 21.14°C.
- All the districts except Anjaw, Dibang Valley, KurungKumey, Tawang, Upper Siang and Upper Subansiri are expected to record higher maximum temperature between 2021-2050 under RCP 4.5 scenario than the annual average maximum temperature recorded during baseline.

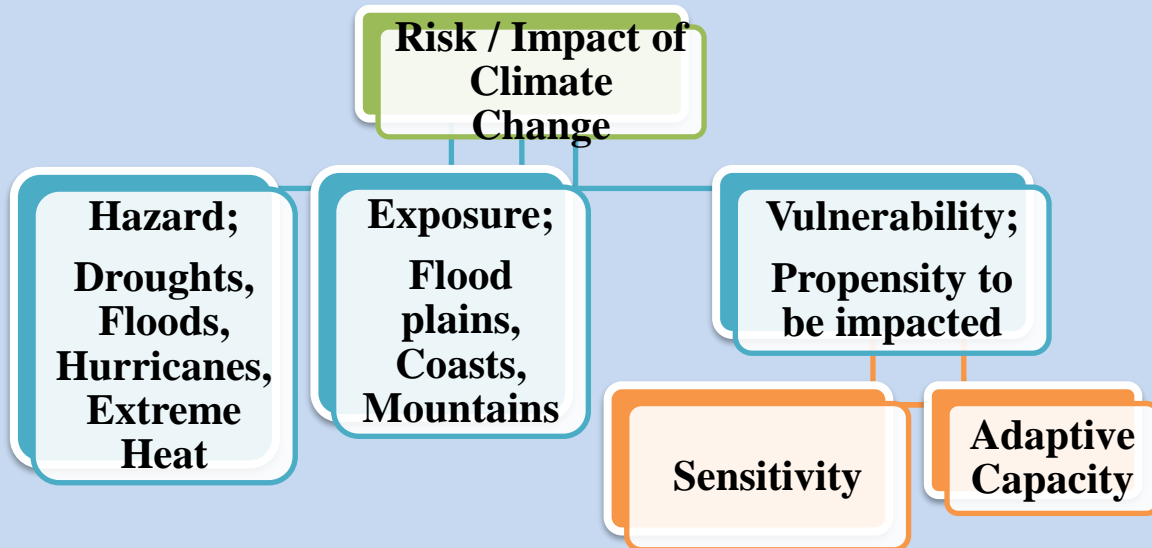
- Under RCP 8.5 scenario, Anjaw, KurungKumey, Upper Siang and Upper Subansiri are also expected to record higher temperature than the annual average temperature recorded during baseline.
- The average annual minimum temperature during the baseline is recorded at 10.1°C.
- Between 2021-2050, all the districts are projected to record higher minimum temperature under RCP 4.5 and RCP 8.5 scenario than the annual average minimum temperature recorded during baseline except for Anjaw, Dibang Valley, KurungKumey, Tawang, Upper Siang and Upper Subansiri. rainfall during the baseline.

(Source: SAPCC2.0)

MAIN GOALS AND OBJECTIVES UNDER NMSHE-

- Vulnerability and Risk Assessment at various Sectors of the State which would provide the adaptation measures.
- Institutional Capacity building to acquire the capability to find the solutions to address the problem of climate change in the state and data base generation as per requirements of the SAPCC and NMSHE programmes and objectives.
- Training /Workshops programmes for stakeholders including Government officials, Researchers, community based organizations, NGO's etc. in the state mainly development focusing for minimizing the adverse effect of climate change issues in the state and to achieve the sustainable goal.
- Involving masses to work for minimizing the impact of climate Change through awareness programme at different places.
- To assist the State Government in planning and implementation of the adaptation related climate actions proposed in "Pakke Declaration 2047 for Climate Resilient Arunachal Pradesh", with technical assistance and provision of data and information.
- To improve knowledge about Climate Change and associated risk to the state of Arunachal Pradesh.
- Development of a coherent data base on the geological, hydrological, biological and socio cultural dimensions including traditional knowledge systems on preservation and conservation of the ecosystem.
- Detection and decoupling of natural and anthropogenic induced signals of global environmental changes in mountain ecosystems and prediction of future trends on potential impacts of climate change on the Himalayan ecosystem with a sound S&T backup.
- Studying of traditional knowledge systems for community participation in adaptation and coping mechanisms inclusive of farming and traditional health care systems.
- Assessment and quantification of the changes in the Himalayan ecosystem attributable to the climate change as a result of global emissions and human activities in the region and model for future projections.
- Identification of most-desirable Adaptation Policies to Improve Regional Sustainability.
- To interface with reputed national and international institutions for climate modelling and predicting future scenarios and impacts on different sectors; to develop a network of state level institutions and government departments to share knowledge.
- To share knowledge and expertise with various departments and other organizations and Building human and institutional capacities in the different existing / new Institutions in the state as well as across the region.
- To increase awareness of the planners, policy makers about the effects of climate change by developing policy briefs, case studies and best practices, publications and workshops from time to time.

Vulnerability Assessment.



Risk arises from interaction of hazard, exposure and vulnerability. Vulnerability is endogenous characteristic of a system and is determined by its sensitivity and adaptive capacity.

Climate Change Vulnerability Assessment Methods (Hinkel 2011)

12 Step methodology for assessment and presentation of Vulnerability

Step 1	Scoping (need/area) & objectives of Assessment
Step 2	Selection of type of Vulnerability Assessment (VA) (Biophysical/social/integrated)
Step 3	Selection of Tier method (Tier 1/2/3)
Step 4	Selection of Sector, Spatial scale, Community, System and period of VA
Step 5	Identification, definition and selection of indicators
Step 6	Quantification and measurement of indicators
Step 7	Normalization of indicators
Step 8	Assigning weights to indicators
Step 9	Aggregation of indicators and development of Vulnerability Index (VI)
Step 10	Representation of V: maps, charts, index, profile
Step 11	Vulnerability ranking of sectors, regions, communities, forest types etc
Step 12	Identification of drivers of V for adaptation planning

Indicators, weights, rationale and data sources

Sl.	Indicators	Weights	Rationale	Source of data
1	Forests {%of area under forest cover in sq.km}	30	Higher is the area, higher the adaptive capacity	SFRI (2017)
2	Yield variability {Production (mt/ha)}	20	Cropping intensity is defined as a ratio between net sown area and gross cropped area. Higher the index, higher is the efficiency of land use	Ministry of Agriculture and Farmers welfare (2008-2014)
3	Female Literacy Rate (%)	15	This indicates empowerment of women. It enhances access to information, and enable better adaptation to climate change and non-climatic risks. It enhances social and economic stability of households	Census (2011)
4	Slope (% of Area > 30 Degree Slope (sq.km)}	10	Higher slope indicates marginalization (difficulty in accessing), difficult terrain, proneness to damage including higher soil erosion. Dwelling in areas with higher slope have higher vulnerability	ARC GIS (2018)

Indicators, weights, rationale and data sources

Sl.	Indicators	Weights	Rationale	Source of data
5	% of BPL HH	12	Higher poverty indicates higher vulnerability	Census (2011)
6	Doctors(No. Of Doctors/1000 HH, 2015)	8	This indicates the availability and access to timely and quality health care, essential for well being of households in a region	Department of Health Service (NRHM), GoAP,
7	Population density {No of person per sq. km}	3	Higher Population density translates to higher exposure	Census (2011)
8	MGNREGA (Avg. Employment person/day/HH, 2008-09 to 2015-16)	2	MGNREGS provides a household access to new livelihood opportunities which helps in building adaptive capacity of the communities	www.nrega.nic.in (2018)

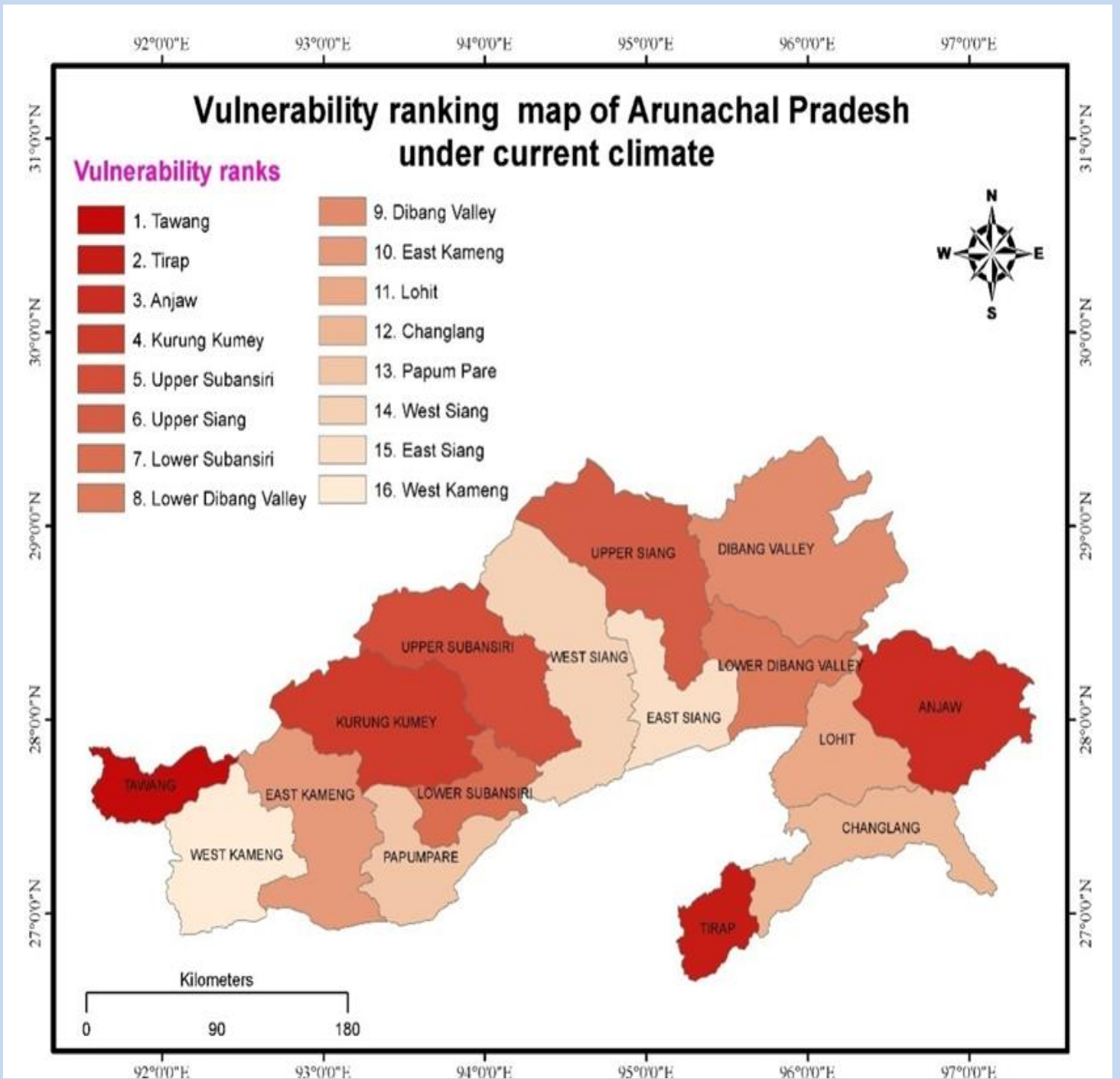
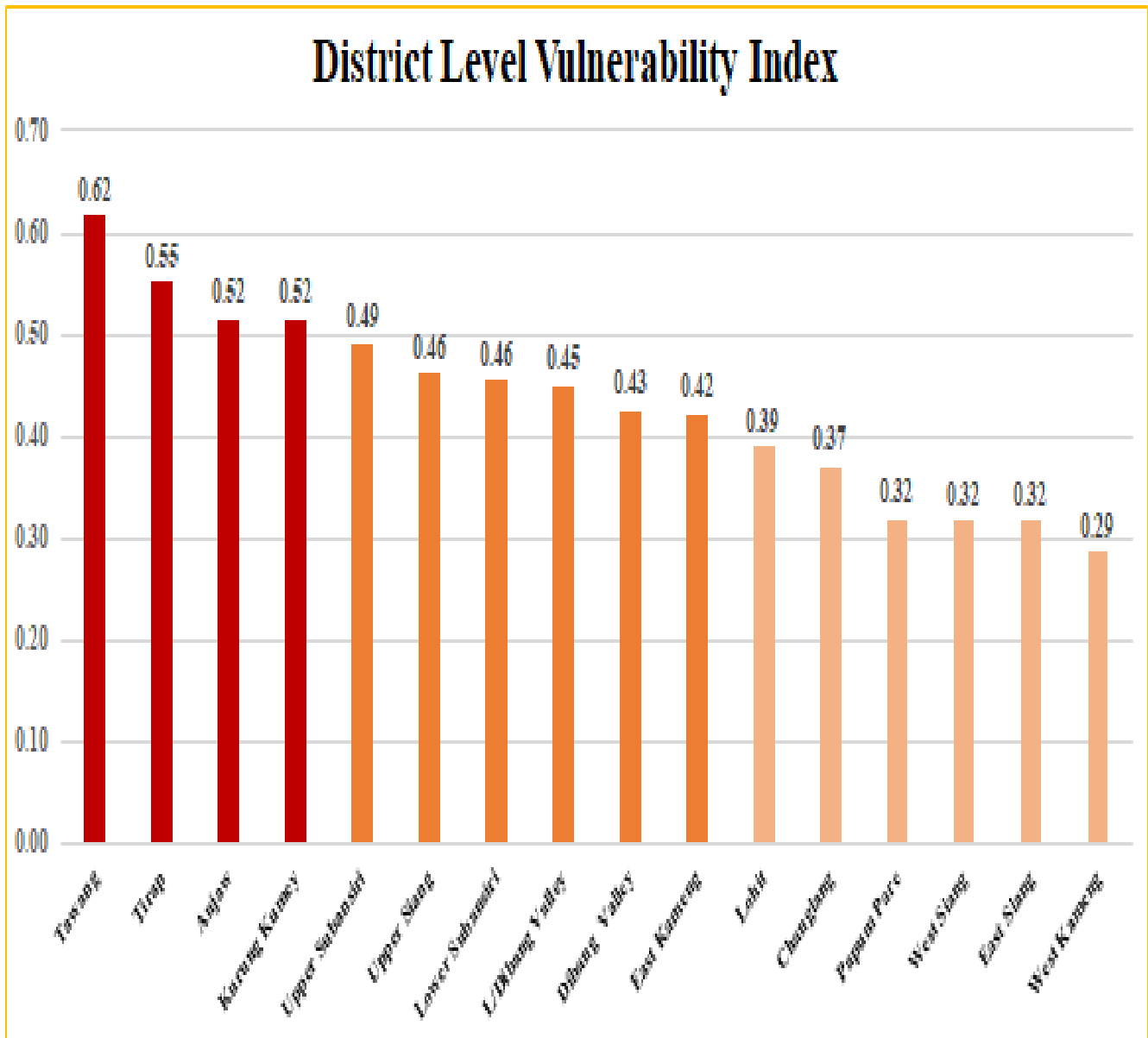


Fig. Vulnerability ranking of districts in Arunachal Pradesh



Vulnerability levels		
0.52-0.62	0.49-0.42	0.39-0.29
Highly Vulnerable	Medium Vulnerable	Low Vulnerable

Fig.District Level Vulnerability Index.

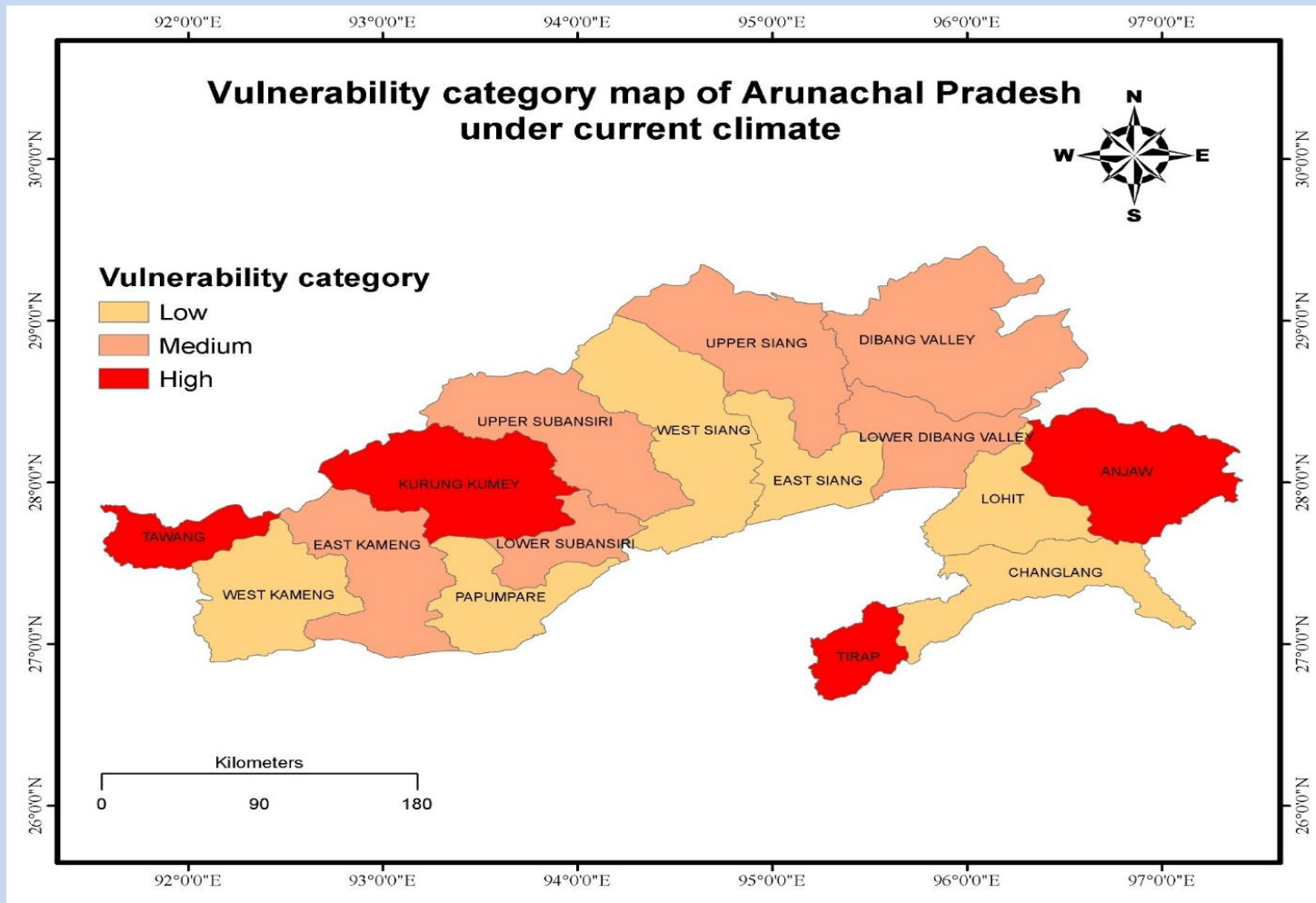


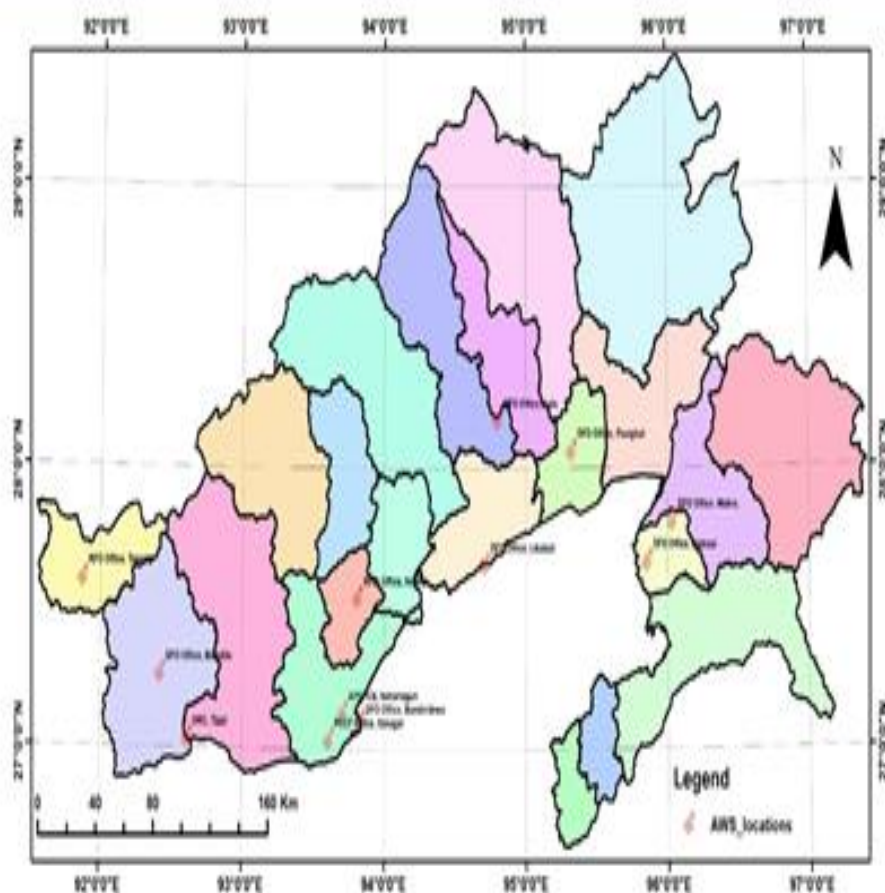
Fig.Vulnerability Category

Capacity building and Networking-

Villages, Cities and networks play an important role in climate change mitigation. Various international, regional, and local networks seek to increase cooperation between cities or between cities and other stakeholders. However, still there is gap in a poor understanding of how these formalised networks help Villages, cities to mitigate climate change at different levels of urban climate governance affecting every single life on the globe making life more challenging. However, it has been acknowledged and analysed by

many climate experts, Scientists, Researchers working all over the world in every sectors and well acknowledged the role of every individual participation in formal climate change mitigation-related networks from the global to the local level. As multilevel networking is a strategic tool for cities, different benefits are highlighted at different levels of governance. There have been created networks of stakeholders with governments dept., institutions and NGOs to work coordinated to mitigate and for adaptation in a more strategic way that are more relevant oriented towards politics and planning for more practical. Formalised networking is also networking between individual people, which should be implemented at every sectors and need immediate actions. The results demonstrate both the advantages of networks and challenges in developing beneficial networking to support climate change mitigation actions at ground level. Through capacity building programmes like Vulnerability Assessment & Risk Assessment under NMSHE oriented programmes, it has been able to find out vulnerable sector at State level, District level & Block Level to help policy makers to get picture insight of the impact likely to cause in near future which require framing good policy in sustainable way without causing any adverse effect. And as a part of capacity building, training imparted to officials/officers of Department of Environment, Forests & Climate Change, Govt. of Arunachal Pradesh on operation and handling of Automatic Weather Stations located at various divisions of the Arunachal Pradesh.

Locations of Automatic Weather Stations(AWS) installed in Arunachal Pradesh





Pic- During installation and training on Automatic Weather stations(AWS) across various districts of Arunachal Pradesh in 2021.



Orientation workshop for Sr. Govt. Officials on Climate Change Adaptation on 2nd Feb '2018



Capacity Building on Climate Change Vulnerability Assessment in States of the Eastern Himalayan Region organized by IIT Guwahati, 12th-13th March 2018



Media workshop on Climate Change Reporting, Itanagar, April 10-12th 2018



Participants of Capacity Building workshop on Climate Change Vulnerability Assessments in States of Indian Himalayan Region, organized by IIT Guwhati, 10-14th Sept 2018.



Regional Workshop for North Eastern States on Conservation and Management of Wetlands

State Action Plan on Climate Change

These national level missions were bolstered by the clear mandate given to all Indian States & Union Territories (UTs) to prepare their respective State Action Plan on Climate Change (SAPCC) consistent with the strategies outlined in the NAPCC. It was imperative that States and UTs integrate with the framework, the diversity of state-level variations in ecosystems, geographic conditions, socio-economic scenario, and other factors within the framework of NAPCC to identify synergies with the existing policies and ongoing programmes and schemes under implementation. Unified under these guidelines, 33 states and union territories, between 2008 and 2015, have been notified by the Ministry of Environment Forests and Climate Change (MoEFCC) to publish their respective SAPCCs. Arunachal Pradesh prepared its first SAPCC in 2011. In January 2018, owing to the rapid advancements in the climate science, and nuanced understanding of risk, impact, and vulnerability assessment methodologies, the Ministry of Environment, Forests and Climate Change, Government of India (GoI) directed all the States and Union Territories (UTs) of India to update their respective initial SAPCCs as per the common guiding framework. Subsequently, the Government of Arunachal Pradesh initiated the process of updating its state climate action plan for the period of 2021-2030 following the common guiding principles and framework.

Accordingly the SAPCC 2.0 also completed this year with major goal heightened as a part of action plan on Climate Change.

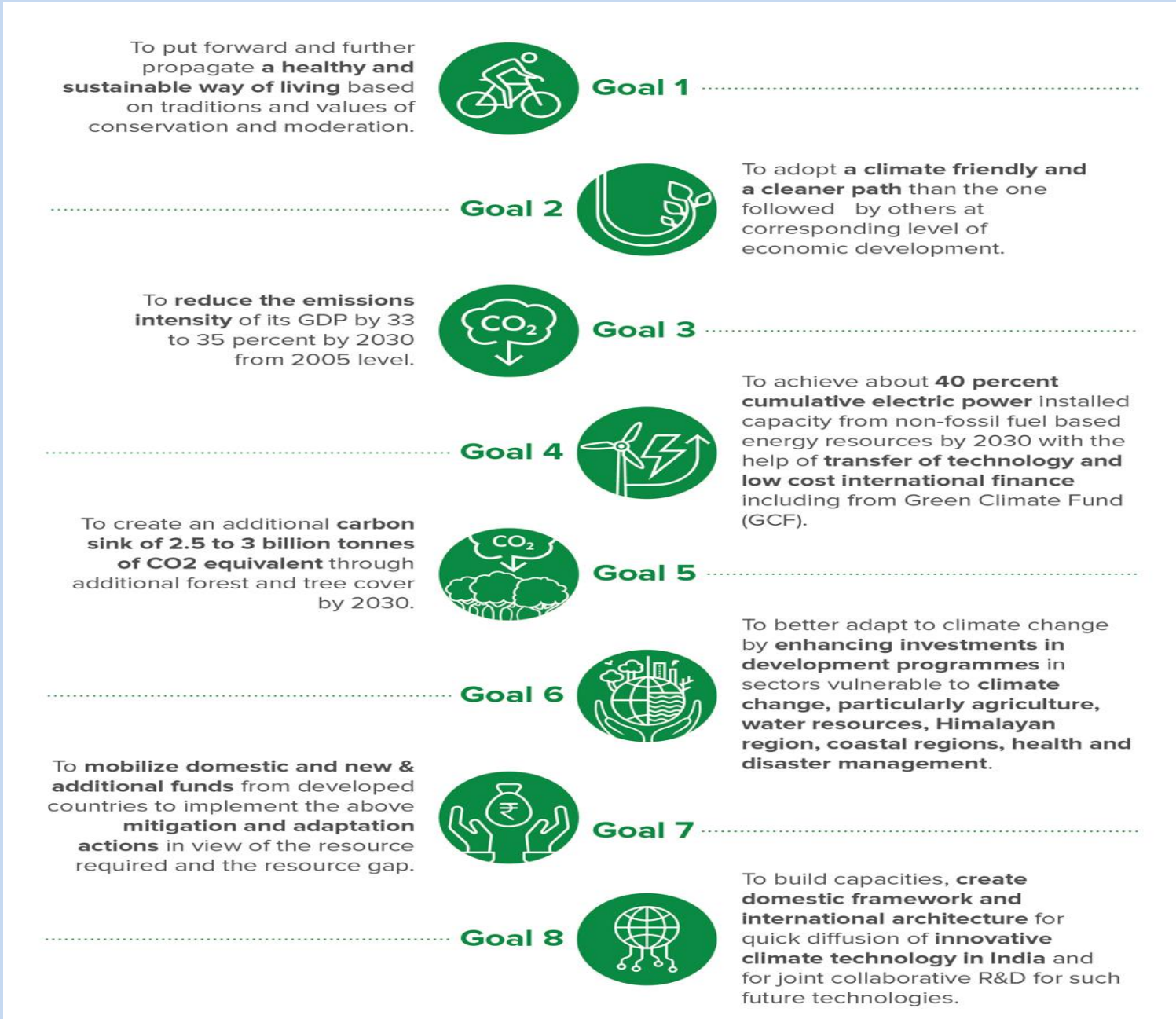


Figure 1: India’s Nationally Determined Contributions

Source: Government of India (2015)

Structure of APSAPCC 2.0

The revision of the Arunachal Pradesh SAPCC 2.0 has been initiated and coordinated by Arunachal Pradesh State Climate Change Cell under Department of Environment, Forests & Climate Change, Government of Arunachal Pradesh, which is based on the recommended structure guided & framed by the MoEFCC under the guidelines of revision of SAPCC. This is motivated by the objective to mainstream climate action in the development planning of the state for a Green and Climate resilient Arunachal Pradesh. While the first SAPCC was focused on formulating mitigation and adaptation strategies spanning the National Action Plan on Climate Change (NAPCC), the revised version undertakes a sectoral approach with updated science and analytics to account for past developments and build upon the foundation of the first SAPCC to inform policies at a state level till 2030. Figure 2 below, therefore, encapsulates the sectors identified while developing the Arunachal Pradesh SAPCC 2.0:

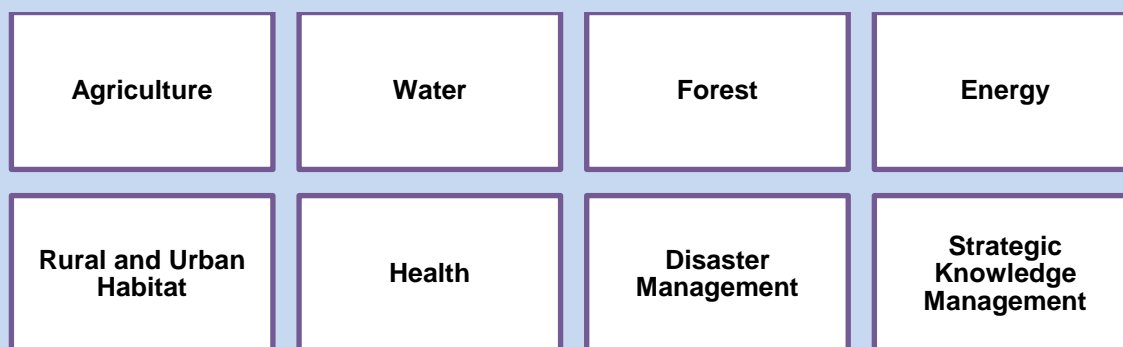


Figure 2: Sectors covered under APSAPCC 2.0

Further, the strategies and action wise targets till 2030 are formulated across sectors, which are in synergy with India's NDC goals, SDGs and the state's development priorities informed by the updated vulnerability assessment. Figure 3 below gives an overview of the structure of the revised Arunachal Pradesh SAPCC.

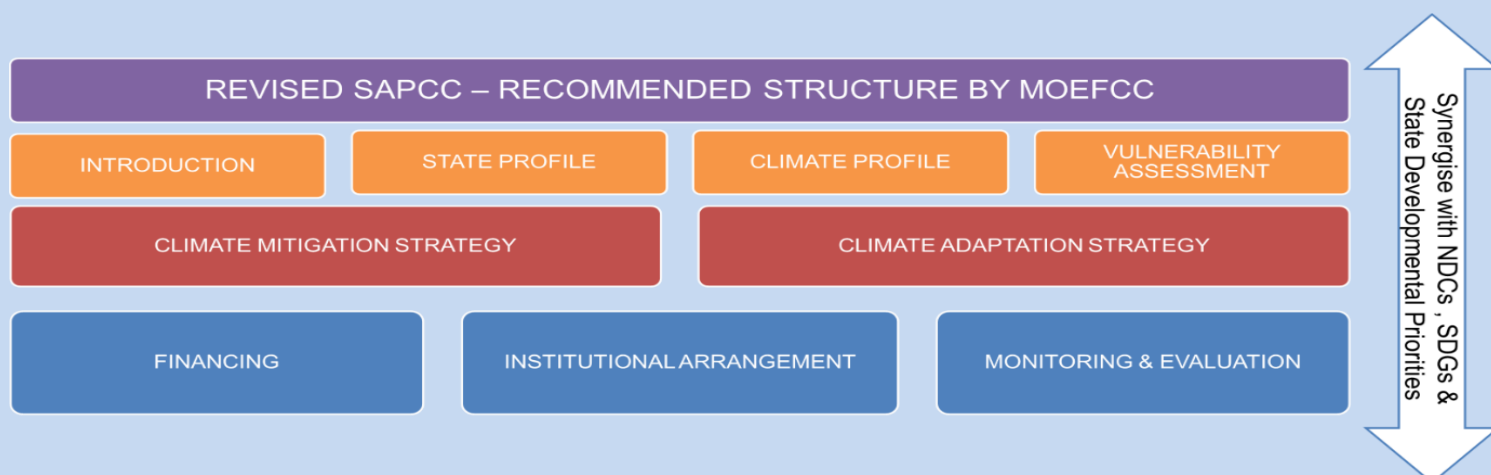


Figure 3: Structure of APSAPCC 2.0

APSAPCC 2.0 objectives and development process

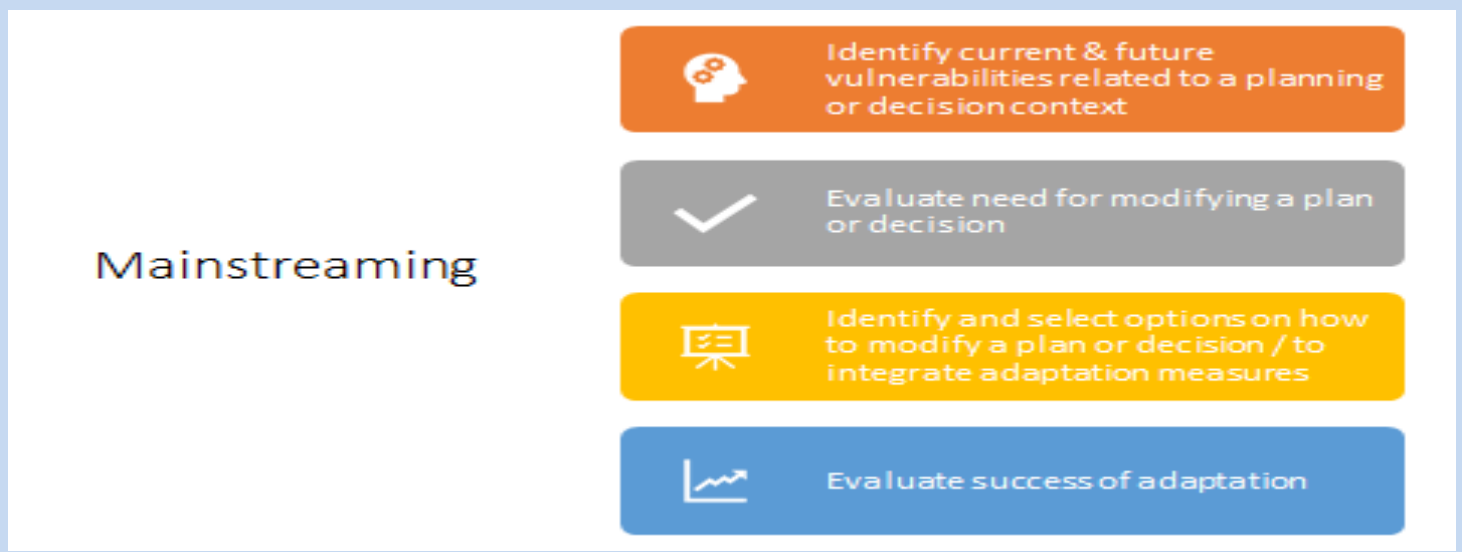
The objective of the updated SAPCC is to revise and prioritise mitigation and adaptation strategies. The revision of APSAPCC also includes a well-developed implementation structure in place. This is also accompanied by a strong financing plan that identifies various sources of finance required to implement the strategies between 2021-2030 along with convergence opportunities with existing schemes and programmes, a robust institutional framework and an effective monitoring and evaluation plan. The updated APSAPCC includes:

- Analysis of observed climate variability and trends of key parameters (Temperature, Precipitation) as well as projections
- Revision/updation of the climate vulnerability assessment of AP (district level) using IPCC AR5 methodological guidance
- Stock take of the implementation of the APSAPCC 1.0
- Re-examination of various actions (adaptations, mitigation) in the light of NDC goals
- Preparation of new short-term and long-term plans

Mainstreaming Climate Change action with Stakeholders-

The Government of Arunachal Pradesh in 2021 prepared a multi-sectorial approach towards low emission and climate resilient development pathway for the state using 5 themes or the PanchDharas, namely environment, forest and climate change; health and well-being of all; sustainable and adaptive living; livelihoods and opportunities and evidence generation and collaborative action.

This was adopted and released by the Arunachal Pradesh state cabinet on November 2021 as the ‘Pakke Declaration’ aimed at “climate resilient development” to commemorate the 75th year of the country’s independence.



Arunachal Pradesh Centre for Climate Change

Conduct modeling for climate change projections at district and block level

Assess impact of climate change on agriculture, water resources, river flow, flooding, forests, health, etc

Develop AP specific and Sector specific Adaptation Strategy

To develop mitigation strategy for Energy efficiency, Renewable energy

Develop Adaptation and Mitigation projects and seek funding to Departments

Capacity building among state Govt Depts

Knowledge Products under NMSHE-

Under NMSHE programme, supported by Department of Science & Technology, Ministry of Science & Technology, Govt.of India, the State Climate Change Cell coordinated with all the concern departments and carried out workshops, training, seminars etc. under capacity building as a part of programme .Under the capacity building ,the officers from line of departments , Researchers, Scholars/AssitantProfessor/Associate Professors/Professor , Scientist were trained in Vulnerability Assessment& Risk Assessment & Mapping in a common framework developed by IIT Guwhati,IISC Bangalore & IIT Mandi,Himachal Pradesh with core concept of three components of Vulnerability ,i.eExposure, Sensitivity& Adaptive Capacity. Under this programme the important concept of three components of Vulnerability broaden up in accordance with the IPCC definitions.

