NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM (NMSHE)

Strengthening The Arunachal Pradesh State Climate Change Cell Under NMSHE (SCCC- NMSHE) -phase II

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Annual Progress Report, State Climate Change Cell, Arunachal Pradesh under NMSHE Phase-II FY 2023-24

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V. Details of Project

- Title of the project: Strengthening the Arunachal Pradesh State Climate Change Cell under National Mission for Sustaining the Himalayan Ecosystem(NMSHE), Phase-II (APSCC-NMSHE) in the State of Arunachal Pradesh
- Project ID/Sanction Number: DST/CCP/NMSHE/SCCC-IHR/Arunachal Pradesh/225/2023 (G)
- 3. **Principal Investigator(s) and Co-Investigator(s)**: Dr. D. Dohu Robin and Dr. Ganguva Murtem.
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5. Manpower

Chapter- I. Introduction

1.1 Arunachal Pradesh State Climate Change Cell (APSCCC)

Arunachal Pradesh State Climate Change Cell was established on 20th October, 2010 in the Department of Environment & Forest, Arunachal Pradesh under National Mission for Sustaining the Himalayan Ecosystem (NMSHE).

The Arunachal Pradesh State Climate Change Centre (APSCCC) was established with the following main objectives :

- i. To identify vulnerability and risk assessment at district level.
- ii. To take up Climate change impact studies.
- iii. Institutional capacity building and R&D for database/ information generation as per the SAPCC and NMSHE requirements.
- iv. To conduct training programmes for stakeholders including government officials, community based organizations, media etc.
- v. To sensitize educational institutions/conduct community awareness programmes.

The main focal activities of Arunachal Pradesh State Climate Change Cell(APSCCC) are:

- Developing concept notes for various adaptation funds for climate change.
- Conducting various studies.
- Awareness creation.

1.2 State Profile

Arunachal Pradesh is located in the easternmost part of the Indian Himalayas. It stretches between 91°30'E-97°30'E longitude and 26°30'N-29°31'N latitude covering an area of 83,743 km². The State shares its boundary in the south with the neighboring states of Assam and Nagaland and an international border with Tibet in the north, Myanmar in the east, and Bhutan in the west. The entire territory forms a complex hilly system with elevations ranging from 50m to 7,000m. The rivers Kameng, Subansiri, Siang, Lohit,and Tirap along with numerous rivulets flow through the state. The undulating topography and high rainfall pattern in the state have endowed it with the largest forest cover in India extending over 79.63 percent of its geographical area and making it one of the top global biodiversity hotspots.

1.3 Governance, Demography, and Economy

The state of Arunachal Pradesh has 25 districts, 109 blocks, 5589 villages and 46 notified towns housing 1.38 million people. The average population density of the State is17 persons/sq. Km which ranges from a minimum of 1 person/km² to a maximum of 51 persons/km² (Census, Size, Growth Rate and Distribution of Population, 2011). Around 23% of the total population resides in urban spaces and the rest 77% reside in rural areas. As Per the census 2011, about 69% of its population is of tribal origin.

Advance estimates of Gross State Domestic Product (at current prices 2011-12 series) for 2019-20 of Arunachal Pradesh place it at Rs. 27036.64 Crore. Per capita,GSDP is estimated as Rs.1, 64,557 and per capita income as Rs. 1,49,798. Share of Gross Value Addition (GVA) by the primary, secondary, and tertiary sectors are 31.19%,25.71%, and 43.1% respectively estimated at current prices (Directorate of Economics and Statistics, GoAP, 2019-2020). The total population below the poverty line is pegged at 34.7% (Ministry of Agriculture & Farmers Welfare, 2021).

1.4 Climate Profile

The climate in Arunachal Pradesh Can be classified as Tropical, subtropical, temperate, and alpine. The tropical climate extends over 80m to 900m above mean sea level (Metre above Mean Sea Level-mamsl). It is characterized by high rainfall and humidity, and temperature ranging between 22-36°C in summer and 10-25°Cin winter. Subtropical climate extends from 900-1800m mamsl with moderate rainfall and humidity and cool temperatures ranging between 15-30°C in summer and 14-21°C in winter. The Temperate climate extending from 1800m to 3500m above experiences less rainfall and cooler temperatures and here temperatures range between 0-22°C. The alpine zone extending above 3500m amsl, experiences cool temperatures in the range of 0-20°C along with snowfall.

Assessment of temperature trends for the state made for the period 1980 and 2019 based on India Meteorological Department (IMD) gridded data indicates a rise in annual mean temperature by 0.015°C per year, which translates to a rise in temperature by 0.59°C in the last 40 years. The state on average receives 2543 mm of rainfall annually. Spatially the rainfall varies between a minimum of 1567 mm in the higher elevations to about 3266 mm in the foothill areas. Between June and September during the southwest monsoon period, the state receives 64 percent of its total rainfall. During the period 1980 and 2019, a significant decreasing trend in southwest monsoon rainfall (JJAS) and also in annual rainfall is observed, along with an increase in the number of dry days and a decrease in the number of rainy days.

Chapter II

Activities/Technical Outcome in the FY 2023-24 as per Objectives in NMSHE II DPR

2.1 OBJECTIVE: ASSISTING STATE GOVERNMENT CLIMATE CHANGE POLICY AND PROGRAM DEVELOPMENT.

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.

Facilitated publication of a guidebook on "Local Climate change and Adaptation Guide Book on Local Climate Change Adaptation Planning and Implementation" attached as Annexure-I.

2.2 OBJECTIVE: KNOWLEDGE GENERATION ON CLIMATE CHANGE

To improve knowledge about Climate Change and associated risk to the state of Arunachal Pradesh by preparing climate projections for near future and long-term from existing data resources for the state.

Climate Change Risk Assessment of Arunachal Pradesh

The Intergovernmental Panel on Climate Change (2014,2022) defined risk in the context of climate change as the impact arising from the "dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system". Hazards, exposure, and vulnerability are each subject to uncertainties regarding their magnitude, likelihood of occurrence and each may change over time and space due to socioeconomic development, adaptation responses and human decision-making. Assessing potential climate risk at the current time as well as in the future, therefore, requires an understanding of all three components: hazard, exposure, vulnerability and is essential for any current and/or future adaptation planning.

The district level climate change related risk profile of the state of Arunachal Pradesh has been evaluated with respect to wide-spread hazards such as floods and droughts. Risk assessment was conducted under two scenarios depending on the objective of the assessment. This was determined by access to historical data, model-based climate change projections, resources, and technical capacity available.

Current Risk or Risk Assessment Based On Historical Climate Trends: It is possible to assess the current risk for a given hazard or a set of hazards in a region consisting of communities, ecosystems, and production systems. Risk could be assessed based on historical trends for a given hazard, such as drought or flood, considering the frequency and intensity of hazard occurrences based on observed data from the past 50 years. A first step towards adaptation to future climate change is considered to be the reduction in vulnerability and exposure to present climate variability.

Future Risk or Risk Assessment under projected climate change scenario: Climatic parameters such as the temperature, rainfall, storms, cyclones ,etc., are projected to be more severe and frequent in the coming years and decades. Climate Change projections are available from global circulation models at a higher spatial scale and from CORDEX models (0.5 x 0.5 deg) for finer spatial scale. Further, climate change projections could be considered under multiple Representative Concentration Pathways (RCPs), ranging from 2.6 to 8.5 or Shared Socioeconomic Pathways (SSPs), ranging from 1.9 to 8.5. Risk in the context of climate change could also be considered for different future periods such as 2020-2050 or 2070-2100.

2.2.1 Climate Change Risk Assessment and Mapping in Arunachal Pradesh in the last 50 years from 1970-2019 in collaboration with IIT Mandi.

As per IPCC in the Fifth Assessment Report (IPCC 2014), severity of the impacts of extreme and non-extreme weather and climate events depends strongly on the level of vulnerability and exposure to these events. Therefore, the study of the nature of vulnerability and extent of exposure is critical to managing risk and enhancing resilience. The Vulnerability of a system is one of three components of risk.

Risk = F(Hazard, Exposure, Vulnerability)

Hazard: Hazard usually refers to climate-related physical events or trends or their physical impacts. This may not always be an extreme weather phenomenon but could be attributed to dry spells, wet days, etc., derived from climate trends.

Exposure: Exposure refers to the inventory of elements in an area in which hazard events may occur (Cardona, 1990; UNISDR, 2004, 2009b). Hence, if population and economic resources were not located in (exposed to) potentially dangerous settings, no problem of disaster risk would exist.

However, it is possible that a certain area is exposed but not vulnerable. In fact, when we consider developing resilient infrastructure or systems, their vulnerability may be reduced. It means either their sensitivity to certain levels of hazards or exposures have reduced, their adaptive capacity has increased or both. Therefore, vulnerability has two elements (sensitivity and adaptive capacity).

Vulnerability=F (Sensitivity, Adaptive Capacity)

IPCC defines: Vulnerability as, "the propensity or predisposition to be adversely affected".. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt".

Sensitivity is, "the degree to which a system or species is affected, either adversely or beneficially by climate variability or change". The effect may be direct (e.g., change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise). Sensitivity refers to those factors that directly affect the consequences of a hazard. Sensitivity may include physical attributes of a system (e.g., house-type, soil type,irrigation type, cropping intensity, etc.),

Adaptive capacity is, "the ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, autoresponder consequences, arising out of climatic or anthropogenic causes.

As the objective of the study was to identify, rank and prioritize the most vulnerable districts for each of the specified sectors in the State of Arunachal Pradesh under current climate, an integrated vulnerability assessment using a tier 1 method that quantifies indicators using secondary sources of information at the district level, has been employed.

A **Vulnerability Index (VI)**, which is a metric that characterizes the vulnerability of a system, has been used. Values of VIs will lie between 0 and 1, where 0 stands for lowest vulnerability and 1 for highest vulnerability. Arrangement of the assessed VI values in decreasing or increasing orders allows for ranking of districts respective to sectoral and composite vulnerability. It must be noted that the vulnerability index value only provides a sense of quantified status of vulnerability and remains largely conceptual in its utility, as this value does not have any stand-alone practical significance.



Figure 1. Steps to compute risk indices

The Focus of the current assessment is on **two predominant hazards**—droughts and floods, due to the large-scale socio-economic impacts in India.

Flood: IPCC (2012) defines flood as 'the overflowing of the normal confines of a stream or other bodies of water, or the accumulation of water over areas that are not normally submerged'. Meteorological floods can be caused by unusually heavy rain and the same has been considered in this assessment to calculate the flood hazard indicator.

Drought: IPCC (2012) defines meteorological drought as "a period of abnormally dry weather long enough to cause serious hydrological imbalance". The Indian Meteorological Department (IMD) declares drought in an area when the rainfall deficiency is \geq 26% of its long-term normal. It is further classified into moderate and severe drought depending upon whether the deficiency is between 26 to 50% or more than 50% respectively.

Hazard Index for Wetness and dryness

One of the commonly used methods and index for dryness is the **Standard Precipitation Index** (SPI) (Mckee,1993). SPI is based on probability of observed precipitation for any timescale.The Probability of observation is transformed into an Index. Data used to compute SPI for historical and future time periods are IMD gridded data (1969 - 2019) and CMIP5-15CORDEX model ensemble (2030-2080) data (under both RCP 4.5 and RCP 8.5 scenarios) for monthly rainfall in a 25x25 square km resolution (Risk assessments under the future climate would be carried out at a later stage).

The SPI is calculated from the historical precipitation record at a weather station, where precipitation accumulation over a period of time is compared to the same period of time throughout the historical record for that location. Since SPI is normalized, both wetter and drier climates can be represented – wetter for floods and drier for droughts. SPI for drought floods expressed as an index for different levels of severity of drought or flood as given in Table 1.

SPI VALUE	CLASSIFICATION
≥2.0	Extremely Wet
1.5to 1.99	Severely Wet
1.0to 1.49	Moderately Wet
-0.99to 0.99	Near Normal
-1.0to-1.49	Moderately Dry
-1.5to-1.99	Severely Dry
-2 and less	Extremely Dry

Table 1. Classification SPI values.

Table 2. Indicators Considered for Exposure

Indicators	Rationale For Selection	Functional Relationship With Exposure	Data source	Year for which the data is applicable
Population	This indicates the population	Positive	Census	2011
Density	exposed to drought and flood		2011	
(population per	in the given geographical			
square km)	area. More Population			
	exposed to any event, more			
	vulnerable the system will be			
	and thus there will be high			
	risk			

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% land with	The steep topography	Positive	State	2018
slope>30°	feature implies lack of		Remote	to
	availability of flat and		sensing	2021
	difficulty in access, likely		and GIS	
	to be adversely affected		Applicatio	
	during floods, landslides,		n Centre,	
	etc. Also, infrastructure on		ASTER	
	the slopes are likely to be		GDEM	
	impacted more by the		30m,	
	hazards. Therefore, if more		CARTOD	
	area is exposed more will be		EM (10m)	
	the risk to population and		NRSC,	
	infrastructure in the sloped		AMSTER	
	area.		DAM	
			(30m).	
% land under	The higher the	Positive	Report on	2015-
agricultural	exposure of agricultural		Agricultur	16 to
use	land to hazards such as		e Census,	2021
	flood, drought, the		http://agri	
	greater the risk of low		coop.nic.i	
	food production.		n/agricult	
			urecontin	
			gency.	

Table 3.	Indicators	of sensitivity	and adaptive	capacity, th	he rationale for	inclusion,and
data sou	rces					

Indicator	Rationale For Selection	Dimension	Data source
% BPL Population (BPL)	People with extremely low incomes are among the most vulnerable. They have little to no financial capital, so they have the least capacity to adapt to the impacts of climate risk (O'Brien,et.al., 2008).	Sensitivity (Positive)	Statistical abstract of AP, 2021.
Share of horticulture in agriculture (Horticulture)	Horticulture trees are hardy and more resilient to climate variations compared to agricultural crops. They provide alternative income sources to agriculture. Once established they are far less sensitive to the impacts of climate risks, particularly rainfall variability and droughts (IHAP, 2019).	Adaptive Capacity (Negative)	Statistical abstract of AP, 2021.

Forest area/1000 population (FA)	Forests are an important source of alternative livelihood and food through the extraction of non-timber forest products (NTFPs).	Adaptive Capacity (Negative)	Forest Survey of India, 2021; Census of India, 2011.
Road Density (RD)	Under extreme weather events, the role of transport becomes crucial. The indicator focuses on accessibility and connectivity and provides the idea of the overall development region.	Adaptive Capacity (Negative)	Ministry of Road Transport and Highway Research Wing, GOI.
Total Number Of Live stocks per1000 rural households	Livestocks are an important source of alternative livelihood.	Sensitivity (Positive)	Statistical abstract of Arunachal Pradesh, 2021.

The hazard-specific risk index is calculated based on the geometric mean of the specific Hazard Index (HI), Exposure Index (EI) andVulnerability Index (VI).

Risk Index = $\sqrt[3]{(HI*EI*VI)}$

Once the risk index is calculated, districts are ranked based on their index values and presented through risk maps.

District-level Risk Assessment Results for Arunachal Pradesh

District	Yearly Arithmetic	Yearly Standard	Max (1070-2010)	Min (1070-2010)
	Mean (1970-2019)	(1970-2019)	(1970-2019)	(1970-2019)
Anjaw	0.074	0.84	2.2	-1.54
Changlang	-0.0003	1.00	4.22	-4.08
Dibang valley	0.0481	0.91	3.3	-1.54
East Kameng	0.0008	1.00	2.95	-4.28
East Siang	0.000	1.00	3.26	-4.39
Kamle	-0.0001	1.00	3.63	-4.1
KraDaadi	0.0481	0.91	3.38	-1.54
Kurung Kumey	0.0013	1.00	2.32	-3.69
Leparada	-0.0001	1.00	3.59	-4.16
Lohit	0.0010	1.00	2.56	-4.79
Longding	0.0015	1.00	3.12	-5.7
Lower Dibang Valley	-0.0012	1.00	2.93	-3.57

 Table 4. Summary of precipitation data for the state of Arunachal Pradesh (in mm)

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				9
Lower Siang	0.0001	1.00	3.46	-4.36
Lower Subansiri	0.0009	1.00	3.25	-4.31
Namsai	-0.0002	1.00	3.27	-4.44
Pakke Kessang	0.0013	1.00	2.61	-4.42
Papum pare	0.0019	1.00	2.13	-4.52
Shiyomi	0.0864	0.85	2.82	-1.39
Siang	0.0005	1.00	3.24	-3.19
Tawang	0.0013	1.00	2.66	-3.02
Upper Siang	0.0283	0.94	3.49	-2.05
Upper Subansiri	0.0013	1.00	2.32	-3.69
West Kameng	0.0014	1.00	2.87	-3.79
West Siang	0.0008	1.00	3.52	-4.33

 Table 5. Types of occurrences of Wetness in the State of Arunachal Pradesh (1970-2019)

	Col (A)	Col (B)	Col (C)	Col (D)	Col (E)
District	No. of Wetness events (moderate)	No. of Wetness events (severe)	No. of Wetness events (extreme)	Probability of Severe To Extreme Wetness events = (Col B + Col C)/595	Rank
Anjaw	56	19	5	0.0403	11
Changlang	53	15	15	0.0504	10
Dibang Valley	45	27	14	0.0689	5
East Kameng	65	26	14	0.0672	6
East Siang	36	21	22	0.0723	4
Kamle	65	15	18	0.0555	9
Kra Daadi	45	27	14	0.0689	5
Kurung Kumey	67	25	8	0.0555	9
Leparada	60	18	18	0.0650	8
Lohit	51	34	10	0.0739	3
Longding	64	15	15	0.0504	10
Lower Dibang Valley	56	34	17	0.0857	1
Lower Siang	47	19	22	0.0689	5
Lower Subansiri	59	23	10	0.0555	9
Namsai	43	20	21	0.0689	5
Pakke Kessang	48	31	9	0.0672	6
PapumPare	55	19	5	0.0403	11

					10
ShiYomi	75	15	6	0.0353	12
Siang	53	25	13	0.0639	7
Tawang	68	24	9	0.0555	9
Tirap	58	21	17	0.0639	7
Upper Siang	49	19	17	0.0605	8
Upper	67	25	8	0.0555	9
Subansiri					
West Kameng	37	38	12	0.0840	2
West Siang	45	23	13	0.0605	8

 Table 6. Types of occurrences of Dryness in the state of Arunachal Pradesh(1970-2019)

District	(Col. A)	Col. (B)	Col. (C)	Col. (D)	Col. (E)
	No. of Dryness events (moderate)	No. of Dryness events (severe)	No. of Dryness events (extreme)	Probability of severe to extremely Dryness events = (Col B + Col C)/595	Rank
Anjaw	73	18	0	0.0303	16
Changlang	47	23	12	0.0588	7
Dibang valley	58	22	0	0.0370	15
East Kameng	64	20	11	0.0521	11
East Siang	61	29	6	0.0588	7
Kamle	61	22	12	0.0571	8
KraDaadi	58	22	0	0.0370	15
Kurung Kumey	40	17	22	0.0655	4
Leparada	59	21	10	0.0521	11
Lohit	54	23	13	0.0605	6
Longding	46	18	14	0.0538	10
Lower Dibang Valley	79	18	5	0.0387	14
Lower Siang	47	15	15	0.0504	12
Lower Subansiri	48	14	19	0.0555	9
Namsai	62	24	4	0.0471	13
Pakke Kessang	35	22	19	0.0689	3
PapumPare	25	17	25	0.0706	2
ShiYomi	51	0	0	0.000	17
Siang	67	17	16	0.0555	9
Tawang	51	12	26	0.0639	5
Tirap	43	22	13	0.0588	7
Upper Siang	40	23	12	0.0588	7
Upper Subansiri	40	17	22	0.0655	4
WestKameng	48	40	8	0.0807	1

West Siang	56	23	15	0.0639	5

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Figure 2. District Wise Wetness Ranking map on a scale High to Low (1970-2019)

The Wetness index has been derived from the meteorological precipitation data from 1970 to 2019 using SPI generator & classified accordingly for 25 districts of Arunachal Pradesh. The districts have been categorized into three (3) categories viz., High for 1-4 ranks, Medium for 5-9 ranks & Low for 10-12 ranks. As represented in Figure 2, the highest probability of wetness events in the districts of Arunachal Pradesh are Lower Dibang Valley,West Kameng, Lohit and East Siang respectively as shown in the above map. Whereas, Shi Yomi, Longding, Changlang, Papumpare and Anjaw are the least wet districts of Arunachal Pradesh.



Figure 3: Map showing dryness in the districts of state Arunachal Pradesh (1970-2019)

Based on Dryness Value, the 25 districts of Arunachal Pradesh have been categorized into Three (3) categories viz., for High: 1-4 ranks, Medium: 5-9 ranks , Low: 10-17 ranks as shown in above Figure 3. The highest probability of dryness events in the districts of Arunachal pradesh are West Kameng, Papum-Pare & Pakke Kesang, Kurung Kumey and Upper Subansiri. The medium probability of dryness events are in the districts of Tawang,West Siang,Lohit,Changlang,East Siang,Tirap,Upper Siang,Kamle,Lower Subansiri and Siang. The Low probability of dryness events districts are Longding,East Kameng,Leparada,Lower Siang, Namsai, Lower Dibang Valley,Dibang Valley ,Kradaadi, Anjaw and Shiyomi.

District	Population Density		%Land Slo >3	d With pe 0°	Land agricu u	under ultural se	Exposu re Index	Rank
	AV	NV	AV	NV	A V	NV	(EI)	
Anjaw	3.4	0.05	93.93	0.93	1.4	0.05	0.34	13
Changlang	31.8	0.62	56.37	0.40	9.4	1.00	0.67	2
DibangValley	0.9	0.00	85.73	0.81	1.0	0.00	0.27	14
East Kameng	19.0	0.36	99.18	1.00	5.0	0.48	0.61	3
East Siang	27.5	0.53	52.10	0.34	6.3	0.63	0.50	5
KurungKumey	15.2	0.29	94.90	0.94	2.3	0.16	0.46	8
Lohit	28.0	0.54	27.51	0.00	2.2	0.14	0.23	15
Lower Dibang Valley	13.9	0.26	64.08	0.51	3.2	0.27	0.35	12

 Table 7 :District-wise actual values (AVs), normalized values (NVs) of indicators and the

 Exposure Index (EI)

Lower Subansiri	23.7	0.45	47.01	0.27	4.8	0.45	0.39	10
Papum Pare	51.0	1.00	66.20	0.54	5.5	0.53	0.69	1
Tawang	23.0	0.44	87.57	0.84	2.0	0.12	0.47	7
Tirap	47.4	0.93	50.51	0.32	4.7	0.44	0.56	4
Upper Siang	5.4	0.09	89.89	0.87	2.4	0.16	0.37	11
Upper Subansiri	11.9	0.22	76.28	0.68	6.0	0.60	0.50	6
West Kameng	11.3	0.21	56.37	0.40	1.6	0.07	0.23	16
West Siang	13.5	0.25	73.01	0.63	4.5	0.41	0.43	9



Figure 4 (a). Population Density map of Districts of AP (Census2011).

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Figure 4 (b). Percentage of land under slope greater than 30.



Figure 4 (c). Map showing land under Agriculture use of districts of Arunachal Pradesh.



Figure 5 : Map showing composite Exposure Index of districts of Arunachal Pradesh.

Due to limited data for the entire districts of the state, the Census of 2011, were considered and out of the total twenty five, sixteen districts were selected for the assessment. Papum Pare and Tirap districts are the most densely populated districts in the state. Dibang Valley is the least densely populated district. East Kameng, Kurung Kumey and Anjaw district has the highest percentage of land with slopes greater than 30°. Changlang and East Siang districts have the largest area under agricultural use. The Exposure Index is highest for the districts of Papum Pare, Changlang, East Kameng, Tirap and East Siang (Figure 6). Exposure Index is least for the districts of West Kameng, Lohit, Dibang Valley, Anjaw, and Lower Dibang Valley.

District	BPL		BPL Horticultu re		FA		Livestock		RD		VI& Ranks	
	AV	NV	AV	NV	AV	Ν	AV	NV	AV	NV	VI	Ran
						V						k
Anjaw	63	0.00	0.29	0.94	1272.3	0.88	65	0.83	0.08	0.93	0.716	5
Changlang	66	0.38	1.29	0.00	21.22	1.00	124	0.62	0.19	0.75	0.548	12
Dibang Valley	64	0.13	0.37	0.87	10168.7 3	0.00	61	0.84	0.04	1.00	0.567	11
East kameng	66	0.38	0.23	1.00	93.31	0.99	200	0.35	0.2	0.73	0.689	6
East Siang	66	0.38	0.85	0.42	36.60	1.00	266	0.11	0.16	0.80	0.540	13

 Table 8. District-wise actual values (AVs) ,normalized values (NVs) of indicators and the

 Vulnerability Index (VI)

Kurung	71	1.00	0.95	0.32	56.31	1.00	40	0.91	0.12	0.87	0.820	1
Kumey												
Lohit	63	0.00	1.25	0.04	26.85	1.00	297	0.00	0.17	0.78	0.364	15
Lower Dibang	65	0.25	0.84	0.42	222.76	0.98	213	0.30	0.11	0.88	0.567	10
Valley												
Lower	66	0.38	0.75	0.51	69.25	0.99	291	0.02	0.19	0.75	0.530	14
Subansiri												
Papum Pare	68	0.63	0.33	0.91	11.10	1.00	117	0.64	0.19	0.75	0.784	3
Tawang	64	0.13	0.88	0.39	86.96	0.99	219	0.28	0.64	0.00	0.356	16
Tirap	65	0.25	0.67	0.58	15.43	1.00	16	1.00	0.57	0.12	0.590	9
Upper Siang	68	0.63	0.37	0.87	528.26	0.95	163	0.48	0.13	0.85	0.754	4
Upper	65	0.25	0.69	0.57	100.98	0.99	150	0.52	0.15	0.82	0.629	7
Subansiri												
West Kameng	65	0.25	0.91	0.36	81.99	0.99	115	0.65	0.21	0.72	0.593	8
West Siang	67	0.50	0.25	0.98	66.04	0.99	77	0.78	0.15	0.82	0.815	2



Figure 6. Map showing Vulnerability Index Ranks of districts of the state Arunachal Pradesh.

Highest percentage of BPL is found in the district of Kurung Kumey and the least is in Anjaw and Lohit districts. It is least in the district of East Kameng. The Forest area cover per thousand rural population is highest in Dibang valley and least in Papum Pare district. The livestock population per 1000 rural households is highest for Lohit, East Siang, Lower Subansiri, and Lower Dibang Valley districts. The highest road density is found in the Tawang district and least in Dibang valley. Further, the derived Vulnerability index was found to be highest for Kurung Kumey with vulnerability index value 0.820, followed by

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District	Wetne	Drynes	VI	EI	Wetness	Wetness	Dryne	Dryness
	ss	s			Risk	Risk	SS	Risk
	Index	Index			Index	Rank	Risk	Rank
	(HI)	(HI)					Index	
Anjaw	0.04	0.03	0.72	0.34	0.214	10	0.194	9
Changlang	0.05	0.06	0.55	0.67	0.264	5	0.281	2
Dibang valley	0.07	0.04	0.57	0.27	0.221	9	0.183	10
East Kameng	0.07	0.05	0.69	0.61	0.309	1	0.276	4
East Siang	0.07	0.06	0.54	0.5	0.266	4	0.253	6
Kurung Kumey	0.06	0.07	0.82	0.46	0.283	2	0.298	1
Lohit	0.07	0.06	0.36	0.23	0.180	11	0.171	11
Lower Dibang Valley	0.09	0.04	0.57	0.35	0.262	6	0.200	8
Lower Subansiri	0.06	0.06	0.53	0.39	0.231	8	0.231	7
Papum Pare	0.04	0.07	0.07	0.69	0.125	14	0.150	12
Tawang	0.06	0.06	0.06	0.47	0.119	15	0.122	14
Tirap	0.06	0.06	0.06	0.56	0.126	13	0.126	15
Upper Siang	0.06	0.06	0.75	0.37	0.255	7	0.255	5
Upper Subansiri	0.06	0.07	0.07	0.5	0.128	12	0.135	13
West Kameng	0.08	0.08	0.08	0.23	0.050	16	0.050	16
West Siang	0.06	0.06	0.82	0.43	0.277	3	0.277	3

 Table 9. Wetness and Dryness-specific Risk Index values and corresponding ranks of districts in Arunachal Pradesh.



Figure 7: Distribution of districts based on Wet Risk Index on a risk scale of Low To High.

Based on Wetness Risk index value, the districts of Arunachal Pradesh have been divided into three (3) categories which have been shown clearly in above map.The categories are:-High:1-5 ranks , Medium:6-10 ranks ,and for low:11-16 ranks, and for Longding district shown as zero (0) rank due to non availability of data.



Figure 8. Distribution of districts based on Dryness Risk Index on a risk scale Low to High

Based on Dryness index value, the districts of Arunachal Pradesh have been divided into three (3) category as shown clearly in above map, as for High:1-5 ranks, Medium:6-10 ranks, and for low:11-16 ranks, and for Longding district shown as zero (0) rank due to non availability of data.

The Index for Wetness and Dryness, Vulnerability Index (VI) and Exposure Index (EI) of all the 16 districts of the state Arunachal Pradesh have been identified to further derive the Wetness and Dryness Risk Index ranks. East Kameng has been identified as the highest Wetness risk district of Arunachal Pradesh followed by Kurung Kumey & West Siang. Whereas, West Kameng, Tawang and Papum Pare are the least wet districts.

Similarly ,based on the dryness risk index, Kurung Kumey district has the highest dryness risk rank followed by Changlang & West Siang, whereas West Kameng, Tawang & Tirap districts are the least dryness districts of Arunachal Pradesh.

Biophysical Drivers

Climate change threatens biodiversity directly by influencing biophysical variables that drive species geographic distributions and indirectly through socio-economic changes that influence land use patterns, driven by global consumption, production and climate. Physical risk drivers are changes in both weather and climate that impact economies. They Can be categorized as acute risks, which are related to extreme weather events, or chronic risks associated with gradual shifts in climate. These drivers may appear with a significant time lag, and the frequency and severity of each type of risk may also vary considerably and become increasingly difficult to predict. While human activity and decisions affect exposure to physical climate risks, the location, timing and magnitude of specific physical events cannot be controlled.

In this study, some of the biophysical drivers considered for determining EI are percentage of land with slope greater than 30°, percentage of land under agricultural use, share of horticulture in agriculture, forest area/1000 population, road density etc. Horticulture, forest cover and road density have negative adaptive capacity with respect to vulnerability index.

The steep topography feature implies lack of availability of flat and difficulty in access, likely to be adversely affected during floods, landslides, etc. Also, infrastructure on the slopes is likely to be impacted more by the hazards. Therefore, if more area is exposed more will be the risk to population and infrastructure in the sloped area. Majority of the districts in the state of Arunachal Pradesh have a high percentage of land with slopes greater than 30°. This makes the state of Arunachal Pradesh more prone to risk of exposure. East Kameng and Kurung Kumey districts have the highest percentage of land with slopes greater than 30°. Both the districts fall under top ten districts prone to risk of exposure (Table 7).

Higher exposure of the land under agriculture use to the hazard such as flood, drought, more will be the risk of low food production. Changlang and East Siang districts have the largest area under agricultural use. Both the districts fall under top five districts prone to risk of exposure (Table 7).

Horticulture trees are hardy and more resilient to climate variations compared to agricultural crops. They Provide alternative income sources to Agriculture.Once Established they are far less sensitive to the impacts of climate risks, particularly rainfall variability and droughts (IHAP, 2019). The share of horticulture produce with respect to agriculture produce is highest for Changlang and Lohit district. Therefore, these two districts are least prone to vulnerability risk. Whereas, the share of horticulture produce with respect to agriculture produce is least in the district of East Kameng making it more prone to risk of vulnerability (Table 8).

Forests are an important source of alternative livelihood and food through the extraction of non-timber forest products. Under extreme weather events, the role of transport becomes crucial.The indicator focuses on accessibility and connectivity and provides the idea of the overall development region.The Forest area cover per thousand rural populations is highest in Dibang Valley and least in Papum Pare district.Dibang valley district is therefore least vulnerable and PapumPare district being one of the most vulnerable districts (Table 8).

Under extreme weather events, the role of transport becomes crucial. The indicator focuses on accessibility and connectivity and provides the idea of the overall development of a region. The highest road density is found in the Tawang district and least in Dibang valley. Tawang district is comparatively less vulnerable than Dibang Valley district (Table 8).

Socio-economic drivers

The socio-economic drivers considered in this study are population density, percentage of BPL and livestock population per 1000 rural households. Population density has a positive relation with respect to exposure index. Percentage of BPL and livestock population per 1000 rural households also has positive sensitivity to vulnerability index.

The more the population is exposed to an event, the more vulnerable the system will be, leading to a higher risk. Papum Pare and Tirap districts are the most densely populated districts in the state. Both Districts therefore fall under the top five districts prone to exposure risk (Table 7). Whereas, Dibang Valley is the least densely populated district and is therefore least prone to exposure risk.

People with extremely low incomes are among the most vulnerable. They have little to no financial capital, so they have the least capacity to adapt to the impacts of climate risk (O'Brien, et.al. 2008). Highest percentage of BPL is found in district Kurung Kumey and the least is in Anjaw and Lohit districts. Kurung Kumey is therefore most prone to vulnerability whereas Lohit is the least vulnerable district (Table 8).

Live stocks are an important source of alternative livelihood and have a positive sensitivity to vulnerability index. The livestock population per 1000 rural households is highest for Lohit, East Siang, and Lower Diabng Valley districts.

Application of Risk Index and Maps at the District level

Risk indexing is a useful and powerful tool that can provide valuable information about the risks associated with climate change for identifying for sectoral level vulnerability assessment of the districts for taking up steps for responsive action. Risk indexing, risk assessments & mapping at the district level based on available secondary data provide an opportunity to have a systematic and comprehensive perspective of the climate change risks that can be prioritized on an urgent basis and for appropriate adaptation measures that can be provided for efficient management for the future. Creating a risk map forces organizations/govts etc., to identify the risks that could threaten the man and their possible impact and likelihood. The vulnerability ranking can clarify priorities to help them get ahead of issues before they threaten organization's operations, creating a risk map also facilitates interdepartmental dialogues about issues of climate change risk. It forces greater collaboration between the risk function and other departments within an organization as they must all work together to identify, prioritize and visualize risks. Such a risk map can help visualize how risks in one part of the organization/sector can affect the other.

Thus, climate risk assessment, indexing & mapping is the foundation tool for effective climate risk management for identification of any important sectors within the block/district or state. A risk map also adds precision to an organization's risk assessment strategy and identifies gaps in an organization's risk management processes.

By identifying risk and assessing the magnitude of impacts on people, assets, value chains, infrastructure, settlements, and ecosystems, climate risk assessment informs decision makers on possible options for action. Thus, vulnerability and risk assessment for a given region of interest is a critical first step in addressing climate change, through development and

implementation of adaptation resilience policies, programmes and projects. Following are the advantages of risk indexing & mapping:

- a) Prioritizing and allocating resources
- b) Identifying the need for more refined risk assessments
- c) Encouraging community-level risk communication and engagement
- d) Educating homeowners and renters
- e) Informing long-term community recovery
- f) Support collaboration between the organization's risk function and other functional departments, which have greater visibility into risk due to the riskmap;
- g) Developing riskmaps can help organizations demonstrate a comprehensive, well-aligned risk management strategy to insurance companies gain more favorable premiums;
- h) Encourage shared strategic decision-making on risk issues;
- i) Effectively focus on improving risk management and risk governance;

State Govt. Departments For Prioritizing Adaptation

The Intergovernmental Panel on Climate Change (IPCC) defines adaptations adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (McCarthy et al., 2001, p.982). Adaptation may be technological, behavioral, financial, institutional or informational in nature, and occur in a variety of forms, including anticipatory, passive, reactive, proactive, autonomous, spontaneous or planned/purposeful (Carter et al., 1994; Smith, 1997; Smit et al., 2000; Fankhauser et al., 1999; Smith and Lenhart, 1996; Smit et al., 2000). In addition, Tompkins et al., (2010, p.630) have classified adaptation actions as (a) Building Adaptive Capacity-where activities may include research, planning, networking, awareness raising, training and advocacy; (b) implementing adaptation, and (c) developing supportive legislative and policy frameworks. The adaptation policies and measures that play an important role that influence the ability to successfully cope with climate variability, including the effectiveness of those policies and measures understanding the adaptations in place to cope with current climate risks is necessary to inform the development of adaptations to manage future climate risks that the system possesses, be it any sector of any region.

The output from this activity forms a preliminary adaptation baseline that describes the policies and measures in place to reduce vulnerability. This involves identifying the autonomous and planned adaptations currently implemented to address climate risks in the priority system, including the level at which these have been implemented (national, regional and community level), their effectiveness and any barriers to their implementation. Also, it will help identify institutions that can support implementation adaptation policies and measures. This evaluation will facilitate proper ways of understanding the past, how policies and measures in place could be improved, and what strategies, policies and measures might be necessary in the future can be prioritized according to need as per the assessment findings in various sectors for all districts / blocks and state as a whole. By this, the state can take a broad perspective and include relevant policies and measures that were designed to address other problems that are relevant to climate change risks such as conducting an assessment of adaptive responses to historic climate risks, and on developing the relationship between

current climate risks and adaptive responses that can be used to calculate future climate risks that would help to define adaptation strategies, policies and measures relevant to the climate risks in system which need urgent attention.

2.2.2 District level Climate Change Risk Assessment and Mapping in Arunachal Pradesh for the period 2031 to 2080 in collaboration with IIT Mandi.

As the climate continues to change, it is essential to conduct risk assessments to evaluate the potential impacts and vulnerabilities associated with future climate scenarios. The risk assessment process involves analyzing the potential hazards, exposure, and vulnerability of various systems and sectors to identify and prioritize potential risks.

Future Risk or risk Assessment under projected climate change scenario: Climatic parameters such as temperature, rainfall, storms, cyclones, etc., are projected to be more severe and frequent in the coming years and decades. Climate change projections are available from global circulation models at a higher spatial scale and from CORDEX models ($0.5 \times 0.5 \text{ deg}$) for a finer spatial scale. Further, climate change projections could be considered under multiple Representative Concentration Pathways (RCPs), ranging from 2.6 to 8.5, or Shared Socioeconomic Pathways (SSPs), ranging from 1.9 to 8.5. Thus, risk in the context of climate change can also be considered for different future periods such as 2020-2050 or 2070-2100.

District-level Hazard Assessment for Arunachal Pradesh State under RCP 4.5 scenario



Figure 9: Map showing occurrence of wet events in the districts of state Arunachal Pradesh (2031-2080) under RCP 4.5scenario.

The district-level hazard assessment of Arunachal Pradesh State under RCP 4.5 scenario for the future wet events is as shown in Figure 9. As per figure 9, a total of 10 districts are highly prone to future precipitation occurrences namely Lower Dibang Valley, Lohit, Pakke Kesang, West Kameng, East Siang, Longding Lower Siang, Namsai Leparada and Tirap. Further, a total of 8 districts are prone to medium precipitation occurrences namely West Siang, East Kameng, Siang, Changlang, Lower Subansiri, Kurung Kumey, Upper Subansiri and Kamle. Lastly, a total of 7 districts are least prone to precipitation occurrences namely Dibang Valley, Papum Pare, Tawang, Upper Siang, Kra Daadi, Anjaw and Shi Yomi.



Figure 10: Map showing occurrence of dry events in the districts of state Arunachal Pradesh (2031-2080) under RCP 4.5 scenario.

The district-level hazard assessment of Arunachal Pradesh State under RCP 4.5 scenario for the future dry events is as shown in Figure 10. As per figure 10, a total of 4 districts are highly prone to future dry event occurrences namely Shi Yomi, Anjaw, Kra Daadi and West Kameng. Further, a total of 7 districts are prone to medium future dry event occurrences namely Papum Pare, Changlang, Dibang Valley, Kurung Kumey, Upper Subansiry, Lower Subansiri and Siang. Lastly, a total of 11 districts have low future dry event occurrences namely, Lepa Rada, Tawang, Lower Siang, Upper Siang, Lohit Tirap, West Siang, Pakke Kesang , East Kameng, East Siang and Longding. Lastly, only 3 districts are least prone to future dry event occurrences namely Kamle, Namsai, and Lower Dibang Valley.



District-level Hazard Assessment for Arunachal Pradesh State under RCP 8.5 scenario

Figure 11. Map showing occurrence of wet events in the districts of state of Arunachal Pradesh (2031-2080)under RCP 8.5 scenario.

The district-level hazard assessment of Arunachal Pradesh State under RCP 8.5 scenario for the future wet events is as shown in Figure 11. As per figure 11, a total of 6 districts are highly prone to future precipitation occurrences namely West Kameng, Lower Dibang Valley, Pakke Kesang, Namsai, Tirap and East Siang. Further, a total of 8 districts are prone to medium precipitation occurrences namely East Kameng, Lohit, Lower Siang, Lepa Rada, Longding, West Siang, Lower Subansiri and Siang. Lastly, a total of 11 districts are least prone to precipitation occurrences namely Changlang, Kurung Kumey, Upper Subansiri, Upper Siang, Kamle, Dibang Valley, Papum Pare, Tawang, Kra Daadi, Anjaw, and Shi Yomi.



Figure 12. Map showing occurrence of dry events in the districts of state of Arunachal Pradesh (2031-2080)under RCP 8.5 scenario.

The district-level hazard assessment of Arunachal Pradesh State under RCP 8.5 scenario for the future dry events is as shown in Figure 12. As per figure 12, a total of 4 districts are highly prone to future dry event occurrences namely Shi Yomi, Anjaw, East Siang, Kra Daadi and West Kameng. Further, a total of 13 districts are prone to medium future dry event occurrences namely Dibang Valley, Papum Pare,Kurung Kumey, Lower Subansiri, Tawang, Upper Subansiri, Siang, East Siang, Kamle, Lepa Rada, East Kaeng, Lower Siang, and Upper Siang. Lastly, a total of 8 districts have low future dry event occurrences namely, Dibang Valley, Lohit, Kurung Kumey, Upper Subansiri, Lower Dibang Valley, Lower Subansiri, Tawang, and Pakke Kesang. Lastly, only 2 districts are least prone to future dry event occurrences namely Kra Daadi and Upper Siang.

Application of Risk Index and Maps at the District-level

Risk assessments provide an opportunity to have a systematic and comprehensive perspective of climate change risks. By conducting the risk assessment, adaptation policies can be prioritized as well as appropriate adaptation measures can be provided for efficient management. Thus, climate risk assessment is the foundation for effective climate risk management. By identifying risk and assessing the magnitude of impacts on people, assets, value chains, infrastructure, settlements, and ecosystems, climate risk assessment informs decision-makers on possible options for action. Thus, vulnerability and risk assessment for a given region of interest is a critical first step in addressing climate change, through development and implementation of adaptation or resilience policies, programmes and projects.

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2.3 OBJECTIVE: CAPACITY DEVELOPMENT IN THE STATE ON CLIMATE CHANGE

2.3.1 Three (3) Day Workshop "Capacity Building Development for Gram Panchayats on Planning and implementation of Local Climate Change Adaptation plans under the Pakke Tiger Reserve -2047 Declaration on Climate Resilient and responsive Arunachal Pradesh in the Lohit Basin" conducted from 21st -23rd June 2023 in Namsai in collaboration with Arunachal University of Studies, Namsai, Department of Panchayati Raj Department of Disaster Management, Govt.of Arunachal Pradesh.



Figure 13. Three days capacity building workshop for Gram Panchayat on planning and implementation of Local Climate Change Adaptation Plans in Lohit Basin, Arunachal Pradesh on 21st - 23rd June.

Target Group: Officials from RD & PR, PRIs and Village Communities.

No. of Beneficiaries:105.

The details of personals trained in the Three (3) Day Workshop "Capacity Building Development for Gram Panchayats on Planning and implementation of Local Climate Change Adaptation plans under the Pakke Tiger Reserve -2047 Declaration on Climate Resilient and responsive Arunachal Pradesh in the Lohit Basin" are attached as Annexure-II.

2.3.2 Conducted Two Day Workshop on "Convergence & Perspective Planning of Actions for Environment Sustainability" on 22nd and 23rd February, 2023 in collaboration with National Institute of Rural Development Panchayati Raj – North Eastern Regional center (NIRDPR-NERC), Ministry of Rural Development, Govt. of India, Guwahati, Assam.



Figure 14. Two Day Workshop on "Convergence & Perspective Planning of Actions for Environment Sustainability" on 22nd and 23rd February, 2023.

Target Group: Officials from various line Departments such as RD & PR, Forestry, Agriculture, Animal Husbandry, Fisheries, Horticulture, academicians, SIRD&PR, ETCs, CEOs of ZPs, PRIs, NGOs, CBOs.

No. of Beneficiaries: 42

Details of personals trained in the Two(2) Day Workshop on "Convergence & Perspective Planning of Actions for Environment Sustainability" on 22nd and 23rd February, 2023 in collaboration with National Institute of Rural Development Panchayati Raj – North Eastern Regional center (NIRDPR-NERC), Ministry of Rural Development, Govt. of India, Guwahati, Assam Annexure-III.

Outcome/ Deliverables:

A. Theme Theme1: Environmentally sustainable development, pillars of sustainable development, sustainable and resilient economics- economic case for investing in nature- planning and development perspectives.

Chaired by : Shri Rajesh S., IFS, CCF (Env and CC).

Convened by :

Issues emanated from panel:

- Changed mindset required for better conservation approaches.
- Hurdles to implementation of programmes due to financial issues & manpower shortages.
- Data driven approach epitome of futuristic learning.
- Spring rejuvenation programmes for sustaining village livelihood.
- Project proposals in the state required to prevent Joshimath like situations.
- Environmental & social inclusiveness exclusive to sustainable development.
- Safety of citizens and environment a priority before any type of development.
- Requirement of implementation of policies to elevate the livelihood of people while also promoting tree plantations to reduce carbon footprint which is to be

achieved by creating a sense of ownership in individuals.

• Gati shakti yojna, multilevel convergence for sustainable development.



Figure 15. Chairperson: Shri Rillang Cheje, Member, Food Commission, GoAP, Itanagar, Convener: Dr. V. Suresh Babu, NIRD&PR – NERC, Guwahati, Discussants: 1. Ms. Niyang Pertin, APCS, Circle Officer, Pangin Circle, Siang District, 2. Dr. Kamal Medhi, Landscape Co-ordinator, WWF, India, 3. Dr. Devendra Kumar, Head & Scientist D, GB Pant NIHE, Itanagar.

B. Theme 2: Soil health and fertility, Biodiversity resilience, Ecosystem restoration, climate resilient models, nature smart development- Ecosystem based approaches.

Chaired by : Shri Rillang Cheje, Member, Food Commission, GoAP, Itanagar

Issues emanated from panel:

- Horticulture's role in maintaining soil fertility by organic practice.
- Pros & cons of horticulture & agroforestry in sustainable development.
- Requirement of carbon sink (bamboo forests & gardens) in mitigating climate change.
- Bamboo utilities as a good source of alternatives to SUPS and requirement of promoting and commercializing bamboo products.
- Requirement of biofuel policy.
- Importance of amalgamating science & traditional knowledge for better planning.
- Biodiversity loss is one of the five threats to humanity and Arunachal Pradesh as a State needs to come up with plans to continue to maintain its biodiversity.
- Engagement of youths and students in awareness & planning to adopt sustainable activities.


Figure 16. Convener: Dr. Vishaish Uppal, Director, WWF, New Delhi, Discussants:1. Shri Bullo Tama, Dy. Director, Horticulture, GoAP, Itanagar, 2. Prof. Hui Tag, Rajiv Gandhi University, Doimukh, 3. Shri G. Murtem, CEO, Bamboo Mission, GoAP, Arunachal Pradesh.

C. Theme Theme3: Challenges and prospects to address adaptability and mitigation strategies, Localization of SDGs , need for collaborative action and whole of government and whole of society engagements- ensuring No One Left Behind.

Chaired by : Dr. Vishaish Uppal, Director, WWF, New Delhi

Issues emanated from panel:

- Development of regional climatic models in a holistic way.
- Capacity building & skill development for adaptation & mitigation.
- Localization of SDGs.
- Challenges in implementation of SDGs.
- Waste to Wealth activities as one of the SDGs.
- Sensitization of school children, public.
- Requirement of protection of pith soil around wetlands.



Figure 17. Chairperson: Dr. Vivek HP, IAS, Spl. Secretary (Health), GoAP, Itanagar, Convener: Shri Likha Tejji, Commissioner, IMC, Itanagar, Discussants 1.Shri. Yo Talum, Environmental Officer, Town Planning Department, Itanagar, 2.Ms. Mitasha Pillay, Programme Manager, SBM, ULB, 3.shri. Siyang Rebe, Assistant Town Planner, GoAP.

D. ThemeTheme 4: Role of institutional resilience in good governance, Convergence of central sector & SSS; collaborative fora and partnerships- Prospects and Constraints.

Chaired by : Dr. Vivek HP, IAS, Spl. Secretary (Health), GoAP, Itanagar.

Issues emanated from panel:

- The current dimensions in the environment sustainability planning process adopted by various line department such as Agriculture, Forestry, Horticulture, Fisheries, Panchayati Raj, Rural Development, Sericulture, etc are economically viable and feasible The Convergence of programmes is practically successful in districts where the concerned officers are proactive and pro-poor. In case of financial convergence, the fund availability in line departments is very meager. The modus operandi in financial convergence to be assessed.
- Integration process of the plans at the local governance i.e Gram Panchayats / Village Councils for holistic development.



Figure 18. Chairperson: Ms. Koj Rinya, IFS, Secretary, (Horticulture), GoAP, Itanagar, Convener: Shri Narayan Sahoo, Dy. Director, SIRD≺ Panel members: 1. Shri D. Dohu Robin, Director (Environment), GoAP, 2. Shri Dimbeswar Borah, State Programme Coordinator, NEIDA, 3. Dr. Mriganka S Sarkar, Scientist - B, Regional Office of GB Pant NIHE, Itanagar.

E. Theme 5: Evidenced models of convergence, basic features-pillars- levers and areas of synergy- how to scale up- what are the prospects and challenges.

Chaired by : Ms. Koj Rinya, IFS, Secretary, (Horticulture), GoAP, Itanagar

Issues emanated from panel:

- Policy and regulatory frameworks can include setting emissions targets, implementing sustainable procurement practices, and promoting renewable energy.
- Public-private partnerships: Collaboration between governments, businesses, and civil society can leverage the resources, expertise, and networks of each sector to drive sustainable development. Public-private partnerships can result in innovative solutions, shared knowledge, and increased accountability.
- Climate action and sustainable development: Convergence between climate action and sustainable development can help mitigate greenhouse gas emissions while also involving measures such as renewable energy adoption, energy-efficient practices, and sustainable land use.
- 2.3.3 Two Days Regional Workshop on Wetlands Restoration for North Eastern States organized by the Ministry of Environment, Forest and Climate Change (Wetlands Division) during 29-30 April 2023 at Imphal, Manipur hosted by Loktak Development Authority (LDA), Imphal, Manipur was attended. The workshop deliberated on the wetlands distribution in the State/UT and identification of priority wetlands, major activities taken for conservation and management of Wetlands in the last three years,

2.3.4 Awareness program on Mission LiFE on 2nd June, 2023 in 2 schools of Itanagar Capital region and at various Districts of state.

Target Group: School students, teachers and other school staff.

No. of Beneficiaries: 250



Figure 19. Mission LiFE awareness programme in Garden Dew Residential School, Ianagar, in collaboration with EIACP.

2.3.5 Field visit on capacity building on Spring Rejuvenation and climate adaptation of NAFCC project with Prly. Secy. held on 07 October 2023.



Figure 20. Field visit on capacity building on Spring Rejuvenation and climate adaptation of NAFCC project with Prly. Secy. held on 07 October 2023.

2.3.6 The NMSHE staff attended the State and District-level meeting on Climate Risk Assessment in India using a common framework at IIT Mandi, held from 03-05 November 2023.



Figure 21 . Meeting of State and District-level on Climate Risk Assessment in India using a common framework at IIT Mandi, held from 03-05 November 2023.

2.3.7 Awareness cum cleanliness drive

The World Wetland Day 2024 was celebrated on 2nd February, 2024 in Gekar Sinyik (Ganga Lake, Itanagar by the State Wetland Authority, Arunachal Pradesh. An awareness cum cleanliness drive was organized in sync with the theme 'Wetlands and Human Wellbeing' with participants from Mayor IMC, village panchayats, school students, DoEFCC office staff, from Nichiphu Residential School and Guardian Angel School, officer of DOEFCC. The School children from Guardian Angel School staged a drama on tree cutting and plastic wastes. The performance vividly portrayed the beauty of wetlands and the consequences of their destruction due to human activities. The students urged the audience to take action for wetland conservation, emphasizing the importance of preserving these ecosystems for future generations.

No. of Participants- 121



Figure 22. Celebration of World Wetland Day on 2nd February 2024 at Ganga La (Gekar Sinyik).

- Identification of most-desirable Adaptation Policies to Improve Regional Sustainability
- To share knowledge and expertise with various departments and other organizations and build 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.
- Formulate an ecosystem-specific future coping/adaptation strategies specific to the types of climate change impacts.

The above-mentioned objectives on Local level Climate Action Plan in Lohit Basin, Arunachal Pradesh on 21st to 23rd June, 2023 were achieved through Participatory Rural Appraisal Adaptation Plans. The Outcome/ Deliverables are as follows:

- 1. Social Mapping
- Completed social map: The villagers created a social map, which provided data on households and common facilities in the village.
- Copy on chart paper: The social map can be transferred onto chart paper for easy reference and use if necessary.
- Copy for Panchayat Office: A copy of the social map to be shared with the Panchayat Office for their reference.

2. Problem Analysis

• Problem cards: Several cards were created, each containing a problem that has been analyzed and explained.

3. Prioritizing Issues

- Three problem lists: The locals identified and prioritized problems, resulting in three lists.
- Urgent prioritizing problems: The No. 1 list consisted of urgent problems that can be resolved within 3-6 months.
- Data for project proposal: The problems identified, along with their related data, will be used by the Participating Institution (PI) to write a project proposal for submission to Unnat Bharat Abhiyan (UBA).
- 4. Consensus on Solution
- Scoring and ranking: The community scored and ranked the proposed solutions to the problems.
- Based on the scoring and ranking, the community reached a consensus on the most suitable solution for each problem.
- 5. Data Validation and Finalization

- Validation of PRA data: The data generated through all the Participatory Rural Appraisal (PRA) exercises will be validated by a larger group of people.
- Finalized problem for UBA support: The problem selected for proposal writing, with the support of the UBA will be finalized.



Figure 23. Social mapping during group exercise and representation by trainee groups.



Figure 24. Social map of Empong Village, Namsai, Arunachal Pradesh by the trainee group.

2.5 State Action Plan on Climate Change (SAPCC 2.0)

The State Climate Change Cell Arunachal Pradesh is working on finalizing the revised State Action Plan on Climate Change (SAPCC 2.0) documents in alignment with Pakke Tiger Reserve Declaration, 2047.

2.6 Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022.

The average temperature, average relative humidity and average rainfall patterns generated for five districts for 2018-2022 are attached as **Annexure IV**.

Chapter III

Other Activities/Technical Outcome in the FY 2023-24

3. 1 Activities with respect to State Wetlands

i. Collaboration of SWA and Zoological Survey of India (ZSI), Arunachal Pradesh

Regional Centre (APRC) as a partner in the implementation of the National Mission on Himalayan Studies (NMHS) sponsored project titled "Multidimensional Assessment of Ecological Dynamics and Ecosystem Health of Selected High-Altitude Wetlands of Indian Himalayan Region (IHR) for Effective Conservation and Management Planning".

ii. Inclusion of seven wetlands under the National Plan for Conservation of Aquatic Ecosystem (NPCA) scheme of the MoEFCC, GoI

The State Wetland Authority (SWA) Arunachal Pradesh accepted and recommended seven Integrated Management Plans (IMP) proposals for inclusion of seven wetlands under the National Plan for Conservation of Aquatic Ecosystem (NPCA) scheme of the MoEFCC, GoI. The Brief Documents and IMPs have been developed for the seven wetlands shown in Table 10.

Table 10. List of Wetlands recommended by the SWA, Arunachal Pradesh for submission to MoEFCC, GoI under NPCA scheme.

sl.no.	List of the seven wetlands recommended by the SWA, Arunachal Pradesh for submission to MoEFCC, GoI under NPCA scheme.
1	Yabik Sinyig Takar Lake, Kurung Kumey District
2	Nikpu Yabik Sinyig Lake, Kurung Kumey District
3	Glaw Lake, Kamlang Wildlife Sanctuary subject to clearance from CWLW.
4	Mehao Cluster of Lakes, Mehao Wildlife Sanctuary subject to clearance from CWLW.
5	Sipit Lake, Yinkiong District
6	Pensam Tso lake (Simu Sile), Shi Yomi District
7	Pasang Sonam Tso lake, Shi Yomi District

iii. Annual Reports of the State Wetland Authority (SWA) of the last Four Financial Years
 2020-2024 are attached as Annexure V.

Towards a Climate Resilient and Responsive Arunachal Pradesh 2047





A GUIDE BOOK ON LOCAL CLIMATE CHANGE ADAPTATION PLANNING AND IMPLEMENTATION

A Primer for the Panchayat Raj Institutions



Prepared by:

Arunachal University of Studies, Namsai. Sponsored by: Department of Environment, Forests and Climate Change, Department of Disaster Management, Department of Panchayati Raj and Rural Development, Government of Arunachal Pradesh.

Facilitated by:

Pakke Declaration Secretariat Cell, Department of Finance, Planning and Investment, Government of Arunachal Pradesh.

A Guide Book on Local Climate Change Adaptation Planning and Implementation

A Primer for the Panchayat Raj Institutions

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A glimpse of the cabinet meeting held in the Pakke Tiger Reserve, Seijosa, Arunachal Pradesh on 13th November, 2021 which adopted the 'Pakke Tiger - 2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh'.

Message from Chairman, AUS



Arunachal Pradesh is the hotspot of biodiversity in Northeast India. It is the home to some of the country's densest forests that play a pivotal yet indispensable role in balancing the rare ecological stability of nature and helping the local communities have their livelihoods. As the impact of climate change is being recorded globally, our beautiful state has also witnessed being affected by this catastrophe. The forest of Arunachal Pradesh has been facing various impacts due to the temperature rise. The most important concern is the precipitation patterns of the season. The state has been witnessing dryer periods with extreme rainfalls. This progression has been hampering the

holistic development of the floras in the forest. Intense dry periods are leading to forest fire. Extreme monsoons are leading to soil erosion. This is doing nothing but deterring our biodiversity and it is a loss we need to fix immediately. If we do not act now, we might be in a critical position to find some species inhabitable to their homes and take different measures to adapt to the changing conditions; perhaps resulting in their extinction event.

AUS has always been sensitive to climate change because the location of the campus is surrounded by a much richer, serene, greenery and equally fragile ecosystem. The biodiversity of the state has my immense respect and I am very passionate about bringing solutions to this discerning matter. Arunachal University of Studies has always been active in conducting workshops, adaptation techniques and training programmes organised by bodies such as the State Climate Change Cell, the Department of Environment and Forests, and the Government of Arunachal Pradesh. Similarly, under the "National Mission for Sustaining the Himalayan Ecosystem (NMSHE) for Block Level Officers, multiple projects and programmes have been handled.

Throughout the last few years, AUS under the sponsorship of World Education Mission has worked with multiple organizations and government fraternities to spread awareness related to the environment and local ecosystem preservation affected by climate change. We are also associated with many geological, and biological bodies that come forward with our support to discuss forest's nutrient cycling, pollination and seed dispersal, reducing forest's carbon sequestration capacity and much more. Previously we had an entire event dedicated to discussing the Characterizing patterns and processes of the alpine ecosystem in the Indian Himalayas with special emphasis on Eastern Arunachal Pradesh in collaboration with SAC-ISRO.

I believe it is high time that the world takes climate change seriously and starts implementation efforts to unlearn the things that have made our lives easy. Nothing greater comes out at the cost of environmental changes. I wish all the participants my big wishes. The three-day workshop is sure to open many possibilities and dialogues to narrow down all the evidence on changing climatic conditions not just of Arunachal Pradesh but also of this planet.

Jai Hind. **Dr. Ashwani Lochan,** Chairman, Arunachal University of Studies Namsai, Arunachal Pradesh

Message from Vice-Chancellor



The "Three-Day Workshop on Climate Change Adaptation Planning and Implementation" holds great significance not only for our university but for the entire district and gram panchayats in the Lohit River basin, particularly in the backdrop of the recent declaration of the Pakke Tiger Reserve. At Arunachal University of Studies, we have always been at the forefront of discussing, researching, and initiating dialogues on climate change. We understand the gravity of this global challenge and recognize the urgent need for action. It is our responsibility as an educational institution to create awareness and develop practical solutions to address the pressing environmental issues facing our region and beyond.

The theme of this workshop aptly reflects our commitment to not only discuss the challenges posed by climate change but also to take concrete measures to tackle them. Climate change is crucial for the prosperity and well-being of Arunachal Pradesh and its communities. The Lohit River basin and the Pakke Tiger Reserve hold immense ecological significance, and their conservation is of paramount importance. As we gather here, our objective is to foster an environment of collaboration and knowledge sharing among the district and gram panchayats, enabling them to develop effective climate change adaptation plans and implement them at the grassroots level.

This workshop serves as a platform for diverse stakeholders, including government officials, researchers, environmentalists, and local community representatives, to come together, exchange ideas, and explore practical solutions. Through engaging presentations, interactive sessions, and case studies, we aim to equip you with the necessary tools and strategies to tackle the challenges posed by climate change effectively.

Our university is committed to supporting Arunachal Pradesh in becoming more environmentally conscious and resilient to climate change. We firmly believe that by fostering a culture of environmental stewardship, promoting sustainable practices, and integrating climate change considerations into policymaking, we can forge a path toward a greener and more prosperous future for our state. Let us embark on this journey together, with the shared vision of a sustainable future.

Jai Hind.

Prof. D.S Hernwal, Vice-Chancellor, Arunachal University of Studies Namsai, Arunachal Pradesh

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Abbreviations

BDO	-	Block Development Office
FFC	-	Fifteenth Finance Commission
GP	-	Gram Panchayat
GPDP	-	Gram Panchayat Development Plan
HEI	-	Higher Education Institution
MHRD	-	Ministry of Human Resource Development
MoRD	-	Ministry of Rural Development
MoPR	-	Ministry of Panchayati Raj
NGO	-	Non-Governmental Organisation
NSL	-	Now, Soon, Later
PI	-	Participating Institution
PRA	-	Participatory Rural Appraisal
RCI	-	Regional Coordinating Institution
SEG	-	Subject Expert Group
SSI	-	Semi-structured Interview / Inquiry
UBA	-	Unnat Bharat Abhiyan
XV-FC	-	15 th Finance Commission
ACE	-	Action for Climate Empowerment
BUR	-	Biennial Update Report
COP	-	Conference of the Parties
IPCC	-	Intergovernmental Panel on Climate Change
MGCY	-	United Nations Major Group for Children and Youth
MRV	-	Measurement, reporting and verification
NAMAs	-	Nationally appropriate mitigation actions
NAP	-	National Adaptation Plan
NDC	-	Nationally determined contribution
SDG	-	Sustainable Development Goal
UNFCCC	-	United Nations Framework Convention on Climate Change

1. Introduction

Located in the easternmost region of India, the Lohit Basin is a significant river basin within the Brahmaputra basin. Its geographical coordinates span between latitudes 27° 34' N and 29° 36' N, and longitudes 95° 38' E and 97° 44' E. Stretching across the international border, the basin's catchment area includes a portion of Tibet. The Lohit River, a major tributary of the Brahmaputra River, originates from the snow-clad peaks in Eastern Tibet, towering at an elevation of 6200 meters above mean sea level. Upon entering India through the Kibithoo area of the district, the river is initially known as Krawnaon in its upper reaches. As it flows westwards, it converges with a tributary called Chalum Susning, originating from the Indo-Burma border. The amalgamation of these two rivers gives rise to the Tellu or the Lohit River. Playing a vital role in the region, the Lohit River serves as a crucial water source. Its expansive catchment area supports a diverse range of flora and fauna. The river and its basin hold immense significance for the livelihoods of the local population, emphasizing the need to preserve its natural flow. Disruptions to this delicate balance can lead to severe consequences. Given its ecological sensitivity, the Lohit River basin demands careful attention to maintain its ecological equilibrium, thereby ensuring the sustainable socio-economic development of the region.

Physiography of Lohit Basin

Flowing through Tibet and eventually entering the state of Arunachal Pradesh, the River Lohit primarily traverses the Mishmi hills. Its journey is accompanied by the convergence of significant tributaries along the way. On the right bank, these tributaries include the Dau, Dalai, and Tidding Rivers, while the Lang River joins from the left bank. After passing through the gorges of the Mishmi hills, the river emerges into the plains near Brahamkund and maintains a westward course.

Continuing its course, the River Lohit encounters additional rivers that contribute to its flow. On the left bank, it is joined by the Noa-Dihing, Kamlang, Tabang, and Tengapani rivers. On the right bank, it receives water from the Digaru, Balijan, and Kundli Rivers. Eventually, the Lohit River merges with another significant tributary of the Brahmaputra, the Dibang River, on its right bank. The combined flow of these two rivers then joins the Dihang river near Kobo. The catchment area of the River Lohit in Tibet covers approximately 15,034 km² and is predominantly situated in high altitude regions. In India, the basin encompasses an area of 13,655 km² and encompasses various distinct physiographic regions, including the Eastern Himalayas, the Patkai Hills, and the Brahmaputra Valley (**Figure 1 & 2**).

As a perennial river, the River Lohit maintains a continuous flow throughout the year. It originates from the melting snow of Himalayan glaciers and receives contributions from numerous small streams. However, during the lean season from November to March, there is a decrease in the river's discharge due to reduced water flow. For a detailed breakdown of the physiography of the Lohit Basin in Arunachal Pradesh, please refer to the district-wise split-up provided in **Table 1**.



Figure 1. Lohit River Basin (Source: https://www.openstreetmap.org, dated. 27/06/2021).

- 1. **Anjaw District:** Anjaw District is located in the northeastern corner of Arunachal Pradesh and is part of the Eastern Himalayas. The district is characterized by high mountains, deep valleys, and fast-flowing rivers. The Dapha Bum and Mishmi Hills are the main mountain ranges in the district, with elevations ranging from 1000 to 4500 meters. The Lohit River originates from the Dapha Bum range and flows through the district.
- 2. Lohit District: The Lohit District is located in the central part of the Lohit River Basin and is characterized by the Patkai Hills. These hills run along the India-Myanmar border and have an average elevation of 1500 meters. The Patkai Hills are densely forested and are home to a variety of wildlife, including tigers, elephants, and clouded leopards.
- 3. **Namsai District:** Namsai District is located in the northeastern part of the Lohit River Basin and is characterized by its proximity to the Brahmaputra Valley. is traversed by several significant rivers, including the Lohit, Noa-Dehing, and other smaller tributaries of the Brahmaputra. The district is renowned for its tea gardens and fertile agricultural land, with paddy fields being a prominent feature.

- 4. Lower Dibang Valley District: The Lower Dibang Valley District is located in the western part of the Lohit River Basin and is characterized by the Mishmi Hills. These hills have an average elevation of 1000 to 2000 meters and are home to several distinct ethnic groups, including the Idu Mishmi and the Digaru Mishmi. The district is also home to the Mehao Wildlife Sanctuary, which is home to several endangered species, including the Asiatic black bear and the red panda.
- 5. Dibang Valley District: The Dibang Valley District is located in the northwestern part of the Lohit River Basin and is characterized by the Eastern Himalayas. The district is home to several high mountain ranges, including the Mishmi Hills and the Dapha Bum range. The Dibang Wildlife Sanctuary is located in this district and is home to a variety of wildlife, including tigers, leopards, and elephants.

Districts (2011)	Population*	Total Area (km ²)	District Area in Basin (km ²)**
Anjaw	21,167	6293.90	6293.90
Dibang Valley	8,004	7180.07	7180.07
Lower Dibang Valley	54,080	5502.05	5502.05
Lohit	49,776	2,402	2,402
Namsai	95,950	1,587	New district (from 2014)

Table 1. District's profile in the Lohit river basin

Source: www.india-wris.nrsc.gov.in;

*Census Data 2011; **Based on the major Brahmaputra basin.



Figure 2. Districts coverage of Lohit River Basin, Arunachal Pradesh.

Agro-climatic regions in Lohit Basin

Lohit Basin is a region in Arunachal Pradesh that comprises the Lohit River, one of the major tributaries of the Brahmaputra River. The agro-climate of this region is determined by a combination of factors, including altitude, latitude, topography, and proximity to the Himalayan Mountains. These factors give rise to a diverse range of agroclimatic regions that are suitable for different crops and agricultural practices.

The Lohit Basin can be broadly divided into three agroclimatic regions:

- The Upper Region: This region comprises the high-altitude areas above 1500 meters. The climate in this region is characterized by long, cold winters and short, cool summers. The average temperature in this region ranges from 10°C to 15°C. The soils in this region are generally acidic and low in fertility. However, the region is suitable for the cultivation of temperate crops such as apples, pears, apricots, and walnuts.
- 2. **The Middle Region**: This region comprises the areas between 500 meters to 1500 meters in altitude. The climate in this region is characterized by mild winters and hot summers. The average temperature in this region ranges from 20°C to 25°C. The soils in this region are generally fertile and well-drained. This region is suitable for the cultivation of a wide range of crops, including rice, maize, wheat, millet, pulses, and oilseeds.

3. **The Lower Region**: This region comprises areas below 500 meters in altitude. The climate in this region is characterized by high temperatures and high rainfall. The average temperature in this region ranges from 25°C to 30°C. The soils in this region are generally fertile and well-drained. This region is suitable for the cultivation of tropical crops such as tea, coffee, rubber, and fruits such as pineapple, mango, and banana.

Livelihoods and land use

- 1. **Agriculture**: Agriculture is the primary source of livelihood in the Lohit basin, and farmers practice both traditional and modern farming techniques. The region's diverse agroclimatic conditions support the cultivation of a wide range of crops, including rice, maize, wheat, millet, pulses, oilseeds, tea, coffee, rubber, and tropical fruits such as pineapple, mango, and banana. The Upper region is suitable for the cultivation of temperate crops such as apples, pears, apricots, and walnuts. The farmers in the region also practice terrace farming, which helps conserve soil and water.
- 2. **Livestock**: Livestock rearing is an important livelihood in the region, especially among the tribal communities. The livestock include cows, buffaloes, goats, pigs, and poultry. Livestock products such as milk, meat, and eggs are used for domestic consumption and sold in local markets.
- 3. **Forestry**: The Lohit basin is home to a wide range of forest types, including tropical rainforests, sub-tropical broadleaf forests, and coniferous forests. The forests provide valuable timber and non-timber forest products such as bamboo, cane, rattan, medicinal plants, and wild fruits. The forest department of the state government manages the forests, and the local communities are involved in forest protection and management.
- 4. **Small-scale fishery**: The Lohit River and its tributaries provide an important source of fish for the local communities. The fish catch includes a variety of indigenous species such as catfish, eels, and carp. The small-scale fishery is mainly carried out by the tribal communities using traditional fishing methods such as angling and fish traps.
- 5. **Other land uses**: The region has significant potential for tourism due to its natural beauty and cultural diversity. The local communities are involved in eco-tourism initiatives such as home-stays, guided nature walks, and cultural tours. The region is also rich in mineral resources such as coal, limestone, and granite, which are mined on a small scale. The state government is promoting the development of small and medium-scale industries such as handloom, handicrafts, and agro-processing to support local livelihoods.

Climate vulnerability of the region

The Lohit basin is vulnerable to a range of climate-related impacts, including landslides and floods. The region experiences heavy rainfall during the monsoon season, which can lead to soil erosion and landslides, especially in areas with steep slopes. The region also experiences flash floods due to the rapid melting of snow and heavy rainfall, which can cause significant damage to infrastructure, crops, and livelihoods.

Here are some specific examples of landslides and floods that have occurred in the Lohit basin in recent years:

- 1. In September 2018, a massive landslide occurred in the Lohit district of Arunachal Pradesh, blocking the Lohit River and causing flooding in downstream areas. The landslide also damaged National Highway 13, cutting off the region from the rest of the country.
- 2. In June 2020, heavy rainfall caused landslides in several parts of the Lohit district, including the Lower Dibang Valley and Anjaw districts. The landslides damaged roads and bridges, disrupting transportation and causing significant economic losses.
- 3. In July 2020, the Lohit River overflowed due to heavy rainfall, causing floods in several areas of the district. The floods damaged crops, infrastructure, and homes, displacing several thousand people.
- 4. In May 2021, landslides and flash floods occurred in the Anjaw district, causing significant damage to infrastructure and crops. The floods also disrupted transportation and communication networks, making it challenging to provide relief and rescue operations.

The vulnerability of the Lohit basin to climate-related impacts underscores the importance of climate adaptation measures such as early warning systems, disaster preparedness, and land use planning. The state government has taken several initiatives to mitigate the impacts of landslides and floods, including the construction of check dams, retaining walls, and slope stabilization measures. However, the challenge of managing climate-related risks in the region requires a long-term, multi-stakeholder approach that involves local communities, government agencies, and civil society organizations.

2. Sector-wise climate change impacts

The Lohit basin in the Himalayan region is experiencing the impacts of climate change, including changes in temperature, rainfall patterns, and extreme weather events. These impacts have significant implications for the region's ecology, economy, and social fabric. Here are some of the climate change impacts on the Lohit basin:

- 1. **Changes in temperature**: The Lohit basin in the Himalayan region is experiencing a gradual increase in temperature, which has implications for agriculture, water availability, and biodiversity. The warming trend is affecting the timing of flowering and fruiting in plants, as well as the migration patterns of birds and animals (Curz et al., 2007; Immerzeel et al., 2009 & 2013; Palash et al., 2023).
- 2. **Changes in rainfall patterns**: The Lohit basin in the Himalayan region is experiencing changes in rainfall patterns, with an increase in the frequency and intensity of extreme weather events such as floods and landslides. The variability in rainfall is affecting crop yields, water availability, and soil erosion (Palash et al., 2023).
- 3. **Glacier retreat**: The Lohit basin in the Himalayan region has several glaciers, including the Kangto and Gorichen Glaciers, which are retreating due to rising temperatures. The loss of glacier mass has implications for water availability, particularly during the dry season (Immerzeel et al., 2009 & 2013).
- 4. **Biodiversity loss**: The Lohit basin in the Himalayan region is home to a rich diversity of flora and fauna, but climate change is threatening their survival. Changes in temperature and rainfall patterns are affecting the distribution and abundance of several species, including the snow leopard, red panda, several bird and fish species (Kansal and Arora, 2012; Lodhi and Amonge, 2022).
- 5. **Socio-economic impacts**: The impacts of climate change are exacerbating existing vulnerabilities in the Lohit basin in the Himalayan region, particularly among the marginalized communities. The loss of crops and livelihoods due to floods and landslides is causing economic distress, while the loss of biodiversity and ecological services is affecting the cultural and spiritual values of the region (Dilshad et al., 2019).

3. Strategies for climate change adaptation and mitigation

Policy context and intervention

Pakke Declaration 2047 (For full details on Pakke Declaration, please see Annexure IV)

"Pakke Tiger Reserve 2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh," popularly known as the Pakke Declaration, focuses on promoting climate resilient and responsive development. It holds the distinction of being the first declaration of its kind by any state government in India. The name "Pakke" originates from the Pakke Tiger Reserve, situated in the Pakke district of Arunachal Pradesh. The Pakke Tiger Reserve is located in the Eastern Himalaya Biodiversity Hotspot. The State Cabinet was convened in the reserve for the first time outside the State capital to emphasize the threat of climate change to different sectors of economy and to pass the declaration in November 2021.

The declaration revolves around five main themes, often referred to as the "Panch Dharas." These themes are as follows:

- 1. Environment, Forest, and Climate Change,
- 2. Health and Well-being for all,
- 3. Sustainable and Adaptive living,
- 4. Livelihoods and opportunities,
- 5. Evidence generation and collaborative actions.

Under the Pakke Declaration, the State Government of Arunachal Pradesh commits to implementing several actions, including:

- Protecting forest cover,
- Restoring degraded forests,
- Reducing health vulnerability caused by climate change and extreme weather events,
- Developing urban master plans that consider local climate change-induced risks,
- Adopting efficient irrigation measures,
- Promoting entrepreneurship.

The Pakke Declaration brings various benefits, primarily for future generations. It will significantly contribute in achieving our country's targets under the Paris Agreement on Climate Change. Furthermore, it aims to protect people from climate change-related risks.

What are the vulnerabilities and risks of climate change in villages along the Lohit Basin?

The Lohit basin in Arunachal Pradesh is vulnerable to the impacts of climate change, and the risks associated with these impacts are significant. Some of the vulnerabilities and risks of climate change in the Lohit Basin are:

Increased Flooding: The Lohit River is prone to flooding during the monsoon season, and climate change is expected to increase the frequency and severity of floods in the region. Floods

can cause significant damage to infrastructure, homes, and crops, leading to loss of lives and livelihoods (Yue et al., 2022).

Landslides: Climate change is expected to increase the frequency and intensity of landslides in the Lohit Basin, which can block roads and damage infrastructure, leading to economic losses and hindering access to essential services (Lohit Basin Report, 2016; Kirschbaum et al., 2020; Rehman and Azhoni, 2023).

Reduced Water Availability: Changes in temperature and precipitation patterns due to climate change are expected to reduce water availability in the Lohit Basin, affecting agriculture, hydropower generation, and household water supply (Shah et al., 2019).

Changes in Agriculture: Climate change is expected to alter the timing and intensity of rainfall, which can affect crop yields in the Lohit Basin. Changes in temperature and precipitation patterns can also increase the incidence of pests and diseases, affecting crop health and productivity (Dilshad et al., 2019).

Biodiversity Loss: Climate change can also affect the biodiversity of the Lohit Basin, as changes in temperature and precipitation patterns can alter the habitat suitability for various flora and fauna. This can lead to the loss of biodiversity, affecting the ecological balance of the region (Lodhi and Amonge, 2022).

Spread of Diseases: Climate change can lead to the spread of diseases in the Lohit Basin, as changes in temperature and precipitation patterns can create favorable conditions for the proliferation of disease-carrying insects, leading to health hazards for humans and animals (Dhara et al., 2013; Levy et al., 2018).

- ► How can we assess our vulnerability to climate change?
- > What are the potential impacts of climate change on our village?

4. Developing Adaptation Strategies

Once vulnerabilities and risks have been identified, it is important to develop adaptation strategies that will reduce the impacts of climate change on the community. This section will cover:

- > What are the principles of effective adaptation strategies?
- ➤ How can we develop effective adaptation strategies for our village?
- ➤ What are the costs and benefits of different adaptation options?
- ► How can we prioritize adaptation options?

Implementing Adaptation Measures

Once adaptation strategies have been developed, they must be implemented. This section will provide guidance on how to implement adaptation measures, including:

- ➤ How can we engage the community in adaptation measures?
- ➤ How can we work with other organizations to implement adaptation measures?
- ► How can we monitor and evaluate the effectiveness of adaptation measures?

Next Steps

- ➤ How can we continue to build resilience to climate change in our village?
- ➤ How can we access funding for adaptation measures?
- ➤ How can we collaborate with other villages and organizations to share knowledge and resources?
- ➤ What can we do at the local level? (Table 2)

Table 2. Sector-wise	e impacts and	potential	adaptation	strategies i	n response t	o climate change
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Sector	Impacts	Potential adaptation strategies		
	Crop yields	 Drought-resistant crop varieties. 		
	Soil quality	 Crop diversification. 		
Agriculture	Drought	 Improved water management practices. Climate-smart agriculture practices. 		
	Water availability	Improve the resilience of the local communities, especially smallholder farmers, through better access to information, technologies, and markets.		
Forest and Diadiversity	Forest cover loss	✤ Adaptation strategies such as diversification		
Porest and Blourversity	Forest fire	of livelihoods, restoration of degraded land,		

	Invasive species	improving water management, and climate-
	Biodiversity loss	 resilient infrastructure. Mitigation strategies such as afforestation and
	Soil erosion and landslides	reforestation, sustainable forest management, community-based forest management and reduced greenhouse gas emissions could help in effectively addressing the impacts of climate change on the forests and biodiversity sector.
	Water availability	 Development of water management plans that
	Water quality	take into account the potential impacts of climate change.
	Water management	 Adoption of water-efficient technologies and practices.
	Flood	 Promotion of community-based approaches to water management.
Water	Changes in river flow	 Improve the monitoring and management of water quality to ensure the availability of safe drinking water. Strategies such as Early warning systems, Emergency response planning, Flood forecasting, Land use planning, Community participation and infrastructure development can be adopted for flood mitigation.
	Flood and landslides lead to physical injuries	Enhancing the resilience of health systems: This involves strengthening the health infrastructure, establishing early warning
	Loss of life and displacement	systems for extreme weather events, and enhancing the capacity of health workers to respond effectively to climate-related
Health	Mental health: stress, anxiety, and depression	emergencies. Disease surveillance and control : It is crucial to monitor the incidence of vector-borne
	Vector-borne diseases	and control measures, such as the distribution of mosquito nets, utilization of insecticides,
	Water-borne diseases	and employing other vector control methods.

	Lack of access to clean water and sanitation	 Improving access to clean water and sanitation: It is crucial to monitor the incidence of vector-borne diseases and implement efficient prevention and control measures, such as the distribution of mosquito nets, utilization of insecticides, and employing other vector control methods. Community engagement and awareness-raising: It is essential to raise awareness about the health impacts of climate change and encourage the adoption of sustainable practices, including the use of renewable energy sources and the reduction of carbon emissions. Technological innovations: Telemedicine can significantly improve healthcare accessibility in remote areas, enabling individuals to consult with healthcare professionals without the need for physical travel. Building resilience to climate change: Adopting a multisectoral approach that involves collaboration and coordination between various sectors, including health, agriculture, water, and energy, is key to building a more sustainable and resilient future.
	Water pollution	Promoting sustainable transportation: Promotion of sustainable transportation options such as public transport cycling and
	sedimentation	walking can reduce the environmental impact of transportation activities.
Transportation	Habitat fragmentation	 Improved waste management practices: Implement improved waste management practices to reduce solid waste generation and prevent the release of harmful chemicals and contaminants into the river basin. Erosion control measures: Implementing erosion control measures such as vegetative cover and gabion structures can reduce soil erosion and sedimentation in the river basin.

*	 Green infrastructure: Green infrastructure such as bioswales, rain gardens, and green roofs can help to reduce the volume and velocity of stormwater runoff, improve water quality, and enhance habitat connectivity. Biodiversity conservation: Reduce the negative impacts of transportation infrastructure on biodiversity by integrating wildlife crossings, and ensuring that design
	wildlife crossings, and ensuring that design and construction of infrastructure consider the conservation of local species.

As climate change continues to impact the availability of water in the Lohit river basin and thus, it is expected to experience more frequent and intense droughts and floods. Additionally, melting glaciers in the Himalayas are likely to impact water availability in the long term (Curz et al., 2007; Immerzeel et al., 2009). Hence, it is essential to specifically implement management interventions at the downstream of the basin to ensure sustainable use of the water resources. **Table 3 & 4** summarize some recommended management interventions and expected changes in water availability in the Lohit river basin.

Type of management action	Expected change in water availability
Implement water conservation measures and recycling of waste water	The first step towards sustainable water management is to implement water conservation measures. This can include rainwater harvesting, use of efficient irrigation methods, and reduction in water wastage.
Promote the use of renewable energy	The Lohit Basin has significant hydropower potential, which can be utilized to meet the region's energy needs. However, hydropower development can also impact water availability, so it is essential to balance energy needs with sustainable water management. Promoting the use of other renewable energy sources like solar and wind can also reduce the pressure on water resources.
Improve water governance	Effective water governance is essential for sustainable water management. This can involve the development of water allocation and management plans, strengthening of water user associations, and promoting community participation in water management.

Table 3. Recommended management interventions and expected changes in water availability in

 Lohit Basin

Develop drought and flood	Developing drought and flood management plans can help to	
management plans	mitigate the impact of these events and ensure water	
	availability during times of water stress.	

District	Name the site	River name	Туре
Namsai	Namsai	Dirang River	Pilgrimage (Temple)
Lohit	Glow Lake	Glow lake	Lake & Kamlang Tiger Reserve
Lohit	Parsurama Kund	Lohit river	Pilgrimage (Temple)
Lohit	Hayuliang	Delai River	Hill Station
Lohit	Walong	Lohit river	Hot Spring
Lohit	Dong	Lohit river	Tourist Spot
Mehao Lake	Mehao Lake	Mehao Lake	Lake and Mehao wildlife sanctuary
Changlang	Miao	Noa-Dihing river	Tourist Spot
Changlang	Miao	Noa-Dihing river	Namdapha National Park

Table 4. Inventory of water tourism sites in Lohit River basin

5. Local level Climate Action Plan

Objectives

The purpose of this tool is to assist communities in raising awareness about climate change and disaster risks, as well as developing adaptation strategies. The tool can be initiated and facilitated by non-governmental or community-based organizations, as well as district or local governments. The tool is designed to be user-friendly and can be used by first-time users with basic knowledge of climate change and community participation experience. Additionally, the tool can be used by community-level project developers, managers, and field staff to assess existing or planned development projects.

- The tool is a valuable resource for incorporating climate and disaster risk considerations into community planning and development.
- It enables users to understand how climate and other hazards impact lives and livelihood resources, learn about current responses to these hazards by local people, identify adaptation strategies to strengthen threatened livelihood resources and enhance resilience, and include gender considerations throughout the assessment of climate and disaster risks.

Module 1: Context	Preparation of background material;
	• Review of the literature on climate change and hazards,
	and on national climate change and disaster risk reduction
	policies,
	• Consultations with stakeholders.
Module 2: Climate change and	Identification and application of local knowledge;
hazard analysis	• Participatory mapping of hazards – baseline scenario
	description,
	• Creation of a seasonal calendar identifying events and
	periods of hazard-related stress,
	• Prioritization of hazards.
Module 3:	Analysis of vulnerable livelihood assets and resources and
Vulnerability assessment	identification of the impacts of hazards;
	• Creation of a vulnerability matrix.
Module 4: Responses to the	Survey and assessment of local responses taken to reduce
impacts of hazards	vulnerability and enhance resilience;
	• Survey and assessment of local responses,
	• Compilation and presentation of assessment results and
	conclusions.
Module 5: Adaptation	Identification of additional responses to cope with climate
strategies	hazards and impacts;
	• Review of climate change scenarios,
	• Identification of community adaptation goals,

Overview of the Tool (Kalmbach et al., 2020; Participatory Assessment of Climate and Disaster Risks - PACDR)

	•Consideration of adaptation strategies, obstacles and opportunities.
Module 6: Co-benefits of	Assessment of environmental and socioeconomic co-
adaptation strategies	benefits of adaptation strategies;
	• Creation of a matrix of adaptation strategies and co- benefits.
Module 7: Community	Development of an action plan and community presentation;
adaptation planning	• Identification of activities for individuals, groups,
	community and other stakeholders,
	Advocacy planning,
	• Presentation to wider community.
Module 8: Adoption of plan,	Adoption of plan;
Implementation and Monitoring	• Assess the local community's needs and priorities regarding climate action,
Module 9: Evidence based	• Engage key stakeholders in the planning process,
feedbacking and evaluation of	• Seek input and feedback from the community through
the Adaptation Plan	public consultations and workshops,
	• Alignment with national and international climate goals,
	policies, and frameworks.
	Implementation;
	• Create an implementation team or task force to oversee
	the plan's execution,
	• Identify specific actions and strategies to address
	Climate-related challenges,
	• Set targets and minestones to measure progress towards
	Secure persons funding and resources to support plan
	• Secure necessary funding and resources to support plan
	Monitoring feedback and Evaluation:
	• Establish indicators and metrics to track the
	implementation progress and outcomes.
	• Regularly collect data and monitor key performance
	indicators,
	• Evaluate the effectiveness of implemented actions and
	strategies,
	• Communicate progress and results to the community and
	stakeholders,
	• Use feedback and lessons learned to refine and update
	the climate action plan over time,
	• Consider external reviews or audits to ensure
	transparency and accountability.

5.1. Module 1: The Context

The aims of this module are to recognize the potential impacts of climate change and disasters on the community, to investigate relevant national policies, and to become acquainted with external organizations that offer valuable resources and planned activities related to effectively responding to climate impacts and disasters (Kalmbach et al., 2020).

Climate change and disaster risk

While people may not always be concerned about whether a hazard is related to climate change in their daily lives, it is crucial to make this distinction in the context of this assessment. Climate change is expected to exacerbate climate-related hazards over time, and the origin of these hazards could be significant in terms of securing funding for future projects (Kalmbach et al., 2020). Industrialized nations bear most of the responsibility for causing climate change and therefore have a major role in supporting adaptation efforts to its impacts.

To complete this assessment, it is important to consider the following questions:

- What changes in temperature, rainfall patterns, and extreme events have occurred in your area? What changes are anticipated in the future?
- What natural, climate, and human-made hazards have been the most significant in your region? Which of these hazards are expected to be crucial in the future?
- What are the most significant impacts of these hazards on the lives and livelihoods in your region? Have these impacts varied between genders?

Policies, plans and strategies

Having knowledge of national policies on climate change and disaster risk reduction and management can be beneficial in understanding how community strategies may align with or diverge from national policy (Kalmbach et al., 2020).

To assess this, consider the following questions:

- What are the primary government policies, strategies, programs, and plans concerning climate change?
- Are these policies being implemented locally? If so, how?
- What are the key government policies regarding disaster risk reduction, and which agencies are responsible for their implementation?
- What are the responsibilities of the government and local population in the event of a disaster?
- Which climate change, environmental, energy, and disaster risk reduction programs or projects are donor agencies financing, implementing, or advising in the country and your region?
- What opportunities exist for civil society organizations to impact policies and processes at the national, regional, or local level?

Description of the community context

Organizations and individuals who are likely to use the Participatory Assessment of Climate and Disaster Risks tool are already familiar with their communities (Kalmbach et al., 2020). The purpose of describing the community context is to establish a shared understanding of the resources available and to identify trends that could be affecting the community. This description will aid participants in connecting the general climate change and disaster risk survey and the overview of national policies, plans, and strategies to the community's specific situation (Kalmbach et al., 2020). It may include the following:

- The primary livelihoods, as well as natural and physical assets and resources available in the area,
- Local and external groups, institutions, and organizations (including informal and community-based groups) that are collaborating with the local population,
- Projects and organizations working on disaster risk reduction and/or climate change in the community,
- Prevention and preparedness systems in place to safeguard against climate, natural, or human-made hazards,
- The government's activities and influence in the region,
- Political, cultural, social, and economic trends (including gender issues).

Methods

The involvement of community advisors such as political and governmental leaders, staff from community-based organizations, resource persons such as extension agents, scientists and other professionals, and private sector representatives such as business people, farmers and others can be beneficial in describing the community context. The facilitating team may have their own ideas about the people to involve in this stage, and the same people involved in this preliminary step are likely to become contributors in the modules that follow.

Once all the information is collected, the assigned team members compile the findings in a report that can inform stakeholders, donors and others involved in the assessment as necessary. This module provides the scientific and policy background that can help determine the strategies the community wishes to pursue (Kalmbach et al., 2020). While detailed information tends to be more available at the national level, it may be less accessible at the regional or local level.

5.2 Module 2: Climate change and hazard analysis

The purpose of conducting separate sessions for men and women (and potentially for minorities) in Module 2 is to create a safe and inclusive space where all participants feel comfortable expressing their views and experiences. This is particularly important when discussing sensitive topics such as gender roles and vulnerabilities to climate change and disasters (Kalmbach et al., 2020). After the separate sessions, it is important to bring everyone together for a joint discussion. This allows participants to learn from each other's perspectives and experiences, and to develop a shared understanding of the community's vulnerabilities and strengths. However, logistical challenges may arise when conducting separate sessions. If it is not possible to have everyone in the same venue, concurrent sessions with their own facilitators can be an alternative. In this case, it is still important to bring the groups together for a joint discussion afterwards.

Exercise 1: Hazard Map (Kalmbach et al., 2020)

The mapping exercise in Module 2 is a valuable tool to gather local knowledge on the community's assets, resources, and risks. By drawing a map of the community, participants can identify and locate important resources, such as farmlands, forests, fisheries, and water sources. They can also indicate areas that are vulnerable to hazards, such as floods, droughts, landslides, and storms. The mapping exercise also allows for the analysis of changes in the extent and intensity of hazards over time. Participants can identify whether certain areas have become more vulnerable or whether new hazards have emerged. This information is crucial in designing effective strategies to mitigate risks and build resilience in the community.

Moreover, the mapping exercise helps to incorporate local knowledge and perspectives into the assessment process. By involving community members in the assessment, their knowledge and experiences can complement the scientific and policy information gathered in Module 1. The resulting information can help to develop more context-specific and culturally appropriate strategies for risk reduction and adaptation (Kalmbach et al., 2020).



Figure 1. Hazard map (Kalmbach et al., 2020).
Exercise 2: Seasonal calendar (Kalmbach et al., 2020)

This exercise provides valuable information on the community's seasonal patterns and vulnerabilities, and can help identify periods of stress and hazard related to climate change. It also provides an opportunity to discuss changes in seasonal activities and events and their links to climate change, which can inform the development of adaptation strategies. For example, if changes in rainfall patterns have affected crop yields during a certain season, the community can discuss alternative agricultural practices that can help them adapt to these changes. Similarly, if there are periods of drought or flooding that cause stress and vulnerability, the community can discuss strategies to reduce their impact, such as water conservation practices or early warning systems (Kalmbach et al., 2020).



This exercise is important for synthesizing the knowledge gained from the previous two exercises and identifying the hazards that are most relevant for the community. By analyzing the changes and trends in hazards and determining possible explanations, the participants can gain a deeper understanding of the risks they face and the factors contributing to these risks. This exercise also helps to identify who is most affected by these hazards, which is crucial for developing effective risk reduction strategies that take into account the needs and vulnerabilities of all members of the community (Kalmbach et al., 2020). By creating a common understanding of the main hazards affecting the community, the participants can work together to develop a shared vision for addressing these risks and building resilience in their community.

5.3. Module 3: Vulnerability assessment

The same approach as in Module 2 can be applied in Module 3 to ensure that all participants have an equal opportunity to contribute to the exercise and that the discussions are more inclusive. However, if conducting separate sessions creates logistical problems, other options such as concurrent sessions with different facilitators can be explored to allow for the same level of participation and contribution from all participants. The important thing is to ensure that everyone's perspective is heard and that the joint discussions can still take place to maximize the benefits of the exercise.

Exercise 4: Vulnerability matrix;

In this activity, participants create a matrix that outlines the resources and assets that are most significant to the community's livelihood, in relation to the hazards identified in Exercise 3. Subsequently, they assess the level of impact that these hazards have on the resources and assets. The goals of the exercise are as follows:

- To identify the primary resources and assets of the community,
- To identify the vulnerability of these resources and assets to the identified hazards,
- To determine which resources and assets are at the highest risk,
- To determine which hazards, have the most significant impact on the resources and assets.

This exercise builds on the information gathered in the hazard map, seasonal calendar, and hazard prioritization from Module 2.

LIVELIHOOD RESOURCES AND ASSETS	Huzurd 1	Hazard 2	ll a sard

Figure 3. Vulnerability matrix (Kalmbach et al., 2020).

Participants then rate the impact of every hazard on the resources using the following scoring system (Kalmbach et al., 2020);

• 3 = high impact on the resource,

- 2 = medium impact on the resource,
- 1 = 1 low impact on the resource,
- 0 = no or positive impact on the resource.

During this exercise, the participants evaluate each hazard and assess its impact on the community's important resources and assets. They begin with the first hazard and evaluate it vertically down the column. For each hazard, the participants determine the extent of its impact on each of the resources and record the score in the relevant box.

5.4. Module 4: Responses to the impacts of hazards

Just like in Modules 2 and 3, the facilitators should carry out the exercise separately for women and men. If there are minority groups involved, it would be a good idea to conduct another separate session for them. The value of the exercises lies in the joint discussions that follow, and having all participants in the same venue would make it easier to conduct the joint session immediately after the separate sessions (Kalmbach et al., 2020). However, conducting separate sessions might cause logistical difficulties, and holding concurrent sessions, each with its own facilitator, may be a feasible alternative.

Exercise 5: Review and evaluation of local responses (Kalmbach et al., 2020)

In this exercise, participants are tasked with filling out a matrix that identifies hazards and their related impacts on livelihoods. They are then asked to list the local responses that people in the community currently use to mitigate the negative impacts of these hazards. Facilitators guide the participants in evaluating these responses, looking at their effectiveness, sustainability, and potential for adaptation to future hazards. The objectives of this exercise are to:

- Identify current local responses to hazards and their impacts on livelihoods,
- Analyze the effectiveness, sustainability, and potential for adaptation of these responses,
- Identify gaps in the current response strategies and potential solutions.

This exercise builds on the previous exercises and provides insight into the community's capacity to adapt to hazards and potential opportunities for strengthening their resilience.

HAZARD	IMPACTS	LOCAL RESPONSES THE	EFFEC. NESS ABILI	SUSTAIN- TY
	Soil erosion	Build weirs	++	++
-	Water pollution	Boil water	+++	+
Hood		Add bleach to water	+++	+
	Loss of income	Cut trees to sell wood	+++	+
		Steal sheep	+	0
	Dehydration	Drink lots of water	++	++
Link		Wear a hat	++	+++
tempera-	Water shortages	Collect river water	++	+
tures		Conserve water	++	++
	More difficult working conditions	Start work earlier	++	+

Figure 4. Review and evaluation of local responses (Kalmbach et al., 2020).

As each response is added to the matrix, participants evaluate the responses on the effectiveness of the measures (column four) and their sustainability (column five) by ranking the measures on the following scale (Kalmbach et al., 2020);

- +++ = Very high,
- ++= High,
- + = Medium,
- 0 =Not effective or not sustainable.

Participants work across the matrix, completing the responses to each impact and the rankings before moving on to the next impact (Kalmbach et al., 2020).

Summary: Review and conclusions

In this summary, the facilitation team will present the results from Exercises 1–5 and work with the participants to draw conclusions about the assessment phase of the tool. The focus of the remaining modules will be on planning and the actions needed for the future.

Hazard	SEVERITY OF IMPACT	STRENGTH OF EXISTING RESPONSES	NEED FOR ACTION
Drought	+++	:+:	+++
Flood	+++	(+)	+++
Heatwaves	++	3+0	++

Figure 5. Review and conclusions (Kalmbach et al., 2020).

Finally, suggest rankings for the severity of impacts based on the prioritization of hazards in Exercise 3 and the vulnerability matrix in Exercise 4, using the same scale as in Exercise 5:

- +++ = Very high,
- ++= High,
- + = Medium,
- 0 =Not effective or not sustainable.

During this exercise, the participants review the rankings from the previous exercises to ensure consistency with their views on the impact of hazards on livelihood resources (Kalmbach et al., 2020). The aim is to consolidate the participants' decisions rather than create new rankings. The facilitators record the rankings in the second column of the table.

For each hazard listed in the first column, the facilitators summarize the strength of the local responses using a single ranking per hazard on the same scale as before. The participants verify the strength-of-response rankings, and the facilitators record them in the third column of the table (Kalmbach et al., 2020).

5.5. Module 5: Adaptation strategies

In Module 5, participants will use the results of the assessments conducted in the previous modules to set adaptation goals and identify suitable strategies for the community. This module will connect global trends and climate change scenarios to the local situation to ensure that the strategies identified are appropriate and effective. The objectives of this module are to:

- Help participants understand the implications of global trends and climate change scenarios for their community,
- Assist participants in setting realistic and achievable adaptation goals,
- Identify and prioritize appropriate adaptation strategies based on the community's specific circumstances,
- Ensure that the strategies selected are compatible with the community's long-term development goals,
- Develop an action plan for implementing the selected strategies.

Presentation: Climate change scenarios

The contents of this presentation draw heavily from the research conducted in Module 1. As presenters, it is important for us to adjust our language and approach to suit the level of knowledge and understanding of our local audience, while also striving to link local climate phenomena and analysis with global trends.

The primary objectives of this session are to:

- Help participants identify adaptation goals and co-benefits,
- Increase awareness of the scientific evidence supporting climate change,
- Raise awareness of the projected trends and the possibility of increasingly severe conditions,
- Inform participants about national-level solutions for adaptation and reducing emissions.

Exercise 6: Community adaptation goals (Kalmbach et al., 2020)

During this exercise, participants will be tasked with identifying both short- and long-term adaptation goals for their community. As with previous modules, facilitators will divide participants into separate groups based on gender, and if necessary, provide a separate session for any minority groups involved. Each group will work independently to define their adaptation goals, after which the facilitators will bring the men and women (and any minority groups) together to discuss their respective results in a joint session.



Figure 6. Community adaptation goals (Kalmbach et al., 2020).

To begin this exercise, participants will form small groups consisting of 2-3 people. Each group will be assigned a sheet prepared by the facilitators that relates to the impacts of the priority hazards. The groups will then work together for a period of 20 to 30 minutes to identify both short-term (1-3 years) and long-term (10 years) goals that they feel are important.

After the allotted time, each group will present their goals to the facilitator and the other participants. The facilitator will then cluster similar goals together and suggest ways to merge similar goals, if appropriate, while arranging the goals according to hazards and impacts. This process will be similar to the example shown on the adaptation path sheet provided earlier.

Exercise 7: Adaptation strategies, obstacles and opportunities (Kalmbach et al., 2020)

In this exercise, participants will be asked to identify adaptation strategies that can help achieve the adaptation goals identified in Exercise 6, while building on the local responses identified in Exercise 5. This exercise can be done in a single large group, although facilitators may choose to conduct the exercise in separate groups based on gender, depending on the local context.

The main objective of this exercise is to develop additional strategies that can help make progress towards the short- and long-term adaptation goals that have been identified.



Figure 7. Adaptation strategies, obstacles and opportunities (Kalmbach et al., 2020).

5.6. Module 6: Mission LiFE strategies

Mission LiFE which means 'Lifestyle for Environment', a groundbreaking initiative which was introduced by the Hon'ble Prime Minister of India Shri Narendra Modi, aiming to place individual behaviours at the forefront of the global climate action narrative at the 2021 UN Climate Change Conference (UNFCCC COP26).

LiFE envisions a shift from the prevailing 'use-and-dispose' economy, characterized by mindless and destructive consumption, to a circular economy based on mindful and deliberate utilization. The mission aims to inspire individuals to embrace simple acts in their daily lives that can make a significant impact on climate change when adopted globally.

LiFE intends to harness the power of social networks to influence social norms related to the climate. The mission plans to establish and nurture a global community of individuals, known as 'Pro-Planet People' (P3), who share a commitment to adopting and promoting environmentally friendly lifestyles. Through the P3 community, the mission seeks to create an ecosystem that fosters and sustains environmentally friendly behaviours.

75 Actions have been identified under the Mission LiFE Programme:

Energy Saved

- 1. Use LED bulbs/ tube-lights,
- 2. Use public transport wherever possible,
- 3. Take the stairs instead of an elevator wherever possible,
- 4. Switch off vehicle engines at red lights and railway crossings,
- 5. Use bicycles for local or short commute,
- 6. Switch off irrigation pumps after use,
- 7. Prefer CNG/ EV vehicle over petrol/ diesel vehicles,
- 8. Use carpooling with friends & colleagues,
- 9. Drive in the correct gear. Keep your foot off the clutch when not changing gears,
- 10. Install a solar water or solar cooker heater on rooftops,
- 11. Switch off appliances from plug points when not in use,
- 12. Use biogas for cooking and electricity needs,
- 13. Keep temperature of Air Conditioners to 24 degrees,
- 14. Prefer pressure cookers over other cookware,
- 15. Keep your electronic devices in energy-saving mode,
- 16. Use smart switches for appliances which are used frequently,
- 17. Install community earthen pots for cooling water,
- 18. Defrost fridge or freezer regularly,
- 19. Run outdoors instead of on a treadmill

Water Saved

- 20. Adopt cultivation of less water intensive crops like millets,
- 21. Participate in recharge of rural water bodies through Amrit Sarovar Scheme,

- 22. Practice crop diversification. Move from rice & wheat cultivation to pulse & oil seed cropping system,
- 23. Use efficient water saving technologies (like micro-irrigation, bunding, farm ponds, zero tillage, direct seeded rice, alternate wetting and drying and others),
- 24. Create rainwater harvesting infrastructure in home/ schools/ offices,
- 25. Use drip irrigation systems created with waste materials, wherever possible,
- 26. Reuse water from washed vegetables to water plants and other purpose,
- 27. Pre-soak heavy pots and pans before washing them,
- 28. Do not discard unused stored water every time there is fresh water coming in taps,
- 29. Use buckets instead of hose pipes to water plants/ floors/ vehicles,
- 30. Fix leaks in flushes, taps and waterpipes,
- 31. Use water-efficient fixtures for taps, and showerheads, and toilet flush units,
- 32. Invest in a water meter for your house to measure water consumption regularly,
- 33. Reuse water drained out from AC/RO for cleaning utensils, watering plants and others,
- 34. Prefer a water purification system that wastes less water,

Single Use Plastic Reduced

- 35. Use cloth bag for shopping instead of plastic bags,
- 36. Carry your own water bottle wherever possible,
- 37. Reuse glass containers/ packaging plastic items as storage boxes,
- 38. Participate in and mobilize participation for clean-up drives of cities and water bodies,
- 39. Prefer using non-plastic eco-friendly cutlery during gatherings and events,
- 40. Turn off running taps when not in active use,
- 41. Use menstrual cups instead of sanitary napkins,
- 42. Use recycled plastic over virgin plastic, wherever possible,
- 43. Use steel/ recyclable plastic lunch boxes and water bottles,
- 44. Cut the packaging bags used for milk, buttermilk, etc. only partially to avoid plastic bits from mixing into biodegradable waste,
- 45. Opt for bamboo toothbrushes and neem combs,

Sustainable Food Systems Adopted

- 46. Include millets in diets through Anganwadi, Mid-Day meal and PD scheme,
- 47. Compost food waste at home,
- 48. Create kitchen gardens/ terrace gardens at homes/ schools/ offices,
- 49. Prepare organic manure from cow dungs and apply to farms,
- 50. Prefer locally available and seasonal foods,
- 51. Use smaller plates for daily meals to save food wastage,

Waste Reduced (Swachhata Actions)

- 52. Contribute cattle waste, food waste, and agricultural waste to biogas plant (provided under GOBARDHAN),
- 53. Practice segregation of dry and wet waste at homes,
- 54. Use agricultural residue, animal waste for composting, manuring and mulching,
- 55. Recycle and reuse old newspapers, magazines,

- 56. Feed unused and uncooked vegetables leftovers to cattle,
- 57. Set printer default to double-side printing,
- 58. Repair, reuse and recycle old furniture,
- 59. Buy paper products made from recycled paper,
- 60. Donate old clothes and books,
- 61. Do not discard waste in water bodies and in public spaces,
- 62. Do not let pets defecate in the public places

Healthy Lifestyles Adopted

- 63. Encourage use of millets in food and indigenous herbs and medicinal plants for nutrition and well being,
- 64. Prefer consuming natural or organic products,
- 65. Start biodiversity conservation at community level,
- 66. Plant medicinal plants such as neem, tulsi, giloy, mint, curry leaves, ashwagandha, curry leaves etc. within household premises,
- 67. Practice natural or organic farming,
- 68. Plant trees to reduce the impact of pollution,
- 69. Avoid purchasing products/souvenirs made from skin, tuskers and fur of wild animals,
- 70. Create and volunteer at community food and cloth banks, and at animal shelters,
- 71. Initiate and/or join green clubs in your residential area/ school/ office,

E-Waste reduced

- 72. Repair and use electronic devices over discarding the devices,
- 73. Discard gadgets in nearest e-recycling units,
- 74. Use rechargeable lithium cells,
- 75. Prefer cloud storage over a pen drive / hard drive.

This list is not exhaustive, further details can be accessed on the website <u>https://www.niti.gov.in/life</u>.

5.7. Module 6: Co-benefits of adaptation strategies

Module 6 is dedicated to assessing the environmental and socioeconomic co-benefits of the adaptation strategies that were developed in Module 5. Since much of the value of this module comes from the joint reflections of the participants, facilitators will conduct the discussion with the entire group (Kalmbach et al., 2020).

The primary objectives of this module are to:

- Emphasize the important role that communities play as stewards of their natural environment,
- Evaluate whether additional co-benefits can be achieved through refinements in the adaptation strategies,
- Increase awareness about the vital ecological processes that sustain life, such as climate change mitigation through carbon sequestration.

Exercise 8: Identification of co-benefits (Kalmbach et al., 2020)

This exercise is designed to build on the climate change research conducted in Module 1, as well as the development of community adaptation goals and strategies that were identified in Exercises 6 and 7.

Participants will be asked to analyze the strategies on the adaptation path sheets one at a time. They will then write down the identified strategies in a table that lists both positive co-benefits and potential refinements, similar to the sample table provided (Kalmbach et al., 2020).

ADAPTATION STRATEGY	CO-BEN EFITS	FURTHER IMPROVEMENTS FOR CO-BEN EFITS
o Reforestation of degraded wateshed to improve stream flow during drought	o Curbon sequestration o Improved water quality o Provide shade o Increase biodiversity o Provides income for nursery owners locally	o Use indigenous the species instead of Eucalyptus o Enhance with beethendly flowers o Use fodder the species as well
o Small-scale irrigation with pumps		o Using renewable energy (solar/wind) for pumps o Monitoring of ground- water levels by the community

Figure 8. Identification of co-benefits (Kalmbach et al., 2020).

5.8. Module 7: Community adaptation planning

Module 7 focuses on identifying specific activities that the community can undertake to realize the adaptation strategies and goals that were developed in earlier modules. Additionally, this module involves determining how the final assessment report will be completed and shared with the wider community (Kalmbach et al., 2020).

The primary objectives of this module are to:

- Develop a first action plan that outlines concrete steps for achieving the adaptation goals,
- Share the findings and recommendations of the Participatory Assessment of Climate and Disaster Risks analysis with the community, serving as a starting point for more detailed community planning.

As with Module 6, facilitators will conduct the exercise with the entire group, and the group will be responsible for determining the specific details regarding the preparation and presentation of the final assessment report.

Exercise 9: Development of an action plan (Kalmbach et al., 2020)

The purpose of this exercise is to create a first action plan that will be included in the Participatory Assessment of Climate and Disaster Risks assessment report (Kalmbach et al., 2020). The action plan should;

- Identify immediate and longer-term actions that need to be taken,
- Distinguish between individual and collective actions,
- Determine where other stakeholders are needed for specific activities,
- Identify limiting external factors and key advocacy issues, as well as the necessary steps to engage with government institutions.

This exercise will establish the first steps and main lines of action necessary to achieve the community's goals (Kalmbach et al., 2020). The impact of the plan in the community will be determined in part by the status and influence of those who helped develop it. This exercise provides a great opportunity to invite prominent local figures or elected representatives to participate.

ADAPTATION	STRATEGY	WHAT WILL BE DONE AT COMMUNITY LEVEL		WHAT EXTERNAL ACTION , SUPPORT IS NEEDED		
GOAL	RESPONSE	NOW	LONG-TERM	NOW	LONG-TER M	
Secure food through agro- forestry and irrigated ganden	Farmer seed exchange	Women Self-Help- Group to shure seeds atspecial event in October	Create annual seed exchange fair at village hall. Organized by farmers' cooperative and women groups	Approach extension service for new variety seeds: farmers coop head	Training on seed production and certification → Women's leader to approach NGO for support	
	Hold Farmer Field Schools on variety selection trials					

Figure 9. Development of an action plan (Kalmbach et al., 2020).

Community presentation

In the final step of the Participatory Assessment of Climate and Disaster Risks process, the results of the analysis are presented to the entire community and external stakeholders. The compiled results can be used to inform other planning processes and to approach external stakeholders for assistance or advocacy. The final product of the analysis is "*The Report of the Participatory Assessment of Climate and Disaster Risks for (Name of Community): Findings, Recommendations, and Actions*". The complete assessment report includes background materials from the context description in Module 1 and the documentation of the results from Modules 2 to 7, which include the assessment of climate and other hazards, impacts, and existing responses from Exercises 1 to 5; adaptation goals and strategies, including co-benefits from Exercise 9.

5.9. Module 8 & 9: Monitoring, feedback and evaluation

In these modules, projects should include all necessary local resources, and external contributions should be limited to what the community cannot do with their own resources. The action plan should contain objectives, corresponding actions, persons in charge, and timelines. Although executives of the institution typically create this plan, mobilizing the people's ability to design one can be beneficial. To create a participatory action plan, the criteria used should be easy to understand. The matrix is a graphic representation of the plan that should be clear to everyone since it serves as the basis for follow-up and evaluation.

The action plan should be created after developing the objectives matrix. Participants should take part in drawing up the matrix, and everyone involved should make decisions. The methodology includes presenting and reaching a consensus on the format and symbols to be used in the matrix. The action plan matrix repeats the last level of the objective's matrix, and when necessary, divides the activities into sub-activities. Quantitative and qualitative goals, which are verifiable indicators from the objective's matrix, should be established. It's important to decide on responsibilities and indicate the timeline for each activity.

Since the action plan guides project implementation and monitoring, it's essential to review and discuss the proposed matrix with all actors involved before approval. The time required and materials needed depend on the complexity of the plan. Blackboard, newsprint, and markers are useful materials.

ACTIVITY			DATE								
Establish the nursery	SOB-ACTIVITY	PERSONS IN CHARGE	J	F	Μ	Α	Μ	J	J	A	
古古古古	(1) Prepare the land and build fence	-Nursery Committee Juan, Ignacio, José, Arnoldo, Elba, Diego	2.						0-0		AC
	(2) Prepare seed beds	-Nursery Committee and Youth Club							· · · · ·		L L
	(3) Fill bags	-Nursery Committee and Youth Club							· · ·		Z
	(4) Plant	-Nursery Committee and Youth Club									PL/
	(5) Water, clean, spray	-Nursery Committee									Ē
	(6) Prepare planting site	-Nursery Committee and Youth Club									Ň
	(7) Plantation	-Nursery Committee and Youth Club									ATR
	(8) Training in grafting techniques	-Nursery Committee -NGO									ĨX
	(9) Information meetings with the forest ranger	Juan									

Figure 10: Action Matrix (Geilfus, 2008).

Follow-up and evaluation planning matrix

To plan for participatory monitoring and evaluation, a matrix can be created to summarize the necessary actions, responsibilities, and timeline. This should be a repetitive process, involving

action (project implementation), observation (monitoring indicators), and reflection (analysis of results and proposed adjustments). The following steps can be taken:

- 1. Analyze project participants and their responsibilities,
- 2. Analyze expectations and potential problems with project activities to expand the vision and search for indicators,
- 3. Analyze indicators to measure progress and impact of activities,
- 4. Determine who will observe indicators and consider forming a follow-up committee,
- 5. Determine who will carry out follow-up and evaluation tasks and what products are expected.

To create the matrix, hold a meeting with project participants and use blackboards, newsprint, markers, and cards. The matrix should indicate different activities, expected results, how to measure progress (indicators), who will measure progress (responsibilities), how it will be presented (products), and when it will occur (timeline). The time required for this process will depend on the complexity of the issue.



Figure 11: Follow-up and evaluation planning matrix (Geilfus, 2008). **Impact assessment indicator matrix:**

Task: Create an indicator matrix for the project's impact evaluation with the participants' input. **Time Required**: 2-3 hours depending on the complexity of the issue Materials: Blackboard, newsprint, markers, cards Methodology:

- 1. Conduct a meeting with project participants and explain the objective of the meeting, emphasizing the need for the assessment. Give practical examples of indicators to help them understand the concept.
- 2. Brainstorm potential indicators with participants, organizing them under four categories:
 - **Social indicators**: measuring changes in the social situation of participants (e.g., access to services, housing, education, land tenure, health, gender equality, adoption of new practices),
 - **Economic indicators**: measuring changes in the economic situation of participants (e.g., indebtedness and investments, access to credit, production goods and others, income, levels of production, levels of self-employment, use of wage-earners, levels of technology, etc.),
 - **Political-organizational indicators**: measuring changes in the degree to which beneficiaries are organized and have control over decisions that affect their lives (e.g., degrees of organization and social control, leadership, distribution of benefits among participants, etc.),
 - **Environmental indicators**: measuring changes in the environment (e.g., deforestation and reforestation, pollution, protected areas, water sources, wildlife, adoption of practices and level of awareness about the environment, etc.).
- 3. Determine how the indicators will be measured, explaining the two main types of indicators to the group (see follow-up indicator matrix).
- 4. If necessary, prioritize the indicators, using measurability as a criterion. Repeat the exercise for the different activities and sub-activities to create a matrix of indicators and results.



Figure 12: Impact assessment indicator matrix (Geilfus, 2008).

6. Participatory Rural Appraisal

Participatory Rural Appraisal (PRA) is an approach used to gather data and gain insight into rural conditions and situations (Ramesh, 2020). PRA employs a variety of methods and tools that can be selected depending on the type and nature of the data required. Development practitioners use PRA techniques in the field to quickly and easily collect the necessary data and information from rural or tribal villages. The PRA process allows practitioners to build closer relationships with the rural community, which can facilitate participatory planning that incorporates data collected from the community members themselves (Ramesh, 2020).

What is a Gram Panchayat ?: In India, a Gram Panchayat usually comprises a group of habitations or villages. It is an elected body responsible for taking up development works related to 29 subjects mentioned in the 11th Schedule of the Indian Constitution. Gram Panchayats (GPs) play a crucial role in rural development in India (Ramesh, 2020). They have the authority to generate local revenue by imposing taxes such as house tax and service charges for providing essential services like rural water supply, sanitation, and street cleaning. Moreover, GPs can avail government funds from various ministries and departments for rural development purposes. Many government programs are implemented through GPs, making them a vital part of local self-governance (Ramesh, 2020).

Block Development Office: A group of Gram Panchayats form a Development Block in India, and each Block is managed by a Block Development Office (BDO). BDOs are responsible for maintaining grassroots level data and monitoring the implementation of various development schemes in each Gram Panchayat. This makes them another potential source of data for development practitioners.

According to Ramesh (2020) there are following Menu in PRA Methods / Tools;

- Transect Walk,
- Social Mapping,
- Seasonality Analysis,
- Ranking Exercises,
 - Wealth / well-being ranking,
 - Direct Matrix Ranking,
 - Pair-wise Ranking,
 - Preference Ranking,
 - Ranking Criteria Matrix,
- Institutional Diagram / Venn Diagram,
- Livelihoods Analysis,
- Focus Group Discussion,
- Chain of Interviews,
- Case Studies,
- Linkage / Mobility Map,
- Problem Analysis / Problem Inventory,
- Causal Diagram / Problem Tree,
- NSL Chart (Now Soon Later Chart),

- Future Visioning,
- Do it Yourself,

The list of PRA methods and tools provided earlier is not exhaustive, and PRA practitioners worldwide have developed new techniques and tools depending on the specific data they need to gather. The flexibility of PRA allows for adaptation, improvisation, and innovation in data collection while respecting the basic principles of PRA, such as showing respect to the community, listening to them, and learning from them. In the following sections, we will discuss more methods and techniques and provide a recommended set of PRA tools that can be used by Participating Institutions of UBA.

Three Pillars of PRA (Chambers, 1997);



Figure 13. Three Pillars of PRA (Chambers, 1997).



Figure 14. The Participation ladder (Geilfus, 2008).

The following is a collection of PRA methods and tools that can be utilized in the villages that are adopted. This list is merely suggestive, as the flexibility to adapt, modify, and enhance these methods based on the specific context and purpose of the PRA.

1. Transect Walk,

- 2. Social Map,
- 3. Problem Inventory / Analysis,
- 4. Problem Prioritization (NSL Chart),
- 5. Solution Assessment,
- 6. Analysis Group Discussion.

EXERCISE – 1: Transect Walk (Ramesh, 2020)

This is a structured stroll that involves the participation of "outsiders," in our case, Pis or HEIs, along with the "insiders" (villagers) in which they visit and observe the village. It is not a rushed walk; rather, it is encouraged to pause at points of interest, engage in discussions, ask questions, and seek to comprehend the village's dynamics.

Farmers Variables	Chinnakalai Brothers	Veluchamy Brothers	Paramiah	Veerakumar	Madasumy	Murugan	Puram Pokku	Perco- lation Pond
Slope	/		-					
Ownership	Private	Private	Private	Private	Private	Private	Public	Public
Soil Type	Sandy loam	Sandy loam	Sandy Ioam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Clay
Depth of soil	3 m	3 m	3 m	3 m	3 m	3.5 m	4 m	-
Crops (i) Standing	Gingili Horsegram	Gingili Horsegram Other pulses	Paddy Other grains	-	Chillies Onion Brinjal			T
(ii) Raised	Do	-	Paddy Other grains	Gingili Horsegram	Paddy Grains Tomato	Cotton Castor grains Groundnut		
Trees	Palm Poovarasu	Palm Neem	Coconut Vagai Poovarasu Tamarind Palm	Palm Tamarind Neem Vagai	Coconut Palm Teak	Poovarasu Palm Coconut		
Cattle		-	Two		Shed	-		
Sources of irrigation	Rain-fed	Rain-fed	Rain-fed	Rain-fed	Rain- fed and open well (energised)	Rain- fed and open well (energised)		5
Water level	NA	NA			3 ñ	38		1.61
Problems	Water scarcity, poor rain, scarce resources	Water scarcity, poor rain, scarce resources						
Opportunities	Willing to accept the department scheme and cooperate	Willing to accept and cooperate	Willing to accept and cooperate	Willing to accept and cooperate	Willing to accept and cooperate	Willing to accept and cooperate		

Figure 15. Transect Walk (Ramesh, 2020).

Who participates? The guided walk involves a team of villagers walking with you through the village's streets, lanes, and agricultural fields. This is by invitation only, and the participants should be selected thoughtfully, depending on the focus of the walk. For instance, if the aim is to learn about farming practices, it would be wise to invite at least 2-3 farmers.

The purpose: The purpose of the walk is to gain a comprehensive understanding of the village's settlement patterns, infrastructures, institutions, facilities, farm practices, and animal husbandry. By walking alongside the villagers and engaging in discussions, you can form a mental map of the village, and if necessary, draw a physical map.

Outcome Expected: This activity will prepare you to facilitate the villagers in drawing a social map, which is the next crucial step in PRA data collection. Additionally, by the end of the transect

walk, you will have learned the names, backgrounds, interests, and concerns of those who walked with you. This knowledge is vital for subsequent PRA exercises, such as problem analysis.

Caution: It is crucial to note that observation is not equivalent to watching and assuming. To understand the village, it is necessary to observe, ask questions, discuss, and seek clarification. Taking a "power-walk" and making assumptions will not aid in comprehending the village.

EXERCISE – 2: Social Mapping / Village Mapping (Ramesh, 2020)

This is a representation of the village as drawn by the villagers on the ground, typically using rangoli powder or chalk, and not necessarily to scale. It provides an aerial view of the village that shows all the streets, lanes, institutions, common infrastructure, and houses.

What is depicted in the Map?

The purpose of creating a village map is to provide a visual representation of the layout and infrastructure of the village, including streets, institutions, and common facilities. The map can be used to gather information about the village and its resources, such as population, households, and infrastructure. By involving the villagers in the process of creating the map, it ensures that it is accurate and reflects their knowledge and understanding of their community. Once the map is completed, it can be used as a reference tool for future planning and development initiatives.

When creating a social map, it is important to involve relevant participants and allocate separate time for each hamlet or village in the Gram Panchayat if necessary. All houses should be included and numbered, along with the name of the head of the household on a corresponding card. This will make it easier to reference each house when collecting data for the PRA. The social map provides a framework for collecting information on various aspects of village life, depending on the purpose of the PRA.

Who participates? It is recommended to involve young men, women, and middle school-level children in drawing the social map as they can actively participate in the process. However, when it comes to collecting data from a completed social map, it is beneficial to involve some elderly persons as well. The involvement of a diverse group of people can help to ensure that the map reflects the entire village's perspective.

The purpose: The social map can provide a lot of valuable information about the village, including details about the population, households, caste, occupation, institutions, and common infrastructure. Depending on the type of data needed, the social map can be used to identify specific details such as child laborers, households without functional water tap connections, or households that have toilets but are not using them. The social map can be an effective tool for generating a wealth of information about the village.

Outcome Expected: Once the villagers have completed the social map, it can be copied onto chart paper for our use if necessary. It is advisable to give a copy to the Panchayat Office for their

future use. The social map provides household and common facility data that we may need about the village.

Caution: When arriving in a village, it is important to approach the task of creating a social map with care. Simply asking people to draw a map of their village can be intimidating and overwhelming. Instead, the process should be approached step-by-step and clearly explained to the villagers. Start by asking them to draw the main streets and then move on to the smaller lanes. From there, identify the location of common facilities, such as the Panchayat Office, School, Anganwadi, Health Centre, water tank, hand-pumps, street lights, and community hall. Finally, ask them to draw every house in the village. Facilitation is key in making this process easy and approachable for the villagers. Be patient and avoid overwhelming them with too many instructions at once. Once the map is complete, take the time to appreciate the villagers' efforts and show them that they are capable of drawing a map of their village. It may be something they have never tried before and could be a source of pride for them. Additionally, make a copy of the map and provide it to the Panchayat Office for future use. The map can also be used to collect data on household details and common facilities available or not available in the village.



Source: PRA Unit, GRI (1995e).

Figure 16. Social Mapping or village Mapping (Ramesh, 2020).

EXERCISE – 3: Problem Inventory / Analysis (Ramesh, 2020)

The purpose of conducting this exercise is to help the villagers identify and prioritize the problems and challenges they face in their lives and livelihoods. This may include issues related to agriculture such as lack of access to water for irrigation, poor quality seeds, and inadequate fertilizers, as well as concerns related to basic infrastructure such as access to clean drinking water, inadequate school education, and lack of primary health care facilities. During the exercise, villagers are encouraged to list out all the problems they face and prioritize them based on their importance.

How is this depicted?

A Guide Book on Local Climate Change Adaptation Planning and Implementation

To start this exercise, you can ask the villagers to share one or two pressing problems they face in the village. Once an issue is raised, if others agree that it's a serious problem, they can also explain how the lack of that facility affects their lives and livelihoods. Each issue is written on a postcard-sized card and displayed in front of everyone. This process is continued as more issues are raised, allowing the villagers to decide, analyze, and prioritize which issues are important to them. It's important to have patience during this exercise and let the villagers lead the discussion.



Figure 17. List of problems identified by people using sticky notes (Ramesh, 2020).

Who participates? The participants who join in the discussion must be relevant to the issues being discussed. For instance, if the discussion pertains to agricultural problems, it is essential to have insiders who are engaged in agriculture. Similarly, if the discussion is about problems in anganwadi or primary school, parents and school-going children can provide authentic information.

The purpose: The purpose of the discussion is to identify the problems of the local people from their perspective and prioritize them. The facilitator must use semi-structured interviewing techniques to allow the participants to narrate their experiences and perspectives. The facilitator's role is to guide the discussion and not to prompt or assess/judge. One participant should write one card for every problem identified during the discussion.

Outcome Expected: The outcome expected is to have several cards, each containing a problem that was analyzed and explained.

Caution: However, caution must be taken not to involve participants who are not directly concerned with an issue, as they may not provide quality information. Therefore, it is essential to have the right participants who can list out, analyze, and explain the problems they face.

EXERCISE – 4: Problem Prioritization (NSL Chart) (Ramesh, 2020)

The aim is to categorize the problems according to their level of urgency and importance. The cards containing each problem are to be sorted into two or three boxes, based on the following categories represented in the picture below.

How to carry out this exercise?

The problems identified by the community are classified based on their urgency and importance by placing the cards into boxes drawn on the ground with a piece of chalk or on a chart paper. The facilitator explains that since all the problems cannot be addressed immediately, the community needs to decide on timelines. Therefore, the labels NOW, SOON, and LATER are written on top of the chart. However, it is up to the community members to determine the specific periods that correspond to each label.

To begin the exercise, the facilitator selects one card at a time and reads out the problem written on it. The community members then discuss the urgency of the problem in relation to the other problems listed on other cards. After thorough discussion, the community members must come to a unanimous decision about which box (NOW, SOON, or LATER) the problem card should be placed in. This process is repeated for every card, resulting in all the problems being classified into one of the three boxes on the chart. This exercise provides the PRA team with an idea of which problem to prioritize and address first, which is the top problem mentioned under NOW. The other problems can be tackled subsequently over a period of 3 to 5 years, making this a continuous engagement.

Table 1: A Typical NSL Chart (Ramesh, 2020);

NOW – N	SOON – S	LATER – L
(3 – 6 months)	(6 months – One year)	(Beyond one year)

•	100% IHHL coverage and declare "real ODF"	• Survey and count HH without drinking water tap	• All office / school buildings and premises
•	The toilets in the primary school and anganwadi be rendered usable with water line facility	connection / those with illegal water tap connection and those who use motors for sucking water from	 to have roof-water harvesting structures. 1000 tree saplings be planted in common &
•	Renovate all ponds, and water storage structures in the village.	 Professional statements of the statement of the	private lands.Survey number of persons eligible for old
•	Groundwater recharge pits be made in 20 strategic points in the village.	taps where pumps are used for sucking water from water distribution lines.	age pension and disability pension and help them apply.

Who participates? The participation of 12-15 local participants, including men, women, young, old, and school-going children, depends on the problem being discussed.

The purpose: The purpose of the problem analysis and prioritization exercise is to identify urgent issues from the perspective of the villagers and propose a project that addresses their priority.

Outcome Expected: The outcome expected is three lists of problems identified by the locals, with the No. 1 list being the urgent problems that could be resolved within 3-6 months. These problems and related data are used by the Participating Institution (PI) to write a project proposal for submission to UBA.

Caution: It is crucial to note that problem analysis and prioritization exercises tend to raise the expectations of the locals on the PI. Therefore, the PI must clarify its position and intention, limitations of funds, powers, and technical expertise, and urge the villagers to make full use of its technical expertise to resolve issues. The locals should avoid developing unreasonable or far-fetched expectations that will make them dependent on the PI and hinder their development. This is essential for ethical development transactions.

EXERCISE – 5: Solution Assessment through Ranking Criteria Matrix

What is the exercise about? The exercise is about involving the local community in coming up with possible solutions to the problems they have identified and prioritized.

How is the exercise carried out? One way to carry out this exercise is through a Ranking Criteria Matrix. In this method, all the solutions are listed, and matched against certain acceptable criteria. The criteria can be suggested by the community members themselves, with the facilitator adding additional criteria if necessary. The community can also be asked to consider criteria beyond

social acceptability, such as technical feasibility, financial viability, and sustainable maintenance arrangements. The type of management model that would be appropriate for the solutions can also be discussed.

	Solution	Solution	Solution	Solution	Remarks
	(Option-1)	(Option-2)	(Option-3)	(Option-4)	
Criteria -1					
(Community	2	3	4	1	
Acceptance)					
Criteria -2					
(Technical easiness to	4	3	4	4	
use)					
Criteria -3	1	2	2	1	
(Fund					
support from scheme)					
Criteria -4	1	1	2	1	
(Maintenance)					
Score	8	9	12	7	
Rank	III	II	Ι	IV	

Table 2: Ranking Criteria Matrix (Ramesh, 2020);

Score: 1 = Very Poor; 2 = Poor; 3 = Good; 4 = Very Good.

Who participates? All community members who are concerned with the problem being addressed can participate.

The purpose: The purpose of this exercise is to involve the community in selecting the most suitable solution to a pressing problem identified through the NSL Chart.

Outcome Expected: The community will reach a consensus on the most suitable solution to the problem, based on their scoring and ranking of the solutions.

Caution: It is important to ensure that all participants have a clear understanding of the method and purpose of the exercise before proceeding. The facilitator should ask the community if there are any other more scientific ways of assessing the appropriateness of the solutions.

EXERCISE – 6: Participatory Beneficiary Selection (Ramesh, 2020)

This is an optional exercise that involves selecting individual beneficiaries for a specific project, such as selecting youth for skill training or progressive farmers for field experimentation with high-yielding seed varieties. It can also involve selecting artisans or craftspeople to try out an improved technology application to reduce drudgery or enhance productivity.

To carry out this exercise, the cards created during the Social Mapping exercise, which contain the names and house numbers of community members, can be used to call out names. The community members can then discuss and decide who deserves a given scheme or benefit. The concerned individuals can also express their willingness to participate. It is essential to conduct a thorough analysis to ensure that no one deserving is excluded or vice versa.



Figure 18. Participatory Beneficiary Selection (Ramesh, 2020).

Who should participate? The PRA team should ensure that relevant members or representatives of households participate, with a group size that may range from 30 to 40 people depending on the project's nature.

What is the purpose? The purpose is to select beneficiaries with the community's approval and the willingness of prospective beneficiaries.

What outcome is expected? The expected outcome is the selection of deserving beneficiaries for assistance, excluding those who do not need support or would not participate.

What caution should be taken? This exercise is sensitive, and everyone may want to be included. Therefore, people's criteria should be used to select participants or beneficiaries. The criteria must be clear and acceptable to most present, and any challenges from those who were slightly above the selection cutoff should be dealt with patiently and ingeniously.

EXERCISE – 7: Analysis Group Discussion (Development Seminar);

The Development Seminar is the final stage of the PRA exercises conducted in different locations within the Gram Panchayat. It is open to all members of the village, regardless of their previous participation or non-participation in the exercises. The purpose of the seminar is to provide a comprehensive understanding of the entire process and the outcomes of the PRA exercises conducted in the village over a period of two to three days as part of the GPDP.

How is this exercise carried out? In this exercise, the outcome of every PRA exercise, starting from the Social Map to the problems listed and the priority of each problem, is shared with the

participants. This is typically done in a Gram Sabha meeting that includes school-going children as well.

Who participates? This is an inclusive meeting that involves almost the entire village community.

The purpose: The purpose of this meeting is to ensure that everyone is aware of the problems identified, the priorities established, and the solutions considered. The final solution that is most likely to be taken up for implementation is also discussed.

Outcome Expected: The data generated through all the PRA exercises is validated by a larger group of people. The problem selected for proposal writing for UBA support is finalized.

Caution: Since this is a larger group with people of varying interests, such as political, religious, and other affiliations, the crowd must be handled with care to avoid local conflicts and political controversies.

EXERCISE – 8: Organizational/institutional analysis: Venn diagram (Geilfus, 2008)

To gather information about the various organizations and groups in the community, as well as their perceived roles and interactions (Geilfus, 2008), the following methodology can be used: **Time required**: 1-2 hours.

Materials: Blackboard or newsprint, markers, circles of paper in different sizes (at least 20, in 3 different sizes).

Participants: Representatives from various sectors in the community, potentially split into working groups.

Step 1: Begin a discussion on institutional issues and present the diagram as a visualization tool. **Step 2:** Ask the participants to identify and name all of the organizations and institutions that have an impact on community life. You may start with a question such as "Which institution is most important for the development of the community?" and allow the participants to decide.

Step 3: Write the names of the organizations in order of importance, starting with the most important, and place them inside the largest circles (one organization per circle). Use progressively smaller circles for the less important organizations until all the institutions have been accounted for. Hang the circles on the board for everyone to see and discuss.

Step 4: Facilitate a discussion among participants about the relationships that exist between these organizations. Ask them to identify any connections, collaborations, or conflicts that may exist between the institutions. Use the circles of paper to represent these relationships, placing them in proximity to each other or using arrows to indicate connections. This may require further discussion and clarification to ensure accurate representation of the relationships.

Step 5: The final output of the exercise should be a visual diagram of the inter-institutional relationships within the community. Compare and discuss the diagrams created by each sub-

group, identifying any similarities or differences in perceptions of relationships. This can provide insights into potential areas of collaboration or conflict during the planning stage.



Figure 19: Social organization (Venn Diagram), (Geilfus, 2008).

EXERCISE – 9: Community history chart

The objective of this exercise is to visually represent the changes that have occurred in the community over the last few years with regards to social organization, health, production, and natural resources. This activity can be used as a supplement to other exercises, such as the timeline and trend line. It can be conducted in focus groups, larger gatherings, and even with families (farm histories). The time frame for this exercise is relatively short, typically no more than ten years, and participants may not be able to recall exact quantitative data.

Step 1: Begin by discussing the issues that will be addressed in the exercise. This should be based on the focus of the study and participants' priorities. Create a matrix with columns for each year and rows for each issue, using symbols to represent each issue.

Step 2: For each issue, ask participants if they remember any exceptional years (e.g. good or bad harvests). This year will serve as a reference point for that issue. If there is no reliable information, try to estimate the data using symbols.

Step 3: Completing the matrix may lead to lengthy discussions, resulting in a great deal of information on annual variations and the way they are perceived by different members of the community.

Step 4: Once the matrix is complete, encourage discussion to explain the most obvious fluctuations and changes recorded. The explanations offered should be recorded since they can provide valuable insights. Finally, analyze the matrix in terms of problems and opportunities.

ISSUE YEAR	1988	1989	1990	1991	1992	1993	1994
PRODUCTION		E E E	HEH HEH	H	뫱	EE	E
FARMLAND	-	20	20	36	36	35	20
FOREST	88 89 69 69 69	\$P\$	89 89 89 89 89 89 89 89 89 89 89 89 89 8	ф ф ф	59 59 59 59 59 59 59 59 59 59 59 59 59 5	₩\$	ଢ଼ଢ଼
LIVESTOCK		×~	፟፟ጟ፝፟፟፟፟፟፟፟፟ጚ፟፟፟፟፟፟፟	XxXx	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	××××	ALA AN
WATER	1111	1111	1111 1111	188	1111		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Figure 20: Community history chart (Geilfus, 2008).

EXERCISE – 10: Resource evaluation matrix

To assess the community's opinions about the utilization of public natural resources like fuelwood, timber, water, fodder, etc., a simple evaluation exercise can be conducted using transect diagrams. The community members or working groups should be gathered, and the purpose of the exercise should be explained.

Step 1: Identify evaluation parameters and criteria. Begin by asking open-ended questions such as "What is in our best interest?" and "What do we like?" to extract participants' opinions. Once the criteria have been identified, use symbols for each one, so that illiterate members of the community can participate fully in the exercise.

Step 2: Create a matrix that includes the identified criteria. Determine a simple qualitative scale that uses symbols such as adequate and inadequate.

Step 3: The evaluation can be performed either by consensus or by voting. Participants must rate each criterion. If the voting method is used, colored markers should be used, and men and women should be allowed to vote together while also recording their preferences.

Step 4: Discuss the results and determine if they are consistent with the group's experiences. If significant differences of opinion occur along gender lines, the possible reasons should be explored. Record the results and provide the group with a copy of the final matrix.

RESOURCE	IS THERE ENOUGH FOR EVERYONE ?	QUALITY
POTABLE		☺‴ ☺;;;;.
FUELWOOD		©
TIMBER	··· ···	:
FODDER	©	©::: ©::::

Figure 21: Resource evaluation matrix (Geilfus, 2008).

EXERCISE – 11: SWOT Analysis

To evaluate the advantages and disadvantages of alternative solutions, SWOT methodology can be used.

This involves brainstorming to establish four sets of characteristics:

- Strengths,
- Weakness,
- Opportunities,
- Threats.

The exercise can take 1-3 hours depending on the complexity of the issue and the number of participants. Materials required include paper, cards, markers, a blackboard or newsprint. The SWOT analysis helps to review the elements included in the evaluation matrix and considers external factors that can impact the outcome of the alternative.



Figure 22: SWOT Analysis (Geilfus, 2008).

EXERCISE - 12: Analysis of pros and cons: "YES or NO" exercise

This method involves using dynamic role-playing to encourage open dialogue on a topic that may have contradictory opinions or unclear limitations. It can be useful when a group needs to evaluate the advantages and disadvantages of an option or when different perceptions on a topic need clarification. The process typically takes 2-3 hours and requires materials such as a blackboard, newsprint, markers, and cards.

- To begin, the group should identify a topic that affects everyone and express it as a proposal or positive statement,
- Then, two volunteers should be chosen to represent the optimist and pessimist sides of the issue, with each given time to prepare their arguments,
- Both leading characters should encourage participants to speak in favor of their side, with each idea visualized on a card and placed on either the "yes sir" or "no sir" side of the blackboard,
- The game should be seen as a competition to see which side will have more ideas. Once neither side can produce any more ideas or arguments, the pros and cons of the proposal

are analyzed, and the cards are prioritized and discussed. If necessary, the process can be repeated with new volunteers,

• Finally, the information obtained should be organized into a comparative chart of pros and cons, possibly in the form of an impact diagram.



Figure 23: Analysis of pros and cons: "YES or NO" exercise (Geilfus, 2008).

EXERCISE – 13: Impact assessment

To analyze the possible outcomes of implementing a project or action, this exercise involves creating a flowchart that lists the potential positive and negative consequences. The flowchart is developed through brainstorming sessions with members of the community and can be used to make important decisions about implementation.

Here are the steps involved in the methodology:

Step 1: Explain the exercise to the participants and make sure everyone understands the purpose and goals of the activity.

Step 2: Write the title of the action or project being analyzed in the middle of the blackboard, newsprint, or on a card. This will be the starting point for the flowchart.

Step 3: Conduct a brainstorming session with participants to identify potential positive consequences of the action or project. Write down these ideas at the top of the blackboard or newsprint, creating a cause-effect chain flowchart.

Step 4: Repeat the brainstorming exercise to list possible negative consequences of the action or project. Write these ideas down at the bottom half of the blackboard or newsprint, creating a second cause-effect chain flowchart.

Step 5: Discuss the final flowchart with the group. Analyze the potential consequences, their likelihood, and the level of impact. This information can be used to make important decisions about implementation.



Figure 24: Impact assessment (Geilfus, 2008).

EXERCISE – 14: Objectives matrix (logical framework)

The objective of this methodology is to establish a logical chain of objectives and results for a project using a table format. The process involves identifying and prioritizing problems, determining a broad objective, specific objectives, results, activities, and inputs.

Step 1: Identify the broad objective. This should be the response to the main problem, for example, increasing and normalizing the community's water supply.

Step 2: Determine specific objectives. These should respond to the main causes of the problem. For example, reforesting the heads of streams and planning land use around the springs.

Step 3: Determine results. These are the necessary achievements to ensure that each specific objective is attained. For example, increased vegetation cover around the heads of streams and reduced soil erosion around the springs.

Step 4: Determine activities and inputs. Make a list of everything that needs to be done to ensure that the results are achieved. For example, conducting soil tests, preparing the land, planting trees, and maintaining the vegetation.

It is essential to ensure consistency and that there are no breaks in logic between the different levels of objectives and results. The logical framework matrix includes verifiable indicators and means for verifying them, as well as assumptions that are beyond the control of the project but necessary to achieve the objectives. If any of the assumptions cannot be met, the logical framework may need to be revised.


Figure 25: Objective's matrix (logical framework) (Geilfus, 2008).

EXERCISE – 15: Matrix of needs and available resources

When undertaking any project, it is essential to identify all the resources required to achieve the objectives. While traditional projects typically focus on monetary, supply, and technical personnel resources, participatory projects require a broader range of resources. These can include human resources, such as the knowledge, experience, and skills of the people involved, as well as natural resources like land and water. Planning for participatory projects should therefore involve identifying all the necessary local resources, as local contributions can never be limited solely to labor, and external contributions should only be sought for things that the community cannot achieve with their own resources. The time required for this planning process will depend on the complexity of the project, while the necessary materials include a blackboard, newsprint, and markers. The methodology for this planning process involves using a matrix principle and answering two basic questions for each activity identified in the objectives matrix: what is needed to carry out the activity, and what resources are available in the community?

Step 1 of this process involves presenting and reaching a consensus on the methodology, including the matrix format and symbols to be used.

Step 2 involves determining the resources required for each activity, using a set of guidelines such as human resources, natural resources, labor, technical knowledge, supplies, and financial cost.

Step 3 involves determining which of these resources are available locally and which will need to be imported. It is important to consider whether certain resources can be substituted for others, such as providing training if there is no one in the community with the required experience.

ACTIVITY	RESOURCES NEEDED	IN THE COMMUNITY	OUTSIDE CONTRIBUTIONS
SET UP THE COMMUNITY NURSERY	1) HUMAN RESOURCES -Nursery committee -Person in charge -Grafter	000	
	2) NATURAL RESOURCES -Land -Water	00	Need to load in tank
	3) LABOR -Prepare the soil -Build fences -Seedbed - find land -Plant -Fill bags -Water and clean	00000	Support with training and follow-up
	4) TECHNICAL KNOW-HOW -Prepare the nursery -Planting and maintenance -Graft fruit trees	000	Some experience Training
	5) SUPPLIES -5 shovels, 2 picks -5 machetes -Water tank -20,000 bags -Forest-tree seeds -Sour orange seeds -Grafts	0000000	Include in the budget Include in the budget

Figure 26: Matrix of needs and available resources (Geilfus, 2008).

7. Tools for climate action

The tools for climate action are fundamental as they allow progress to be made towards achieving the **objectives for global climate action** established in the Paris Agreement. These objectives are based on the following main themes: **mitigation**, **adaptation**, **and loss and damage** (González and Numer, 2020).

Tools for complying with the Paris Agreement

In order to meet global climate action goals, **it is imperative that they be integrated into each country's national action plans.** One way to do this is through the formulation of guidelines or ambitious policies. There are other tools that countries use to align themselves with global goals (González and Numer, 2020).

These tools are:

- NDCs,
- Nationally Appropriate Mitigation Actions (NAMAs),
- National Adaptation Plans (NAPs),
- Long-term strategies,
- Adaptation Communications.

India's nationally determined contribution - Working towards climate justice

- The objective is to promote and widely spread a sustainable and healthy way of life that is rooted in traditions and values of conservation and moderation. This will be achieved through a large-scale movement called 'LIFE' (Lifestyle for Environment), which aims to combat climate change.
- The aim is to embrace a climate-friendly and cleaner path of development that surpasses the practices adopted by other countries at a similar level of economic growth.
- By 2030, the goal is to reduce the intensity of greenhouse gas emissions produced per unit of GDP by 45 percent, compared to the levels recorded in 2005.
- By leveraging technology transfers and accessing affordable international finance, including support from the Green Climate Fund (GCF), the plan is to achieve approximately 50 percent of the total installed capacity of electricity generation from non-fossil fuel sources by 2030.
- Aiming to enhance the absorption of carbon dioxide, an additional carbon sink of 2.5 to 3 billion tones of CO₂ equivalent will be created by expanding forest cover and tree planting by 2030.
- In order to better cope with the impacts of climate change, investments in vulnerable sectors like agriculture, water resources, the Himalayan region, coastal areas, health, and disaster management will be increased.
- The plan involves mobilizing domestic funds as well as securing new and additional financial support from developed countries to implement the aforementioned mitigation and adaptation measures, taking into account the resources required and the funding gap.

• Efforts will be made to build capabilities, establish domestic frameworks, and develop international structures to facilitate the rapid adoption of cutting-edge climate technologies in India. Collaboration in research and development of such future technologies will also be pursued.

National Action Plan for Climate Change – India

There are eight National Missions on climate change:

- National Solar Mission,
- National Mission for Enhanced Energy Efficiency,
- National Mission on Sustainable Habitat,
- National Water Mission,
- National Mission for Sustaining the Himalayan Eco-system,
- National Mission for a Green India,
- National Mission for Sustainable Agriculture,
- National Mission on Strategic Knowledge for Climate Change.

The guiding principles of NAPCC are as follows:

- Ensuring the protection of vulnerable and impoverished communities through an inclusive and sustainable development approach that takes into account the impacts of climate change,
- Pursuing national economic growth and poverty alleviation goals while simultaneously ensuring ecological sustainability,
- Implementing efficient and cost-effective strategies to manage and reduce energy consumption at the end-user level,
- Promoting widespread and rapid adoption of suitable technologies for both adapting to and mitigating the effects of climate change,
- Encouraging the development of new and innovative market mechanisms, regulatory frameworks, and voluntary initiatives that support sustainable development,
- Achieving effective implementation of climate change measures through close collaborations with civil society, local government units, and public-private partnerships.

Action for Climate Empowerment

Action for Climate Empowerment (ACE) is a comprehensive approach that underpins the other tools outlined in this booklet. It was developed to comply with article 6 of the UNFCCC and article 12 of the Paris Agreement. ACE is a key component of the international agreements aimed at promoting global action on climate change (González and Numer, 2020). The components of ACE include:

1. **Education**: This involves increasing understanding of the causes of climate change and possible approaches to address it. Through education, children and adolescents can develop the necessary skills and knowledge to respond to the negative impacts of climate change.

- 2. **Training**: It is necessary to build capacity for actions that support the transition to sustainable and resilient societies. This can be achieved by training individuals and communities to mobilize and support climate action.
- 3. **Public awareness**: It is essential to increase awareness among the general public of the importance of climate action. Public awareness can lead to social transformations that support climate action.
- 4. **Public participation**: The right to public participation should be guaranteed so that people, including children and adolescents, can have a say in decisions that affect them. This right allows young people, adolescents, and children to demand action in response to the negative impacts of climate change.
- 5. **Public access to information**: The right to access information should also be guaranteed so that people, including children and adolescents, can be aware of the impacts they may experience and the possible effects that some climate change actions may have.
- 6. **International cooperation**: Countries can benefit from the exchange of experiences, knowledge, and successful actions, as well as from the strengthening of institutional capacities and access to financing, which can make climate action more effective.

Annexure I

Additional material for supporting the facilitation of the exercises (Kalmbach et al., 2020)

Exercise 2: Preparation of the seasonal calendar

The following list can help as additional hints, which events and activities to consider when preparing the seasonal calendar. The main input must come from the community, but the facilitators should ask probing questions in order not to forget important periods in community life.

Characteristics: Periodic events, activities, hazards, challenges (seasonality)

Climate:

- Rainy seasons, dry seasons,
- Heatwaves, heavy rains, thunderstorms, hurricanes, strong winds, sandstorms, frost, hailstorms, storm surges,
- Flooding, droughts, uprooting,
- Landslides, mudslides, rock fall, erosion, silting, sanding.

Ecology:

- Wildfires, bush fires,
- Slash and burn activities.

Economic:

- Major crops (clearing, burning, sowing, weeding, harvest) Livestock,
- Other crops (fruit trees, mushrooms...) Epidemics, diseases, pests,
- Cash activities (hunting, firewood, charcoal, fishery, petty trade, brick making, gold digging),
- Labour migration,
- Food and water situation: Food shortage, hunger,
- Water scarcity, water pollution, salinization.

Financial situation, cash needs:

- School fees, holiday expenses Taxes,
- Subsidies, government grants, aid.

Social, cultural, political:

- Festivals, holidays,
- Weddings, funerals, initiations,
- Conflicts (land, elections, ethnic, religious),
- Domestic violence,
- Theft, damage, looting.

Personal, human:

- Epidemics, diseases,
- Alcohol drinking,
- Suicide.

Exercise 3: Prioritization of hazards (Kalmbach et al., 2020)

These are all useful methods for participatory hazard ranking. The most appropriate method to use will depend on the context, number of participants, and available resources (Kalmbach et al., 2020). Here is some additional information about each method:

- 1. Weighted rankings with items: This method is suitable for small to medium-sized groups and works well when participants can read and write. Each participant is given three votes to distribute among the hazards. The facilitator can provide stickers, markers, seeds or pebbles for participants to mark the hazards. This method allows participants to focus their attention on a few hazards that are most relevant to them.
- 2. **Hands-up**: This method is easy to use and suitable for groups of any size. The facilitator names each hazard one by one and asks participants to raise their hands if they think the hazard is important. Each person can raise their hand up to three times. This method allows for quick prioritization of hazards and encourages participation from everyone in the group.
- 3. **Stand and vote**: This method works well for larger groups and when the hazards are more complex or abstract. Hazards are written on cards and spread out on the wall or floor. Participants stand next to the card that is most important to them. The hazard with the most participants standing next to it is selected and pinned on a board. This process is repeated until all the hazards have been ranked. This method allows for a visual representation of the priorities and encourages discussion and collaboration among participants.

Exercise 4: Vulnerability matrix: Examples of livelihood assets (Kalmbach et al., 2020)

To develop a vulnerability matrix, the community's livelihood assets are categorized into five different groups. However, participants may sometimes struggle to list items belonging to each category, so a list of commonly identified items has been compiled to assist the facilitator in asking relevant questions. Nonetheless, the primary source of information must come from the community (Kalmbach et al., 2020).

Category	Example assets and resources
1. Natural resources (around	• Arable land, soil,
us without human efforts)	• Grassland ,
Rely on directly (for food,	• Water,
income, medicine) or	• Air,
indirectly (protection from	• Biodiversity,

\mathbf{L} \mathbf{U}	Table 3:	Vulnerability	matrix:	livelihood	assets	(Kalmbach et	al., 2020)
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storms)	• Forest: Fuel, building, food, medicine,
	• Wild plants and animals,
	• Peat,
	• Wetland systems,
	• Sand, gravel, rocks,
	 Sea coral reefs.
	Mangrove forests
	 Tidal flats.
2. Physical resources	Houses stables and sheds
(created by human work and	 Agricultural implements and equipment
efforts)	 Ponds, harvesting systems.
Basic infrastructure and	 Bridges, roads, airports, harbours Schools.
productive capital for	hospitals.
transport, buildings, water	Communication facilities.
management, energy and	• Energy supply.
communication	 Boats, ferries.
	• Cars, trucks, motorcycles, bicycles, rick-shaws,
	 Computers, office equipment.
	• Waste disposal systems.
	• Water pumps, tanks, wells.
	• Water delivery and sanitation systems.
3. Economic and financial	• Income generating activities: Agriculture, husbandry,
resources (human activities and	fishery, trade, business,
capital to generate income)	• Access to markets,
Activities, stocks and flows	• Liquid assets (livestock, stocks, etc.),
of money that allow people	• Cash and savings, jewelry,
to achieve their livelihood	• Loans,
needs and objectives	• Credit systems,
	• Pensions,
	• Remittances,
	• Insurance.
4. Social resources	Social attitudes and practices:
(human relationships,	• Participation, democracy, solidarity, mutuality,
affiliations, organization,	awareness, conflict resolution skills, safety,
groups)	communication, respect of laws, influence.
Formal and informal of social	Social structures:
relationships + institutions from	• Local CBOs,
which people draw in pursuit of	• Savings and solidarity groups,
their livelihood	• Human rights groups,
	• Disaster preparedness committees,
	• Networks,
	• Local, regional and national governance institutions,

	• NGOs (local, regional, international),	
	• Informal groups,	
	• Women's and men's groups,	
	• Religious groups, church groups,	
	• Trade associations,	
	• Unions, federations,	
	• Parties, political organizations.	
5. Human resources	• Health (physical, mental),	
(personal or individual	• Skills: agricultural, veterinary, crafts, water	
resources)	management, health care etc.,	
Skills, knowledge,	• Attitude, commitment,	
capacities and good	• Values and virtues Faith,	
health important to the	• Human rights,	
pursuit of livelihoods	• Affiliation, membership, influence.	

Annexure II

Add-on tools, games and exercises (Kalmbach et al., 2020)

This annex provides links to other tools that can be used to complement Participatory Assessment of Climate and Disaster Risks (PACDR) and a quick guide for decision-making on whether or not to use them.

Conflict sensitivity analysis (Module 2 – Climate change and hazard analysis)

What can it be used for? In some contexts, the hazard analysis of the PACDR can reveal that there are severe underlying conflicts in the community that could hinder the success of any climate-related project or community activities or that could be made worse during such a project. In such a case, an additional conflict sensitivity analysis helps to address these tensions in a systematic manner (Kalmbach et al., 2020).

How does it work? The Helvetas/Swisspeace manual on working in fragile and conflict-affected contexts uses mainly participatory exercises. Step 1 includes three main exercises: (1) an actors' mapping and (2) an analysis of the positive and negative factors in the community that divide different groups, including men and women, or bring them together (e.g. values, institutions, common experiences or traditions). This is complemented by (3) an analysis of governance problems. The results can inform the development of conflict-sensitive adaptation options in the PACDR. In highly fragile or conflict-ridden contexts a full conflict analysis as described in the manual is recommended (Kalmbach et al., 2020).

How long does it take? The three exercises of step 1 in the tool take about 4 hours.

Source: https://www.helvetas.org/Publications-PDFs/2013_hsi_manual_3_steps_wfcs.pdf

Participatory Vulnerability Analysis (Module 3 – Vulnerability Assessment)

What can it be used for? The Participatory Vulnerability Analysis (PVA) tool developed by Action Aid enables you to do an additional vulnerability assessment of vulnerable people or groups. The PACDR analyses the vulnerability of the community in general and of different livelihood resources. It also looks at gender dimensions of vulnerability and touches on issues of minorities, but not at differences within these groups. The PVA tool provides a detailed analysis of who the most vulnerable are within a community beyond gender and minorities, what they are vulnerable to and what the underlying causes of vulnerabilities are (Kalmbach et al., 2020).

Annexure III

Semi-structured Interviews (SSI)

PRA uses semi-structured Interview technique. This is also known as Semi-structured Inquiry. The expression "*semi-structured*" implies that there is something called *fully- structured* and something else called: *unstructured Inquiry*? The questionnaires used in household surveys are, often fully structured – meaning all the questions are pre- determined and it is presumed to be complete (Kalmbach et al., 2020).

One demerit in using such fully structured questionnaires is that anything that is not predetermined obviously gets omitted during the course of inquiry / interview. There is no way the Inquiry can accommodate such unanticipated responses. Therefore, we remain ignorant about it. On the other hand, if we are unstructured, meaning going with no questionnaire at all, we may fail in sequencing our line of questioning, and consequently we may miss collecting some data / information that did not occur during the course of our inquiry (Kalmbach et al., 2020).

In the case of semi-structured interviews, we have a check-list of, often open ended questions, which are in a sequence. Since what aids the interview process is only a check-list, anything that we may have failed to pre-determine in our checklist can be accommodated during the interview. The interview often progresses like a seamless conversation, where the next question we ask is determined partly by what we have in the check-list, and partly by what the response was to the previous question (Kalmbach et al., 2020).

Facilitators of PRA exercise generally use Semi-structured Interview technique. But, using SSI requires skills in setting the tone of the discussion, ingenuity to skills and

How to do Semi-structured Interviewing (SSI) (Kalmbach et al., 2020);

- The interviewing team consists of 2-4 people of different disciplines,
- Ensure *horse-shoe shape seating* so that eye-contact with everyone is easy,
- Begin with the traditional greeting and state that the interview team is here to learn,
- Begin the questioning by referring to someone or something visible,
- Conduct the interview informally and mix questions with discussion,
- Be open minded and objective,
- Let each team member finish their line of questioning (don't interrupt),
- Carefully lead up to sensitive questions,
- Assign one note-taker (but rotate),
- Be aware of non-verbal signals,
- Avoid leading questions and value judgments,
- Avoid questions which can be answered with "yes or no",
- Individual interviews should be no longer than 45 minutes,
- Group interviews should be no longer than two hours,

• Each interviewer should have a list of topics and key questions written down in his / her notebook.

SSI Individual Errors

The following are some of the mistakes we generally make, that we should avoid;

- Failing to listen closely,
- Repeating questions,
- Helping out informants when they appear temporarily lost for word by;
 - Interrupting,
 - Suggesting answers.
- Asking vague questions,
- Failing to probe, (use Six helpers),
- Asking leading questions,
- Too long an interview,
- Pretending to be dumb,
- Focusing on lead informant,
- Appearing to be intimidating or overbearing.

SSI Team Errors

- Interrupting each other during the interview or long gaps,
- Switching to a new topic suddenly,
- Failing to close the group (meaning some people leaving half-way),
- Failing to plan and prepare fully,
- Failing to give sufficient time for group discussions,
- Improper place for interviewing (some people don't participate because of it),
- Too many/too less informants,
- Lack of process observations (if the PRA team is following the principles),
- Methods / tools not mutually understood (e.g. when you can't explain clearly how to do map, or how to do ranking exercises people tend to leave).

Sample interview guide

1. Introduction

- Introduce interviewers and institution,
- Why we're here,
- Explain methodology.

2. General information

- Family size, number of people working on farm,
- Date of arrival in community,
- Sources of income,
- Farm ownership status and size.

3. Identification of production systems

- System components.
- 4. Characterization of agricultural sub-system
 - Main crops,

- Production and marketing problems,
- Labor,
- Income, gender issues,
- Compare with situation a few years ago.

5. Characterization of animal production sub-system

- Main types of production,
- Production and marketing problems,
- Labor,
- Income, gender issues,
- Compare with situation a few years ago.

6. Additional comments

7. Conclusion

- What we're going to do next,
- Thanks.

ANNEXURE IV

Pakke Tiger Reserve - 2047 Declaration on Climate Change Resilient and **Responsive Arunachal Pradesh**



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GOVERNMENT OF ARUNACHAL PRADESH DEPARTMENT OF ENVIRONMENT, FOREST AND CLIMATE CHANGE ITANAGAR

The 1st August, 2022

NOTIFICATION

No. For. Env (SAPCC)-261/2021 — The following is the short version of the declaration adopted by the Government of Arunachal Pradesh in its State Cabinet meeting held on 13th November. 2021 at Pakke Tiger Reserve, Seijosa, Arunachal Pradesh and it is hereby published for general information.

Pakke Tiger Reserve 2047 Declaration

on Climate Change Resilient and Responsive Arunachal Pradesh (Short Version)

The Government of Arunachal Pradesh, in the 12th meeting of the Council of Ministers in the year 2021 heid at Pakke Tiger Reserve, Pakke Kessang, Arunachal Pradesh, deliberated on Climate Change Resilient and Responsive Arunachal Pradesh in the context, of the increasing body of evidence on the direct and indirect adverse impacts of the ongoing climate change, which pose a serious burden on the well-being of all at all ages as well as sustainable development. The Government recognizes the imminent need to

- enhance coping capacities to deal with the various adverse impacts of climate change relevant to the State by fostering climate resilient and low Green House Gas emission (a) development trajectories
- ensure that resource flows and their effective utilization complement the climate-resilient (b) and responsive sustainable development in the State,
- Arunachal Pradesh specific climate change response action to realize sustainable development goals whilst averting and minimizing the loss and damage due to the adverse {c} impacts of climate change
- hamess economic benefits and opportunities associated with strategic decisive, pragmatic and immediate actions to transition to climate aware and responsive economy and communities to yield potential and desirable economic, ecological, social and cultural (d) dividends.
- foster ongoing efforts to address the climate change challenges with the synergistic involvement of the States in the North-East Region and other States of the country, including inter-state collaboration, and collaboration with national and inter-governmental organizations, and other key actors such as communities, development agencies, non-governmental organizations, private sector, academia and the climate research community. (e)
- undertake persistent efforts to mitigate and adapt to climate change, intending to lead by example through policies, strategies and knowledge-based management and action toward increasing the adaptation capacity and climate resilience of Arunachal Pradesh in the face 305 of ongoing climate change,

Whilst Celebrating 'Azadi ka Amrit Mahotsav' in this 75th year of India's independence and looking forward, in the next twenty-five years approaching the centenary celebrations, to accelerating comprehensive, smart, climate resilient and inclusive development of the People and Land of the Dawn-Lit Mountains with its mighty rivers and abundant natural resources with all-round efforts endorsed the Packe Tiger Reserve 2047 Ministerial Declaration on Climate Change Resilient and Responsive Arunachal Pradesh'.

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The declaration has prioritized the following five broad themes – Panch Dhara – and associated seventy-five strategies with sector-wise resource allocation within respective budgetary envelopes for coordinated, systemic, sustained, and ambitious engagements in the State of Arunachal Pradesh to urgently tackle and mitigate climate change impacts in the State and realize climate resilient and responsive landscapes in tune with the national policies on climate change response.

Environment, Forest and Climate Change

Climate Resilient Forestry

2

- Protect and maintain the existing Very Dense Forest cover in Arunachal Pradesh.
- 2 Improve the degraded forests
- 3 Strengthen fire protection measures for all vulnerable forest areas.
- 4 Attenuate the drivers of deforestation such as itegal felling and encroachments in forest areas
- Greate high-lech nurseries for forest rehabilitation interventions and forest stand quality improvement.
- 6. Eco restore degraded culturable lands and wastelands through cross sectoral action
- Adopt landscape-based approaches for conservation of Protected Areas and Sacred Groves.
 Control the scread of Invasive Alien Species.
- 9 Protect and conserve threatened and migratory species
- Promote Non-Timber Forest Products (NTFPs) value chains in forest fringe villages to assist forest- dependent communities adapt to climate Change
- 11 Facilitate sustainable and ecosystem sensitive tourism and nature-based livelihood options aimed at increasing climate change resilience awareness, including communities participation in protecting and conserving indigenous biodiversity and ecosystems values.

Climate Resilient Water Resources Management

- Survey, demarcate/geo-locate and assess the current hydrological conditions of all water bodies and their catchment areas in the State.
- 13 Rehabilitate degraded water bodies and their catchment areas and develop identified groundwater resources, including water bodies/water harvesting structures.
- 14 Encourage community-based planning for protection and development of wetlands and rejuvenation of Tanks/Wetlands/Springs.
- 15. Institute river-bank stabilization with structural, geo-textile and forestry measures
- 16. Generate awareness and build capacity for judicious use of water

Renewable Energy and Energy Efficiency

- 17. Increase Hydel Power production, including through micro/mini/pico projects.
- Increase Solar Power generation in the State in accordance with appropriate energy mix consumption based on Central sector allocation of power and State's own power generation capacities.
- 19 Generate awareness and conduct training programmes on project implementation and climate resilient infrastructure development.
- Implement plot demonstration projects for undertaking energy efficiency measures etc. as per Bureau of Energy Efficiency norms.
- 21. Promote star rated devices in infrastructure, other socio-economic and household soctors.
- 22 Launch incentive-based programmes for promoting energy efficiency
- 23 Increase penetration of LED technology in various lighting applications.

I Health and Well Being of All

Climate Change Resilient Health Care

- 24 Reduce morbidity, mortality, injuries and health vulnerability due to climate change and extremo weather events
- 25 Strengthen capacity of the healthcare system and health-care providers to address illnesses and diseases resulting from climate change and extreme weather events, including through regular review, and monitoring of foreseen climate sensitive illnesses in the State for formulating adaptation plans thereof in coordination with relevant stakeholders.
- 26 Strengthen public health preparedness and response through sensitization of policy makers, including elected representatives, community-based organizations, youth associations, social influencers, non-governmental organizations, religious and spiritual leaders towards situational analysis and required action(s) with whole of society approach at state/distinct/sub district and community levels.

Towards a Climate Change Resilient and Responsive Arunachal Pradesh-2047

3

The Azunachai Pradesh Extraordinary Gazette, August 23, 2022

27. Strengthen research capacity for evidence based and better informed assessment of climate change impacts on human health, including survey, documentation and validation of medicinal plants and herbs as well as traditional medicine systems' knowledge and folk healing practices.

- 28 Train and sensitize all health service providers as well as communities on the respective health adaptation plans for various climate change related illnesses and create awareness among general population and policy makers regarding possible adverse impacts of climate change on human health.
- 29 Strengthen integrated health information platform and surveillance through involvement of all public and private healthcare providers, including for forecasting of illnesses, reporting and monitoring outbreaks, evidence of malnutrition/micronutrient deficiencies and dissemination of health advesories.
- 30. Promote integrated and whole of school, college and technical education approach to increase climate change awareness, build responding abilities and foster inter-sectoral partnerships for related education development aimed at enhanced climate restience of children, adolescents, and communities.

III Sustainable and Adaptive Living

Climate Resilient Sustainable Habitats

- 31. Develop and implement Smart Master Plans for all Urban Areas, reflective of the local climate change induced risks.
- 32 Develop Smart, Sustainable and Livable Cities, including through promotion of telecommunications and innovative virtual methods of working for enhanced productivity in climate friendly manner.
- 33. Conduct climate risk vulnerability assessments and demarcate hazard-prone zones.
- 34 Adopt Building Material and Technology Promotion Council (BMTPC) designs for flood resilient buildings
- 35 Mandate installation of Rainwater Harvesting Structures/Recycling of Rainwater for all schools and institutional buildings in urban areas.
- 36 Promote building of efficient and climate resilient household drainage systems for all the notified towns.
- 37 Design and develop systems to prevent direct solid waste discharge into streams / rivers.
- 38 Manage solid waste as per national Solid Waste Management guidelines
- 35 Disaggregate waste at source and recycle all waste streams.

Sustainable Transport systems

- 40 Promote low carbon transport systems for local commute in all cities and towns of the State
- 41 Develop an ecosystem for encouraging adoption of electric mobility in the State.
- 42 Formulate and implement replacement plan for old commercial vehicles.
- 43 Promote public and mass transport systems to bring in efficiencies of scale.
- 44. Enhance support for promotion of alternative fuels.
- 45 Promote walking, biking and telecommunication based on smart growth principles

17 Livelihoods and Opportunities

Climate Resilient Agriculture and Horticulture

- Adopt efficient impation measures such as drip imigation, sprinkler imigation, pot imigation fertigation etc.
- 47 Popularize drought resistant variaties, cropping systems and cultivation practices.
- 48 implement Integrated Nutrient Management Systems.
- 49. Promote large scale and comprehensive organic farming
- 50 Implement Integrated Post and Disease Management Systems
- 51 Promote that trees and vegetable gardens in every school in Arunachal Pradesh
- 52. Encourage integrated efforts for enhanced productivity & sustainability to illuminareas through appropriate substitution practices.
- 53 Promote ecologically sustainable and economically viable diversification of agriculture.
- 54 Promote integrated crop management including agro-forestry in the upper reaches of hitls, slopes.

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- Climate Resilient Animal Husbandry and Fishery
- 55 Vaccinate livestock in all villages and monitor zoonotic transmission in forest fringe areas.
- 56 Augment investock productivity by resorting to resilient high productive investock breeds.
- 57 Promote local tree fodger species through multi location mass cultivation centers.
- 58 Conserve cold water and indigenous fish species and germplasms.
- 59 Adopt river ranching and other innovative projects
- 60 Develop actor plans for identification and conservation of threatened fish species and the associated riverine systems
- 61 Use Wetlands/High altitude wetlands for recreational fishenes
- 62 Promote high-tech fish hatchenes, including for conservation of fishilaquatic/wetland biodiversity
- 53 Conduct research on the impacts of climate change on livestock and fish health and productivity.

Skill Development

4

- 64 Adopt institutional policies and plans for targeted vocational education and skill development aimed at climate change vulnerabilities and adaptation required thereof, especially through Skill Shifts needed to meet ecological targets and implement sector specific strategies.
- 65 Promote entrepreneurship and alternative livelihoods through development of Green Employment Skills. Green Production Processes and Green Investment Ecosystems.

V Evidence Generation and Collaborative Action

Disaster Management

- 66 Develop community level disaster preparedness and management plans.
- 67 Install Early Warning Systems (EWS) to monitor hazard prone areas (hydro meteorological, topographical, and geological), with particular focus on hilly tracts along state/national highways, degraded mountain slopes and areas near hydropower projects or major development sites.
- Formulate and periodically review multi-sector disaster management action plans and research projects for disaster proofing and mitigation strategies at all levels of governance.

Research and Knowledge Development

- 69 Develop capacities and enhance technical know-how through collaborative research projects with academia and think tanks on climate resilience mitigation and responsive strategies.
- 70 Document Traditional Knowledge Systems of Indigenous Communities with the view to preserve and propagate adaptive climate resilient methods and locally sustainable practices.
- 7.1 Promote excellence and upscaling of best practices toward sustainable development and maximizing the potential of bio-resources and bioeconomy with futuristic research and dissemination of related bio-technology knowledge.
- 72 Leverage the use and wider application of Information & Communication Technology in understanding, promoting awareness, disseminating and adopting mitigation and adaptation climate change responses at local and regional levels.

Gender, Equity and Climate Change

- 73 Promote equitable gender roles and responsibilities in climate resilient as well as sustainable resource management at community level for enhanced resilience and adaptive capabilities.
- 74 Protect the most vulnerable, especially women and children, in communities from the adverse impacts of climate change including ensuring distributive justice.
- 75 Utilize existing and build new networks, physical and virtual, on climate change and its impacts with the view to promote equitable, accessible and affordable responses at individual or collective levels.

Dr. Sharat Chauhan

Principal Secretary (Environment, Forests and Climate Change) to the Government of Arunachal Pradesh, Itanagar

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Gram Panchayat Level Federation of Development Committees



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GOVERNMENT OF ARUNACHAL PRADESH DEPARTMENT OF ENVIRONMENT, FOREST & CLIMATE CHANGE **ITANAGAR**

NOTIFICATION

The 12th July 2022

No. For Env. (SAPCC)-261/2021/1300-1350 .--- In pursuance of the decision of the State Cabinet held on 13th November, 2021 at Seijosa Pakke Kessang District, which adopted the 'Pakke Tiger Reserve 2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh'; the following institutional arrangement at Gram Panchayat level is hereby notified with immediate effect to coordinate the implementation of the interventions under the said declaration at the Gram Panchayat level.

GRAM PANCHAYAT LEVEL FEDERATION OF DEVELOPMENT COMMITTEES

At Gram Panchayat level, a federation of various development-oriented committees operating at village evel with a rotating Vice-Chairmanship and with equal voting rights for the constituent development related committees is constituted

The said committee under the Panchayat Pradhan/Head of local Self Government will facilitate the transparent, inclusive and equitable implementation and monitoring of climate adaptation projects in the jurisdiction.

The non-Government development agencies operating in the jurisdiction of the Panchayat may be invited to participate as observers in the proceedings of the meeting of the said Federation. The grass root level federation of development committees is to meet on a monthly basis to facilitate implementation of climate. change adaptation/resilience projects in the respective jurisdictions and submit monthly progress reports to the district level facilitation committee.

- 1. Chairperson of the Gram Panchayat concerned
- 2 Heads of Development Related Committees (Village Health Nutrition and Sanitation Committee, Biodiversity Management Committee, Food and Nutrition Committee, Village Forest Management Committee, Eco-development committees, SHGs and Primary Level Federations) and such other local level development committees as may exist at Panchayat level
- 3 Local level Functionanes (Forest/Wildlife/Women and Child Development/ Member Education/Agriculture/Horticulture/Veterinary and Animal Husbandry/ Fishenes/Water Resources/Renewable Energy/Health/Urban Alfairs/ Transport/industries/Skill Development/Disaster Management/Research/ District Panchayat/Tourism/Rural Work Department/Public Work Department/Public Health Engineering & Water Sanitation)
- 4 Gaon Buras

4

- 5 Non-Governmental Development Agencies Operating in the Jurisdiction Observer
- 6 Member Secretary, Gram Panchavat
- The committee may Co-opt members/experts as required

 Member Secretary Dr. Sharat Chauhan,

Principal Secretary, (Environment, Forest and Climate Change), Government of Arunachal Pradesh, Nanagar.

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- rotation basis) and
- Vice-Chairperson (on

- Chairperson

Special Invitees

Member

Annexure -VI

District Level Facilitation Committee



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GOVERNMENT OF ARUNACHAL PRADESH DEPARTMENT OF ENVIRONMENT, FORESTS & CLIMATE CHANGE ITANAGAR

NOTIFICATION

The 12th July, 2022

No. For. Env (SAPCC)-261/2021/1250-1300.—In pursuance of the decision of the State Cabinet held on 13th November. 2021 at Seijosa, Arunachal Pradesh regarding adoption of the 'Parkke Tiger Reserve 2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh'; the following institutional arrangement at District level is notified with immediate effect to effectively facilitate the implementation of the projects and interventions under the said declaration in the districts.

DISTRICT LEVEL FACILITATION COMMITTEE

At District level, a facilitation and coordination committee led by the Deputy Commissioner of the District along with the expert members for the subject matter areas drawn from the government departments concerned and accredited development agencies operating in the districts is hereby constituted.

The committee is mandated to faciliate time-bound and smooth implementation of the climate change response interventions across the sectors in the district under the Pakke Tiger Reserve-2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh and to inform progress quartely to the Secretariat of the Empowered Group on Pakke Declaration.

1.	Deputy Commissioner	Chairman
2	Divisional Forest Officer concerned	Member Secretary
З,	District Heads (Police/Women and Child Development/Education/ Agriculture/Horticulture Veterinary and Animal Husbandry/Fisheries/ Water Resources/Renewable Energy/Health/Urban Affairs/Transport/ Industries/Skill Development/Disaster Managoment/Rosearch/District Penchayat/Tourism/Rural Work Department/Public Work Department/ Public Health Engineering & Water Sanitation.	Member
4	Representatives of accredited development agencies operating in the District	Special Invitoes

The committee may co-opt members/experts as required.

Dr. Sharat Chauhan

Principal Secretary (Environment, Forest and Climate Change). Government of Arunachal Pradesh, Ilanagar.

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Annexure –VII

An Indicative Format for Local Level Climate Adaptation Plan of Gram Panchayat

- 1. Executive Summary
 - Brief overview of the adaptation plan,
 - Key objectives and goals.
- 2. Introduction
 - Background information on the local area and its vulnerability to climate change,
 - Importance of developing a climate adaptation plan.
- 3. Climate Change Context
 - Current and projected climate change impacts in the local area and baseline scenarios,
 - Climate risk assessment and vulnerability analysis.
- 4. Stakeholder Engagement
 - Description of stakeholder groups involved in the planning process,
 - o Methods and mechanisms used for stakeholder engagement,
 - Outcomes and contributions of stakeholders,
- 5. Adaptation Options
 - Identification and description of adaptation measures and strategies (as much possible quantifiable and verifiable), under the Pakke Declaration on Climate Resilient and Responsive Arunachal Pradesh,
 - Nature-based and engineered solutions considered,
 - Evaluation of feasibility, effectiveness, and cost-effectiveness.
- 6. Mitigation Options
 - Identification and description of Mitigation measures and strategies (as much quantifiable and verifiable), under the Pakke Declaration on Climate Resilient and Responsive Arunachal Pradesh,
 - Non-Business as Usual Actions,
 - Evaluation of feasibility, effectiveness, and cost-effectiveness.
- 7. Actions under Mission LiFE
 - o Identification and description of climate actions under Mission LiFE,
 - Framework for realizing Pro Planet Villages under the Panchayat,
 - Evaluation of feasibility, effectiveness, and cost-effectiveness.
- 8. Prioritized Actions
 - List of prioritized adaptation actions,
 - \circ $\;$ Rationale for the selection and sequencing of actions,
 - Alignment with local development goals and priorities.
- 9. Integration and Mainstreaming
 - Integration of adaptation considerations into existing policies, plans, and programs,

- Coordination with relevant sectors and levels of governance,
- Ensuring coherence with disaster risk reduction and sustainable development strategies.
- 10. Capacity Building
 - Capacity-building initiatives for local institutions and stakeholders,
 - Training, knowledge sharing, and technical support provided,
 - Enhancing the ability to implement and monitor adaptation actions.
- 11. Financing and Resource Mobilization
 - o Identification of financial resources for implementing adaptation measures,
 - Funding opportunities explored (government budgets, climate finance mechanisms, etc.),
 - Innovative financing mechanisms and potential revenue streams considered.
- 12. Monitoring and Evaluation
 - Monitoring framework for tracking the progress and effectiveness of adaptation actions,
 - Evaluation of outcomes and impacts,
 - Adjustments and improvements based on monitoring results.
- 13. Knowledge Management and Learning
 - Knowledge sharing and learning initiatives,
 - o Documentation and dissemination of good practices and lessons learned,
 - Collaboration and exchange of experiences with other regions.
- 14. Review and Update
 - Process for periodic review and updating of the adaptation plan,
 - Incorporation of new scientific knowledge and changing climate scenarios,
 - Ongoing engagement with stakeholders for plan maintenance.
- 15. Conclusion
 - Summary of the adaptation plan and its key elements,
 - Importance of local-level adaptation in building resilience to climate change.
- 16. Annexes (if applicable)
 - Supporting data, maps, and charts,
 - Detailed technical information,
 - Additional resources and references.

Note: The format can be adjusted and customized based on the specific needs and requirements of the local area and the stakeholders involved in the climate adaptation planning process.

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Glossary of climate change related terms

Adaptation: Adjustment or preparation of natural or human systems to a new or changing environment which moderates harm or exploits beneficial opportunities.

Adaptive capacity: "The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences." Adaptive capacity is what enables people to make adjustments to protect their lives and livelihoods from the impacts of climate change. It is generally applied outside of crisis periods, based on learning from past shocks and stresses. It is oriented towards managing uncertainty and reducing future risks (Source: CARE 2019, IPCC 2019).

Climate action Tools: Key tools for making progress towards the global climate action goals and the Sustainable Development Goals, including the Paris Agreement, nationally determined contributions and other tools.

Climate governance Information about climate governance and the decision-making process at the national and international levels, including the Framework Convention on Climate Change, how it works and the mechanisms for participation.

Carbon dioxide (co2): A naturally occurring gas, carbon dioxide is also a by-product of burning fossil fuels (such as oil, gas and coal), of burning biomass (organic material from plants and animals, such as wood and manure), of land-use changes (such as deforestation) and of industrial processes (e.g., cement production). It is the principal greenhouse gas originating from human activity (Source: modified from IPCC 2019).

Carbon sequestration: The process of capturing and storing atmospheric carbon dioxide with the goal of reducing global climate change. For example, reforestation that increases the biomass that captures carbon through photosynthesis, or land management changes that increase the soil organic carbon content, resulting in a net removal of carbon dioxide from the atmosphere (Source: modified from IPCC 2019).

Carbon sink: A carbon sink is a (natural) system that stores solid carbon. Some important carbon sinks include forests, wetlands, soil and oceans (Source: modified from IPCC 2019).

Climate: The average weather. The mean and variability of temperature, rainfall, wind etc. over a relatively long period of time (typically 30 years). One popular phrase can help distinguish weather from climate: "Climate is what you expect. Weather is what you get." (Source: IFRC 2007).

Climate change: Any change in climate over time. In principle, climate change can be due to natural processes or a result of human activity. The media often refers to "global warming" (an increase in the average temperature of our planet), which is actually the initial manifestation of an increasing greenhouse gas effect. Warmer temperatures lead to further climatic changes, such as changes in rainfall patterns and in the frequency or intensity of extreme weather events. In the context of the United Nations Framework Convention on Climate Change (UNFCCC), the term is linked to climate change that is caused by human activities that alter the composition of the atmosphere, particularly greenhouse-gas emissions due to burning of fossil fuels (Source: modified from IFRC 2007).

(Climate change) Adaptation: Adjustments in response to actual or expected climate change, to reduce negative impacts or take advantage of opportunities (Source: IFRC 2007). The official definition from the Intergovernmental Panel on Climate Change (IPCC) is "the process of

adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities." In practical terms, adaptation refers to the changes people and institutions make to adjust to observed or projected changes in climate. It is an ongoing process that aims to reduce vulnerability to climate change. Adaptation can also occur in natural systems, where it is the process of adjustment to actual climate and its effects, sometimes facilitated by human intervention (Source: CARE 2019, IPCC 2018).

Climate risk management: An approach to systematically manage climate-related risks affecting activities, strategies or investments, by taking account of the risk of current variability and extremes in weather as well as long-term climate change. Climate risk management is similar to working on disaster management, health, food security and so on, but paying attention to (1) the way risks are changing, and (2) options to reduce the risks in addition to being prepared to respond after the event (Source: IFRC 2007).

Co-benefits: The positive effect that a policy or measure aimed at one objective might have on another objective or sphere of life. Co-benefits depend on local circumstances and implementation practices, among other factors. Careful consideration and design of adaptation measures can increase co-benefits, while minimizing potential costs. For example, climate change adaptation measures can also contribute positively to climate change mitigation as well as employment, environment, health, reducing poverty levels, food security, gender relations etc. Co-benefits are also referred to as ancillary benefits (Source: modified from IPCC 2019).

Disaster: A situation in which the impact of a hazard (such as a storm or other extreme weather event) negatively affects vulnerable individuals or communities to a degree that their lives are directly threatened or sufficient harm is done to economic and social structures to undermine their ability to survive or recover (Source: IFRC 2007).

Disaster risk management: A systematic process of implementing policies, strategies, and measures to reduce the impacts of natural hazards and related environmental and technological disasters. This includes, among other things, disaster risk reduction, preparedness, response, recovery and rehabilitation (Source: IFRC 2007).

Ecosystem: Dynamic complex of plant, animal and microorganism communities and the nonliving environment interacting as a functional unit. Humans are an integral part of ecosystems (Source: CARE 2019, MEA 2005).

Ecosystem services: Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber and fibre; regulating services such as climate regulation and carbon sequestration; cultural services that provide recreational, aesthetic and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling (Source: CARE 2019, MEA 2005).

Fossil fuels: Carbon-based fuels from fossil hydrocarbon deposits, including coal, oil, and natural gas.

Gender: A social construct that defines what it means to be a man or woman, boy or girl in a given society. It carries specific roles, status and expectations within households, communities and culture. Individuals may also self-identify as neither male or female, or both male and female. There are different sexual orientations and gender identities. The initials LGBTIQAP refer collectively to people who are lesbian, gay, bisexual, transgender, intersex, queer, asexual or pansexual (Source: modified from CARE 2019).

Gender equality: The equal enjoyment by people of all genders and ages of rights, opportunities, resources and rewards. Equality does not mean that all genders are the same but that their enjoyment of rights, opportunities and life changes are not governed by whether they were born female or male (Source: CARE 2019).

Global warming: The rise in average temperature on earth due to the increasing amounts of greenhouse gases in the atmosphere. The media often uses this term to refer to "climate change" (a concept that includes global warming as well as other changes) (Source: IFRC 2007).

Greenhouse gas (GHG): A gas, such as carbon dioxide or methane, that absorbs and re-emits infrared radiation. When pollution adds these gases to the earth's atmosphere, they trap more solar energy in our planet (like in a greenhouse) warming the earth's surface and contributing to climate change (Source: IFRC 2007).

Hazard: A potentially damaging physical event that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation (Source IFRC 2007).

Livelihoods: The resources used and the activities undertaken in order to live. Livelihoods are usually determined by the entitlements and human, social, natural, physical or financial assets to which people have access (Source: CARE 2019, IPCC 2018).

Mitigation: This word has different meanings for practitioners in the climate change and disaster management communities, often leading to confusion:

- *Mitigation (climate change):* Measures to reduce greenhouse gas concentrations in the atmosphere, and thus ultimately the magnitude of climate change. Measures include energy conservation, using renewable energy such as wind or solar energy instead of coal, oil or gas; and planting trees that absorb carbon dioxide from the atmosphere.
- *Mitigation (disaster management):* Measures aimed at moderating or reducing the severity of disaster impact. They include such things as retention walls, water reservoirs, and reforestation to avoid landslides. From the perspective of the climate change community, these measures would be labelled as "adaptation" because they help reduce the negative impacts of climate change (Source: IFRC 2007).

Nationally Determined Contributions (NDCs): A term used under the United Nations Framework Convention on Climate Change (UNFCCC) whereby a country that has joined the Paris Agreement outlines its plans for reducing its emissions. Some countries NDCs also address how they will adapt to climate change impacts, and what support they need from, or will provide to, other countries to adopt low-carbon pathways and to build climate resilience. According to the Paris Agreement, each Party shall prepare, communicate and maintain successive NDCs that it intends to achieve (Source: IPCC 2019).

Paris Agreement: The Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Entered into force on 4 November 2016. One of the goals of the Paris Agreement is "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels", recognizing that this would significantly reduce the risks and impacts of climate change. Additionally, the Agreement aims to strengthen the ability of countries to deal with the impacts of climate change (Source: IPCC 2019).

Renewable energy: Bioenergy, geothermal, hydropower, ocean, solar, and wind energy.

Resilience: The capacity of social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation. Resilience is about managing risk and dealing with shocks and stresses that negatively influence people's lives (Source: CARE 2019, IPCC 2019).

Risk: The probability of harmful consequences due to interaction between hazards and vulnerable conditions (Source: IFRC 2007).

Sendai Framework for Disaster Risk Reduction: The Sendai Framework for Disaster Risk Reduction 2015–2030 outlines seven clear targets and four priorities for action to prevent new, and to reduce existing disaster risks. The voluntary, non-binding agreement recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders, with the aim of substantially reducing disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries (Source: IPCC 2019).

Vulnerability: The degree to which someone or something can be affected by a particular hazard (from sudden events such as a storm to long-term climate change). Vulnerability depends on physical, social, economic and environmental factors and processes. It is related, for instance, to the places where people live, the strength of their houses, the extent to which their crops can survive adverse weather, or whether they have organized evacuation routes and shelters.

- *Physical vulnerability* relates to the built environment and may be described as "exposure"
- *Social vulnerability* is caused by such things as levels of family ties and social networks literacy and education, health infrastructure, the state of peace and security
- *Economic vulnerability* is suffered by people of less privileged class or caste, ethnic minorities, the very young and old etc. They suffer proportionally larger losses in disasters and have limited capacity to recover. Similarly, an economy lacking a diverse productive base is less likely to recover from disaster impact which may also lead to forced migration
- *Environmental vulnerability* refers to the extent of natural resource degradation, such as deforestation, depletion of fish stocks, soil degradation and water scarcity that threaten food security and health (Source: IFRC 2007).



Team Pakke Declaration





Climate Resilient

Agriculture

Climate Resilient Water Resource Management



Climate Resilient Horticulture



Green Value Chains



Medicine from Sky



Please read for further details Pakke Tiger Reserve - 2047 Declaration on Climate Change Resilient and Responsive Arunachal Pradesh Details of personnel trained in the Three (3) Day Workshop "Capacity Building Development for Gram Panchayats on Planning and implementation of Local Climate Change Adaptation plans under the Pakke Tiger Reserve -2047 Declaration on Climate Resilient and responsive Arunachal Pradesh in the Lohit Basin".

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<u>Annexure- III</u>

Details of personals trained in the Two(2) Day Workshop on "Convergence & Perspective Planning of Actions for Environment Sustainability" on 22nd and 23rd February, 2023 in collaboration with National Institute of Rural Development Panchayati Raj – North Eastern Regional center (NIRDPR-NERC), Ministry of Rural Development, Govt. of India, Guwahati, Assam.

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21/02/2023 18:26:39	NTam	PCCF	WL & BD	pccfwildlife@gm ail.com	1234567890
21/02/2023 18:27:59	Ajay Bisht	Secretary	IPR	ajay@gmail.com	1234567890
21/02/2023 18:29:33	Suraj singh	DCF	DoEFCC	suraj6@yahoo.co m	8285875186
21/02/2023 18:31:27	Dr. Sharat Chauhan	Principal Secretary	GoAP	csharat@ias.nic.i n	1234567890
21/02/2023 18:33:08	A K Biswal	PCCF	P&D	biswal@gmail.co m	2234567890
21/02/2023 18:35:35	Dr. Vivek HP	Spl. Secretary	Health	secretary@gmail. com	1234567890
21/02/2023	Rillang	Member	Food	rillang@gmail.co	1234577890

18:37:00	cheje		Commissioner	m	
21/02/2023 18:53:27	Dr Bomto Riram	State Consultant Climate Change and Human Health	Directorate of Health Services	bomto.riram@ar n.gov.in	6009379042
21/02/2023 20:39:07	ANI DAI	DEO	DoEFCC	anienvis@gmail. com	+91 87945 11374
21/02/2023 21:08:27	ANUPAM GOGOI	Project Assistant (NAFCC)	DIRECTOR ENVIRONMENT AND CLIMATE CHANGE CELL	anupamgogoi55 @gmail.com	8472840370
22/02/2023 05:30:44	Alex M Shepherd	Vice Principal	Guardian Angel School	alexmshepherd87 @gmail.com	9847977616

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

Year 🕹	Average Te	verage Temperature in (Celsius) ,AALO WEST SIANG DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	ΜΑΥ	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC		
2018	14	16	19	22	23	26	26	27	21	17	15	21		
2019	13	15	18	22	23	26	25	27	22	20	14	21		
2020	13	16	19	20	23	25	25	26	23	17	14	21		
2021	14	16	19	21	24	25	26	25	23	17	14	21		
2022	13	12	21	21	24	24	27	27	25	21	17	14		

1.0 WEATHER DATA OF AALO, WEST SIANG DISTRICT, ARUNACHAL PRADESH

Year ↓	Average Relative Humidity in (%), AALO WEST SIANG DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	ΜΑΥ	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	
2018	78	78	73	73	77	82	84	83	78	78	74	79	
2019	69	74	73	72	80	82	87	81	82	81	78	79	
2020	79	73	72	74	77	86	88	84	83	77	79	80	
2021	79	72	73	72	79	85	83	87	80	78	76	79	
2022	75	76	68	83	80	87	80	80	84	81	70	78	

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

Year 🕹	Average Rainfall in (mm), AALO WEST SIANG DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	
2018	1	1	4	5	8	13	19	9	2	3	1	7	
2019	1	3	2	5	13	16	31	7	5	1	0	8	
2020	1	1	1	9	16	29	39	16	6	1	0	12	
2021	1	0	3	3	12	22	10	27	7	0	0	7	
2022	1	3	3	16	16	34	10	10	14	16	0	1	

Year 🗸	Average Temperature in (Celsius), BOMDILA, WEST KAMENG DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	
2018	3	4	6	9	12	15	16	15	14	9	6	3	
2019	1	3	5	10	12	15	15	16	14	11	8	3	
2020	1	3	6	8	12	15	15	16	15	13	7	4	
2021	3	4	6	9	12	15	16	15	14	12	7	3	
2022	1	3	3	16	16	34	10	10	14	16	0	1	

2.0 WEATHER DATA OF BOMDILA, WEST KAMENG DISTRICT, ARUNACHAL PRADESH

Year 🕹	Average Relative Humidity in (%), BOMDILA, WEST KAMENG DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC	
2018	79	80	79	84	85	87	89	89	91	83	80	78	
2019	73	78	78	82	85	87	90	88	90	86	84	79	
2020	82	80	82	83	85	89	92	89	91	82	76	82	
2021	80	78	78	76	85	88	88	90	88	86	85	81	
2022	75	76	68	83	79	87	81	80	84	81	70	78	

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

Year ↓	Average Rainfall in (mm), BOMDILA, WEST KAMENG DISTRICT, ARUNACHAL PRADESH														
Months→	JAN	FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC													
2018	0	0	2	2	4	6	10	8	5	1	0	1			
2019	0	1	1	4	7	6	13	5	7	2	0	0			
2020	0	1	1	4	7	10	10	5	6	3	0	0			
2021	0	0	1	1	4	7	8	5	6	1	0	0			
2022	1	3	3	16	16	33	10	10	14	16	0	1			

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

3.0 WEATHER DATA OF ITANAGAR, PAPUM PARE DISTRICT, ARUNACHAL PRADESH

Year ↓	Average Te	Average Temperature in (Celsius), ITANAGAR, PAPUM PARE DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC		
2018	15	18	21	24	25	27	27	27	26	23	19	16		
2019	15	17	20	24	25	28	27	28	26	23	21	16		
2020	14	17	21	23	25	27	27	27	26	25	19	16		
2021	15	18	21	24	26	27	27	27	27	25	18	16		
2022	14	13	22	22	25	26	28	27	26	23	18	15		

Year 🗸	Average Ro	Average Relative Humidity in (%), ITANAGAR, PAPUM PARE DISTRICT, ARUNACHAL PRADESH												
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC		
2018	79	76	71	71	79	84	86	84	87	80	80	78		
2019	72	71	65	69	80	82	87	83	86	83	83	79		
2020	79	73	68	72	76	86	89	86	89	84	80	82		
2021	80	71	66	63	76	85	86	88	82	82	80	77		
2022	75	73	61	80	79	87	84	83	85	83	76	81		

Year ↓	Average R	verage Rainfall in (mm) , ITANAGAR, PAPUM PARE DISTRICT, ARUNACHAL PRADESH										
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
2018	0	1	3	5	8	13	15	13	10	1	1	1
2019	0	2	2	5	11	12	21	6	13	6	0	0
2020	1	1	1	13	12	17	16	11	12	7	1	0
2021	1	0	2	2	10	15	13	12	7	3	0	0
2022	75	73	61	80	79	87	84	84	85	84	76	81

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

4.0 WEATHER DATA OF NAMSAI, NAMSAI DISTRICT, ARUNACHAL PRADESH

Year ↓	Average T	verage Temperature in (Celsius), WEATHER DATA OF NAMSAI, NAMSAI DISTRICT, ARUNACHAL PRADESH										
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2018	17	19	23	26	27	29	30	30	28	25	21	18
2019	17	19	22	26	28	30	29	30	28	26	23	18
2020	16	19	23	25	27	29	29	30	28	27	22	18
2021	17	19	23	26	28	29	30	29	29	26	21	18
2022	13	12	21	21	23	24	26	27	25	21	17	14

Year ↓	Average R	verage Relative Humidity in (%), NAMSAI, NAMSAI DISTRICT, ARUNACHAL PRADESH										
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
2018	77	73	69	68	75	78	81	80	82	77	76	73
2019	69	73	66	68	72	78	83	79	83	80	78	75
2020	77	72	67	68	73	81	83	81	83	84	74	77
2021	79	71	67	64	71	80	80	83	78	79	76	76
2022	75	77	68	83	80	87	81	80	84	81	70	78

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

Year 🗸	Average Ra	Average Rainfall in (mm), NAMSAI DISTRICT, ARUNACHAL PRADESH										
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
2018	1	1	4	5	7	10	16	9	13	1	2	1
2019	1	3	2	4	12	15	24	6	14	5	0	0
2020	1	1	1	6	14	23	27	13	17	6	1	0
2021	0	0	3	3	11	18	7	20	4	6	0	0
2022	1	3	3	16	16	34	10	10	14	16	0	1

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

Year ↓	Average To	emperatu	ıre in (Celsiu	is), PASIGH	IAT, EAST SI	ANG DIST	RICT, AR	UNACHAL F	PRADESH			
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
2018	17	18	22	25	27	29	29	30	28	24	20	18
2019	17	18	21	25	27	29	28	30	27	25	23	17
2020	16	18	22	24	26	28	28	29	28	26	21	18
2021	17	19	22	25	27	28	29	28	29	26	20	18
2022	16	15	22	23	26	27	30	30	28	25	21	18

5.0 WEATHER DATA OF PASIGHAT, EAST SIANG DISTRICT, ARUNACHAL PRADESH

Year 🗸	Average R	elative Hu	umidity in (S	%), PASIGH	IAT, EAST SI	IANG DIST	RICT, AR	UNACHAL I	PRADESH			
Months→	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ОСТ	NOV	DEC
2018	72	72	68	66	70	76	79	77	79	71	71	66
2019	60	69	67	66	70	75	83	77	81	75	75	70
2020	74	67	66	66	71	79	83	79	81	79	67	68
2021	71	66	67	65	71	78	77	82	74	73	69	68
2022	70	68	63	75	72	80	75	75	79	75	60	70

Average Temperature, Average Relative Humidity and Average Rainfall patterns generated for five districts 2018-2022

STATE WETLAND AUTHORITY ARUNACHAL PRADESH

ANNUAL REPORTS ISSUE I 2024



Department of Environment, Forest and Climate Change, Government of Arunachal Pradesh



List of Annexures

SL. No. Annexures

Annexures to Annual Report 2021-2022

- A-1 Notification of the Technical Committee, SWA
- A-2 Notification of the Grievance Committee, SWA

Annexures to Annual Report 2022-2023

A-1 The physical and financial statements of the previous years

Annexures to Annual Report 2023-2024

- A-1 The indicator framework for identification of wetlands
- A-2 The indicator framework for identification of Ramsar sites
- A-3 The minutes of the 2nd Technical Committee meeting
- A-4 The affidavit filed before the Hon'ble Supreme Court on behalf of the State Government of Arunachal Pradesh in the matter of WP(C) 230 of 2001 titled MK Balakrishnan v Union of India.

Annual Report of the State Wetland Authority, Arunachal Pradesh for the Financial Year 2020-2021

1. Preparation of a list of all the wetlands of the State.

A list of the wetlands were obtained from the MoECC, GoI and circulated to the DFOs for field verification and reporting. The progress was reviewed with the DFOs from time to time at the PCCF level.

For inclusion in the phase 2 of the wetland rejuvenation programme, a list of 28 wetlands in the State in numerical name along with the coordinates prepared by the NESAC, Shillong was submitted to the MoEFCC, GoI.

2. Preparation of the list of wetlands to be notified.

The wetlands located in the notified areas need not be notified as per Wetland Rules, 2017.

However, the wetlands situated outside the notified forest/wildlife areas have been circulated to the DFOs for necessary field verification for the purpose of notification.

3. Identification of wetlands for restoration of wetlands within 100 days programme of the Government of India.

As requested by the MoEFCC, GoI, vide letter D.O J-22012/21/2019-CS(W) dated 8th August 2019, a status report on the submission of the brief documents of the five wetlands was shared with the Joint Secretary, MoEFCC GoI vide letter no For(Env)-129/2019/wetland dated 19th September 2019.

As per the report, 5 wetlands namely Shungatsar Lake, Glaw Lake, Pasang Sonam Tso, Mehao Lake, and Sally Lake were identified for the programme. A list of the Nodal Officers for the respective wetlands along with a brief document of the Shungatsar Lake were also submitted.

Besides, the Nodal Officers were appointed for the respective wetlands as per the notification no. For (Env)-129/2019/wetland dated 19th September 2019.

4. Development of comprehensive digital inventory of all the wetlands of the State.

The DoEFCC, GoAP in collaboration with the NESAC Shillong and the SRSAC, Itanagar updates the wetlands data from time to time. The updated dataset is being maintained by the SRSAC, Itanagar.

5. Development of a comprehensive list of activities to be regulated and permitted within the notified wetlands and their zone of influences.

As per the National Plan for Conservation of the Aquatic Ecosystem (NPCA), the following activities have been developed to be regulated in the wetland. These guidelines have been circulated with the wetland managers.

- Withdrawal of water / impoundment/diversion or any other hydrological intervention.
- Harvesting of resources (living / non-living).
- Construction of boat jetties, and facilities for temporary use, as pontoon bridges.
- Aquaculture, agriculture and horticulture activities within the wetland boundaries.

As per the NPCA format the following activities are proposed to be permitted

- Eco-tourism
- Habitat Management
- Research studies
- 6. Defining strategies for conservation and wise use of wetlands.

As per the NPCA format, the strategies for conservation and and wise use of wetlands are as follows:-

- Catchment area protection (Contour trenching, check/guide, dams, sluice gate, anicuts with subsequent maintenance, Feasibility study, budget estimation, procurement of satellite imagery, toposheets, geological maps).
- Conservation of biodiversity: (Study and documentation of biodiversity & climate change actions for conservation of biodiversity including planting fruit bearing species, fish feeding).
- Solar power system installation for regular supply of power and maintenance.
- Water supply system from nearby stream to forest cottage and maintenance
- Zero Waste Garbage Management (Identification of site for garbage disposal, Installation of Dustbins, and Signages. Earmarking, Development of site for waste disposal both solid, liquid and biodegradable and nonbiodegradable wastes, Purchase of hygiene maintaining gloves, shoes,

bins to be placed in various points and garbage carrying management, Weekly Truck management till motorable point to collect garbages.

- Upgradation of Infrastructure (Construction of patrolling path and makeshift bridges, Construction of Wooden barrack, Construction of officer transit camp, Construction of toilets, Construction of Eco huts with Solar lighting and heating system for both staff and visitors. Installation Solar Powered Automatic Weather Station (AWS)).
- Erosion Control Work Management (Dry Stone Rubble masonry Wall, Gully Control Work , Hand Packed Stone Wall Fencing)
- Development of EcoTourism (Training of Eco guides, Printing of Promotional Material, Purchase of Raft with Pump, Construction of Wooden Boat, Purchase of Equipment (binoculars, tents, sleeping bags, solar lights)).
- Enhancement of Manpower Strength/ Upgrading management capacity-(Engagement of Protection Squad, Eco Guide, Research Associate)
- Fuel Wood Alternative (Distribution of LPG Cylinder, Distribution of Solar Light/Lamp, Distribution of Induction Chulha etc.)
- Community awareness.
- Monitoring & Evaluation

7. Review Integrated Management plans for each of the notified wetlands.

The Management Plans and the Wetland Health Cards of the Shungetsar lake and Pasang Sonam Tso were shared with the Joint Secretary, MoEFCC, GoI vide letter no.For(Env)-129/2019/wetland dated 17th October 2019.

To oversee the submission of the brief documents and project DPR, the Nodal Officers against each of the wetlands were notified vide Notification no. For (Env)-129/2019/Wetland/554-70 dated 4th August 2020.

Directions were issued to the DFOs for submission of the brief document, IMPs, wetland health card and constitution of wetland mitras vide DO. No. (For) Env-129/2019/vol-2/239 dated 11th February, 2021. The concerned DFOs/ Nodal officers were apprised from time to time via mail/ letters/reminder letters for submission of brief documents, project DPRs and constitution of Wetland Mitras.

8. Some other activities given below were also identified.

- Demarcation of wetland boundary and validation by ground truthing.
- Demarcation of its zone of influence indicated in a digital map.
- Ecological character description.
- Account of pre-existing rights and privileges.
- List of specific activities to be permitted within its zone of influence.
- List of specific activities to be regulated within its zone of influence.

• Modalities for enforcement of regulation.

Annual Report of the State Wetland Authority, Arunachal Pradesh for the Financial Year 2021-2022

1. Constitution of the Technical Committee (TC) under the State Wetland Authority (SWA) of Arunachal Pradesh.

The Technical Committee (TC) under the **State** Wetland Authority (SWA) of Arunachal Pradesh had to be constituted under the sub rule 6(a) of Rules 5 of the Wetland (Conservation and Management) Rules, 2017. This TC is statutorily required to review the Brief Documents and Management Plans of the wetlands in Arunachal Pradesh and advice on any Technical matter referred to it by the Wetlands Authority of Arunachal Pradesh. However, the TC was not constituted ever since the notification of the SWA in Arunachal Pradesh in March 2018.

Hence, a proposal was submitted to constitute the TC, SWA which received the approval of the Hon'ble Minister (Environment, Forest & Climate Change, Arunachal Pradesh/ **SWA** Chairperson. Arunachal Pradesh). Accordingly, the Technical Committee (TC) of the SWA was constituted on 3rd February, 2022 vide Order No. For (Env)-53/2016/QA-50/Part-III in pursuance of the Rule 5 (6) (a) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of MoEFCC, GoI A copy of the notification is at Annexure 1.

2. Constitution of the Grievance Committee under the State Wetland Authority (SWA) of Arunachal Pradesh

The Grievance Committee under the SWA of Arunachal Pradesh had to be constituted under the sub rule 6(b) of Rules 5 of the Wetland (Conservation and Management) Rules, 2017. This Grievance Committee is statutorily required as a mechanism for hearing and forwarding the grievances raised by the public to the State Wetlands Authority, Arunachal Pradesh regarding wetlands. The Grievance Committee was not constituted ever since the setting up of the SWA in March 2018.

Hence, a proposal was submitted to constitute the Grievance Committee, SWA which received Hon'ble the approval of the Minister Forest (Environment, & Climate Change, Arunachal Pradesh/ Chairperson, **SWA** Arunachal Pradesh).

Accordingly, a Grievance Committee under the SWA was also constituted on 3rd February, 2022 vide Order No. For (Env)-53/2016/QA-50/Part-III. A copy of the notification is at **Annexure 2**.

3. Celebration of Iconic week to commemorate the 75 years of Indian Independence from 04th to 10th October 2021 under Azadi Ka Amrit Mahotsav.

Azadi Ka Amrit Mahotsav was celebrated on 10th October 2021 at Ganga Lake (*GekerSinyik*) and the Glaw Lake by the State Wetland Authority, Arunachal Pradesh to mark the iconic week.

As per the guidelines issued by the MoEFCC the events were organised at the Ganga Lake by the State Wetland Authority, Arunachal Pradesh and at Glaw Lake by the DFO, Kamlang Wildlife Sanctuary and Tiger Reserve. The events covered the following activities as per the format circulated by the MoFCC, GoI.



Iconic week celebration at Ganga Lake, Azadi ka Amrit Mahotsav 10th October, 2021

- c. A nature education session for the wetland mitras and students was conducted by Sh. Ankit Kumar, IFS, DCF (CAMPA), focusing on the importance of wetlands.
- d. The villagers and school students enrolled themselves as Wetland Mitras for Ganga Lake.

The following events were conducted at the Glaw Lake by the DFO, Kamlang Wildlife Sanctuary and Tiger Reserve.



Group photo with students, Community Based Organizations, Community Members

- a. Installation of signages at the entrance of the Ganga Lake (Geker Sinying) as an informative and engaging resource for visitors, encouraging them to explore and learn about the wetland while promoting responsible and sustainable practices.
- b. Wetland Mitras were registered and an awareness campaign was conducted for the school pupils.



Iconic week celebration at the Glow Lake

- a. The villagers enrolled themselves as Wetland Mitras for Glow Lake.
- b. The wetland Mitras alongwith the forest staff trekked to reach Glow Lake.
- c. Awareness program highlighting wetlands was undertaken.
- d. An interactive session with the stakeholders was conducted. The Program was attended By Forest officials and local villages.

4. World Wetlands Day - 2022 Celebration.

The State Wetland Authority, Govt. of Arunachal Pradesh, organised an online literary competition on the occasion of 'World Wetlands Day (2nd February 2022)', with the theme the **Environmental** Information System Status on of Environment & its Related Issues. The event was aimed at sensitising and informing the general public about wetlands and its importance.



World Wetland Day Celebration at the PCCF Office, Itanagar, Arunachal Pradesh, 2nd February, 2022.



World Wetland Day Celebration at the PCCF Office, Itanagar, Arunachal Pradesh, 2nd February, 2022.

One Day Brainstorming session with the theme *"Wetland Action for people and Nature"* and an online literary competition were conducted at the PCCF Office, Itanagar.

5. Workshops and capacity building programmes attended by the State Wetlands Authority.

- A Three Day Training Workshop for IFS Officers on Monitoring and Management of Wetlands on 13 -15 December, 2022, SACON, Coimbatore was attended.
- A two day regional workshop for conserving Himalayan wetlands under the Chairpersonship of Secretary, MoEFCC, GoI on 13-14 June, 2022 at Srinagar (J&K) was attended.
- A two day Regional Workshop on "Conservation and Management of wetlands for wetland managers and Nodal Officers Of North Eastern States held at Imphal, Manipur from 23rd -24th January, 2020 was attended.

6. Development of Wetland Health Card.

The Wetland Health Card assesses wetlands using 9 indicators across 4 broad categories -Area, Hydrology, Biodiversity and Governance easily understandable that is by local stakeholders and non-technicians including policy makers. It helps prioritise immediate threats and identify priority areas for future efforts. A healthy wetland conservation ecosystem is one in which living and nonliving components and their interrelationships are intact enough to make the wetland capable of withstanding disturbances and stressors.

A total of 9 wetland.health cards have been prepared for the wetlands namely Sipit Lake, Glaw Lake, Pasang Sonam Tso, Shungetsar Lake, Simu Sile, Ditung Lopung, AN-78 & AN-79 in Anjaw, Mehao Lake and Sally Lake.

9	District	Wetland Name
	Upper Slang	Spit Lake
	Lohit	Glow Lake
	Shi Yomi	Pasang Sonam Tso
	Towang	Shungetser Lake
and the	Shi Yomi	Bimu sile (Pensam Tso) Lake
	Shi Yomi	WS-11 (Ditung Lopung)
	Anjaw	AN-78 & AN-79
Total Wetlands Health Care	Lower Dibang Valley	Mehao Lake
	Lower Dibang Vallay	Sally Lake

Status of Preparation of Health Card Documents as on 29-11-2021

Government of Arunachal Pradesh Department of Environment Forests and Climate Change State Wetlands Authority of Arunachal Pradesh

O Point Tinali, P Sector, Itanagar, PIN 791111

No. FOR (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

ORDER

In pursuance of the rule 5 (6) (a) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of Environment, Forest and Climate Change, Government of India, a "Technical Committee" under the Wetlands Authority of Arunachal Pradesh, is hereby constituted to review brief documents, management plans of wetlands in Arunachal Pradesh and advise on any technical matter referred to it by the Wetlands Authority of Arunachal Pradesh. The Technical Committee will consist of the following members;

Sl. No.	Name of the Member	Designation
1	Addl. PCCF (Conservation) Department of Environment, Forests and Climate Change, Govt of Arunachal Pradesh.	Chairperson (Ex-Officio)
2	Dy Chief Wildlife Warden, Department of Environment, Forests and Climate Change, Arunachal Pradesh	Member (Ex-Officio)
3	Chief Engineer, Water Resources Department, Arunachal Pradesh	Member (Ex-Officio)
4	Chief Engineer, Public Health Engineering Department, Arunachal Pradesh	Member (Ex-Officio)
5	Director, Fishery Development, Arunachal Pradesh	Member (Ex-Officio)
6	Director, State Forest Research Institute, Itanagar	Member (Ex-Officio)
7	Representative from the Department of Science and Technology, Arunachal Pradesh	Member (Ex-Officio)
8	Director, Planning & Investment Department, Arunachal Pradesh	Member (Ex-Officio)
9	Representative from the Central Ground Water Board, Naharlagun	Member (Ex-Officio)

10	Member Secretary, Arunachal Pradesh State Pollution Control Board, Naharlagun	Member (Ex-Officio)
11	Member Secretary, State Biodiversity Board, Arunachal Pradesh	Member (Ex-Officio)
12	Director (Environment), Department of Environment, Forests and Climate Change, Arunachal Pradesh	Convenor (Ex-Officio)

The Terms of Reference of the Technical Committee are as follows:

- 1. The Technical Committee shall submit its recommendations keeping Wetlands (Conservation and Management) Rules, 2017 notified by Govt. of India in mind and shall clearly list out activities to be prohibited or to be regulated for wetlands and its zone of influence separately.
- 2. The Technical Committee shall consider the matters as per the provisions contained in the Wetlands (Conservation and Management) Rules, 2017 as amended from time to time.
- 3. The Committee shall meet at least once in every quarter to perform its functions.

The Secretariat of the State Wetlands Authority, Arunachal Pradesh will provide necessary secretarial assistance to the Technical Committee.

Sd/-(R.K. Singh) PCCF & Principal. Secy. (Environment, Forests & CC)

No. FOR (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

Copy to: -

- 1. The PS to the Hon'ble Minister Environment, Forests and Climate Change, Govt of Arunachal Pradesh / Chairman, State Wetlands Authority, Arunachal Pradesh.
- 2. The PS to the Advisor to the Hon'ble minister (Environment, Forests and Climate Change), Govt. of Arunachal Pradesh.
- 3. The Chief Secretary, Government of Arunachal Pradesh / Vice-Chairman, State Wetlands Authority, Arunachal Pradesh.
- 4. All Members of State Wetlands Authority, Arunachal Pradesh

- 5. The PS to the PCCF and Principal Secretary (EF&CC), Govt of Arunachal Pradesh.
- 6. Ms. Manju Pandey, Joint Secretary, Ministry of Environment, Forests and Climate Change, Government of India, New Delhi.
- 7. All Members of the Technical Committee, State Wetlands Authority, Arunachal Pradesh.
- 8. Guard File.

(Tapek-Riba) Joint Secy. (Environment, Forests & CC)

Government of Arunachal Pradesh Department of Environment Forests and Climate Change State Wetlands Authority of Arunachal Pradesh

O Point Tinali, P Sector, Itanagar, PIN 791111

Dated the 3rd February, 2022

ORDER

No. FOR (Env)-53/2016/QA-50/Part-III

In pursuance of the rule 5 (6) (b) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of Environment, Forest and Climate Change, Government of India, a "Grievance Committee" under the Wetlands Authority of Arunachal Pradesh, is hereby constituted with the following members as a mechanism for hearing and forwarding the grievances raised by the public to the State Wetlands Authority, Arunachal Pradesh regarding wetlands falling under respective jurisdiction:

Sr. No.	Name of the Member	Designation
1	PCCF (Planning and Development), Department of Environment, Forests and Climate Change, Government of Arunachal Pradesh	Chairperson (Ex-officio)
2	Chief Engineer, Water Resource Department, Government of Arunachal Pradesh	Member (Ex-officio)
3	Director, Fishery Development, Government of Arunachal Pradesh	Member (Ex-officio)
4	Representative of the Secretary, Department of Panchayati Raj, Government of Arunachal Pradesh	Member (Ex-officio)
5	Director (Environment), Government of Arunachal Pradesh	Convenor (Ex-officio)

The Terms of Reference of the Grievance Committee, besides the directions/guidelines given by the Wetlands Authority of Arunachal Pradesh, from time to time, will be:

- 1. To redress the grievance at the local level as a mechanism for hearing and forwarding the grievances raised by the public to the Authority and recommend to the Authority for the finality of decisions.
- 2. The meeting of this Committee for the cases referred to by the Wetland Authority shall be held at least once every quarter or earlier so as to comply with time limit or other guidelines, and proceedings be presented in meetings of the Wetland Authority.

6

3. The Committee should consider matters as per the provisions contained in the Wetlands (Conservation and Management) Rules, 2017, as amended from time to time.

Sd/-

(R.K. Singh) PCCF & Principal. Secy. (Environment, Forests & CC)

No. For (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

Copy to: -

- 1. The PS to the Hon'ble Minister Environment, Forests and Climate Change, Govt. of Arunachal Pradesh / Chairman, State Wetlands Authority, Arunachal Pradesh.
- 2. The PS to the Advisor to the Hon'ble Minister (Environment, Forests and Climate Change), Govt. of Arunachal Pradesh.
- 3. The Chief Secretary, Government of Arunachal Pradesh / Vice-Chairman, State Wetlands Authority, Arunachal Pradesh.
- 4. The PS to the PCCF and Principal Secretary (EF&CC), Govt. of Arunachal Pradesh.
- 5. Ms. Manju Pandey, Joint Secretary, Ministry of Environment, Forests and Climate

Change, Government of India, New Delhi.

- 6. All Members of State Wetlands Authority, Arunachal Pradesh.
- 7. All Members of the Grievance Committee, State Wetlands Authority, Arunachal Pradesh.
- 8. All Deputy Commissioners, Arunachal Pradesh.
- 9. The Director, Department of Panchayat Raj, Govt. of Arunachal Pradesh.
- 10. All Heads of Water Body owning agencies, Arunachal Pradesh.
- 11. Nodal Officers (Water Bodies) of all water body owning agencies.
- 12. Guard File.

(Tapek Riba) Joint Secy. (Environment, Forests & CC) Annual Report of the State Wetland Authority, Arunachal Pradesh for the Financial Years 2022-2023

1. First Meeting of the Technical Committee (SWA).

The 1st Technical Evaluation Committee (TC), SWA meeting was held on 4th May, 2022. In this meeting proposals were received from eight Forest Divisions namely Yingkiong Forest Division (FD), Aalo FD, Tawang SF Division, Anjaw FD, Mehao FD, Pasighat FD, Anini SF Division, and Daporijo FD.

As the proposals were not complete and the statuses of the land were not mentioned, therefore the committee could not grant technical approval.



2. Review Meeting under the Chairmanship of the PCCF (EFCC).

In order to follow up the submission of the brief documents and IMPs, a number of review meetings were held with the Wetland Managers for development of prescribed IMPs under the chairmanship of the PCCF, DoEFCC on 27th June, 2022, 11th January, 2023, 2nd March 2023, 17th March 2023 and 21st July, 2023.



Wetland review meeting held on 11th January, 2023

3. World Wetland Day-2023 Celebration.

The World Wetland Day 2023 was celebrated on 2nd February, 2023.



4. Identification of Budget line for SWA.

Since the functions & responsibility of the SWA is autonomous in nature, a separate bank account in the name of the Member Secretary, SWA has already been opened under approval of the State Govt.

A separate Sub Head of Account under the Major Head of Expenditure Eco. & Env. - 3435 was identified by the Finance Department for SWA. The physical and financial statements of the previous years are placed at **Annexure-1**.

5. Opening of a new bank account for the SWA.

A bank account no. 576602010003708 in the Union Bank of India has been opened for the State Wetland Authority. The account is operated jointly by Finance and Accounts and Member Secretary, SWA.

An amount of Rs. 60,000/- was received from the MoEFCC, GoI as a one-time grant for observing Azadi ka Amrit Mahotsav for wetland conservation in the year 2021 was credited to this account and utilised.

6. Establishment of the office of the State Wetland Authority.

As per Rule 5 of Wetlands Rules, 2017, it is the responsibility of the State Government to establish an office of the SWA. The State Government or UT Administration shall designate a department as nodal department for wetlands. Such departments shall provide all the necessary support and act as Secretariat to the Authority. The State Governments / UT Administrations may allocate sufficient budget and human resources to ensure smooth functioning of the Authority and conduct of its

various activities. The Authority and the nodal department may identify a professional institute(s)/organization(s) that would assist them in their various functions such as preparing a list of wetlands, Brief Documents for notification etc.

For the purpose of the establishment of the State Wetland Authority, erstwhile Tourism building at the Ganga lake premises was identified and thereafter the proposal was moved. However, no space has been provided yet and the matter is followed up.

7. Staffing the State Wetland Authority

The Department of Environment / Forests or Department handling wetlands shall designate one expert each in the following fields for a period not exceeding three years: [Ref. Rule 5 (2) (xvi) of Wetlands Rules] a) Wetlands ecology b) Hydrology c) Fisheries d) Landscape planning e) Socioeconomics.

Since the establishment of SWA in 2018, there has been no manpower to look after the affairs of the Wetlands. Therefore, proposals were made for the engagement of following scientific personnels on contract viz., one scientist, one GIS expert and one field assistant under administrative approval from the Minister (Env&Forest).

8. Workshops and capacity building programmes attended by the State Wetlands Authority.

A National Workshop for Developing a Roadmap for Participatory Conservation and Wise-Use of Wetlands titled 'Sahbhagita', was held on May 21, 2022, at the National Center for Sustainable Coastal Management (NCSCM) in Chennai, Tamil Nadu. The workshop was held under the aegis of the GEF-UNEP-MoEFCCfunded Integrated Management of Wetlands Biodiversity and Ecosystem Services project. The workshop was held in two sessions. The morning session chaired by Mrs Manju Pandey (Joint Secretary, MoEFCC) included discussions on key elements of the participatory national wetlands conservation and wise use policy. The second session, chaired by Hon'ble Union Minister of Environment, Forest and Climate Change, Mr Bhupender Yadav, included felicitation of the wetland champions, presentation of the round table results, and dialogue with the wetlands managers and decision-makers. Hon'ble Union Minister Mr Bhupender Yadav had a dialogue with wetlands managers of states and took account of significant developments and challenges. It was decided that a Standard Operating Procedure for participatory conservation and wise use of wetlands may be drafted by the Ministry and shared with the state for implementation.

	State Wetland Authority, Arunachal Pradesh												
	Physical and Financial Statement (April 2021 - March 2023)												
			April 20)21 - Marc	h 2022		April 2022 - March 2023						
Sl.no	Head of	Total	Expenditure	Physical	Balance	Remark	Total	Expenditure	Physical	Balance	Remark		
	Account	Fund		Achievement			Fund		Achievement				
1	3435-03-101-	-	-	-	-	-	2,00,000/-	2,00,000/-	Seminars, tours	Nil	-		
	02-00-11:TE								on wetland				
									matters				
2	3435-03-101-	-	-	-	-	-	4,00,000/-	4,00,000/-	consumables	Nil	-		
	02-00-13:OE								items				
3	3435-03-101-	-	-	-	-	-	1,50,000/-	1,50,000/-	POLs items	Nil	POLs items		
	02-00-												
	13:OE(POL)												
4	3435-03-101-	-	-	-	-	-	2,00,000/-	2,00,000/-	Workshops	Nil	-		
	02-00-50:OC												
	Total						9,50,000/-	9,50,000/-		Nil			

Annual Report of the State Wetland Authority, Arunachal Pradesh for the Financial Year 2023-2024

1. Development of an indicator framework for identification of priority wetlands and Ramsar sites.

An indicator framework was developed for identification of priority wetlands for consideration under the NPCA scheme as per the advice received from the PCCF (EFCC). As per the framework approved by the DoEFCC, wetland managers have submitted a total of 15 lakes were identified namely Ganga lake, Ramro Patang, Geggu Seriu, Olo Sinik, Pasang Sonam Tso, Shungetsar, Sipit, Kamu Uya, Emu Uya, Simu Sile, Pensam Tso, Ditung Lopung, Airow lake, Karow lake and Fhalwa lake for inclusion of wetlands under the NPCA scheme. The indicator framework for identification of wetlands is at **Annexure 1**.

The indicator framework for Ramsar sites was also developed for consideration under the NPCA scheme. Two Ramsar sites namely Mahao Lake and Glaw Lake were identified under NPCA Scheme. The indicator framework for identification of Ramsar sites is at **Annexure 2.**

2. Development of Brief Documents for priority wetlands of the State.

For wetlands which fulfil the criteria set, a Brief Document (Annexure V of the NPCA guidelines) may be considered by the concerned Government Union State / Territory Administration. An undertaking by the State Government to provide commitment for State share of the cost of implementation of integrated management plan should also be provided. Such undertaking should also indicate the justification for identification of the wetland and its significance. The Brief Documents of the seven no.s of proposals were recommended by the TC,

SWA for seeking financial support under National Plan for Conservation of Aquatic Ecosystem (NPCA) given as under:

sl.no	List of the seven wetlands recommended by the TC, SWA, Arunachal Pradesh
1	Yabik Sinyig Takar Lake, Kurung Kumey District
2	Nikpu Yabik Sinyig Lake, Kurung Kumey District
3	Glaw Lake, Kamlang Wildlife Sanctuary subject to clearance from CWLW.
4	Mehao Cluster of Lakes, Mehao Wildlife Sanctuary subject to clearance from CWLW.
5	Sipit Lake, Yinkiong District
6	Pensam Tso lake (Simu Sile), Shi Yomi District
7	Pasang Sonam Tso lake, Shi Yomi District

The priority wetlands were approved by the PCCF (EFCC) for development of proposals under the NPCA scheme.

3. Development of Integrated Management Plans (IMPs) of the State Wetlands.

As per NPCA guidelines, it is recommended that IMPs may be prepared by engaging expert agencies and in full consultation with the stakeholders, particularly dependent communities. The State Governments / UT Administration shall commission such agencies at their behest. A tripartite MoU between Government of India, State Government / UT Administration and agency identified for implementation of IMP will be signed containing agreements on sharing of costs, timely implementation of IMPs, and post project sustainability. This MoU will be the basis of providing grants to State Governments /UT Administrations (Annexure VIII of the NPCA guidelines).

The IMPs of the seven nos of proposals were recommended by the TC, SWA for seeking financial support under National Plan for Conservation of Aquatic Ecosystem (NPCA) given as under:

sl.no.	List of the seven wetlands recommended by the TC, SWA, Arunachal Pradesh
1	Yabik Sinyig Takar Lake, Kurung Kumey District
2	Nikpu Yabik Sinyig Lake, Kurung Kumey District
3	Glaw Lake, Kamlang Wildlife Sanctuary subject to clearance from CWLW.
4	Mehao Cluster of Lakes, Mehao Wildlife Sanctuary subject to clearance from CWLW.
5	Sipit Lake, Yinkiong District
6	Pensam Tso lake (Simu Sile), Shi Yomi District
7	Pasang Sonam Tso lake, Shi Yomi District

4. The second Meeting of the Technical Committee (SWA).

The second TC meeting was held on 28th August, 2023 under the Chairmanship of the Addl. PCCF (Cons) cum Chairman (TC, SWA) on 28th August 2023 at 1430 Hrs in the Conference Hall of the PCCF Office, Itanagar. A total of nine proposals were submitted by the DFOs which were reviewed in the meeting. In the meeting, seven no.s of proposals were recommended for seeking financial support under National Plan for Conservation of Aquatic Ecosystem (NPCA) scheme subject to fulfilment of the observations. The Integrated Management Plans recommended by the Technical Committee will be submitted to the MOEFCC, GoI for funding support after the approval of the State Wetland Authority. The minutes of the 2nd TC meeting is attached herewith as Annexure-3.

5. Enrollment of Wetland Mitras.

A total of 92 wetland mitras have been formed as an initiative by the SWA spread over 6 districts namely Papum pare, Kurung Kumey, Shi Yomi, Yinkiong, Anjaw, and Namsai.

6. Defending Court Cases.

The Hon'ble Supreme Court had *vide* Order dated 11.10.22 directed for the affidavit to be filed with respect to the matter of WP(C) 230 of 2001 titled MK Balakrishnan v Union of India, in pursuance of the directions of the Hon'ble Supreme Court dated 11th October, 2022 regarding conserving the wetlands in the State and the current status of the wetlands as they exist on date.

The affidavit was filed before the Hon'ble Supreme Court on behalf of the State Government of Arunachal Pradesh in the instant matter is annexed as **Annexure 4**.

7. Identification of a Knowledge Partner for SWA.

The Wetlands International South Asia, New Delhi had consented to support the efforts of wetlands conservation of Arunachal Pradesh as a knowledge partner as agreed in the regional Sahbhagita workshop convened by the Wetlands Division of the Ministry of Environment, Forest and Climate Change on March 30, 2023, held under the chairmanship of Hon'ble Union Minister of Environment and Forest, Mr Bhupender Yadav. As such the MoU for collaboration with the said organisation will be discussed in the upcoming State Wetland meeting.

8. Collaboration with Development partners.

A proposal to tie with the TATA Trust, M/s North East Initiative Development Agency (NEIDA), Kohima, Nagaland was discussed for working in the areas of springshed development, water security, livelihood enhancement and climate resilience. A meeting was held on 19th July, 2023 under the chairmanship of the Principal Secretary (EFCC), GoAP. It was decided that the NEIDA will prepare DPRs for water conservation projects in respect of the forest areas and submit them to the DoEFCC for arranging resources and implementation in the forest areas. The GoAP will collaborate with the NEIDA in implementation of the project by facilitating convergence action of the stakeholders concerned.

The Pakke Declaration Secretariat cell will collaborate with NEIDA to develop climate resilient water security plans through a convergence mode for implementation in the select project areas, including through a Technical MoU as needed.

9. Development of ICE materials.

- Brochure on wetlands was developed.
- A couple of electronic movies were also developed on wetlands.

10. Workshops and capacity building programmes attended by the State Wetlands Authority.

Two Days Regional Workshop on Wetlands Restoration for North Eastern States organized by the Ministry of Environment, Forest and Climate Change (Wetlands Division) during 29-30 April 2023 at Imphal, Manipur hosted by Loktak Development Authority (LDA), Imphal, Manipur was attended. The workshop deliberated on the wetlands distribution in the State/UT and identification of priority wetlands, major activities taken for conservation and management of Wetlands in the last three major achievements, maior vears. challenges faced in conservation and management of Wetlands, key areas and aspects of support needed for effective management of Wetlands.

11. World Wetland Day-2024 Celebration.

• The World Wetland Day 2024 was celebrated on 2nd February, 2024 in Gekar Sinyik (Ganga Lake), Itanagar by the State Wetland Authority, Arunachal Pradesh. An awareness cum cleanliness drive was organized in sync with the theme 'Wetlands and Human Wellbeing' with participants from Mayor IMC, village panchayats, school students, DOEFCC office staff, from Nichiphu Residential School and Guardian Angel School, officer of DOEFCC.

The School children from Guardian Angel School staged a drama on tree cutting and plastic wastes. The performance vividly portrayed the wetlands and the beauty of consequences of their destruction due to human activities. The students urged the audience to take action for wetland conservation, emphasising the importance of preserving these ecosystems for future generations.



World Wetland Day Celebration on 2nd February, 2024 in Gekar Sinyik (Ganga Lake), Itanagar.

12. Third State Wetland Authority Meeting.

- The 3rd State Wetland Authority (SWA) was held under the chairmanship of the Minister, Environment, Forest & Climate Change, GoAP cum Chairman, SWA on 12-02-2024 at Civil Secretariat, Itanagar. Major outcomes of the meeting are as below:
- i. Submission of proposals under the National Plan for Conservation of Aquatic Ecosystem (NPCA) scheme of the MoEFCC, GoI: The Authority accepted seven Integrated Management Plans proposals and recommended the proposals for submission to the State Government for onward submission to the MoEFCC, GoI for funding support under NPCA scheme. It was informed that the cabinet sub-committee (CSC) of the State Government had agreed to bear 10% of State Share Rs. 5.36 Cr from State Budget BE, FY 2024-25.
- ii. Collaboration of SWA and Zoological
 Survey of India (ZSI), Arunachal
 Pradesh Regional Centre (APRC) as a
 partner in the implementation of the
 National Mission on Himalayan Studies
 (NMHS) sponsored project titled
 "Multidimensional Assessment of
Ecological Dynamics and Ecosystem Health of Selected High-Altitude Wetlands of Indian Himalayan Region (IHR) for Effective Conservation and Management Planning".

iii. The Authority agreed to engage the Wetland International South Asia, New Delhi as Knowledge Partner and approved the signing of MoU with them.

iv. Ramsar Site Proposal

The Authority approved the proposal for listing Glaw Lake, in Kamlang Tiger Reserve and Wildlife Sanctuary as RAMSAR site for its further submission to the MoEFCC, GoI.

v. Engagement of Human Resources/Manpower.

The Authority approved for the engagement of bare minimum of 3 (three) scientific personals required for the management of the SWA affairs.

vi. Office space for SWA.

The first floor in the vacant building of erstwhile Tourism building at the Ganga Lake under Forest Department was proposed to house the office of the SWA. This proposal has been agreed by the Ld. Chief Secretary, GoAP in the recent SLSC meeting held on 4th January, 2024. Hence, the Authority decided to request the concerned Department for immediate handover of the building to SWA for its office to be set up.

vii. Action plan for FY 2024-25 and Grant in Aid for State Wetland Authority.

A proposal was placed to allocate sufficient budget and human resources to ensure smooth functioning of the Authority and conduct of its various activities. Accordingly, an action plan for FY 2024-25 along with the extent of grant of Rs 2.41 Cr (Rupees Two Crore Forty One Lakhs) required for the SWA was presented to the Authority. The Authority approved the action plan for FY 2024-25.

	An e	valuation of	the wetland	ds for consi	deration un	der the NP	CA Scheme o	of the MoEF	CC, Gol			
			1. Wetland	Is located witi	n urban, peri-	urban and se	mi-urban areas		,			
		Wetland 1	Wetland 2									
Criteria No	NPCA Criteria	(Gekar Sinyi)	Patang (ES-1)									
	District	Papum Pare	East Siang									
1	year and with peak inundation area equivalent or greater than 5 ha; and,	1	1									
2	Wetland is highly degraded and cannot be put to its traditional use due to pollution resulting from discharge of domestic and /or industrial wastewater, municipal solid waste or other non-point sources of pollution. Designated best use criteria for surface waters as recommended by CPCB are provided in Annexure IV.	0.25	0									
	Total	1.25	1 ands located	in high altitud	o aroas (with	olovations or	oator than 2.50	0 m MSL)				
	MPCA Criteria	Geggu Seriu	Olo Sinik	Sipit (Hipit Hiyeng)	Pasang Sonam Tso	Shungatser (Madhuri)	Kamu Uya	Emu Uya	Simu Sile / Pensam Tso	WS-11 (Ditung Lopung)	Airow	Karow
	District	Upper Subansiri	Upper Subansiri	Upper Siang	Shi Yomi	Tawang	Dibang Valley	Dibang Valley	Shi Yomi	Shi Yomi	Anjaw	Anjaw
1	Wetland has an area of 5 ha and above	1	1	1	1	1	1	1	1	1	1	1
	Total	1	1	1	1	1	1	1	1	1	1	1
			3. Wet	lands locat	ed below 2,	500 m MSL	elevation					
		Wetland 1	Wetland 2	Wetland 3								
	MPCA Criteria	Glaw Lake	Mehao Lake	Sally Lake								
	District	Lohit	Dibang Valley	Dibang Valley								
1	Wetland or wetland cluster has a peak inundation area of 100 ha and above, and meets at least one of the following criteria:	0	1	1								
2	Is representative, rare or unique example of natural or nearly natural wetland in a biogeographic zone;	1	1	1								
3	Supports vulnerable, endangered or critically endangered species; or threatened ecological communities (as evaluated through IUCN Red List or any other national list);	1	1	1								
4	Supports plant and/or animal species at a critical stage in their life cycle, or provides refuge during adverse conditions;	1	1	1								
5	Supports populations of plant/ or animal species important for maintaining the biological diversity of a particular biogeographic region;	1	1	1								
6	Regularly supports 20,000 or more waterbirds:	0.5	0.5	0.5								
7	Regularly supports 1% of individuals in a population of one species or sub-species of waterbirds or is an important breeding site for rare/migratory bird species;	1	1	1								
8	Is an important source of food for fishes, spawning ground, nursery and /or migration path on which fish stocks/ either within the wetlands or elsewhere depend;	1	1	1								
9	Provides important hydrological functions as a source of water, regulates hydrological extremes, recharges groundwater, buffers floods and purifies water;	1	1	1								
10	Is an important source of livelihoods for communities living in and around it;	0.5	0.5	0.5								
11	Is of significant cultural/ religious / recreation value.	1	1	1								
	Total	9	10	10								
		Wetler 1 1	4. W	etland with	an area bel	ow 5 ha						
	MPCA Criteria	Fhalwa										
	District	Lohit										
1	Wetlands smaller than the above mentioned area thresholds may be considered by the Central Government on recommendation of the State/UT Wetland Authority.	1										
	Iotal	1										

An evaluation of We	etlands under the Ramsar Sites criteria fo	r identifying wetlands o	of International Importar	ice
		Name of the wetland	ds for consideration	
Group A of the Criter unique wetland types	ia. Sites containing representative, rare or	Glaw Lake	Mehao Lake	
Criterion 1:	A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.	1	1	
Group B of the Criter	ia. Sites of international importance for			
conserving biological	diversity			
Criterion 2:	A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.	1	1	
Criterion 3:	A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.	1	1	
Criterion 4:	A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.	1	1	
	Specific criteria based on waterbirds			
Criterion 5:	A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.	0.5	0.5	
Criterion 6:	A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.	1	1	
	Specific criteria based on fish			
Criterion 7:	A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.	1	1	
Criterion 8:	A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.	1	1	
	Specific criteria based on other taxa			
Criterion 9:	A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent nonavian animal species.	1	1	

OUT TODAY/ BY MAIL

Government of Arunachal Pradesh Office of Chairman Technical Evaluation Committee State Wetland Authority, Arunachal Pradesh Department of Environment, Forests and Climate Change

O- Point Tinali, Itanagar, PIN 791111

Dated 3rd October, 2023

File No.For(Env)-10/2022 /2124-38 Computer No. 90020

Minutes of the Meeting

The second meeting of the Technical Evaluation Committee (TEC), State Wetland Authority (SWA), was conducted under the Chairmanship of the Addl. PCCF (Cons) cum Chairman (TEC,SWA) on 28th August 2023 at 1430 Hrs in the Conference Hall of the PCCF Office, Itanagar. The list of participants is annexed as Annexure- A.

The committee after reviewing the Brief Documents and Integrated Management Plans of the Wetlands and based on corrective actions and justification made by the DFOs/wetland managers, in the proposal with reference to OM no. For (Env.)- 10/2022/2114 dated 29th September, 2023. The proposals of six (6) numbers of wetlands is recommended for funding support under NPCA.

Sl. no.	List of the six wetlands recommended by the TEC, SWA, Arunachal Pradesh
1.	Yabik Sinyig Takar Lake & Nikpu Yabik Sinyig Lake, Kurung Kumey District
2.	Glaw Lake, Kamlang Wildlife Sanctuary subject to clearance from CWLW.
3.	Mehao Cluster of Lakes, Mehao Wildlife Sanctuary subject to clearance from CWLW.
4.	Sipit Lake, Yinkiong District
5.	Pensam Tso lake (Simu Sile), Shi Yomi District
6.	Pasang Sonam Tso lake, Shi Yomi District

× 2023

Director (Env. & CC) Deptt. of Env, Forests & CC Govt., of A.P, Itanagar

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The proposals of Ganga Lake(Gekar Sinyig) and Bilo Sangyatha lake were not taken up for discussion during the meeting. The Chairman emphasized the significance of having the presence of respective DFOs for presenting the proposals in the meeting, and it was noted that there was no need for presentation in the absence of the respective DFOs.

Sd/-(K B Singh), IFS, Addl. PCCF (Cons) & Chairman, Technical Evaluation Committee (TEC), State Wetland Authority (SWA), Arunachal Pradesh.

Distribution:

- 1. The PA to Addl. PCCF (Conservation), DoEFCC, GoAP.
- 2. The Dy Chief Wildlife Warden, DoEFCC, GoAP.
- 3. The Chief Engineer, Water Resources Department, GoAP.
- 4. The Chief Engineer, Public Health Engineering Department, GoAP.
- 5. The Director, Fishery Development, Arunachal Pradesh.
- 6. The Director, State Forest Research Institute, Itanagar.
- 7. The Director, Department of Science and Technology, GoAP.
- 8. The Director, Planning & Investment, GoAP.
- 9. The Scientist in-charge/Engineer, Central Ground Water Board, Naharlagun.
- 10. The Member Secretary, AP State Pollution Control Board, Naharlagun.
- 11. The Member Secretary, State Biodiversity Board, Arunachal Pradesh.
- 12. The DFO Shi Yomi/ DFO Yinkiong/ DFO Mehao/ DFO Kamlang/ DFO Kurung Kumey/ DFO Kra Daadi/ DFO Banderdewa

Copy to:

- 1. The PS to the Hon'ble Chairman, State Wetland Authority, Arunachal Pradesh.
- 2. The PS to PCCF, (E, F & CC), GoAP, Itanagar for kind information.
- 3. The PA to CCF, (Env. & CC), GoAP, Itanagar for kind information.

(D. Dohu Robin

Director (Environment) & Convenor, Technical Evaluation Committee (TEC), State Wetland Authority (SWA), Arunachal Pradesh. Director (Env. & CC) Deptt. of Env, Forests & CC Gove. of A.P. Itanagar



Counter Affidavit on behalf of the State of Arunachal Pradesh in the matter of WP(C) 230 of 2001 titled as MK Balakrishnan v The Union of India

Scientist DoEFCC <scientistdoefcc@gmail.com>

17 July 2023 at 15:10

To: Eliza Bar <eliza@tewariandassociates.com>

Cc: pccfnsecy-arn@nic.in, rskumarifsccf@gmail.com, Director environment <direnvt@gmail.com>, likha suraj <likhasuraj@gmail.com>, lawjudicial21@gmail.com, lawjudicial11@gmail.com, Arunachal Pradesh SPCB <arunachalspcb@gmail.com>

A1.pdf	
A2.pdf	
A3.pdf	
A4.pdf	
A5.pdf	
A6.pdf	

Ma'am,

Please find attached Counter Affidavit on behalf of the State of Arunachal Pradesh in the matter of WP(C) 230 of 2001 titled as MK Balakrishnan v The Union of India.

Affidavit in matter of M.K Balakrishnan Vs Uol.pdf 1591K



IN THE SUPREME COURT OF INDIA

CIVIL ORIGINAL JURISDICTION

WRIT PETITION (C) 230 OF 2001

IN THE MATTER OF:

M.K BALAKRISHNAN ...PETITIONER VERSUS UNION OF INDIA ...RESPONDENTS & ORS

AFFIDAVIT ON BEHALF OF THE STATE OF ARUNACHAL

PRADESH

I, Sh.D Dohu Robin, Director (Environment), Govt. of Arunachal Pradesh, Itanagar, do hereby submit as follows:

1. That, I Sh. D Dohu Robin, Aged 48 years, presently working as the Director(Environment) and therefore am well versed with the facts of the case and accordingly competent to swear the instant affidavit.

2. It is submitted that the matter was previously listed for hearing before the Hon'ble Supreme Court on 11.10.2022. The Hon'ble Court had *vide* Order dated 11.10.22 directed for the Petitioner to file a fresh affidavit containing the issues which persisted with regards to the original prayer made in the Writ Petition in 2001 and had also directed for the respective parties to file their replies with respect to the instant matter.

Director (Environment) lachal Plude Govt. of Arun Itanagar

Executive Magistrate Itanagar Capital Complex ITANAGAR

3. That by way of the instant affidavit, the answering respondent prays to place on record the measures undertaken by the State of Arunachal Pradesh to conserve the wetlands in the State and the current status of the wetlands as they exist on date.

4. That the status of wetlands as they exist on date within the State of Arunachal Pradesh is as follows:

A. There are 1182 Wetlands (area>=2.25ha) in Arunachal Pradesh as per the National Wetland Inventory and Assessment (NWIA) Atlas published by Space Applications Centre, Indian Space Research Organisation, Ahmedabad(2021).

There are 1154 Natural inland Wetlands in the categories of high altitude wetland, waterlogged, river/streams, ox-bow lakes/cut-off meanders and lakes/ponds as per the said report

There are 28 Man-made inland wetlands in the categories of tanks/ponds, reservoirs/barrages and aquaculture ponds. A copy of the National Wetland Inventory and Assessment (NWIA)

Atlas published by Space Applications Centre, Indian Space Research Organization, Ahmedabad(2021) is annexed herewith and marked as Annexure A-1 (pages 144-149).

B. That the natural area covered by the wetlands in Arunachal Pradesh is 151,104 ha. Wetlands account for 1.8 % of the total geographical area of the State. That the locations of the wetlands within the State may be observed

Director (Environment) O/O PCCF Govt of Arunachal Pradesh . Itanagar .. Just

Executive Magistrate Itanagar Capital Complex **ITANAGAR**

upon the perusal of the National Wetland Inventory and Assessment (NWIA) Atlas.

C. Dominant wetland classes are Rivers/Streams (92%) and high altitude (8%) wetlands in the State. The current state of ecology of the Wetlands especially in the riverine area is influenced by braiding, increase in stream width, avulsion and stream capture in the foothill region of the State. Ecologically, the area of the total wetlands under aquatic vegetation is 6002 ha during the post monsoon period and 5924 ha during pre-monsoon period as per an estimation of the National Wetland Inventory and Assessment Atlas, published Space Application, Indian Space Research Organization, Ahmadabad.

5. That, the State of Arunachal Pradesh has also adopted several measures and enforced mechanisms to ensure that the ecological fragility of the wetlands and their conservation is maintained uniformly across the State. In this regard, the Arunachal Pradesh State Wetlands Authority has been constituted and notified under the Sub-Rule (1) of Rule 5 of the Wetlands (Conservation and Management) Rules, 2017 vide gazette notification no. For (Env) 53/2016/QA-501/Part-II dated 5th March, 2018.

A copy of the Wetlands (Conservation and Management) Rules, 2017 notified vide gazette notification no. For (Env) 53/2016/QA-501/Part-II dated 5th March, 2018 is annexed herewith and marked as Annexure A-2 (pages 1-3).

6. That the Government of Arunachal Pradesh has constituted its "Technical Committee" under the Wetlands Authority of Arunachal Pradesh for comprehensive evaluation of the Brief Documents, Integrated Management

Director (Environment) O/o PCCF Itanagar

Executive Magistrate Itanagar ANAGAR

Plans for effective documentation and management planning for conservation of the wetlands in the State under the Rule 5 (6) (a) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of Environment, Forest & Climate Change, Government of India.

A copy of the Order of the State Wetlands Authority of Arunachal Pradesh constituting the Technical Committee dated 03.02.22 is annexed herewith and marked as Annexure A-3 (pages 1-3).

7. Additionally, the Government of Arunachal Pradesh has also constituted the "Grievance committee" of the Arunachal Pradesh State Wetlands Authority under Rule 5 (6) (b) of the Wetlands (Conservation and Management) Rules, 2017 to redress grievances related to the conservation of the wetlands in the State as well as notification of wetlands under the Wetlands (Conservation and Management) Rules, 2017.

A copy of the Order of the State Wetlands Authority of Arunachal Pradesh constituting the Grievance Committee dated 03.02.22 is annexed herewith and marked as Annexure A-4 (pages1-2).

8. It is also submitted that most of the wetlands in the State are under Notified Protected Areas/Notified Forest Areas and are therefore managed for protection and conservation in accordance with the approved management Plans applicable to such areas and are legally protected under the Wildlife Protection Act, 1972 and the relevant Forest Acts and regulations there under. The management plans so maintained accommodate provisions for protection of the fragile ecological balance by factoring in ecosystem and landscape level conservation considerations. Furthermore, wetlands located in recorded forest

Director (Environment)

Govt. of Arunachal Fieldsh

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areas outside the notified forest/wildlife areas are also legally protected under the Forest Conservation Act, 1980.

9. That, the State of Arunachal Pradesh has also undertaken measures to foster community awareness towards conservation of wetlands. The Arunachal Pradesh State Wetlands Authority and the Department of Environment, Forest & Climate Change, Government of Arunachal Pradesh have been implementing Information, Education, and Communication (IEC) campaigns from time to time with the objective of raising mass awareness for wetlands conservation.

10.That for the preservation and conservation of the wetland area in the State of Arunachal Pradesh, the Brief Documents and Integrated Management Plans (IMPs) of the 5 notified wetlands in the State have been prepared as per National Plan for Conservation of Aquatic Ecosystems (NPCA) guidelines and are in the process of being reviewed by the Technical committee of the State Wetland Authority, Arunachal Pradesh for submission to the Ministry of Environment, Forests and Climate Change, Government of India. The State of Arunachal Pradesh has enacted the Arunachal Pradesh Urban and country Planning Act, 2007-(ACT No. 3 of 2008). While preparing the Development/Master Plan of the Local Planning Area/Towns, provision is always made for conservation/protection of all wetlands/ water bodies if any. Annexure **A-5**.

11. That, in order to protect the water bodies and prevent water pollution, the Arunachal Pradesh State Pollution Control Board (APSPCB) has imposed environmental compensation against the automobiles workshops, hotels/

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Director (Environme O/o PCCF Govt. of Arunachal F. Itanagai

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restaurants and health care facilities for failing to install effluent treatment plants (ETP). Closure order has been issued against forty-seven (47) defaulting industries. An amount of Rs. 6,60,250/- has been realized towards environmental compensation charges from non- complying industries and 19 units have completed installment of Effluent Treatment Plant (ETP)- Annexure

A-6.

12. That the present affidavit may kindly be taken on record. The answering Respondent further craves the leave of this Hon'ble Court to place additional documents on record, if required, and make detailed submissions at the time of hearing.

DEPONENT

Director (Environment) O/o PCCF Govt. of Arunachal Pradesh Itanagar

VERIFICATION:

I, the above-mentioned deponent, do hereby verify that I have read and understood the contents of the above counter affidavit, and that the same are true and correct to the best of my knowledge and belief. No part of the same is false, and nothing material is concealed therefrom.

_, 2023. evariant on this _____ day of _____ Verified at

DEPONENT

Director (Environment) O/o PCCF Govt. of Arunachal Prades¹1 Itanagar

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ARUNACHAL PRADESH

Arunachal Pradesh means "land of the dawn lit mountains" is one of the twelve mega "Biodiversity hotspot". Formerly the North-East Frontier Agency, it gained Union Territory status on 20th January 1972 and got full statehood on the 20th February 1987. The state covers an area of 83,743 Sq. km and shares international boundaries with Bhutan to the West, Tibet (China) to the North & Northeast, Myanmar to the east and the states of Assam and Nagaland to the south. It lies between 91° 32' E to 97° 26' E longitude and 26° 37' to 29° 28' N latitude. Arunachal Pradesh is divided into 25 districts. Geologically the state presents a unique mosaic of landforms reflecting a complex geotectonic setup. The rugged hills of the high Himalayas are characterized by glaciers and snow covered regions, denudo-structural hills in the middle Himalayas , structural Hills and quaternary alluviums in the Himalayan foothill region. The annual rainfall in the state ranges from 2000-4100 mm. The state gets maximum rainfall in July (30% of SW monsoon rainfall) followed by June (28% of SW monsoon rainfall) as per IMD, Govt. of India (2020). The forest cover is 79.63 % of the total geographical area of the state. The forest resources support the livelihood and the economy of the state. The state has about 20% species of country's fauna and also having 4,500 species of flowering plants, 400 species of pteridophytes, 23 species of conifers, 35 species of bamboos, 20 species of canes, 52 species of Rhododendrons and more than 500 species of orchids. There are two National Parks and 11 Wildlife Sanctuaries.

Around 1.07% wetlands are located inside the green wash areas as per the India State of Forest Report (2019). Agriculture is the primary driver of the economy which include Jhum (shifting cultivation) practised along the hill slopes, other type include terrace type settled cultivation, paddy cum fish cultivation, etc. The state is also ideal for horticulture development. The major industries in the state are forest based, tea, handloom, handicraft, fruit preservation, edible oil, etc. The state has a huge potential for hydroelectric power production and economic mineral resources.

The rivers Siang, Subansiri, Kameng, Dibang, Tawang Chu, Lohit, Diyun (NoaDihing), Tirap and their tributaries are the natural wetlands of the state. Areas of very high elevation close to the Tibet(China) border has alpine or tundra type climate and harbours numerous high altitude lakes. These lakes and their catchments are rich in biodiversity. Many high altitude lakes are considered sacred and are conserved by the community. In the Tawang district, the community conserved areas are Bhagajang, Nagula and Pangchen Lumpo Muchat wetland complex.

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Arunachal
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						Area in ha
		201	l7-18	200	6-07	Change
Wetlaı	nd Type	Wetland Area	Percentage of wetland area	Wetland Area	Percentage of wetland area	Wetland Area
Inland	l-Natural	150853	99.8	147768	99.9	3085
Inland	d-Man-made	251	0.2	146	0.1	105
Coast	al-Natural	I	I	I	I	1
Coast	al-Man-made:	ı	•	1	ı	I
	Total	151104	100	147914	100	3190

Note: wetlands database of 2006-07 was updated by incorporating interpretational changes

2006-07	140000 160000	6-07
	120000	4 200(
	00000	18 and
	80000 1 (ha)	g 2017-
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Lake Ox-Bow Lake/ Cut-Off Meander High Altitude wetland Riverine wetland Waterlogged (Natural) River/stream Reservoir/ Barrage Tank/Pond Waterlogged (Man-made) Salt pan Aquaculture pond Lagoon Creek Sand/Beach Intertidal mudflat Salt Marsh Mangrove Coral Reef Salt Marsh Mangrove Coral Reef Salt pan Aquaculture pond	0	Wetland type-wise a
Wetland types		

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Wetlands of India



	3	Area (ha)	ı		2	ı	ı	ı	63	7	·		34	ı	ı	ı		ı	ı	ı		ı	106
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l Pradesh	Decadal Change	Area (ha)	-2	0	-13	ı	-287	3387	63	8	1	I	34	I	I	I	1	I		I	I	I	3190
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e analysis o	2006-07	Area (ha)	118	291	11307	-	576	135476	53	12	-	-	81	I	1	•	-		-	-	-	ı	147914
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Decada		Number	æ	13	1074		7	57	æ	5			20	1		,				,		,	1182
	-	Level -III	Lake/Pond	Ox-bow lake/ cut-off meander	High altitude lake	Riverine Wetlands	Waterlogged	River/Stream	Reservoir/Barrage	Tank/Pond	Waterlogged	Salt pan	Aquaculture Pond	Lagoon	Creek	Sand/Beach	Intertidal mud flat	Salt Marsh	Mangrove	Coral Reef	Salt pan	Aquaculture pond	Total
	Vetland Typ	Vetland Typ Level -II Natural					Man-made								Natural					Man-made			
		Level -I						Inland										Coastal					
		Wetland code	1101	1102	1103	1104	1105	1106	1201	1202	1203	1204	1205	2101	2102	2103	2104	2105	2106	2107	2201	2202	
		Sr. No.	1	2	З	4	Ŋ	9	7	8	6	10	11	12	13	14	15	16	17	18	19	20	

Note: wetlands database of 2006-07 was updated by incorporating interpretational changes

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Wetlands of India



Wetlands of India







RECENT (2019-20) FIELD PHOTOGRAPHS

DECADAL CHANGES (2006-07 to 2017-18) IN WETLANDS (SATELLITE IMAGES)

Post-monsoon 2006

Post-monsoon 2017



Increase in River area due to braiding of River



Decadal change in River and Reservoir







Sela Lake, Tawang

Shungatser Lake, Tawang



Lower Dibang Valley Mehao Lake,

Dikrong River, Papumpare

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The Arunachal Pradesh Gazette

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Separate paging is given to this part in order that it may be filed as a separate compilation.

GOVERNMENT OF ARUNACHAL PRADESH

PART - III

Resolutions, orders, notifications, rules etc., issued by the Government and Heads of Departments.

NOTIFICATION

The 5th March, 2018

No. For(Env) 53/2016/QA-501/Part-II.-In exercise of the power conferred by the Central Government under Sub-Rule (1) of Rule 5 of the Wetlands (Conservation and Management) Rules, 2017, the State Government of Arunachal Pradesh hereby constitute the State Wetlands Authority consisting of the following members :

Minister in-charge of the Department of Environment and Forests	-	Chairperson
Chief Secretary, Government of Arunachal Pradesh	-	Vice-Chairperson
Principal Secretary, Department of Environment and Forests	-	Member
Secretary, Department of Urban Development	-	Member
Secretary, Department of Rural Development	-	Member
Secretary, Department of Water Resoures	-	Member
Commissioner/Secretary, Department of Fisheries	-	Member
Secretary, Department of Irrigation and Flood Control	-	Member
Secretary, Department of Tourism	-	Member
Secretary, Department of Revenue	-	Member
Additional Principal Chief Conservator of Forests, Regional Office, MoEF and CC, Shillong.	-	Member
Director, State Remote Sensing Centre, Arunachal Pradesh	-	Member
Chief Wildlife Warden, Arunachal Pradesh	×	Member
Member Secretary, State Biodiversity Board	(i) - in	Member
Member Secretary, State Pollution Control Board		Member
Dr. Manmohan Mall, Assistant Professor, Department of Management, NERIST	6	Expert Member (Socio-economics)
Shri Sukhvinder Singh, Senior Town Planner		Expert Member (Landscape Planning)
M.S. Lodhi Scientist i/c GBPHESD, NE unit	÷	Expert Member (Wetland Ecology)
Shri R.K. Kalitha, Scientist D, I/c Central Ground Water Board	_	Expert Member (Hydrology)
Additional Principal Chief Conservator of Forests (Environment and Climate Change)/Chief Conservator of Forests (Env. & CC)	_	Member Secretary
	Minister in-charge of the Department of Environment and Forests Chief Secretary, Government of Arunachal Pradesh Principal Secretary, Department of Environment and Forests Secretary, Department of Urban Development Secretary, Department of Rural Development Secretary, Department of Rural Development Secretary, Department of Water Resoures Commissioner/Secretary, Department of Fisheries Secretary, Department of Irrigation and Flood Control Secretary, Department of Tourism Secretary, Department of Revenue Additional Principal Chief Conservator of Forests, Regional Office, MOEF and CC, Shillong. Director, State Remote Sensing Centre, Arunachal Pradesh Chief Wildlife Warden, Arunachal Pradesh Member Secretary, State Biodiversity Board Member Secretary, State Pollution Control Board Dr. Manmohan Mall, Assistant Professor, Department of Management, NERIST Shri Sukhvinder Singh,Senior Town Planner M.S. Lodhi Scientist i/c GBPHESD, NE unit Shri R.K. Kalitha, Scientist D, I/c Central Ground Water Board Additional Principal Chief Conservator of Forests (Environment and Climate Change)/Chief Conservator of Forests (Env. & CC)	Minister in-charge of the Department of Environment and Forests — Chief Secretary, Government of Arunachal Pradesh — Principal Secretary, Department of Environment and Forests — Secretary, Department of Urban Development — Secretary, Department of Rural Development — Secretary, Department of Water Resoures — Commissioner/Secretary, Department of Fisheries — Secretary, Department of Irrigation and Flood Control — Secretary, Department of Tourism — Secretary, Department of Revenue — Additional Principal Chief Conservator of Forests, Regional Office, MoEF and CC, Shillong. — Director, State Remote Sensing Centre, Arunachal Pradesh — Chief Wildlife Warden, Arunachal Pradesh — Member Secretary, State Biodiversity Board — Member Secretary, State Pollution Control Board — Dr. Manmohan Mall, Assistant Professor, Department of — Management, NERIST Shri Sukhvinder Singh, Senior Town Planner — M.S. Lodhi Scientist i/c GBPHESD, NE unit — Shri R.K. Kalitha, Scientist D, I/c Central Ground Water Board — Additional Principal Chief Conservator of Forests (Envir

2. The State Wetland Authority may co-opt any member having expertise in the subject not exceeding three, if requred.

- The State Wetland Authority shall exercise the powers and perform the functions as per Sub-Rule 4 of Rule 5 of the Wetland (Conservation and Management) Rules, 2017 which are as follows :-
 - (a) prepare a list of all wetlands of the State within three months from the date of publication of these rules;
 - (b) prepare a list of wetlands to be notified, within six months from the date of publication of these rules; taking into cognizance any existing list of wetland prepared/notified under other relevant State Acts;
 - (c) recommend identified wetlands, based on their Brief Documents, for regulation under these rules :
 - (d) prepare a comprehensive digital inventory of all wetlands within a period of one year from the date of publication of these rules and upload the same on a dedicated web portal to be developed by the Central Government for the said purpose; the inventory to be updated every ten years;
 - develop a comprehensive list of activities to be regulated and permitted within the notified wetlands and their zone of influence;
 - (f) recommend additions, if any, to the list of prohibited activities for specific wetlands.
 - (g) define strategies for conservation and wise use of wetlands within their jurisdiction ; wise use being a principle for managing these ecosystems which incorporates sustainable uses (such as capture fisheries at subsistence level or harvest of aquatic plants) as being compatible with conservation, if ecosystem functions (such as water storage, groundwater recharge, flood buffering) and values (such as recreation and cultural) are maintained or enhanced;
 - (h) review integrated management plan for each of the notified wetlands (including trans-boundary wetlands in coordination with Central Government), and within these plans consider continuation and support to traditional uses of wetlands which are harmonized with ecological character :
 - in cases wherein lands within boundary of notified wetlands or wetlands complex have private tenancy rights, recommend mechanism for maintenance of ecological character through promotional activities;
 - (j) identify mechanism for convergence of implementation of the management plan with the existing State/Union Territory level development plans and programme;
 - (k) ensure enforcement of these rules and other relevant acts, rules and regulations and on halfyearly basis (June and December of each calendar year) inform the concerned State Government or Union Territory Administration or Central Government on the status of such notified wetlands through a reporting mechanism;
 - coordinate implementation of integrated management plans based on wise use principle through various line departments and other concerned agencies;
 - (m) function as nodal authority for all wetlands specific authorities within the State.
 - (n) issue necessary direction for conservation and sustainable management of wetlands to the respective implementing agencies;
 - undertake measures for enhancing awareness within stakeholders and local communities on values and functions of wetlands;
 - (p) advice on any other matter suo-motu, or as referred by the State Government.
- The Authority shall constitute the technical committee and grievance committee as per Sub-Rule 6 of Rules 5 of the Wetland (Conservation and Management) Rules, 2017.
- The Additional Principal Chief Conservator of Forests (Env, & CC)/Chief Conservator of Forests (Env, & CC) shall within a period of one year from the date of publication of these rules prepare a brief document for each of the Wetland identified for notification, providing ;
 - (a) demarcation of Wetland boundary supported by accurate digital maps with coordinates and validated by ground truthing.
 - (b) demarcation of its zone of influence and land use and land cover thereof indicated in a digital map
 - (c) ecological character description
 - (d) account of pre-existing rights and privileges
 - (e) list of site specific activities to be permitted within the wetland and its zone of influence
 - (f) list of site specific activities to be regulated within the wetland and its zone of influence
 - (g) modalities for enforcement of regulation

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- The Authority based on the brief document shall make recommendations to the State Government for notifying the Wetlands.
- The State Government shall after considering the objections, if any, from the concerned and affected persons, notify the wetlands in the Official Gazette, within a period not exceeding 240 days from the date of recommendation by the Authority.
- 8. The Authority shall meet at least thrice in a year.
- The term of non-official members of the Authority, if any, nominated by the State Government shall be for a period not exceeding three years.
- The Department of Environment and Forest shall be the Nodal Department and its Office of the Deputy Director (Environment) shall provide all necessary support and act as the Secretariat to the Authority.

Chief Secretary. Government of Arunachal Pradesh, Itanagar.

NOTIFICATION

The 7th March, 2018

No. LA/ESTT-25/83 (Pt).— In exercise of the powers conferred by clause (3) of Article 187 of the constitution of India, the Governor of Arunachal Pradesh after consultation with the Speaker of the Legislative Assembly of Arunachal Pradesh is hereby pleased to make the following rules, further to amend the Arunachal Pradesh Legislative Assembly Secretariat Group - 'A' (Gazetted) Recruitment Rules, 2003 for the post of Secretary.

1. Short title and commencement : (i) These rules may be called "Arunachal Pradesh Legislative Assembly Secretariat Group 'A' (Gazetted) Recruitment (Amendment) Rules, 2018 for Secretary".

(ii) They shall come into force with immediate effect.

2. Amendment to the Schedule : (i) In the column 11 of the schedule for the words and figure "By selection in the grade of Additional Secretary with 3 (three) years of continuous service on the basis of senioritycum-merit failing which by Deputation/Transfer of Officers from State/UT/Central Government of Lok Sabha/ State/UT Legislative Assembly holding analogous post" shall be substituted.

- (ii) In the column 12 for the words substituted as follows :-
 - DPC for confirmation of service :-
 - "1. Deputy Speaker
 - Joint Secretary (Establishment) of Legislative Assembly.
 - One APST Group 'A' Officer in the rank of Secretary, Government of Arunachal Pradesh to be nominated by the Speaker.
- Chairman
- Member
- Member".

M. Lasa Secretary, Legislative Assembly, Arunachal Pradesh, Itanagar.

NOTIFICATION

The 7th March, 2018

No. LA/ESTT-22/2014.— In exercise of the powers conferred by clause (3) of Article 187 of the Constitution of India. the Governor of Arunachal Pradesh in consultation with Speaker, Legislative Assembly of Arunachal Pradesh is hereby pleased to make the following rules, further to amend the Recruitment Rules for the post of Chief Reporter, Legislative Assembly Secretariat (Group - 'A' post) Recruitment Rules, 1991 namely :-

 Short title and commencement : (i) These rules may be called "The Chief Reporter (Group - 'A'), Legislative Assembly Secretariat Recruitment (Amendment) Rules, 2018".

(ii) They shall come into force with immediate effect.

 Amendment to the Schedule : (i) In the schedule for the post of Chief Reporter Legislative Assembly Secretariat (Group - 'A') Recruitment Rules, 1991 in column 12 of the existing Recruitment Rules, the following entry shall be substituted, namely :-

Government of Arunachal Pradesh Department of Environment Forests and Climate Change State Wetlands Authority of Arunachal Pradesh

O Point Tinali, P Sector, Itanagar, PIN 791111

No. FOR (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

ORDER

In pursuance of the rule 5 (6) (a) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of Environment, Forest and Climate Change, Government of India, a "Technical Committee" under the Wetlands Authority of Arunachal Pradesh, is hereby constituted to review brief documents, management plans of wetlands in Arunachal Pradesh and advise on any technical matter referred to it by the Wetlands Authority of Arunachal Pradesh. The Technical Committee will consist of the following members;

Sl. No.	Name of the Member	Designation
1	Addl. PCCF (Conservation) Department of Environment, Forests and Climate Change, Govt of Arunachal Pradesh.	Chairperson (Ex-Officio)
2	Dy Chief Wildlife Warden, Department of Environment, Forests and Climate Change, Arunachal Pradesh	Member (Ex-Officio)
3	Chief Engineer, Water Resources Department, Arunachal Pradesh	Member (Ex-Officio)
4	Chief Engineer, Public Health Engineering Department, Arunachal Pradesh	Member (Ex-Officio)
5	Director, Fishery Development, Arunachal Pradesh	Member (Ex-Officio)
6	Director, State Forest Research Institute, Itanagar	Member (Ex-Officio)
7	Representative from the Department of Science and Technology, Arunachal Pradesh	Member (Ex-Officio)
8	Director, Planning & Investment Department, Arunachal Pradesh	Member (Ex-Officio)
9	Representative from the Central Ground Water Board, Naharlagun	Member (Ex-Officio)

10	Member Secretary, Arunachal Pradesh State Pollution Control Board, Naharlagun	Member (Ex-Officio)
11	Member Secretary, State Biodiversity Board, Arunachal Pradesh	Member (Ex-Officio)
12	Director (Environment), Department of Environment, Forests and Climate Change, Arunachal Pradesh	Convenor (Ex-Officio)

The Terms of Reference of the Technical Committee are as follows:

- 1. The Technical Committee shall submit its recommendations keeping Wetlands (Conservation and Management) Rules, 2017 notified by Govt. of India in mind and shall clearly list out activities to be prohibited or to be regulated for wetlands and its zone of influence separately.
- 2. The Technical Committee shall consider the matters as per the provisions contained in the Wetlands (Conservation and Management) Rules, 2017 as amended from time to time.
- 3. The Committee shall meet at least once in every quarter to perform its functions.

The Secretariat of the State Wetlands Authority, Arunachal Pradesh will provide necessary secretarial assistance to the Technical Committee.

Sd/-(R.K. Singh) PCCF & Principal. Secy. (Environment, Forests & CC)

No. FOR (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

Copy to: -

- 1. The PS to the Hon'ble Minister Environment, Forests and Climate Change, Govt of Arunachal Pradesh / Chairman, State Wetlands Authority, Arunachal Pradesh.
- 2. The PS to the Advisor to the Hon'ble minister (Environment, Forests and Climate Change), Govt. of Arunachal Pradesh.
- 3. The Chief Secretary, Government of Arunachal Pradesh / Vice-Chairman, State Wetlands Authority, Arunachal Pradesh.
- 4. All Members of State Wetlands Authority, Arunachal Pradesh

- 5. The PS to the PCCF and Principal Secretary (EF&CC), Govt of Arunachal Pradesh.
- 6. Ms. Manju Pandey, Joint Secretary, Ministry of Environment, Forests and Climate Change, Government of India, New Delhi.
- 7. All Members of the Technical Committee, State Wetlands Authority, Arunachal Pradesh.
- 8. Guard File.

(Tapek-Riba) Joint Secy. (Environment, Forests & CC)

Government of Arunachal Pradesh Department of Environment Forests and Climate Change State Wetlands Authority of Arunachal Pradesh

O Point Tinali, P Sector, Itanagar, PIN 791111

Dated the 3rd February, 2022

ORDER

No. FOR (Env)-53/2016/QA-50/Part-III

In pursuance of the rule 5 (6) (b) of the Wetlands (Conservation and Management) Rules, 2017 notified by the Ministry of Environment, Forest and Climate Change, Government of India, a "Grievance Committee" under the Wetlands Authority of Arunachal Pradesh, is hereby constituted with the following members as a mechanism for hearing and forwarding the grievances raised by the public to the State Wetlands Authority, Arunachal Pradesh regarding wetlands falling under respective jurisdiction:

Sr. No.	Name of the Member	Designation
1	PCCF (Planning and Development), Department of Environment, Forests and Climate Change, Government of Arunachal Pradesh	Chairperson (Ex-officio)
2	Chief Engineer, Water Resource Department, Government of Arunachal Pradesh	Member (Ex-officio)
3	Director, Fishery Development, Government of Arunachal Pradesh	Member (Ex-officio)
4	Representative of the Secretary, Department of Panchayati Raj, Government of Arunachal Pradesh	Member (Ex-officio)
5	Director (Environment), Government of Arunachal Pradesh	Convenor (Ex-officio)

The Terms of Reference of the Grievance Committee, besides the directions/guidelines given by the Wetlands Authority of Arunachal Pradesh, from time to time, will be:

- 1. To redress the grievance at the local level as a mechanism for hearing and forwarding the grievances raised by the public to the Authority and recommend to the Authority for the finality of decisions.
- 2. The meeting of this Committee for the cases referred to by the Wetland Authority shall be held at least once every quarter or earlier so as to comply with time limit or other guidelines, and proceedings be presented in meetings of the Wetland Authority.

6

3. The Committee should consider matters as per the provisions contained in the Wetlands (Conservation and Management) Rules, 2017, as amended from time to time.

Sd/-

(R.K. Singh) PCCF & Principal. Secy. (Environment, Forests & CC)

No. For (Env)-53/2016/QA-50/Part-III

Dated the 3rd February, 2022

Copy to: -

- 1. The PS to the Hon'ble Minister Environment, Forests and Climate Change, Govt. of Arunachal Pradesh / Chairman, State Wetlands Authority, Arunachal Pradesh.
- 2. The PS to the Advisor to the Hon'ble Minister (Environment, Forests and Climate Change), Govt. of Arunachal Pradesh.
- 3. The Chief Secretary, Government of Arunachal Pradesh / Vice-Chairman, State Wetlands Authority, Arunachal Pradesh.
- 4. The PS to the PCCF and Principal Secretary (EF&CC), Govt. of Arunachal Pradesh.
- 5. Ms. Manju Pandey, Joint Secretary, Ministry of Environment, Forests and Climate

Change, Government of India, New Delhi.

- 6. All Members of State Wetlands Authority, Arunachal Pradesh.
- 7. All Members of the Grievance Committee, State Wetlands Authority, Arunachal Pradesh.
- 8. All Deputy Commissioners, Arunachal Pradesh.
- 9. The Director, Department of Panchayat Raj, Govt. of Arunachal Pradesh.
- 10. All Heads of Water Body owning agencies, Arunachal Pradesh.
- 11. Nodal Officers (Water Bodies) of all water body owning agencies.
- 12. Guard File.

(Tapek Riba) Joint Secy. (Environment, Forests & CC)





File No : TP-22/8/2023-DIR-TP-TOWN PLANNING जगर नियोजन विभाग / Department of Town Planning अरुणाचल प्रदे शसरकार/Govt. of Arunachal Pradesh *ईटानगर*/Itanagar

Dated Itanagar the 5th July 2023

To,

The Director (Environment) Department of Environment Forests & Climate Change Govt. of Arunachal Pradesh Itanagar.

Sub: - Reg. Letter seeking information and clarification in the matter of WP (C) 230 of 2001 titled MK Balakrishnan v Union of India Ministry of Environment, Forest and Climate Change

Your Letter No. For (Env)-121/2023 comp. no. 135194 dated 29th June 2023 Ref:

Sir,

In reference to the above cited subject and your letter under reference, attached please find herewith the consolidated input as per questionnaire attached at Annexure I.

This is for your kind information and necessary action please.

Enclosed: Annexure I as stated.

Yours Si icerely. (Likha Suraj)

Director Department of Town Planning Govt. of Arunachal Pradesh Itanagar

File No : TP-22/8/2023-DIR-TP-TOWN PLANNING (E-)/586-90 Dated Itanagar the 5th July 2023 Copy to:

- 1. The Chief Wildlife Warden, Govt. of Arunachal Pradesh, Itanagar for information please.
- 2. The Add. PCCF (Cons), DoEFCC, Govt. of Arunachal Pradesh, Itanagar for information please.
- 3. The SPA to Commissioner, Department of Town Planning, Govt. of Arunachal Pradesh, Itanagar for information please.
- Office copy.

Director

Department of Town Planning Govt. of Arunachal Pradesh Itanagar

ANNEXURE - I



SI. No.	Queries	Inputs for preparation of Draft Affidavit
1	Number of wetlands which exist in Arunachal Pradesh as on date? If the wetlands can be categorised as natural or man-made, it is requested that information be provided separately.	As on date, no such research or research study on wetland reports has been carried out or prepared by the department. As per records, there exists no major wetland which falls under urban areas of the state for which master plan/development proposals are made. Although an extensive report on wetlands in Arunachal Pradesh 'National Wetland Atlas: Arunachal Pradesh' has been prepared by the Space Applications Centre, Indian Space Research Organisation (ISRO) Available at <u>https://vedas.sac.gov.in/vedas/downloads/atlas/Wetlands/NWI A_ArunachalPradesh_Atlas.pdf</u>
2	Please provide information regarding the natural area covered by the wetlands, their location and current state of ecology?	Extensive report on wetlands in Arunachal Pradesh 'National Wetland Atlas : Arunachal Pradesh' has been prepared by the Space Applications Centre, Indian Space Research Organisation (ISRO) Available at <u>https://vedas.sac.gov.in/vedas/downloads/atlas/Wetlands/NWI A_ArunachalPradesh_Atlas.pdf</u>
3	What measures or policies has the State of Arunachal Pradesh implemented to ensure that the wetlands are conserved and the fragile ecological balance is maintained?	Pertains with to the Department of Environment, Forests and Climate Change.
4	Whether any wetlands have been converted in the State of Arunachal	Pertains with to the Department of Environment, Forests and Climate Change.

Director Dept. of Town Planning Govt. of Arunachal Pradesh Itanagar

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100	Pradesh for commercial or residential use? If so, please provide details regarding the land area so converted, when it was done and the	
	the ecological impact.	
5	What steps has the State of Arunachal Pradesh taken to protect and preserve wetlands in National interest under Section 5 of the Environment (Protection) Act, 1986 ?	Pertains with to the Department of Environment, Forests and Climate Change.
6	Any other steps, measures, policies or guidelines enforced or sought to be enforced relating to the preservation and conservation of wetland area in the State of Arunachal Pradesh?	The state of Arunachal Pradesh has enacted the <i>Arunachal Pradesh Urban and Country Planning Act, 2007.</i> (ACT No. 3 of 2008. While preparing the Development/Master Plan of the Local Planning Areas/Towns, provision is always made for conservation/protection of all wetlands/ water bodies if any.

offilms

Director Dept. of Town Planning Govt. of Arunachal Pradesh Itanagar



StateWetland Authority <statewetlandauthorityap@gmail.com>

Letter seeking information and clarification in the matter of WP(C) 230 of 2001 titled MK Balakrishnan v Union of India Ministry of Environment, Forest & Climate Change and Ors - request for sharing information and data on wetlands in Arunachal Pradesh-reg

Arunachal Pradesh SPCB <arunachalspcb@gmail.com> To: StateWetland Authority <statewetlandauthorityap@gmail.com> 5 July 2023 at 17:40

Sir

Please find herewith the attached file in connection with the aforesaid cited under reference for your necessary action.

Yours faithfully

for, Member Secretary APSPCB Naharlagun



Furnishing of Information and clarification in the matter of WP(C) 230 of 2001 titled MK Balakrishnan v Union of India Ministry of Environment, Forest & Climate Change and Ors - request for sharing information and data on wetlands in Arunachal Pradesh – reg.

SI. no.	Queries	Inputs for preparation of Draft Affidavit
1	Number of wetlands which exist in Arunachal Pradesh as on date? If the wetlands can be categorised as natural or man-made, it is requested that information be provided separately.	No information on number of wetland with APSPCB.
2	Please provide information regarding the natural area covered by the wetlands, their location and current state of ecology ?	No information available in this regard with APSPCB.
3	What measures or policies has the State of Arunachal Pradesh implemented to ensure that the wetlands are conserved and the fragile ecological balance is maintained?	No information available in this regard with APSPCB.
4	Whether any wetlands have been converted in the State of Arunachal Pradesh for commercial or residential use? If so, please provide details regarding the land area so converted, when it was done and the measures taken to offset the ecological impact.	No information available in this regard with APSPCB.

5	What steps has the State of Arunachal Pradesh taken to protect and preserve wetlands in National interest under Section 5 of the Environment (Protection) Act, 1986?	No information available in this regard with APSPCB. However, in order to protect the water bodies and prevent water pollution, the Arunachal Pradesh State Pollution Control Board (APSPCB) has imposed environmental compensation against the automobiles workshops, hotels/ restaurants and health care facilities for failing to install effluent treatment plant (ETP). Closure order has been issued against forty-seven (47) defaulting industries. An amount of Rs. 6,60,250/- has been realized towards environmental compensation charges from non- complying industries and 19 units has completed installment of Effluent Treatment Plant (ETP).
6	Any other steps, measures, policies or guidelines enforced or sought to be enforced relating to the preservation and conservation of wetland area in the State of Arunachal Pradesh ?	No information available in this regard with APSPCB.
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Style For, Member Secretary APSPCB, Naharlagun

PROTECTING OUR WETLANDS IS CRITICAL TO OUR SURVIVAL