Proposal for

"Gene pool Conservation of Indigenous Rice Varieties under Traditional Integrated Rotational Farming System (*Jhum optimisation*) for Promoting Livelihood and Food Security as Climate Change Adaptation Strategy in Nagaland"

for assistance under

NATIONAL ADAPTATION FUND FOR CLIMATE CHANGE

Submitted to

सत्यमेव जयते

Ministry of Environment, Forests and Climate Change,
Government of India

NABARD

NIA-NAFCC
National Bank for Agriculture and Rural Development

January 2017

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ABBREVIATIONS AND ACRONYMS

ACA	Additional Central Assistance
AICRIP	All India Coordinated Rice Improvement Project
APC	Agriculture Production Commissioner
APMC	Agriculture Produce Marketing Committee
ATMA	Agriculture Technology Management Agency
BADP	Boarder Area Development Programme
BL	Base Line (1975 for climate change vulnerability analysis)
BUS	Business as Usual Scenario
BRGF	Backward Grant Fund
BPL	Below Poverty Line
BSA	Benefit Sharing Agreements
CBO	Community Based Organisation
CC	Climate Change
CCA	Climate Change Adaptation
CCA-NER	Climate Change Adaptation in the North Eastern Region of India
CGRFA	Conservation of Genetic Resource on Food and Agriculture
CSS	Centrally Sponsored Scheme
CIAE	Central Institute of Agriculture Engineering
DoNER	Ministry of Development of North Eastern Region, Government of India
DRR	Directorate of Rice Research
EC	End Century (2100 – for climate change vulnerability analysis)
ENPO	East Naga Peoples Organisations
FAO	Food and Agriculture Organisation of United Nations
FYM	Farm Yard Manure
GIM	Green India Mission, one of the eight missions of the NAPCC
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit mbH,
GoN	Government of Nagaland
GoI	Government of India
Govt.	Government
Ha.	Hectare
ICAR	Indian Council of Agricultural Research
ICCOA	International Competence Centre for Organic Agriculture
ICDP	Integrated Cereal Development Programme
IETC	Integrated Extension Training Centre
IGA	Income Generating Activities
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
KVK	Krishi Vigyan Kendra
MC	Mid Century (2050 for climate change vulnerability analysis)
MoEFCC	Ministry of Environment Forest and Climate Change
MoRD	Ministry of Rural Development, Government of India

MRV	Monitoring Reporting and Verification
MT	Metric Tonne
M&E	Monitoring and Evaluation
NABARD	National Bank for Agriculture and Rural Development
NAPCC	National Action Plan on Climate Change
NBCC	Naga Baptist Church Council
NEPED	Nagaland Environmental Protection and Economic Development
NER	North Eastern Region of India
NEPeD	Nagaland Empowerment of People through Energy Development
NEPED	Nagaland Environment Protection and Economic Development
NERIWLM	North Eastern Regional Institute of Water and Land Management
NIRD	National Institute of Rural Development
NFSM	National Food Security Mission
NGO	Non-governmental Organisation
NH	Naga Hoho
NIPHM	National Institute for Plant Health Management
NMA	Naga Mothers Association
NMAET	National Mission for Agriculture Extension and Technology
NMOOP	National Mission for Oil Seeds and Oil Palms
NMSA	National Mission for Sustainable Agriculture
NMSHE	National Mission on Sustaining Himalayan Eco-systems
NPPTI	National Plant Protection Training Institute
NREGA	National Rural Employment Guarantee Act
NRM	Natural Resource Management
NSAMB	Nagaland State Agriculture Marketing Board
PES	Payment for Environmental Services
PMFBY	Pradham Mantri Fasal Bima Yojna
PMJJBY	Pradhan Mantri Jeevan Jyoti Bima Yojan
PMSBY	Pradhan Mantri Sukraksha Bima Yojana
PRA	Participatory Rural Appraisal
PSC	Project Steering Committee
RIDF	Rural Infrastructure Development Fund
RKVY	Rastriya Krishi Vikas Yojana
Rs.	Indian Rupees
SAMETI	State Agriculture Management and Extension Training Institute
SAPCC	State Action Plan on Climate Change of HP
SARS	State Agriculture Research Station
SASRD	School of Agriculture Science and Rural Development
SHG	Self Help Group
SMAE	Sun Mission for Agriculture Extension
SMAM	Sub-Mission for Agriculture Machineries
SMCPL	Suvigya Management Consultants Private Limited
SMPP	Sun Mission for Plant Protection
SMSPM	Sun Mission for Seed and Planting Material
SWC	Soil and Water Conservation
TC	Technical Cooperation
TLS	Truthfully Labelled Seeds

TRC	Terrace Rice Cultivation
VC/VC	Village Council / Village Development Council
VDB	Village Development Board
WRC	Wet Rice Cultivation

LEARNING FROM THE PAST

Actual examples showing effectiveness of the proposed interventions from the State: GIZ's seed (indigenous rice and other jhum crop varieties) exchange programme under Climate Change Adaptation Programme for North East Region (CCA-NER)

GIZ and GoN realised that while traditional rice varieties were neglected, it was difficult to promote high yielding varieties in remote areas of Nagaland because of non-availability of high cost agricultural inputs and social non-acceptance. This led to a situation of food scarcity and malnutrition with undermined genetic bio-diversity and traditional low input practices. The situation got further aggravated due to loss of genetic diversity of traditional rice varieties as a result of impending climate change. The production risk of farmers under the circumstance could only be addressed through selecting and promoting climate resilient farming practices and propagating traditional seed varieties of various jhum crops (mainly traditional rice). Many researches across the world have also shown that mixtures of crops are more resilient to pests and diseases than single varieties and that the yield level is slightly higher compared to growing single varieties. Nagaland is repository of large number of rice varieties. Thus, it was decided by GIZ and GoN that rather than waiting for seed exchange to happen by chance it could be promoted as a programme under CCA-NER and demonstrated as a well devised strategic venture as "farmer field school model" for climate change resilience, where farmers and extension staff engage in joint leaning for development.

Therefore, in 2014-16, GIZ under CCA-NER, in technical collaboration with State Agriculture Research Station (SARS), Department of Agriculture, Government of Nagaland launched a rice exchange programme in 4 districts in Nagaland viz. Mon (Yonghong), Kohima (Tsiese Basa), Kiphire (Langkok) and Phek (Sakraba). 48 farmers participated in the programme wherein 42 rice varieties (20 Jhum varieties and 22 TRC varieties) were exchanged. 4 Rice varieties were also contributed by the SARS. Besides rice, seeds of 37 other crops were also exchanged. The programme prepared inventory of 61 indigenous rice varieties (30 jhum varieties and 31 TRC varieties)

Photo: 1 Few of rice varieties identified, documented and exchanged under CCA-NER

The objectives of this rice seed exchange programme under CCA-NER were:

1. Increasing farmers' resilience against climate change by increasing number of crop varieties grown by farmers to reduce their production risk.
2. Preserving existing agro biodiversity of rice for future generations.
3. Optimising rice yield for farmers as they move from place to place under shifting cultivation by matching specific site conditions (altitude, soil quality, water availability etc.) with traits of different rice varieties. More varieties enable farmers to adapt better to specific conditions on the farm
4. Enhancing farmers' understanding of impact of climate change (increase in temperature) and enabling selection of rice varieties with resultant altitude drop ($+2^0$C next 40 years; 0.5^0C each 10 years = 75m altitude drop).
5. Increasing number of complementary traditional varieties grown by farmers for stabilising long term farm production against risk of pest infestation, drought, excessive rain etc.
6. Reinforcing traditional practices of farm management by community, firming up social networks and cultural ties where assets are managed as community resource rather than individual resource thereby increasing their risk taking capacity.
7. Increasing nutritional and food security especially amongst poor families as traditional rice varieties are more nutritious (protein, minerals, vitamins, etc.). Eating more different varieties leads to a more diverse and healthier diet. Better health leads to more physical power, better self-esteem, and also better income through reduced medical costs.
8. Increasing marketing options with increase in number of marketable varieties with different (offseason)sowing, ripening and harvesting times

Main activities under the programme were:

- Selection and collection of potential indigenous rice varieties with traits of climate resilience
- Exchange of these rice varieties and other crops between locations with different agro-climatic conditions
- Awareness generation amongst farmers for increasing the quality and quantity of breeding stock for better rice production and selection of farm plots for experiment.
- Encouraging farmers to conduct experiments under the able supervision of SARS and record performance of each variety under the experiment
- Record traditional knowledge available with farmers about time tested rice varieties/ crops
- Discuss result of the experiment with the agriculture department for scaling up conservation and propagation of rice varieties

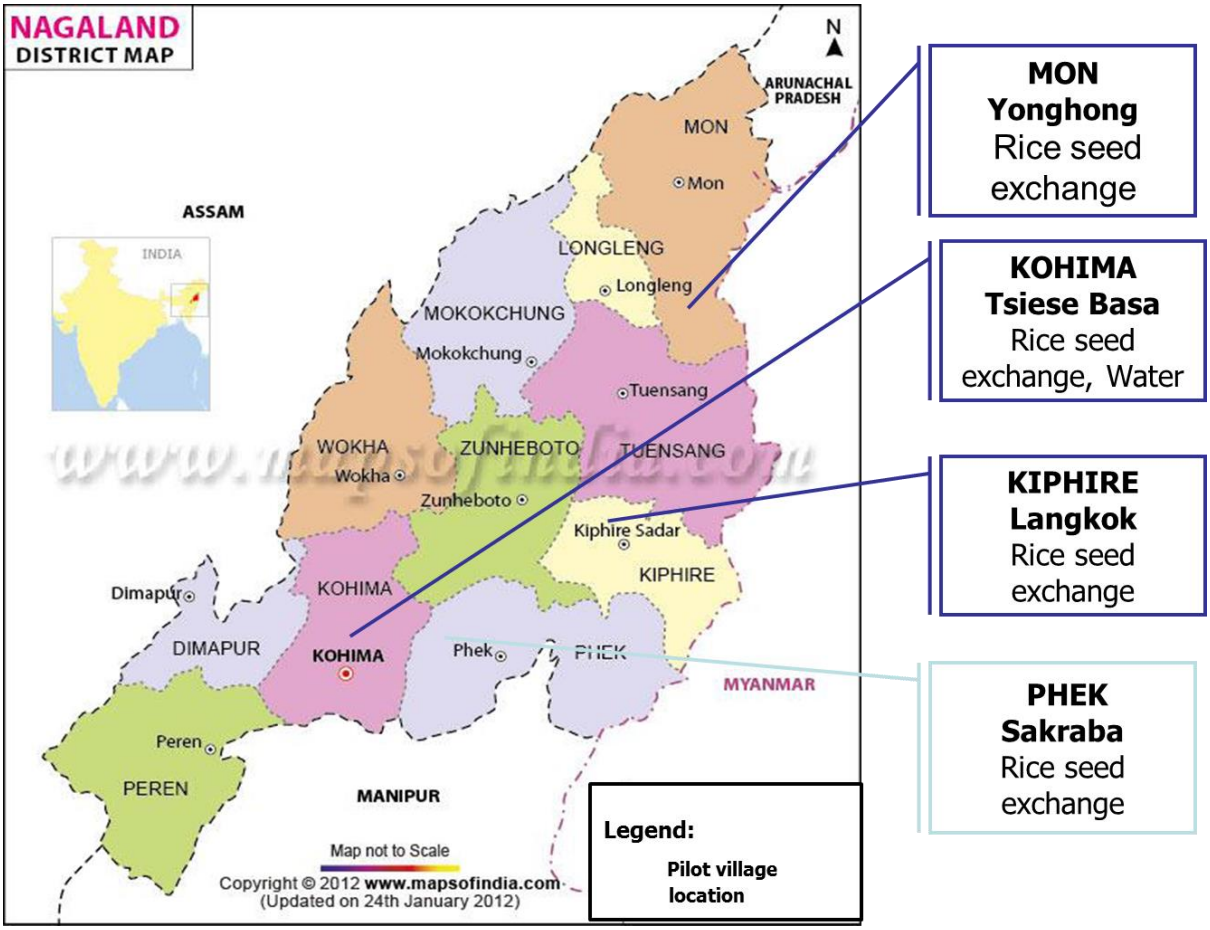

Figure 1 Locations covered under rice exchange programme

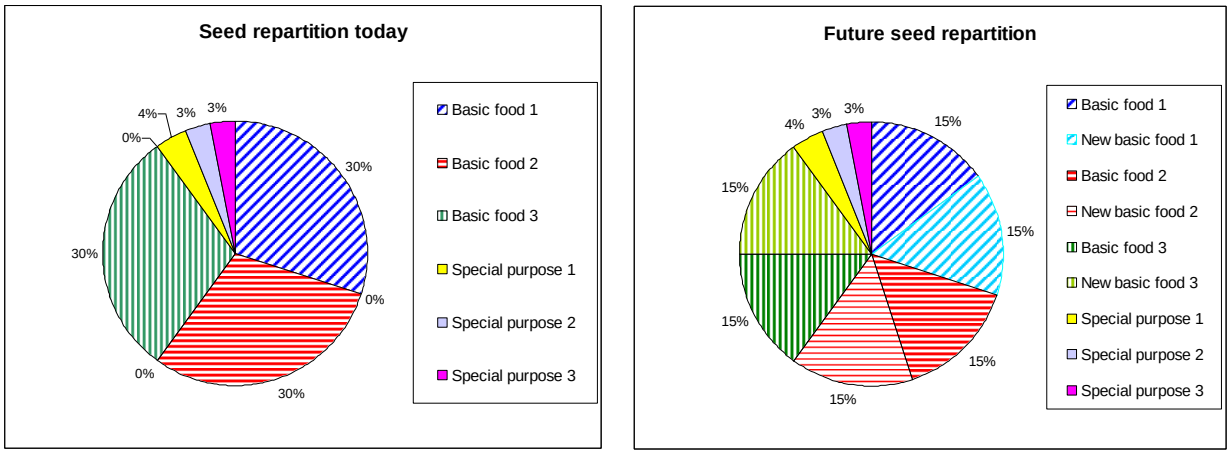

Figure 2 Increase in number of rice varieties grown by farmers over time

Photo: 2 Wet Rice Terrace cultivation in Nagaland

Photo: 3 Seeds of various crops exchanged under CCA-NER

In Nagaland, seed of rice and other crops that farmers were willing to use were exchanged. This made the exercise more attractive to farmers. The results of rice exchange programme were:

- 87% of the exchanged rice varieties gave normal germination
- 49% of the seeds performed equal to local varieties while 10% performed better. Introduced seed varieties could adapt to change in altitude and soil conditions
- Although there were concerns of different harvesting time, when compared to local varieties, more crop diversity helped farmers to overcome challenges of climate change as exchanged varieties could be used in location that experience water stress due to delay in monsoon.
- Growing more different food crops reduced production risk and increased overall farm output. Particular drought resistant crops such as pulses, millet, tuber crops such as sweet potato, yams and cassava were also of great interest to farmers.
- The concept should be "subsistence plus". Production focus should be on having more food available for the household first (subsistence). Any resulting surpluses (plus) can be sold if a market exists. If marketing fails, surpluses can be fed to livestock to add value (often the case in remote locations). In this way farmers can react flexibly to whatever opportunities open up.
- Similar to rice, increasing the number of varieties grown for many crop is a good strategy to improve farm income and farm resilience to climate hazards and price fluctuations.
- The introduction of system rice intensification (SRI) can further improve the benefits of rice seed exchange. Seed exchange combined with SRI can increase yields further.
- Introduction of agroforestry practices with appropriate species (*Alder, Gliricidea, Leucaena,* etc.) for providing green manure can enhance productivity further.

Photo: 4 Team of Rice Exchange Programme under CCA-NER

Photo: 5 Display of rice seeds from Yonghong Village

Photo: 6 Characterisation and documentation of rice varieties

Photo: 7 Awareness generation of Seed Exchange Programme

Photo: 8 Recording concerns of the farmers at their convenient time

EXECUTIVE SUMMARY

Title of Project	**:**	Gene pool Conservation of Indigenous Rice Varieties under Traditional Integrated Rotational Farming System (*Jhum optimisation*) for Promoting Livelihood and Food Security as Climate Change Adaptation Strategy in Nagaland
Project Objective	**:**	1. Genetic resource of traditional rice varieties is conserved and increased number of crop varieties are propagated under integrated rotational farming systems for nutritional and food security, resilience to climate change and reduced production risk 2. Jhumming is optimized (increased jhum cycle and matching specific site conditions with traits of different rice varieties) through area treatment, increase in soil productivity and use of green energy 3. Enhance understanding and capacity of people dependent on Jhum in management of genetic and other natural resources under climate change scenario. 4. Provide comprehensive risk coverage (life, crop productivity, weather market risks etc) to farmers and increase number of marketable varieties with collective marketing for increased livelihood and income generation
Project Sector	**:**	Agriculture
Name of Executing Entity	**:**	Agriculture Department in collaboration with other related Departments of the Government of Nagaland
Beneficiaries	**:**	1000 families (primary beneficiary) Approximately 34000 people (secondary beneficiary) in 10 villages

Project Duration	**:**	3 years
Start Date	**:**	April 2017
End Date	**:**	April 2020
Amount of Financing Requested	**:**	INR 2468.75 Lakh (24.69 lakh)
Project Location	**:**	10 villages in 5 districts of Nagaland
State	**:**	Nagaland
Districts	**:**	Tuensang, Wokha, Zunheboto, Mokokchung, Kohima

Project Components

Table 1 Summary of project components

S. No.	Activity	Amount in INR Lakh	% Share
1	Sustainable land use planning, identification of climate vulnerable families and jhum allocation and optimization planning	5.00	0.02%
2	Conservation of gene pool of traditional rice varieties and farmer to farmer seed exchange	191.69	7.76%
3	Area treatment for traditional integrated farming particularly rice cultivation including soil and water conservation and land rejuvenation	643.00	25.92%
4	Soil productivity enhancement through environmentally sensitive measures	294.75	11.94%
5	Propagation of traditional rice varieties under integrated rotational farming system	789.90	31.84%
6	Green energy management for jhum stabilization	224.40	9.04%
7	Access to market for traditional varieties of rice and other jhum crops	177.10	7.14%
8	Accompanying measures in technical collaboration with GIZ: Training and Capacity Building, Knowledge Management, collaboration with other technical institutions, Risk Management etc.	24.00	0.97%
9	Project Management by Government of Nagaland	45.00	1.81%
10	NABARD's share	73.91	2.99%
Total		2468.75	100.00%

1 PROJECT BACKGROUND

1.1 Project background and context

a) Problem analysis

i) Agriculture economy of Nagaland

Nagaland has agrarian economy where 70% of the population depend on agriculture for their livelihood. Gross agriculture production of the State is 1178 thousand MT. Gross cropped area in 422 thousand ha. Of which net sown area is 325 thousand ha. Irrigated area under kharif season (June – September) is 96 thousand ha. and rabi season (October to March) is 4000 ha.

Agricultural production in Nagaland, dominated by rice cultivation, is carried out up to 3600 m altitude and on slopes up to 60%. Cereal crops account for 51% of agriculture produce of which 38% is only rice. Maize is cultivated mainly in kharif season in 63.600 thousand ha. producing 136 thousand MT. Other cereals produced in the State are *jowar* (sorghum), small millets, *bajra* (*Pennisetum glaucum*), *ragi* (*Eleusine coracana*), wheat, barley and oats.

Oil seeds constitute 6% while pulses constitute 4% of agriculture production. *Rajmash* (French beans) is produced in both rabi (11.64 MT) and kharif (7200 MT) seasons. Other main pulse grown in the State is rice bean (*Vigna umbellate*) (5330 MT). Minor pulses of the State are pigeon pea, *urad dal* (*Vigna mumgo*), cowpea, beans, horse gram, lentils, black gram etc.. Soya bean (31060 MT) is the most prominent oilseed produced in the State while other minor oilseeds are groundnut, castor, sunflower, mustard, linseed etc.

Commercial crops, such as tea, potato, tapioca, colocasia, ginger, sweet potato etc. constitute 39% of the agriculture production.

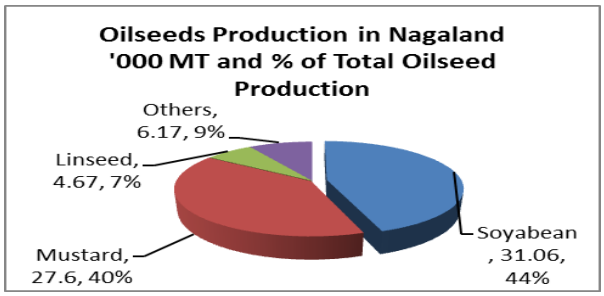

Figure 3 Oilseed Production in Nagaland

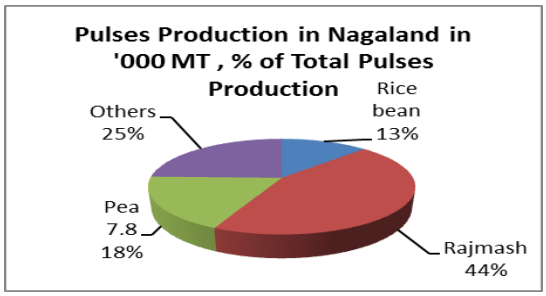

Figure 4 Pulses Production in Nagaland

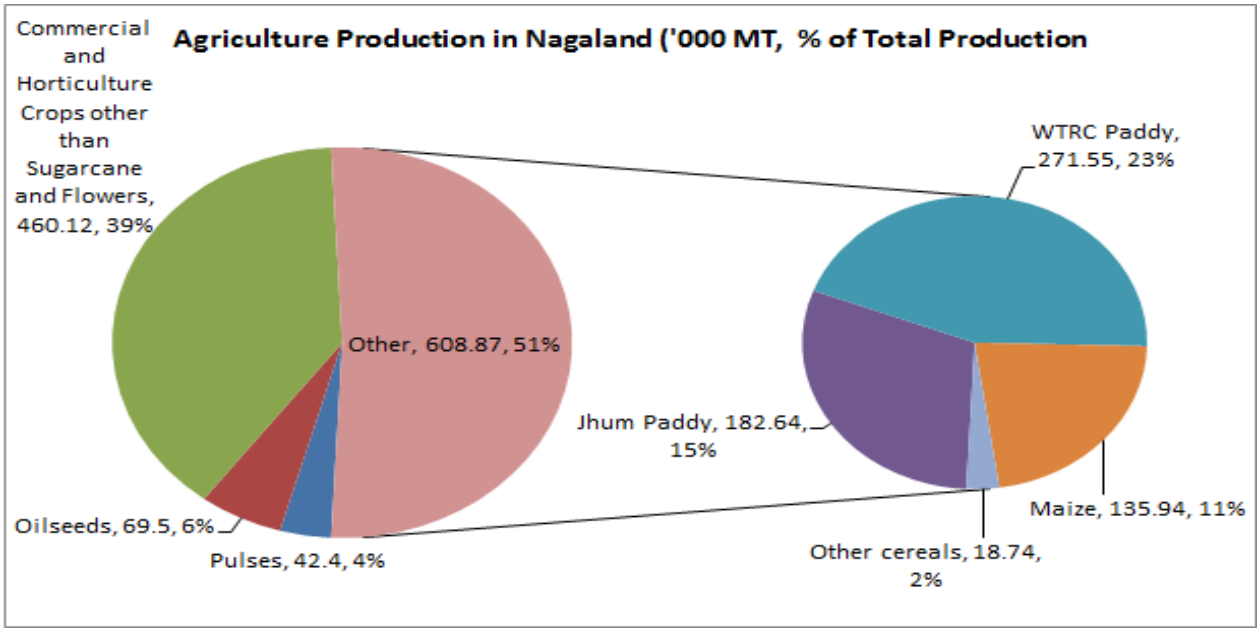

Figure 5 Agriculture Production in Nagaland

ii) Importance of indigenous rice cultivated under integrated rotational farming- jhuming

Social, cultural, climatic, edaphic, ecological and topographical feature of the State coupled with lack of infrastructure and communication networks forced tribes in Nagaland to be self-dependent for food security and sustenance with in jhum field through integrated farming systems. Naga foods are a combination of products from agriculture, forests and animals, both from domesticated and wild sources, produced/collected under Jhum farming. Nagas are habitual

of eating wild insects, birds, amphibians etc. from forests which are rich source of nutrients and protein. Villagers produce almost everything they require ranging from fruits, vegetables, pulses, millets, grains under traditional rotational agriculture. Besides indigenous rice varieties other food crops that are peculiar to Nagaland grown under traditional farming are spreading beefsteak plant (*Perilla frutescnes*), soya bean, french bean, Naga king chilli, bamboo shoots, oilnut fruit, stink grass (*ergrostis*), tree bean, nepal prickly ash (*Sichuan pepper*), colocasia, Chinese knot weed, tree tomato, rice beans, jobs tear (*Coix lacryma-jobi*) etc. These crops have nutritional and medicinal value. Pigs, fishes, snails, frogs are reared in backyard or in rice fields. Potato, colocasia, tapioca, sweet potato, yam are tuber crops that provide excellent food and nutritional security to people in remote areas.

Rice is staple food of Nagaland with 195.24 thousand ha. of area under paddy cultivation most of which is under *Jhum* farming. About 86% of the cultivable area in Nagaland is under traditional Jhum and Terrace Rice Cultivation (TRC) system and rest under commercial and other crops. Jhum cultivation produces 71% of the total food production in the State. While rice is the main crop under jhum cultivation other crops such as root and tuber, pulses, oilseed and cereals are integral component of this farming system. These traditional rice varieties grown in altitude ranging from 300-2500 meters do not respond well to modern technology and thrives well under low management practices.

Biological diversity of traditional rice is the greatest asset of the State. It provides maximum potential in terms of food security, livelihood and income generation. 867 land races of rice have been documented by the State Agriculture Research Stations (SARS) most of which are endemic to Nagaland. SARS has broadly categorized these varieties into glutinous rice, brown rice, and aromatic rice. This degree of plant diversity has incredible role in the national wealth of any country, especially in the present period of globalization and climate change.

The natural evolution and selection of rice varieties in Nagaland has been achieved by tribal communities over centuries due to:

a) Geographical isolation of Nagaland from the main-land India in the west and Myanmar in the east due to topographical features.
b) Presence of varied agro climatic condition: The topography of Nagaland supports tropical climate in the Western plains to sub-tropical climate in middle ranges and temperate climate in the higher ranges of East and South East
c) Traditional differentiating preferences for aroma, taste and cooking quality for various rice varieties by tribal communities
d) Indigenous knowledge and varietal cultural linkages of Naga life style with rice cultivation of indigenous varieties

e) Evolution of climate change resilient varieties which can sustain heavy draught, floods, heavy rains etc.

Traditional rice varieties are highly diverse in terms of pest resistance, yield, time of cultivation and maturity, water requirement, adaptability to varied agro-climatic and topographic conditions, adaptability to cold and stress condition etc.. Jhuming has served as the conservatory of these diverse crop species carried over from generation to generation.

A rich bio diversity of rice landraces has been found to exist in Nagaland that is cultivated under various agro ecological situations. Three distinct classes of local cultivars namely Glutinous rice; Brown rice and Aromatic/scented rice are grown at various altitudes ranging from 300 to 2500m msl and its area under cultivation is hence, strictly defined by the preference of each tribe and farmers liking(per se). However, this vast genetic resource is under constant threat leading to rapid genetic erosion and extinction due to modernization and government initiative for replacement with HYV. Efforts under National Food Security Mission (NFSM) made to promote cultivation of hybrid rice have not been very successful. These efforts are directed towards promoting specialised and high intensity farming of rice and pulses instead of integrated farming systems. This system of intensive farming is also not found to be climate resilient. Besides, it system also assumes availability of and access to:

- Market economy and information
- Resources and agricultural inputs (irrigation, seeds, implements, fertilizers etc.)
- Infrastructure – transportation, storage etc.
- Financial systems and access to finance
- Risk management options– price risk, yield risk, climate risk
- Protective and productive regulations

In absence of above resources, farmers who are dependent on only few commercial crops under intensive farming practices become susceptible to climate induced loss of production and productivity. Therefore, there is need to have a relook at the models of intensive farming and to strengthen positive aspects of traditional rotational farming systems. Diversity of indigenous and localised production systems ensures food security in Nagaland especially when most parts of the State are poorly connected by all-weather roads and impending threat of climate change is ever increasing.

As has been discussed earlier, one of the inevitable consequences of climate change is loss of bio-diversity in agriculture sector. This loss, when occurs to staple food crops like rice, can threaten climate resilience and adaptive capacity of vulnerable people especially in remote areas of Nagaland. It is therefore important to conserve bio-diversity in rice to ensure long-term sustenance and food security of this population.

Therefore, traditional rice varieties and rotational cultivation are key to food security of Naga tribes and any project for climate change adaptation should address fundamental issues in this sector such as genetic erosion of the indigenous and endemic rice gene pools and its conservation for future generations.

iii) Elements of climate change having impact on agriculture economy

Food production, particularly in rainfed conditions, is highly subjected to climate variability. IPCC has project 2.5-10% decrease in the crop yield in Asia due to climate change by 2020 as compared to 1990 level.

Climate change is a major concern in Nagaland because 70% of the population is rural Nagaland depends on climate sensitive sector such as agriculture, forestry and fisheries etc. Analysis of past trends and future projections of climate change in Nagaland is illustrated in section 1c.

During last 100 years Nagaland has experienced increase in average annual temperature from 1.4^0 C to 1.6^0 C. The projected increase in average annual temperature is 1.6^0 C-1.8^0C. Similarly, the rainfall is also expected to increase in intensity by 20%.

Number of extreme dry days and extreme wet days will increase during 2021-2050. Phek , Kohima and Tuensang districts will experience annual increase of more than two extreme days per year during 2021-2050.

The number of days with heavy rainfall will increase by 38%. Moderate droughts and floods events will also increase by 5%.

This will have impact on the water yield and evapotranspiration. By mid-century water yield in most of the districts of Nagaland is expected to increase by 10-40% due to increase in the intensity of rainfall. Evapo-transpiration is also expected to increase by above 50% in the State during this period (figure 8).

Figure 16 depicts increase in drought like condition[1] for most part of NE Region including Nagaland

[1] Percentage change in agricultural drought index and soil moisture deficit weeks in monsoon season for short and long term scenarios

iv) Impact of heavier monsoon precipitation and extreme precipitation events

Heavier precipitation during monsoon results into higher water yield leading to higher surface runoff, higher frequency of landslides, higher soil erosion and hence heavier silt load in the rivers leading to river bank erosion, flooding of low lying areas and water borne diseases. Higher runoff also lowers the recharge capacity of soil in and around springs, damages existing water storage structures, leads to loss of soil minerals, and increased propensity to landslides etc..

Extreme precipitation events are increasing in their frequency and exacerbating the damage already caused by heavier rainfall. The deluge is leading to heavier soil erosion and higher incidence of landslides, including in non-prone areas. Such landslides block roads and access to markets and other social infrastructure resulting in economic losses. Landslides also damage water conservation structure and water pipes affecting drinking water availability. High precipitation and extreme precipitation events also have overall negative impact on health, production and productivity of natural resources. The year-to-year variability in monsoon rainfall with extreme hydrological events (large-scale droughts and floods) will also adversely affect agriculture output.

v) Impact of increase in annual average temperature

With the increase in average annual temperature productivity of certain crops like rice and tomato has reduced and production zones are shifting to higher altitudes. This is leading to encroachment of forest lands as people strive to ensure food security. Increase in temperature leads to higher evapotranspiration and water stress. Moderate to extreme moisture stress condition during critical crop growing stage is also projected to increase under A1B scenario. Several districts of Nagaland are badly affected due to drought like situations for many years in last two decades especially leading to widespread crop failure affecting almost 60-80% of the agriculture area. This scenario is likely to increase in intensity.

vi) Impact of increase in number of drought days during monsoon period

Increase in the number of drought days coupled with higher evapotranspiration is leading to uncertainty in yield of crops and increased vulnerability of the agriculture systems as a whole affecting food security in vulnerable districts. Other problems being poor recharge of springs, non-availability of drinking water etc.

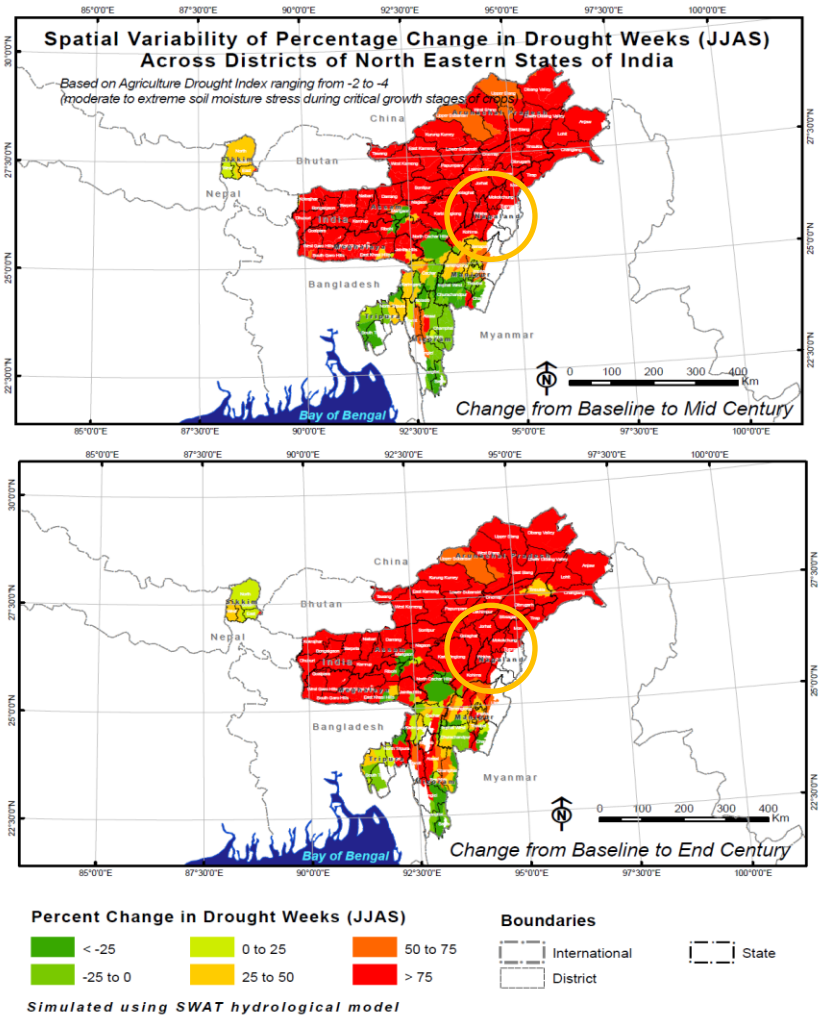

Figure 6 Change in Spatial distribution of soil moisture deficit weeks under moderate to extreme soil moisture stress during critical crop growth stages for BL, MC and EC

vii) Impact of climate change on water yield and evapotranspiration2

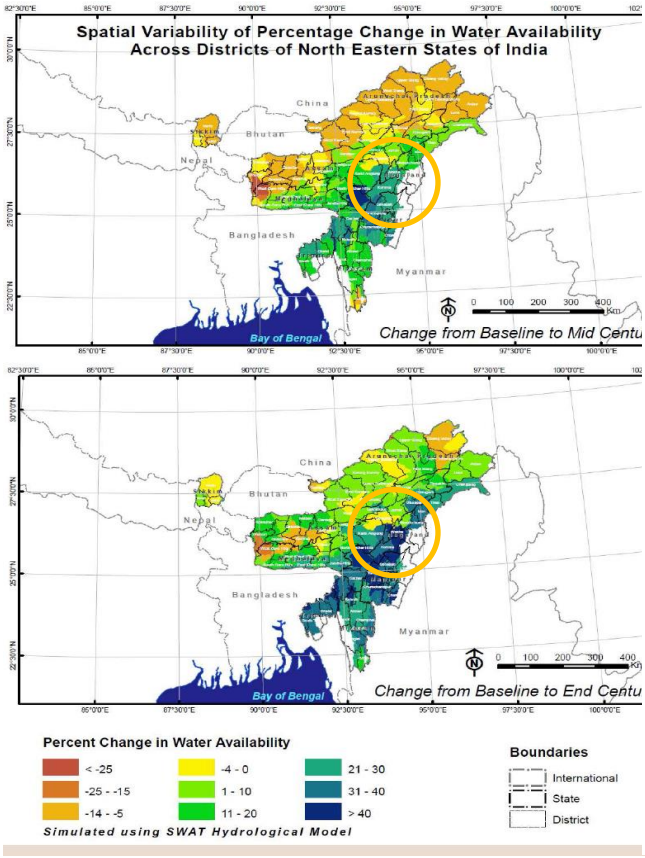

Figure 7 Percentage change for BL, MC and EC climate scenarios (IPCC SRES A1B) in mean annual water yield

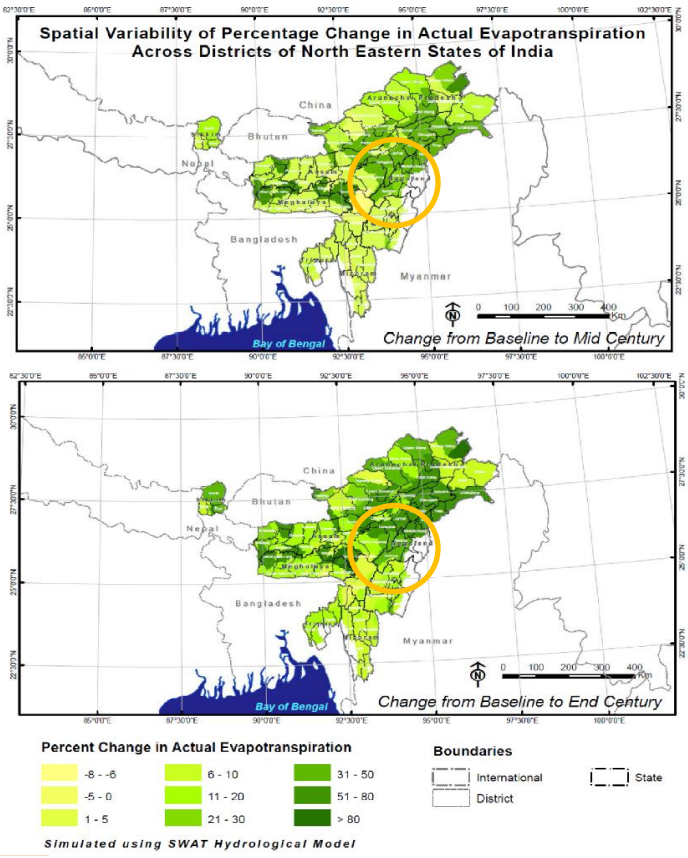

Figure 8 Percentage change for BL, MC and EC climate scenarios (IPCC SRES A1B) in mean annual Evapotranspiration

viii) Impact of climate change on indigenous rice cultivation under jhuming

Nagaland is the deficit in food production. Naga tribes grow everything they need under *Jhum* farming (refer section 1.1 a ii). Rotational cultivation (*jhuming*) in fully dependent on natural resources for soil productivity, energy needs of agriculture, genetic biodiversity of crop varieties etc.

It can be emphasised that the most impending threat of climate change to Naga society is because of loss of this bio-diversity as illustrated in the forest and agriculture vulnerability climate change

[2] Based on SWAT and PRECIS models under IPCC SRES A1B Baseline, Mid Century and End Century climate scenarios to study impact of climate change on water resources in the Region.

as indicated in section on vulnerability analysis. Hence, degradation of natural resources due to climate change are impacting crop yield of subsistence farming under stressful rainfed conditions. Rice being the most predominant food crop, the impact of climate change on the yield of the rice crops[3] is of major concern. Despite various efforts made by the Government of Nagaland rice yield has remained stagnant at 1.6 MT/ ha. as against potential crop yield of 205MT/ha.

The indigenous rice cultivars, even cultivated under adverse and marginal conditions, have been remarkably securing the food and nutritional security of rural farmers of the region. However, climate change has resulted into low cropping intensity mainly due to water stress, and insufficient soil moisture conditions during post-monsoon season, recurrent draught, low soil fertility due to soil erosion etc. Other factors for genetic erosion of traditional rice varieties are introduction of high yielding but climate vulnerable varieties of rice, shortening of *Jhum* cycle etc..

b) Synergy with SAPCC – economic, social, developmental and CC issues

SAPCC has envisaged following activities under these sectors which have been addressed in the present project proposed under NAFCC.

Table 2 Synergy of SAPCC with proposed NAFCC project

SAPCC Ref. No.	Activities under SAPCC also covered under NAFCC
Integrated Agriculture Management	
1.1	Introducing climate resilient varieties
1.1.1	Conduct research to know temperature resistant varieties in rice, maize, mustard and colocassia
1.2	Documentation and promotion of indigenous cultivars
1.3	Crop intensification: conduct research to assess short duration rice. Maize…. growing in less moisture immediately after Kharif harvest
1.5	Strengthening of research institutions (like SARS) for under taking research on plant breeding, genetics, organic farming and adaptability trials

[3] The main climate variables that are important for determining rice yields, as for other crops, are air temperature and humidity, cloudiness, solar radiation, water availability (including rainfall), and atmospheric CO2 concentration. Increase in temperature adversely affects rice crop physiology and results in decreasing crop yields and grain quality. Increase in atmospheric concentration of carbon dioxide is expected to increase plant growth and consequently rice yields, because carbon dioxide is an essential component in photosynthesis. The effects of carbon dioxide increase, however, have been found to be nullified by the effects of increase in temperature (IARI). The reduction in the yield is also due to soil erosion, floods etc. because of high intensity of rainfall. By the end of century loss in food production is expected to the tune of 10-40% despite the positive effects of increase in CO2 concentration on crop growth (Aggarwal, P.K., 2008).

2.1	Seed production and certification for producing drought resistant, HY local varieties
2.1.1	Set norms for producing quality rice, millets…..by identifying suitable locations
2.1.2	Supply seed bank material for storing seeds, piloting in farmer's field
2.2	Protected cultivation to reduce losses due to increase in temperature
2.3	Land resource inventory (mapping) for moisture conservation through soil survey and testing
2.4.1	Land development by bench terracing, contour bunding and trenching, mechanisation, afforestation and providing livelihood options
2.5	Reclamation and amendment of soils to improve land and productivity enhancement
2.5.1	Use land inventory data for improving soil strength
2.5.2	Monitor productivity of data of key crops grown in the area
2.6	Strengthening creation of irrigation potential
2.6.2 – 4	Construction of diversion weirs, check dams, rain water harvesting ponds etc.
3.1	Instructional strengthening – training on climate change
3.2	Enhance capacity for crop diversification, supply of inputs to farmers etc.
3.3.1	Consolidation of seeds and its exchange, providing seeds, improved milling technology, germ-plasm collection and characterisation and establish market linkages
3.4	Awareness creation among farmers on technologies to adapt to climate change
3.4.1	Production of extension and training material on climate change issues and impact on crops
3.4.2	Conduct farmer trainings
3.5	Reduce weather related risks
3.5.1 – 2	Organise village groups and training of weather managers
3.6	Risk management to address crop failures
3.6.1	Implementation of modified national agriculture insurance schemes
3.7.2	Cultivation of drought resistant crops
3.8	Jhum optimisation
3.9	Post-harvest technology and value additions
3.10	Mineral mixture mapping and know mineral deficiency in soils
Forestry Management	
3.2	Afforestation of degraded jhum areas
7	Soil and moisture conservation
7.1	Gully plugging, check dams, gabion structure
7.2	Use of vegetative measures for soil and water conservation
7.3	Staggered trenching, contour trenching
Water Management	
1.2.5	Train communities for regulation of efficient water use by the communities
1.3	Increase area under terraces to utilize excess water receipt during monsoon
1.4	Build household and community level reservoirs in rural areas
1.5	Use hydro-power potential in given climate change scenario
3.2	Assess climate change and its impact due to change in rainfall pattern on land slides, other natural disasters etc.

Energy Management	
1	Promote energy efficiency
2.1	Use of hydro energy at micro levels
3.1	Increase decentralise energy application
Health management	
	Sanitation

c) Climate analysis and vulnerability assessment in Nagaland[4]

i) Observed past trends of temperature

Analysis of long-term temperature data (100 years) for the NE region including Nagaland points to a distinctly rising trend in surface air temperatures. The annual mean maximum temperature in the region is rising at the rate of 0.11°C per decade. The annual mean temperature is also increasing at a rate of 0.04°C per decade in the region. This may well be a manifestation of the regional impact of global warming/climate change.

During last 100 years the districts of Wokha, Zuneboto, Tuensang and Phek have registered an increased in minimum temperature of more than 1.6^0 C. The maximum temperature also shows an increasing trend all across Nagaland. Overall the trend for last 100 years shows that increase in minimum temperature is slightly higher in absolute terms than the increase in maximum temperature.

ii) Observed past trends of precipitation, draught and floods

Nagaland is highly dependent on the southwest monsoon (June-September), as agriculture, mainly rainfed agriculture, primarily under rotational agriculture (*Jhuming*), is highly vulnerable to climate change.

Information on spatial and temporal variations of rainfall is important for understanding the hydrological balance and its impact on water management in agriculture. Nagaland has distinct precipitation and drainage patterns due to its unique location and topography. Between March and May thunderstorms contribute about 20% of total annual rainfall. During the months of June to September, South-West Monsoon supplies 70% of the annual precipitation. Another 8% of annual rainfall between October and November is associated with North-East Monsoon.

Nagaland experienced 8-14 mm mean rainfall per day averaged for the period 1901-2007 (figure 9). The State is part of the NE Region where year-to-year variability in monsoon rainfall shows extreme hydrological events (large-scale droughts and floods) that could be resulting in reduction

[4] Ravindranath et al have studied climate variability of the State as part of their study of Climate Change Variability of NR Region for south west monsoon season.. The high resolution (1° x 1° lat. and long.) daily gridded rainfall dataset provided by Indian Meteorological Department (IMD) for the Northeast Indian region for a period of 107 years (1901–2007) for precipitation, and 37 years (1969-2005) for temperature (Rajeevan et al. 2006) were used to calculate the variability and trend in precipitation and temperature respectively. District-wise data was obtained by re-gridding the dataset to 0.1° lat. x 0.1° long., and re-aggregating by the districts to study the climate variability at district level.

in agricultural output and affecting the vast population. The figure 10 shows epochs of wet and dry period over the region in last five decades as percentage departure from long term mean (1901-2007).

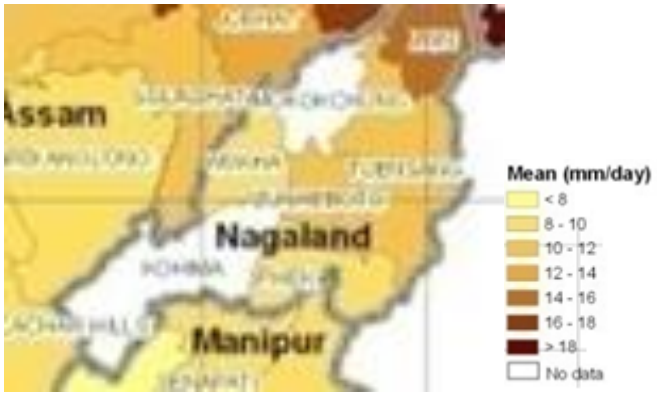

Figure 9 Spatial pattern of southwest monsoon seasonal (June-September) mean rainfall (mm/day).

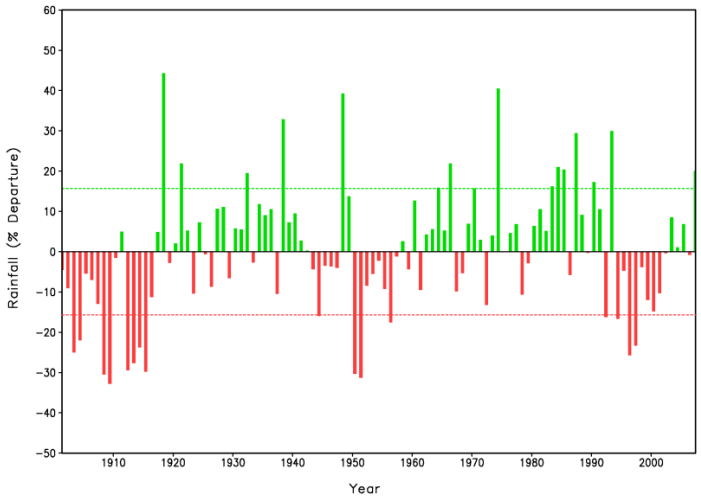

Figure 10 Southwest monsoon rainfall of Northeast India for the period 1901-2007 expressed as percentage departure from long term mean

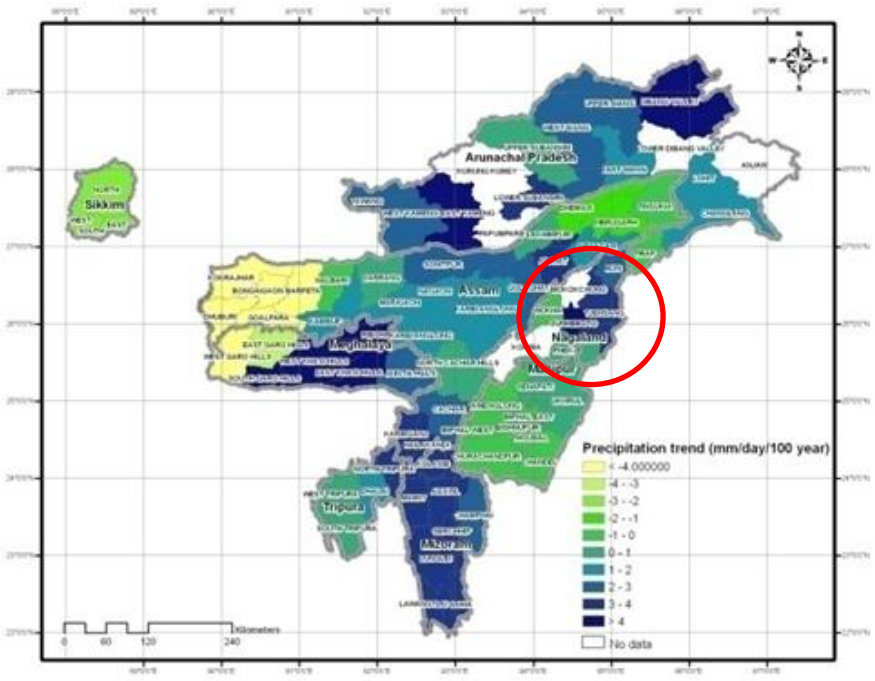

Figure 11 District-wise precipitation trend (mm/day per 100 yr.) of southwest monsoon season (June-September) for the period 1901-2007.

The precipitation trend in Nagaland for last 100 years (figure 11) show trend of increase in rainfall although number of drought years have also gone up. While the intensity of rainfall has increased its average spread during any year has decreased resulting into recurrence of drought like conditions aggravated by other climatic factors such as high temperature, high wind and low humidity during non-monsoon months.

iii) Future projections of temperature

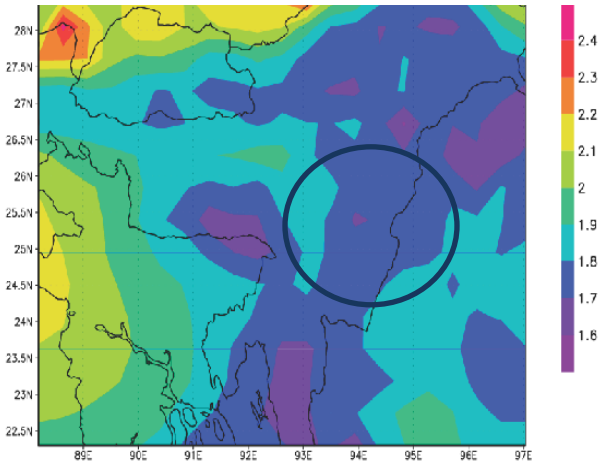

Figure 12 Increase in temperature (°C) for midterm (2021-2050, A1B SRES scenario) compared to baseline (1975), projected by the HadRM3 model.

In the mid-century (2020-2050) the State is projected to experience an increase in annual average temperature between 1.6^0C to 1.8^0C. Southern districts show higher increased in temperature with Kohima, Wokha, Phek, Zuneboto and Tuensang showing an increase in temperature between 1.7^0C and 1.8^0C. The northern districts of Mon and Mokokchung are projected to have an increase in temperature between 1.6^0C and 1.7^0C.

iv) Future projections of rainfall

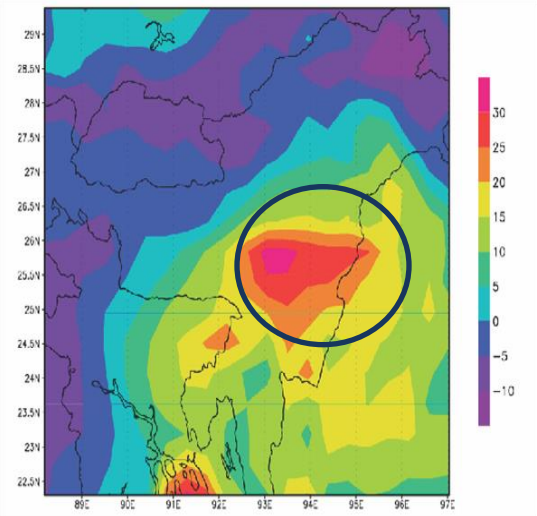

Figure 13 Annual increase in rainfall (%) for midterm (2021-2050) compared to baseline (1975)

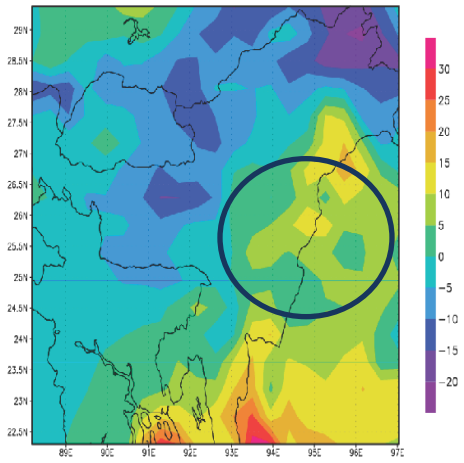

Figure 14 Increase in rainfall (%) for midterm (2021-2050) compared to baseline (1975) during JJAS

Most of the central and southern Nagaland is expected to have increase in rainfall above 20% for the period 2012-2050 as compared to the baseline (1975). The southern districts are likely to receive higher rainfall as compared to northern districts. It is expected that both dry and extreme wet days will increase. While number of days for less rainfall may slightly increase the number of days exceeding 150mm rainfall per day will increase significantly by 38%. Phek , Kohima and Tuensang districts will experience annual increase of more than two extreme days per year during 2021-2050. The northern districts of Zunehboto, Wokha, Mon, Mokokchung will show less than 2 days of extreme events per year.

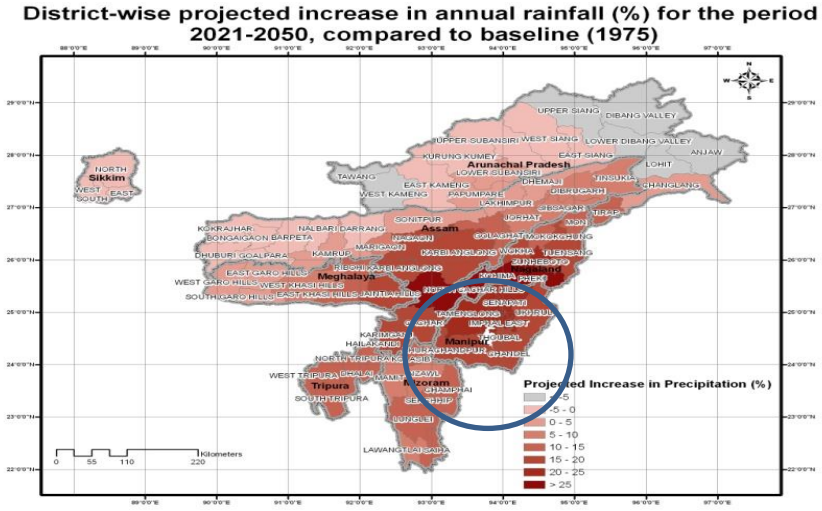

Figure 15 District wise projected increase in rainfall (%) for the period 2021-2050, compared to baseline (1975)

v) Future projections of droughts and floods

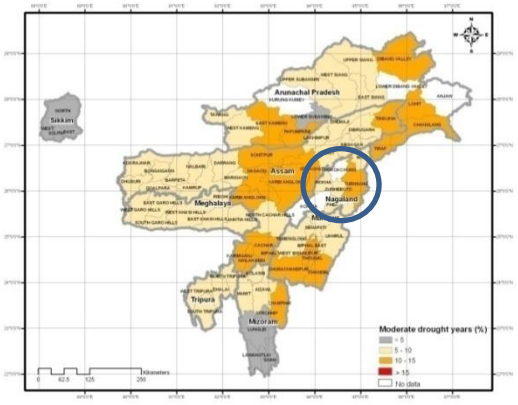

Figure 16 Probability of mod. Draught

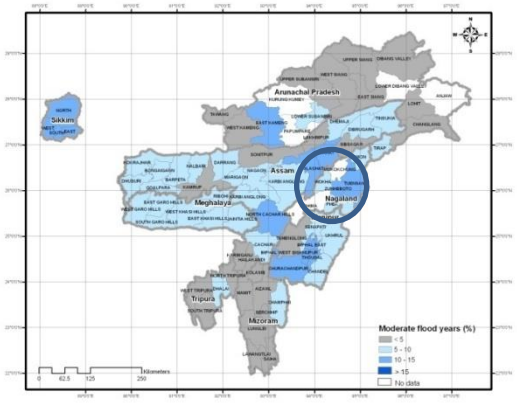

Figure 17 Probability of moderate floods

The probability of moderate draught and moderate floods in mid-century, as estimated from data of last 100 years by Ravaindranath et al, using Standard Precipitation index, are above 5% for most of the districts of Nagaland which is higher for eastern and central Nagaland.

vi) Vulnerability of agriculture sector under baseline and A1B Scenario

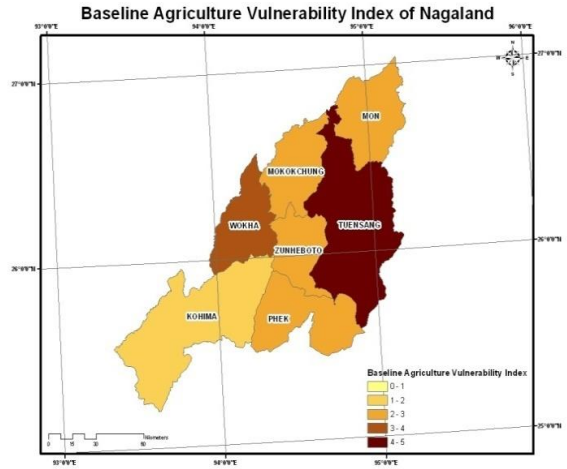

Figure 18 District wise agricultural vulnerability profile of Nagaland for baseline

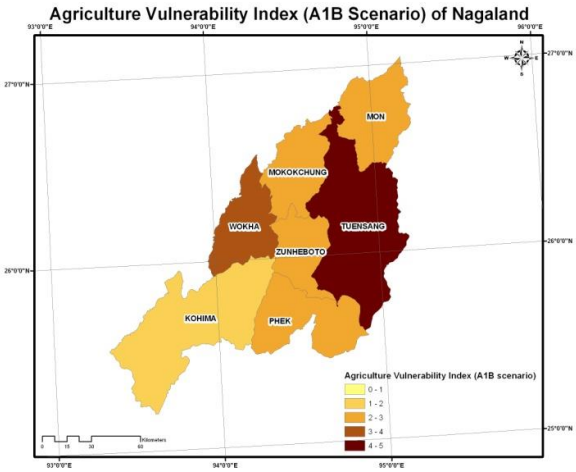

Figure 19 District wise agricultural vulnerability profile of Nagaland for A1B scenario

- **Very highly vulnerable districts**: Out of the eight districts considered, Tuensang is found to be very highly vulnerable under both the scenarios because of high rainfall variability, low groundwater availability and recharge, high area under rainfed crops indicating heavy dependence on rainfall for irrigation. This district is severely drought-hit.
- **High vulnerable districts*:*** The district Wokha is found to be very highly vulnerable under both the scenarios. This district is also drought-hit.
- **Moderately vulnerable districts*:*** Four out of eight districts are estimated to be under the moderately vulnerable category for both the scenarios. This could be due to moderately high rainfall variability, moderately high area under rainfed crops and moderate rural population density.
- **Low vulnerable to very low vulnerable districts*:*** Two districts Kohima and Dimapur are estimated to fall under the low vulnerable category under both the scenarios due to reasons such as high area under irrigated and HYV crops, high consumption of fertilizers and manure, high availability of groundwater and high mean crop yields.

vii) Vulnerability of water sector

Water vulnerability is assessed by developing a composite water vulnerability index using the four indicators namely water scarcity, crop water demand (Evapotranspiration), drought weeks in monsoon months and flood discharge vulnerability index.

Currently, most vulnerable districts based on the four indictors are:

- *Water Availability*: Wokha, Kohima, Mokokchung, Zunheboto and Phek
- *Evapotranspiration (ET):* Kohima, Wokha, Phek, Mokokchung and Zunheboto
- *Drought:* Wokha, Tuensang, Kohima, Mon and Zunheboto
- *Flood:* Mon, Mokokchung, Tuensang, Zunheboto and Wokha

Table 3 Current ranking of vulnerability of districts for the four vulnerability indicators

District	Water scarcity Rank	ET Demand Rank	Monsoon Drought Weeks Rank	Flood magnitude Rank
Wokha	7	6	7	3
Kohima	6	7	5	2
Phek	3	5	1	1
Zunheboto	4	3	3	4
Mokokchung	5	4	2	6
Tuensang	2	2	6	5
Mon	1	1	4	7

Expected water vulnerability under climate change scenario:

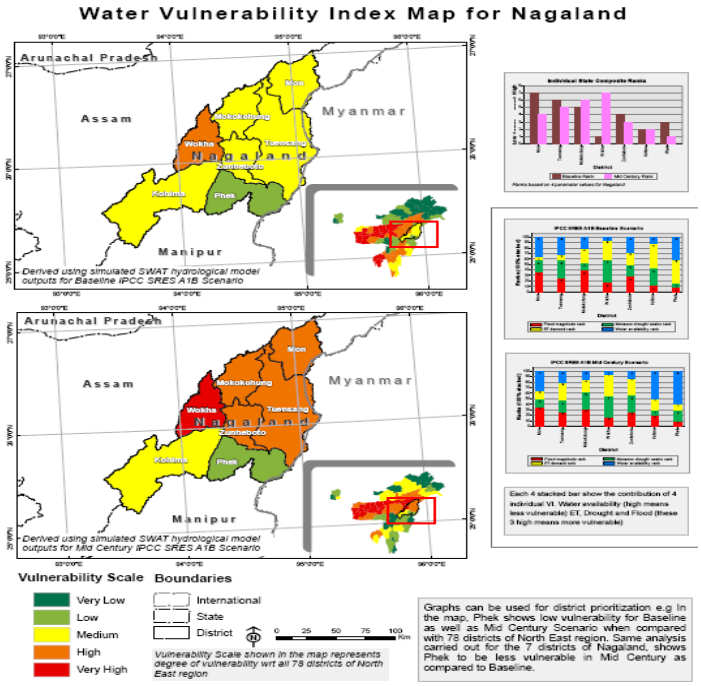

Figure 20 Spatial distribution of districts of Nagaland according to vulnerability index under model (A1B) derived current climate (baseline) and climate change (A1B) scenario for mid century

It can be observed that in majority of the districts which currently rank as very high vulnerable with respect to floods also ranked very high vulnerable with respect to drought also. This indicates that these are the districts which need prioritized adaptation consideration. Under climate change scenario Wokha district is likely to be most vulnerable from perspective of water.

viii) Vulnerability of poverty infested areas

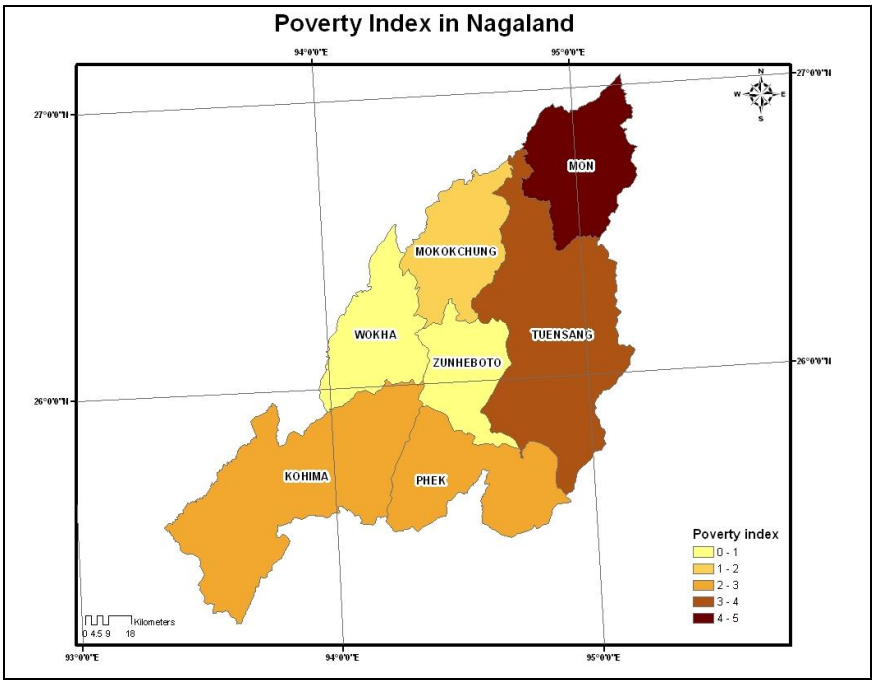

Figure 21 District Wise Distribution of Poverty in Nagaland

Mon is highest vulnerability due to poverty followed by Tuensang. Kohima and Phek have also high vulnerability due to high income disparity.

ix) Vulnerability of forest sector

Nagaland is part of bio-diversity hotspot with high percentage of population dependent on forest for livelihood. Even the people dependent on shifting cultivation are dependent on forests. Forests in the State are subjected to conversion for non-forestry purposes, decreasing cycle of shifting (*jhum*) cultivation, exploitation of forest for timber, grazing and lack of scientific forest management strategy. Forest vulnerability can be assessed from four indicators viz., disturbance index, fragmentation index, forest richness and expected change in vegetation due to climate change. All these indicators can be clubbed together to get the Composite Forest Vulnerability Index.

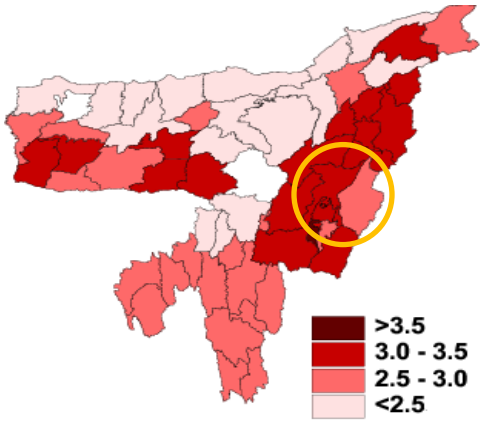

Figure 22 Composite forest vulnerability index

Table 4 Composite forest vulnerability index of districts

District	CFVI	Reasons for high CFVI (greater than 3.0)
Mon	3.36	High disturbance index, high fragmentation status, low biological richness, high projected impact of climate change
Tuensang	3.36	High disturbance index, high fragmentation status, low biological richness
Mokokchung	3.27	High disturbance index, high fragmentation status, low biological richness, high projected impact of climate change
Zunheboto	3.26	High disturbance index, high fragmentation status, low biological richness
Phek	3.26	High disturbance index, high fragmentation status
Wokha	3.12	High disturbance index, high fragmentation status, low biological richness

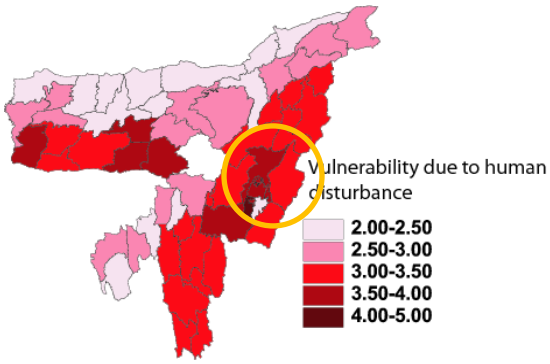

Figure 23 Forest Disturbance Index (high index = high disturbance due to human activity)

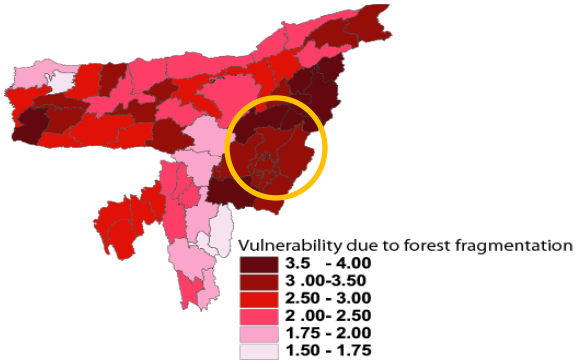

Figure 24 Forest Fragmentation Index: (High index = high fragmentation and low possibility due to re-forestation)

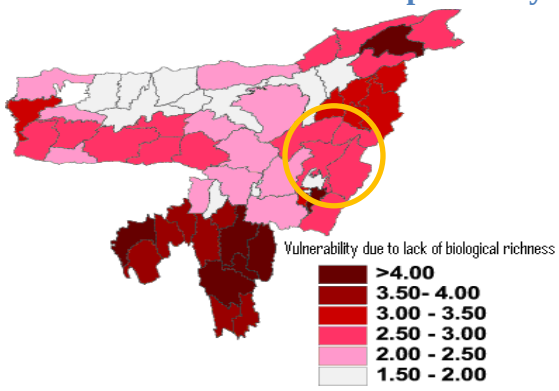

Figure 25 Forest vulnerability due to lack of lack of biological richness

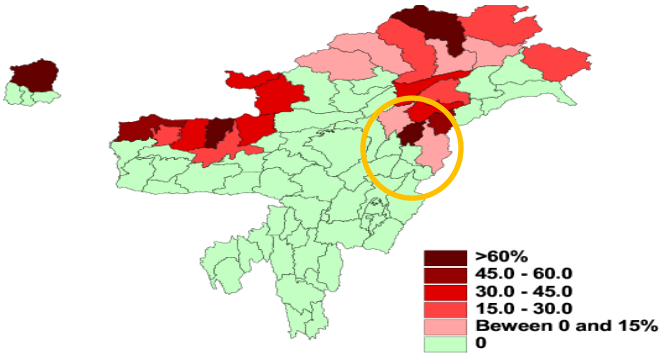

Figure 26 District-wise representation of the fractional area that is projected to undergo change in vegetation type by 2021-2050.

x) Overall vulnerability index

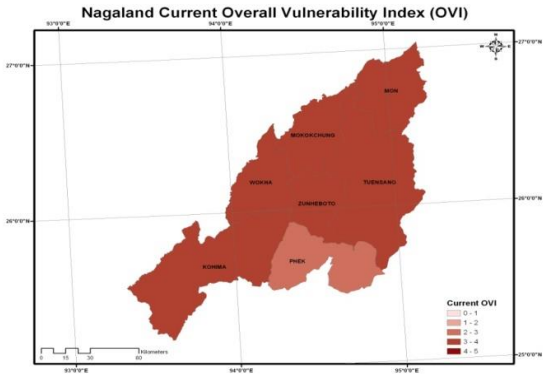

Figure 27 Current Overall Vulnerability of Nagaland

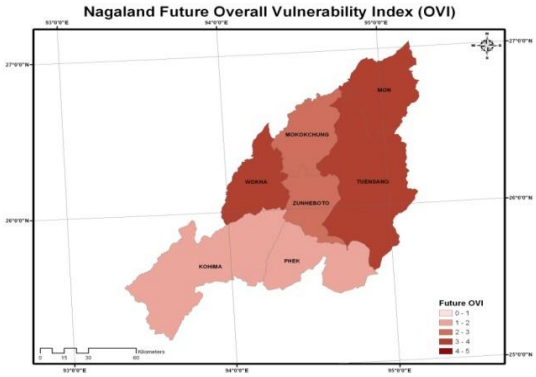

Figure 28 Future A1B Scenario of Overall Vulnerability of Nagaland

In Nagaland, the overall current vulnerability is moderate in Zunheboto, Mokokchung, Kohima, Mon, Tuensang, Wokha and Longleng, whereas the overall vulnerability is low in 2 districts, Dimapur and Phek.

In the future A1B scenario, 4 districts viz., Mon, Wokha and Tuensang are moderately vulnerable, whereas the vulnerability is low in the 5 districts – Dimapur, Kohima, Phek, Zunheboto, Pheren.

d) Project location and criteria for selection

The project shall be located in the districts of Tuensang, Wokha, Zunheboto, Mokokchung and Kohima. Following criteria has been adopted for selection of districts/ blocks and villages.

Criteria for selection of districts and blocks

1. **Agriculture vulnerability to climate change**: The composite vulnerability index is high for all the districts of Nagaland. Agriculture vulnerability is high in Tuenshang, Wokha and moderate in Zunheboto, Mokokchung, Kohima, Longleng and Mon.
2. **Districts with indigenous rice growing areas**:

Table 5 Criteria for selection of districts under NAFCC project

District	Composite vulnerability	Agriculture vulnerability	Area of major production - indigenous rice varieties	Selection under NAFCC	Representative blocks
Tuensang	High	High	High	Yes	Longkhim, Noksen
Wokha	High	High	High	Yes	Chukitong, Wokha
Zunheboto	High	Medium	High	Yes	Akuluto, V K Circle
Mokokchung	High	Medium	High	Yes	Kubolong, Chuchuyimlang
Kohima	High	Medium	High	Yes	Tseminyu Chunlikha
Longleng	High	Medium	Medium	No	
Mon	High	Medium	Medium	No	
Kiphire	High	Medium	Medium	No	
Phek	Medium	Medium	Medium	No	
Peren	High	Low	Medium	No	
Dimapur	High	Low	Low	No	

Figure 29 Districts selected for the project

Criteria for selection of villages

The project will be implemented in one village in each selected block. Total 10 villages will be selected based on following criteria

1. Situated on main road with easy access to local markets
2. Village with shortest jhum cycle to be selected to get maximum demonstrable benefit from the project
3. Willingness to avoid slash at least for three years in treated areas
4. Willingness of the community to allocate 1ha. jhum pre family under the project so that all farmers get benefitted irrespective of their current land holding
5. Willingness of the participating departments to converge other programmes with NAFCC project in the selected village.
6. Willingness of the community to form farm grower association for collective agricultural planning and marketing of produce
7. Area per village will be 100 ha. (total 1000 ha. for 10 blocks)
8. Only area under jhum will be taken up for treatment under the project.

e) Demography and socio-economic profile

i) Nagaland

Table 6 Demography of Nagaland

Districts	Blocks	Villages	*Total*	*Male*	*Female*	*Rural*	*Urban*	*No of HH*	Sex Ratio	Population Density
Nagaland	74	1216	19,78,502	1024649	953853	1407536	570966	396002	931	119
Dimapur	6	200	3,78,811	197394	181417	180942	197869	78605	916	410
Kiphire	5	79	74,004	37830	36174	57517	16487	14771	900	66
Kohima	7	91	2,67,988	138966	129022	146900	121088	54391	927	213
Longleng	3	79	50,484	26502	23982	42871	7613	11985	903	89
Mokokchung	9	81	1,94,622	101092	93530	138897	55725	42690	927	120
Mon	8	105	2,50,260	131753	118507	215816	34444	41978	898	140
Pheren	4	81	95,219	49714	45505	81429	13790	18475	917	53
Phek	8	94	1,63,418	83743	79675	138843	24575	36639	951	81
Tuensang	9	110	1,96,596	101933	94663	159822	36774	36742	930	90
Wokha	7	129	1,66,343	84505	81838	131339	35004	31891	969	102
Zunheboto	8	167	1,40,757	71217	69540	113160	27597	27835	981	112

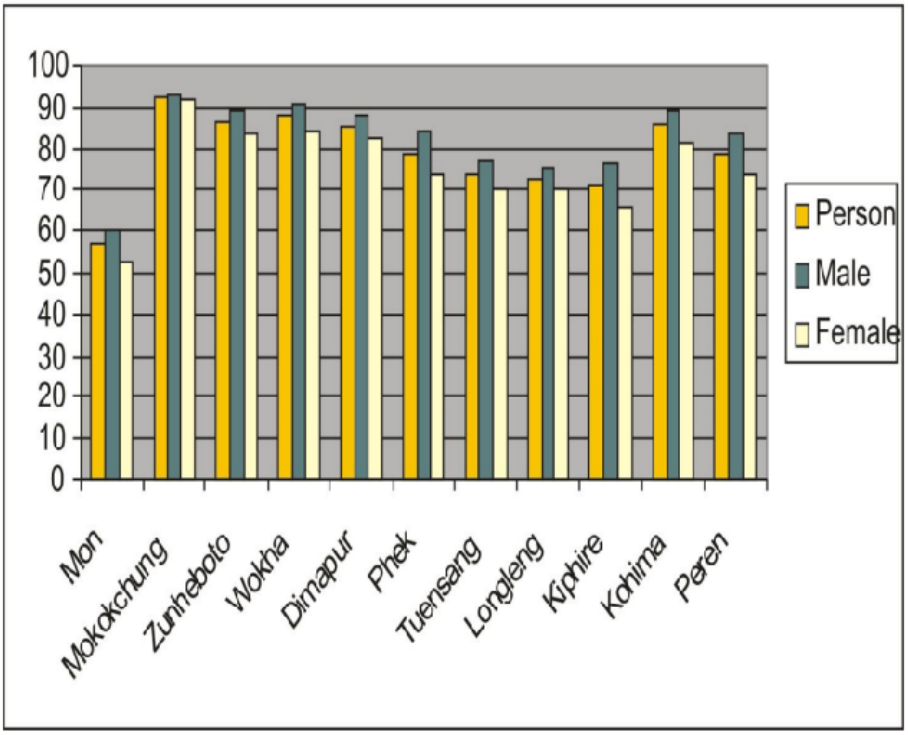

Figure 30 Literacy rate in various districts of Nagaland

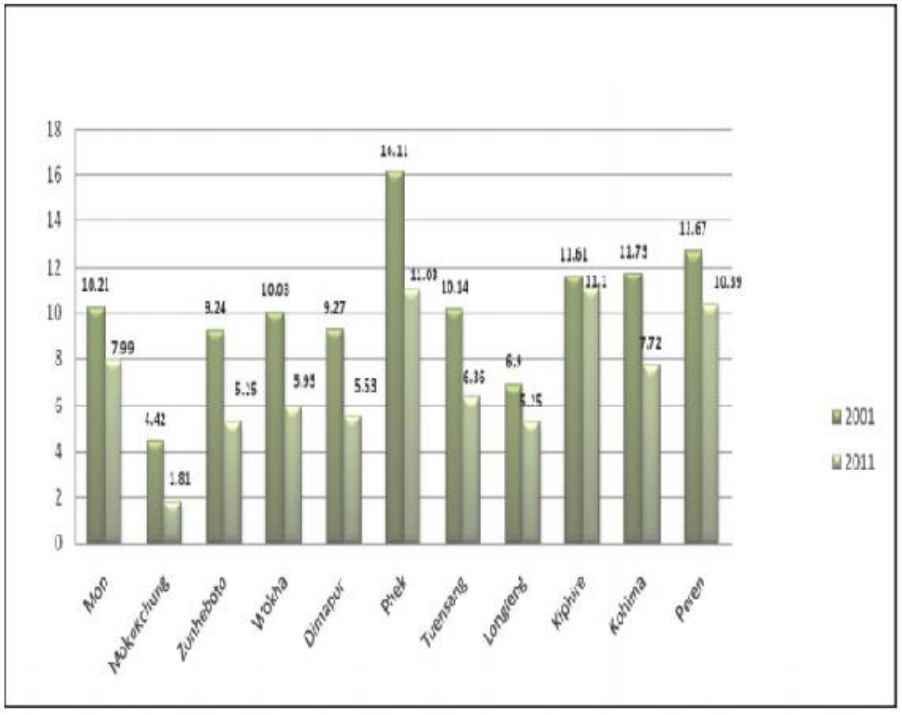

Figure 31 Male / Female gap in literacy in Nagaland 2001-2011

ii) Representative village

(Sungratsu village, Mokokchung District, Nagaland (based on PRA conducted)

Land use pattern

Table 7 Land use pattern of representative village

	Particulars	Unit	Current scenario	Projection under CCA scenario NAFCC
	Total geographical area	Ha	6300	
Area under Jhum cultivation				
	Area under Jhum cultivation	Ha.	250	220
	Average Jhum cycle	Years	10	15
Area other than Jhum				
	Waterlogged area	Ha	Nil	Nil
	Forest area	Ha	1100	1130
	Cultivable wastelands	Ha	50	30
	Uncultivable Wastelands	Ha	70	70
	Gross cultivated area under permanent cultivation		200	250
	Fallow land other than current fallows	Ha	3900	3960
	Current fallows	Ha	280	220
	Net sown areas (permanent)	Ha	100	120
	Gross irrigated area	Ha	Nil	250
	Net irrigated area	Ha	Nil	100
	Area under– dry land horticulture	Ha	150	150
	Area under irrigated horticulture	Ha	Nil	20
	Village area, Commercial (Roads, stone quarries, etc.)	Ha	400	400

Demography of representative village

Table 8 Demography of representative village

1	Number of Households	823		
2	Total Population (2011 census)	3384		
		Male	Female	
		1680	1704	
3	Literacy Rate	80 %		
4	Number of Jhumia Families	200 (100 poor and vulnerable)		
5	Number of Government Employees	160		
6	Schools/Institutions	a. Private School: 1		
		b. Government Schools		
		Primary	Middle	High School
		2	1	1
7	Total Students enrolled in schools	260		
8	Health Centres	1 (Primary Health Centre)		
9	Markets	Daily Market	Weekly Market	
		Nil	1	
10	Number of Groceries shops	10		
11	Number of Fair Price Shops	2		
12	Anganwadi Centres	9		
13	Rice Mills	1		
14	Churches	2		
15	Wage Earners(Stone Masonry, Carpentry, Black smithy, Agricultural labours)	Type	Number	Rate/ man day (in Rs.)
		Skilled	156	400
		Unskilled	130	300
16	Major Income Source:	Average Income (in Rs.)		
	a. Agricultural Produce	12,000-15,000/HH/year		
	b. Stone Carving(Blocks, Slabs, Boulders) – mines owners	150 Lakh/Year		
	c. Livestock	10 Lakh/year		

1.2 Project Goal and objectives in context of CC logical framework

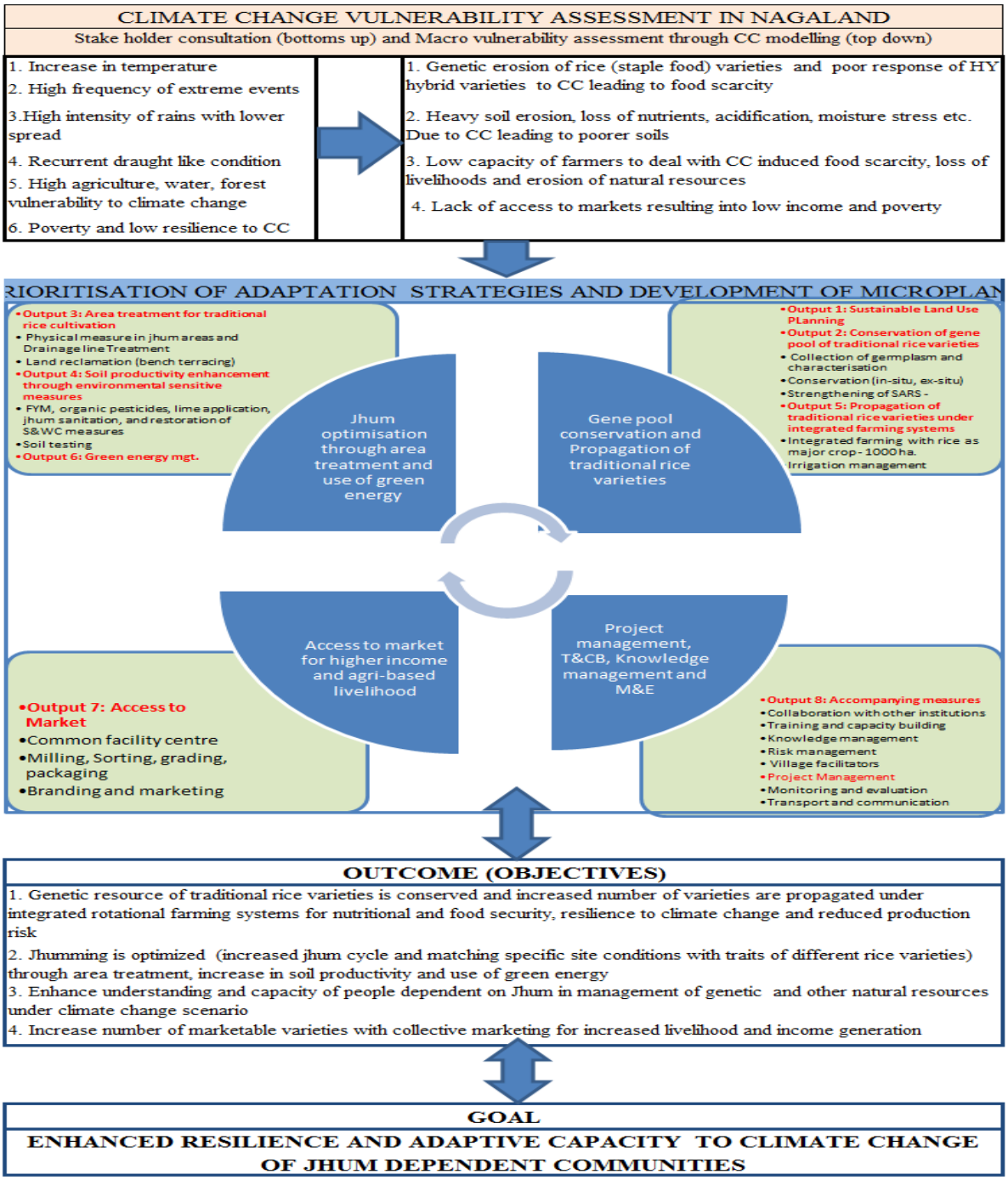

Figure 32 Pictorial log-frame of project

Project Objectives

1. Genetic resource of traditional rice varieties is conserved and increased number of crop varieties are propagated under integrated rotational farming systems for nutritional and food security, resilience to climate change and reduced production risk
2. Jhumming is optimized (increased jhum cycle and matching specific site conditions with traits of different rice varieties) through area treatment, increase in soil productivity and use of green energy
3. Enhance understanding and capacity of people dependent on Jhum in management of genetic and other natural resources under climate change scenario.
4. Provide comprehensive risk coverage (life, crop productivity, weather market risks etc) to farmers and increase number of marketable varieties with collective marketing for increased livelihood and income generation

1.3 Details of Project Executing Entity

a) General information

The major department for implementation of the project will be Department of Agriculture, Government of Nagaland under overall supervision of the State Nodal Officer on Climate Change. The Agriculture Department will function through its climate change cell already notified by the GoN for CC activities. Professional and technical inputs will also be carried out by other departments such as Land Resource Development, Soil and Water Conservation, Horticulture Department, Forest Department etc. in convergence and synergistic mode . Besides, technical support will be provided by GIZ office in Kohima for knowledge management, training and capacity building etc. SARS will function as a resource agency for conservation of genetic material for traditional rice varieties and NEPeD will provide green energy solution for jhum optimization. Civil Society such as Naga Hoho[5], Eastern Naga People's Organization[6], Naga Mothers Association[7], Nagaland Baptist Church, Village Councils[8] and Village Development Board will provide assistance in community mobilization.

[5] Naga Hoho is an apex body of different tribal organisations from Dimapur, Kohima, Mokokchung, Peren, Wokha and Zunheboto and consists of representatives nominated by constituent tribal organisations.

[6] ENPO is an apex body of tribal organisations from Mon, Longleng, Tuensang and Kiphire

[7] Naga Mothers Association represents all villages of Nagaland and work on social justice, women rights etc.

[8] Village Councils are empowered to carry out administration. The village chiefs are chosen as per customary and usages.

Each of the department will nominate a senior officer (Director level) to the Project Management unit as resource person and point of contact for project implementation. At the District level, District Agriculture Officer will coordinate and supervise the work of all agencies involved in project implementation. At the lowest level, the project will be implemented by Village Development Council.

The contact details are as under
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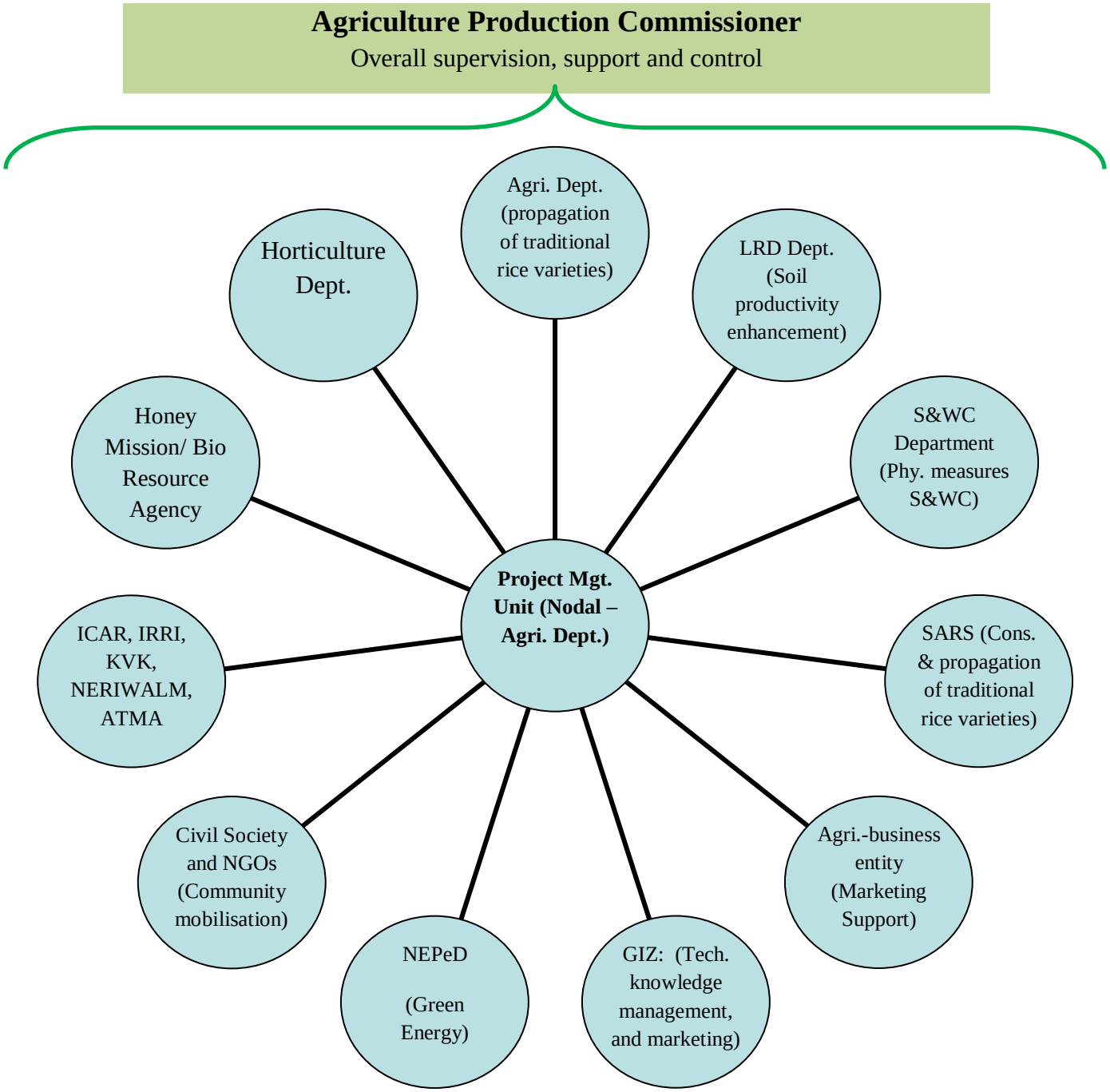

Figure 33 Collaborative arrangement of various agencies under the project

b) Responsibility of various agencies will be as under

Government of Nagaland

- Select and appoint resource persons from various departments to facilitate project implementation
- Allocate funds for project management, mid-term and end term review
- Ensure convergence with various necessary State and Centrally Sponsored Schemes
- Overall supervision, support and control
- Chairman of the Project Management Unit
- Coordination with State Steering Committee for Climate Change

Project Management Unit (nodal department: Agriculture Department)

- Project planning, overall administration and implementation of the project
- Fund flow and financial management
- Preparation of sustainable land use development plans of the selected villages
- Project documentation learning and knowledge management
- Coordination with other department and ensuring convergence with State and Central Sponsored Schemes
- Training and capacity building on various aspects of project viz., genetic resource conservation and management, NRM, jhum optimization, marketing of rice varieties, management of soil and water conservation measures, etc.
- Engaging with agencies such as IRRI, ICAR, NABARD, SAMETI, office and missions and sub-mission of State and Centrally Sponsored Schemes etc.
- Appointment of external experts and agencies, whenever necessary, for various aspects of the project
- Support the Government of Nagaland to conduct mid-term and end term (terminal) review of the project.

Agriculture Department

- Propagate traditional rice varieties through farmer to farmer seed exchange of selected varieties
- Introduction of new climate resilient rice resilient varieties in collaboration with SARS
- Treat agro-forestry in sensitive fallow lands which are over exposed
- Undertake activities for agriculture information, extension and publicity under convergence mode
- Organize agriculture events and exposure programmes

- Maintain linkages with agriculture experts to provide input on jhum intensification and management of traditional rice varieties.
- Develop and implement models of crop diversification
- Promote inter cropping and crop rotation
- Undertake irrigation management activities

Soil and Water Conservation Department

- Prepare and implement plans for drainage line treatment such as gully plugs, loose boulder check dams, gabion structures etc.
- Establishment and repair of physical soil and water conservation measures and protection of those measure through vegetative cover
- Undertake land leveling and bench terraces with the community participation

State Agriculture Research Station

- Development of inventory of indigenous rice varieties with their characterization
- In-situ conservation of rice varieties – conduct research trials and development of package of practices for indigenous rice cultivation and development of field gene bank in 5 Acres
- Ex-situ conservation of rice varieties in 5 Ac in SARS
- Packaging, transportation and distribution of genetic material for farmer to farmer to exchange
- Training and knowledge management on rice conservation in consultation with GIZ and other department
- Monitoring of performance various rice varieties
- Packaging, transportation and distribution (through agriculture department) of seeds of traditional rice varieties
- Promoting farmer to farmer exchange of seeds as recording their performance (refer: GIZ methodology and experience)
- Up gradation of current facilities and establishment of mini-gene bank in collaboration with IRRI and ICAR.
- Ensure implementation of KCC, PMSBY, PMFBY, PMJJBY schemes etc.

Land Resource Development Department, Horticulture Department and Honey Mission, Nagaland Bio –Resource Agency

- Undertake stabilization of S&WC measures by planting grasses, cereals, pulses on them
- Ensure soil productivity enhancement through use of FYM, green leaf application, vermin-composting etc.

- Promote replacement of chemical pesticides by organic pesticides
- Undertake soil testing and introduction of soil health cards for farm lands.
- Promote diversified livelihood opportunities other than agriculture for enhances income of the communities as climate change resilience strategy under convergence mode
- Work closely with honey mission, horticulture department, animal husbandry to promote livelihood options
- Promote sustainable NRM practices such as in-situ conservation of original varieties of flora under jhum cultivation
- Introduction of diversified sources of food- kitchen garden, backyard poultry etc.
- Creation of post-harvest storage facilities in collaboration with community etc.

NEPeD

- Development, testing and establishment of green energy technologies for upland farming
- Conduct training of farmers on use and maintenance of equipment under green energy technologies

Civil society/ Village Development Council

- Community mobilization for the project
- Conflict resolution and promotion of good will for long term sustainability of the project
- Appoint village facilitators as a focal point for connecting with farmers, information dissemination and project implementation at the village level
- Plan and ensure optimal and equitable distribution of project benefits including selection of 100 climate vulnerable farmer families and allocation of 1 ha. jhum land for these families for project implementation

GIZ

- Development of project design document in consultation with various stakeholders
- Provide technical expertise in project and knowledge management for climate change adaptation
- Conduct training programs on climate change and seed exchange
- Hire agri-business entity for guidance on marketing of rice varieties

Agri-business agency

- Plan development of grower associations and/ or producer organisations.
- Develop plans and provide support for marketing of rice varieties and other agriculture products from the project villages
- Advise in establishment of common facility centers for aggregation, sorting, grading and storage of rice varieties
- Plan packaging and transportation facilities
- Advise on market information collection, dissemination and use
- Advise branding and marketing of rice varieties
- Help civil society / village council in organizing systems for collective procurement and marketing of agricultural inputs/ outputs

c) Technical manpower of Project Executing Agency

The executing entity is a regular Government Department of the State has well established organizational structure and has qualified technical experts in the areas agriculture management, extension, horticulture, forestry, land resources and soil conservation. The Department has state-wide spread in each district having a district level officers in place. The Agriculture department at the district level is supported by agriculture officers, inspectors and field assistants. Forest Department is supported by District Forest Officers at district level, Assistant Conservators of forests at sub division level, Range Forest Officers at the range level, beat officers at beat level duly supported by foresters and forest guards at village level. Similarly departments of Soil conservation, Horticulture and land resources have wide spread and adequate strength of supervisory and field staff. Agriculture Department also has an Integrated Extension Training Centerat Medziphema, State Agriculture Research Station at Yisemyong, Mokokchung, and Agronomist Seed farm at Meapani, .

d) Three largest CCA projects handled

The projects executed by the nodal department under this category are given in Table below.

Table 9 Details of largest CCA related projects handled

S.No	Project	Objectives & geog. Coverage	Amount Sanctioned	**Funding** Agency	Geog. Coverage	Implementation Period & Outcome
1	Sustainable Land and Eco-systems man**a**gement in shifting cultivation areas of Nagaland for Ecological and Livelihood Security (SLEM)	Participatory Land Use Planning Improve vegetation cover Check soil erosion Income generation Introduction of farm management proctices	USD 36 Million (GEF), Gov. of Nagaland (Co-financing) USD 1 Million in cash USD 18.57 Million (in kind)	GEF-UNDP	3 districts of Nagaland	**2009-2015** Horticulture, agro-forestry plantations and soil and water conservation measures have improved vegetation cover by over 2,000 hectares of land in project areas Soil erosion rate has decreased from 50 m/ha per year to 26 m/ha per year Incomes of 4,400 women have increased by 10% Average incomes of 5,008 households have increased by 15-20% annually through access to existing credit facilities, agriculture revolving fund and sales from increased yield of jhumfields Over 800 jhum-practicing households have benefited from the introduction of integrated farm development practices
Also see table 10						

e) Details of three largest community based NRM projects handled

The nodal department in the past has executed several agriculture and NRM programmes with collaboration with other departments of the Government of Nagaland.

i. Agri link roads under RIDF with NABARD assistance
ii. Research projects in collaboration with State Agriculture Research Station
iii. Integrated Cereal Development Programme (ICDP)
iv. Seed production programme
v. Integrated Pest Management Programme
vi. Organic Programme
vii. Programme for Integrated Farming and Fallow Management including Jhum intensification
viii. Programme for Surface run off Management and Land Shaping
ix. Agriculture Technology Management Agency (ATMA)
x. NFSM for rice, pulses, coarse cereals and jute
xi. National Mission for Sustainable Agriculture (NMSA)
xii. Sub-Mission for Agriculture Machineries (SMAM)
xiii. Rashtriya Krishi Vikas Yojana (RKVY)

f) Details of three largest CCA/NRM projects of State/Central Government:

Table 10 Details of CCA/NRM Projects of State / Central Govt.

S. N	Project	Objectives & Geog. Coverage	Amount Sanctioned (in lakhs)	Funding Agency	Geographical Coverage (ha)	Implementation Period & Outcome
1	Nagaland Empowerment of People Through Economic Development NEPED I and II	I- Develop alternative approach to shifting cultivation. Increasing income of people of Nagaland Enhance capacity of local institutions II- Marketing of agricultural crops Micro-finance and self reliant credit based approach	NEPED I – Rs. 12.86 Crores NEPED II – 12.85 Cores	GoI and India Canada Environment Facility	NEPED I- 857 Villages, Nagaland; NEPED II- 105 villages across Nagaland	Phase 1 :6 years (1995-2001) A total of 7.8 million trees were planted. Wide scale acceptance of alternate jhum, continuation of the project from the first phase focusing on environment protection to the second phase focusing on economic empowerment Phase II (2001-2006) Capacity building, bajk linkages, strengthening of village institutions, development of marketing channels etc.
2	Integrated Wasteland	Converting wastelands	21305 Lakhs	Ministry of Rural	Nagaland 380430 ha	1995-96 to 2009-10

	Development Program (IWDP)	to productive lands with NRM activities		Development, Department of Land Resources		
3	IWDP	Optimum utilisation of natural resources to increase productivity and increase livelihood of the people	40573 Lakhs	Ministry of Rural Development, Department of Land Resources	Nagaland 240489 ha.	2009-10 to 2015-16
4	Watershed Development Project in Shifting Cultivation Areas	Settled Cultivation for the *Jhumias*	7011 Lakh	Ministry of Agriculture (Natural Resource Management) , Govt. of India	All 11 districts of Nagaland, 72,893 ha	- Encouraged sustainable practices of *jhum* cultivation; -Settled agriculture in all the potential lands; - Empowerment of farmers especially marginal farmers and improved livelihood; - Augmented Water harvest for agriculture and groundwater recharge and -Promoting biomass for soil fertility improvement

g) Availability of suitable infrastructure for project implementation

The entity has the requisite office space, computers and mobility. The additional infrastructure requirements for implementing the project will be assessed as per the need.

h) Credibility of Project Executing Entity

The Executing Entity was never blacklisted, barred from implementation of any projects, faced any charges/legal cases related to mismanagement of project and funds.

1.4 Project components and financing

Table 11 Project Components and Financing

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
C1. Sustainable land use planning	• Stakeholder consultation in target villages • Detailed baseline survey and inventory with characteristics of resources for better targeting of Jhum area in 10 villages • Identification of families vulnerable to climate change and allocation of at least 1 ha. jhum area per family for treatment, • Social profile of selected villages and general agreement of the village council in the plan of action • Identification of key livelihood of the people and critical resources on which these livelihoods depend. Critical resources may include natural capital, physical capital, financial capital, human capital and social capital. • Vulnerability and resilience assessment of critical sectors and hazard mapping with development of hazard calendar and assessment of likely impact of hazards on resources • Prioritization of vulnerable sites (hotspot) and	• Availability of scientific basis and enhanced understanding for project action plan and its components for addressing risks associate with CC • General consensus on the concept of climate change, conservation of bio-diversity and its relation to food security • Planned approach to development with community participation	5

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
	their treatment options • Assessment of coping and adaptation strategies and implementation mechanism • Identification of institutional partnership for CC adaptation • Development of adaptation plan and identification of investments for CC adaptation		
C2.Conservation of gene pool of traditional and indigenous rice varieties and farmer to farmer seed exchange.	• Guidelines, framework, and policy implications based on the synthesis of past experiences for on-farm management of plant genetic resources are developed by SARS • Survey is conducted and germplasm of traditional rice varieties and other indigenous crops are collected in 11 districts of Nagaland • Indigenous rice varieties are characterized and their traits, requirement of growing conditions, resistance to pest and tolerance to climate variables along with nutritional, medicinal and aromatic properties are documented in consultation with the community • A substantial quantity of rice germplasm of both the jhum and TRC added to the ones already under maintenance at SARS. • Development of field gene bank for in-situ conservation and research of promising	• Genetic erosion of indigenous agricultural crops mainly rice is checked and farmers varieties are protected through identification, conservation, and seed exchange programme and more climate resilient indigenous varieties are available for farmers ensuring continuity of production, availability of food and increased income • Gene pool conservation of staple food crops becomes national priority and an important component of CC strategy • Network of farmers is developed and interest generated for on	191.69

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
	varieties as backup for seed exchange in 10 villages and control for research trial. Separate field gene bank for jhum rice and terrace rive will be developed • Collection, packaging and transportation of selected promising seeds varieties for exchange with farmers across the project villages and across the State • Network of farmers developed and interest generated for on farm conservation of indigenous rice and other crop varieties	farm conservation of indigenous rice and other crop varieties • Gene pool utilized by research organization for further enhancement of rice varieties to enhance CC resilience and food security • SARS established as knowledge center for indigenous rice varieties	
C3. Area treatment for traditional integrated farming particularly rice cultivation including soil and water conservation and land rejuvenation	• 1000 ha. is jhum area is stabilised for conducive cultivation of traditional rice varieties through physical and vegetative measures • 40% of the area is treated with contour bunds to ensure soil and water conservation specially on steeper slopes and for improvement of soil quality • Sufficient number of gully plugs using local material are made to check soil erosion during heavy rainfall and extreme events • Loose boulder check dams are constructed on sites which are prone to extensive soil erosion	• Land is made suitable for longer tem / permanent cultivation of agricultural crops and integrated livelihood especially related to indigenous rice, pulses, coarse cereals, vegetable and other food requirement of Naga people etc. • Resilience and long term utility of land as an important resource for livelihood as CCA measure is enhanced	643.00

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
	• Already exposed vulnerable are covered with trees and soil quality is improved with cultivation of nitrogen fixing traditional pulses, coarse cereals with soil binding capacity • At least 30%. of jhumland in target area in each village is recovered by construction of bench terraces and land leveling		
C4. Soil productivity enhancement through environmentally sensitive measures	• 100 Vermi composting units are established in each village for nutrient recycling in 100 ha. of jhumland treatment per village for enhancing nutrient content of soil. • Nutrient content of soil is enhanced through application of Farm Yard Manure (FYM) and vermin composting • Acidic soils in the jhum areas are treated through lime application • Soil nutrient plans are prepared and soil testing is conducted periodically. • Soil health card are introduced for all farmers in selected villages • Chemical pesticides are replaced by organic pesticides in village	• Productivity of soils in jhum areas are enhanced through sustainable means and need to move to new areas through slash burn is reduced resulting into increase into jhum cycle by at least 50% • Production in Jhum areas are increased by at least 30%	294.75
C5. Propagation of traditional rice varieties under	• Indigenous rice varieties are propagated in 1000 ha, along with other traditional crops under integrated farming system	• Indigenous rice varieties and traditional varieties of coarse cereals, millets, pulses, fruits and	789.90

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
integrated rotational farming system	• Horticulture crops (fruits and vegetable crops) are grown at least 20% of treated area in jhum areas thus reinforcing traditional farming system • Income generations activities such as collection of Non Timber Forest Produce (NTFP) such as honey collection from natural forests are undertaken • Agro-forestry models are developed and selected forest trees species necessary to rehabilitating the area are replanted while moving from one plot of land to another • Farm ponds and water harvesting structure are developed for conjunctive use of water during extremely dry seasons • 100 ha per village land is brought under at least minimal irrigation (crop saving) through construction of field and open channels	vegetables are protected and propagated under integrated farming system to overcome climate change hazards and ensure food security • Additional income from NTFP forces tribal economy to realise value from standing forests rather than through slash and burn. • Recovery rate of jhum is hastened through replanting and agro-forestry models • Stressful dry conditions are delayed/ avoided through crop saving irrigation	
C6. Green energy management for jhum stabilization	• Remote areas under jhum cultivation are electrified through generation of electricity by hydrogers (technology developed by NEPeD) • Solar power unit are established • Irrigation facilities are extended by lifting water from seasonal/permanent streams by using ramp up pump and stored in farm ponds	• Use of renewable energy will enhance production and productivity of jhum lands and eliminate need for frequent shifting of agriculture field thereby extending jhum cycle • Electrification will help in	224.40

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
	• Zero energy consuming cold storages are developed for enhancing shelf life of perishable commodities • Agriculture is mechanized using renewable energy and drying, grinding and threshing units are established	promoting permanent cultivation, diversified livelihood, increased sources of income etc. • Post- harvest management of crops results into higher income and low wastage of perishable commodities prone to damage due to increased temperature / moisture conditions (climate change) thereby supporting food and nutritional security	
C7. Access to market for traditional varieties of rice and other jhum crops	• Farmers are organized into **Grower Associations** • Village level common facility centers are established as economically viable entities with facilities to support collective agri-business activities • Post-harvest management activities of indigenous rice and other crops are established • Crop produced under integrated rotational farming system are collectively branded and marketed • Market information is made available to farmers and community based collateral management systems are established.	• Enhanced access to regional and national markets for indigenous and organic products of Nagaland • Improved price discovery and price realization • Capital flow/ formation in traditional farm management systems thereby reinforcing ecologically sound and climate resilient agriculture practices	177.10

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
C8. Accompanying measures in technical collaboration with GIZ: Training and Capacity Building, Knowledge Management, Risk Management collaboration with other technical institutions etc.	• KCC is ensured for all farmers • Cadre of trained facilitators, farmers, Govt. officials established for CCA relevant agriculture management, sustainable land use planning and jhum stabilization • Crop-biodiversity budgets and seed exchange calendars established • Material for information, education and communication developed • Training and awareness on jhum stabilization, conservation of traditional crop varieties and land use planning are conducted • Exposure visits to successful demonstration sites are conducted and exchange of ideas for CCA relevant agriculture • Modules on self-monitoring and evaluation developed and implemented • Convergence with RKVY and other GoI and GoN schemes ensured • KCC are issued and all farmers • All farmers are covered by Pradhan Mantri Suraksha Bima Yojna (PMSBY) and Pradhan Mantri Jivan Jyoti Bima Yojna PMJJBY) • All farmers are covered by Pradhan Mantri Fasal Bima Yojna (PMFBY)	• Effective knowledge helps Jhum dependent communities enhance their knowledge base on ecosystem resilience of sustainable integrated agriculture, diversification of their livelihood, income and food security, access to market through collective action etc. • Capacities of stakeholders for using bio-diversity conservation as tool for food security and CCA is developed and communities become self-reliant through development and implementation of CCA relevant agriculture development plans in Jhum areas • CC issues are internalized in developmental policies • Awareness on systems of community based management of resources is strengthened though learning from other collaborative institutions • Comprehensive insurance cover of life and crop is achieved	24

Project Components	Expected Output	Expected Outcome	Amt in Rs. lakh
	• Knowledge networks with IRRI, ICAR, NMSHE and GIZ's CCA-NER established		
C9. Project Management by Government of Nagaland	• Project Management Unit is established under the supervision of Agriculture Production Commissioner • Project schedule is drawn and all department concerned are oriented to the project needs • Plan of convergence is drawn in collaboration with all department concerned of the GoN • Fund allocation is made for project management • Monitoring and evaluation mechanism is put in place and related MIS formats are developed • Departmental human resource is deployed with specific responsibilities • Transport and communication arrangements are made	Specific project management needs of a multi-departmental CCA project are realized as climate change issues run across sectors and require collaborative approach. A model for holistic convergence is evolved.	45
C10. NABARD Support: Project cycle management fee charged by the implementing entity @ 3% of project cost			73.91
Total amount of finance requested			2468.75

1.5 Projected calendar

Table 12 Project calendar

Milestones	Expected Dates
Start of project implementation	April 2017
Mid-term review (if planned)	Dec 2018
Project closing	April 2020
Terminal evaluation	March 2020

2 PROJECT JUSTIFICATION

a) Component-wise details and justification of the project components

i. What is the business as usual development for the target sector?

ii. What are the specific adaptation activities to be implemented to reduce the climate change vulnerability compared to business as usual situation?

iii. Please specify with regards to components as on the concrete adaptation activities of the project and how these activities contribute to climate resilience

Project justification: Strategy for CCA though gene pool conservation and propagation of indigenous rice varieties and other important crops of jhum areas

It is clearly demonstrated in earlier sections that jhum communities in Nagaland are highly vulnerable to climate change and GIZ experience has shown that conservation, propagation and seed exchange of traditional rice varieties will help in increasing resilient their resilience to climate change.

Promoting integrated rice farming in Nagaland as highly innovative adaptation strategy, builds on local traditions, and is likely to increase resilience of the farmers in the face of increased climate risks. Lately it has been realized that these gene pool can be effectively use for breeding programme as they have sustained adverse condition and can be potential donors of several desirable characters including nutrient content. Further very little works has been carried out in upland rice as compared to those cultivated under lowland condition. Collection and conservation of these germplasm will go a long way in conducting scientific studies and improvement of these varieties.

From food security point of view these varieties also need continuous improvement. This can be accomplished by utilising inherent characters of the varieties for developing high yielding varieties through farmers led participatory breeding programme (PBP). This is highly relevant from the point of view that 90% of the farmers of the state depend upon these land races for their food security where performance of modern HYV, which need high inputs, has not proved sustainable for the resource poor farmers of the state.

Moreover, conditions of climate induced erosion of germplasm leading to complete extinction of some of the promising cultivar, strongly require that there is an urgent need for conservation of

indigenous rice germplasm by the application of both *in situ* and *ex situ* conservation methods for sustainable utilization of the same for future generations.

Therefore, Nagaland can be developed as potential location for in-situ conservation and improvement of gene pool of indigenous rice varieties. While International Rice Research Institute (IRRI), under International Treaty of Plant Genetic Resource for Food and Agriculture has *ex-situ* international gene bank of rice accessions and wild varieties, Nagaland is a "natural *in-situ*" repository of over 867 species of rice preserved and cultivated since time immemorial. 16 Naga tribes spread across 11 districts of Nagaland, have specialised in natural selection and isolated cultivation of various varieties of rice under traditional rotational agriculture (*jhum* cultivation) system. These genetic resources are well protected though bio-fence of encapsulating forest areas. While *ex-situ* conservation, as done by IRRI, helps in preserving the existing genetic variability the *in-situ* preservation, as done by Nagas, can help in further diversifying that biological diversity. Varieties preserved under *in-situ* condition tend to be more robust to climate change as they evolve with changing environmental conditions through natural selection process.

Tribal communities have practiced sustainable cultivation of rice without much modern knowledge of scientific selection process. However, their traditional practices under *Jhum* cultivation have helped in *in-situ* preservation of rich gene pool of indigenous rice which is now a potential resource and an answer to hunger alleviating strategies in light of climate change. These rice varieties can be grown in different agro-climatic zones with different soil conditions.

Nagaland is therefore a natural laboratory for breeding numerous varieties of rice which can be matched and distributed for meeting requirement of food security in light of impending climate change provided a conscientious strategy is developed so support the indigenous knowledge and natural heritage of traditional rice cultivation of Nagaland.

State Agriculture Research Station (SARS) and GIZ under CCA-NER, have initiated efforts to preserve and promote indigenous rice varieties though exchange of rice varieties between tribal communities as climate change adaptation strategy. As a natural succession to rice-exchange-programme of GIZ, this project under NAFCC is proposed for **comprehensive conservation, promotion and marketing of indigenous rice varieties for** building climate resilience, enhancing livelihood, ensuring foods and nutritional security and promoting gender empowerment. Once successful, the pilot project can be expanded with the help of agencies like UNFCCC, FAO, ADB, WB, etc. The project component for conservation of tradional rice varieties will include:

i. **Exploration and collection of indigenous germplasm :** Exploration trips will be carried out at various regions of each district in the state. The exploration schedule will be pre planed for systematic approach. Information from farming communities and local folks can also be collected for exploring various ecological niches for germplasm collections. Field data on agro climatic conditions, plant associations, soil characteristics, altitude variations, amount of rain fall, GPS data on exact location of field etc. are to be noted for preparing the passport data sheet of each accession.

ii. **Documentation of accession and establishment of field gene bank:** Passport data sheet for each accession on special format with all relevant details have to maintain for future reference. Seed specimens are also to be deposited at SARS. Conservation is the primary aim of the Field Gene Bank. All accessions collected from identified location will have to carefully packed and transported to SARS. Later field introduction of these accessions in different plots of the Field Gene Bank will be carried out during the relevant season. Periodical monitoring and phonological data collection of introduced accessions will also be carried out for future reference. Seed collections for seed banking are also routine functions of the Field Gene Bank.

iii. **Morphological characterization:** Evaluation of genetic variants through characterization studies is the fundamental part in assessment of genetic resources. The true value of each genetic variant can only be determined through their characterization by appropriate methods.

iv. **Ex-situ and in-situ conservation in seed banks**: Standard seed banking protocol will be followed and the germplasm stored at seed bank for ex-situ and in-situ conservation as active collection. For this coordination with NBPGR and CRRI Cuttack is required.

v. **Multiplication and Distribution of high yielding genotypes:** After ascertaining the promising cultivars with high yield potential, they are multiplied in larger field within the SARS and distributed to other district within the state for testing in other location.

vi. **Registration:** Rice genotypes showing promising yield potential and wide adaptability will be processed for registration under NBPGR.

vii. **Develop climate resilient models of traditional farming systems**: Development of model for strengthening of traditional farming systems with indigenous rice as integral component can follow eco-systems approach to climate resilient farming.

Table 13 Project baseline, activities and their justification

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
1	No planning for land utilisation for jhum farming. Land is utilised as per convenience without any plan for capital formation and improving its productivity to address CC risk related to food security, livelihood and income generation	**1. Sustainable land use planning for CCA** • Stakeholder consultation is conducted in target villages for CC vulnerability analysis and its impact on food security vis-à-vis farming systems • Detailed baseline survey and inventory with characteristics of resources for better targeting of Jhum area in 10 villages that major traditional seed varieties • Identification of families vulnerable to climate change and allocation of at least 1 ha. jhum area per family for	• Planning provides scientific basis and enhanced understanding for project action plan and its components for addressing risks associate with CC • General consensus on the concept of climate change, conservation of bio-diversity and its relation to food security • Planned approach to development with community participation will help in long term sustainability of the project • Survey results are analyzed and used for SLUP • Vulnerable families are identified and their rights and obligations are delineated. Adaptation plan is prepared and agreed between stakeholders to reduce conflicts • Social profile is recorded and authenticated to reduce any conflicts

[9] Stakeholder consultation and PRA was conducted in one of the representative village i.e. Sangratu village in Mokokchung district located below NH-61 in between $94^0$33'02.70 East Longitude, 26^0 22'52.17 North Latitude. Its elevation is ranging from 500m to 1067m and the average slope is ranging from 30-50%.The drainage map and the proposed Soil and Water Conservation and drainage line treatment measures map were also prepared. The survey and PRA exercise conducted on the proposed project showed that the village has abandoned jhum fallow land devoid of use of any soil and water conservation measures in the past except use of scattered traditional bunding made of stone and log wood. 100 ha. of jhum land (out of total 250 ha), which is most sensitive to climate change hazards, in each village will be taken for treatment to minimise the impact of climate change.

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
		treatment, • Identification of key livelihood of the people and critical resources on which these livelihoods depend. • Vulnerability and resilience assessment of critical sectors and hazard mapping with development of hazard calendar and assessment of likely impact of hazards on resources • Prioritization of vulnerable sites (hotspot) and their treatment options keeping in mid the project objectives • Assessment of coping and adaptation strategies and implementation mechanism for food security and conservation of traditional rice (and other seed) varieties • Identification of institutional partnership for CC adaptation. Development of adaptation plan and identification of investments for CC adaptation • Social profile of selected villages and general agreement of the village council	• Agreement / MoU is signed with in village council • Key livelihoods and critical resources are identified and their vulnerability to climate hazards are recorded and understood by stakeholders to seek their active participation • Partner institutions are identified and their role discussed and clarified to get their long term commitment and involvement • Nodal department and other departments are trained in conducting PRA and CCA relevant planning so that departments cooperate in development planning • Community is equipped and trained to make positive contribution in the planning process • Confidence of Naga tribes and VC concerned is arrived through judicious allocation of jhum areas for treatment

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
		on the plan of action	
2	Nagaland is repository of 800+ rice varieties which are capable to handling challenges of climate change. However, these are disappearing over last few decades due to climate change and anthropogenic factors. Factors such as increase in temperature and recurrent draughts have resulted into loss of bio-diversity on which the traditional farming systems depend.	**2. Conservation of gene pool of traditional rice varieties and farm to farmer seed exchange:** 2.1 Survey, collection of germ-plasm and documentation 2.2 Conservation of genetic material 2.2.1 In-situ conservation in field gene bank – Jhum rice 2.2.2 In-situ conservation in field gene bank –Terrace Rice Cultivation by SARS 2.2.3 Ex-situ conservation and by SARS 2.3 Strengthening of SARS 2.3.1 Engagement of research scholars 2.3.2 Packaging and transportation of genetic material for farmer to farmer exchange 2.3.3 Establishment of mini-gene bank and upgrading of current storage facility of SARS 2.3.4 Purchase of farm equipment	• Programme for seed exchange of traditional rice varieties by GIZ have demonstrated that traditional rice varieties are more resilient to climate change and meeting food security challenges in Nagaland. • Genetic erosion of indigenous agricultural crops mainly rice is checked and farmers varieties are protected through identification, conservation, and seed exchange programme and more climate resilient indigenous varieties are available for farmers ensuring continuity of production, availability of food and increased income • Gene pool conservation of staple food crops becomes national priority and an important component of CC strategy • Unless the germ plasm of indigenous tice varieties are conserved through in-situ and ex-situ conservation their genetic wealth will be lost for ever • Nagas through their traditional integrated rotational farming practices (sustainable jhumming) have conserved rice varieties over the centuries that need to be documented and promoted. • SARS, which have documented 867 rice varieties, lacks resources for furthering their agenda. Therefore,

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
			SARS efforts need to be supported • Conservation of indigenous rice varieties can be a solution to the problem of food scarcity due to climate change where rice varieties across the world are losing their potency and virility with loss of bio-diversity • Network of farmers is developed and interest generated for on farm conservation of indigenous rice and other crop varieties • Gene pool utilized by research organization for further enhancement of rice varieties to enhance CC resilience and food security • SARS is established as knowledge center for indigenous rice varieties
3	Micro (stakeholder consultation) and macro CC analysis (CC modelling) have shown increase in frequency of extreme events and hazards especially high intensity rains over s short spell of time. This results into: • Heavy soil erosion on almost all fallows under shorter jhum cycles which are exposed due to lack of	**3. Area treatment for traditional rice cultivation** 3.1 Sediment monitoring 3.2 Physical measures in jhum areas for soil erosion and degradation control 3.2.1 Contour bunding with stones and local material 3.3 Drainage line treatment 3.3.1 Gully plugs 3.3.2 Loose boulder check dams 3.4 Land rejuvenation 3.4.1 In-situ conservation of trees,	• Contour bunding using local material is (bamboo and other vegetation bunds) most effective means in soil and water conservation at micro / farm level • The practice of contour bunding is found to increase crop yield by about 15-20%. • Vegetation cover is essential till the time the tranches and bunds get stabilized. Erosion resistant crops such as millets, tubers, coarse grains on soil and water conservation measures allow runoff but resist soil erosion thereby maintaining an optimal soil and water regimen.

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
	vegetation. • Landslides during heavy rain mostly along the drainage line are frequent leading to loss of property and agricultural assets • Heavy rains also result into cutting or stream banks and frequent changes in the course of hilly streams leading to crop damage.	planting of coarse cereals, pulses and millets 3.4.2 land leveling and bench terraces on sensitive areas	• Afforestation in exposed area and planting of grasses, pulses and millets on bunds helps in stabilizing the structures and also result in improving soil quality. • Soil erosion and degradation control measure are effective both as preventive and curative measure to check impact of CC (high intensity rains) • Treatment of drainage line (through gully plugs and loose boulder structures) will help in reducing the rate of flow of water in the streams thus preventing landslides, cutting of stream banks and flooding of farm lands and low lying areas during extreme climate events. • As farmer move from one field to another under jhum cultivation replanting of land stabilizing tree species will help in its recovery at faster rate as it will check soil erosion under extreme climate events • Land leveling and bench terracing on suitable areas will convert these cultural wasteland into permanent field thereby reducing need for shifting from field to field. • All above activities will make land suitable for longer tem / permanent cultivation of agricultural crops and integrated livelihood especially related to indigenous rice, pulses, coarse cereals, vegetable and other food

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
			requirement of Naga people etc. • Resilience and long term utility of land as an important resource for livelihood as CCA measure will enhance
4	Most jhum area is under vicious cycle of low soil productivity (low nutrient level) and shorter jhum cycle where both are cause and effect of each other. These soils are no longer suitable for supporting traditional integrated farming systems and indigenous crops mainly rice. As a result of loss of natural vegetative cover these lands have also become acidic and non-productive.	**4. Soil productivity enchantment in jhum areas through environmentally sensitive measures** 4.1.1 Vermicomposting, green leaf manure, FYM 4.1.2 Lime application for treatment of acidic soils 4.1.3 Use of organic pesticides 4.1.4 Soil testing and introduction of soil health cards	• Vicious cycle of low nutrient level and shorter jhum cycle can only be broken by making investment in environmentally sensitive productivity enhancement measure to improve CC resilience. • With periodic soil testing community can become more climate resilient by optimal nutrient management and crop selection based in micro-environmental conditions • Soil health cards can show progress of CC resilience • Vermi composting, jhum sanitation units developed under the project can be source of livelihood for the jhum dependent community • Soil will become neutral after application of amendments such as lime their neutrality is maintained by proper crop selection

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
	Nagaland is deficient in food production. This situation is getting aggravated under CC scenario and more and more traditional food varieties are being lost with loss of genetic diversity of food crops. Rice is important for food security and is an integral component of Naga life style (please refer note on rice in section 1.1 a (ii)). Introduction of HYV require heavy inputs in the forms of fertilizers, irrigation, application of crop protection chemicals etc. which are not available in Nagaland. Specialisation of stable crops resulting into non-availability of diverse food items necessary for nutritional security	**5. Propagation of traditional rice varieties under integrated farming systems** 5.1 CCA resilient farming systems 5.1.1 Traditional rice propagation 5.1.2 Intercropping with CC resilient crops 5.1.3 Planting of horticulture crops along contour bunds 5.1.4 Honey production as alternate livelihood 5.1.5 Agro-forestry – regeneration of forests in fallow lands 5.2 Optimal irrigation management 5.2.1 Farm ponds and water harvesting structures 5.2.2 Development of open and field channels	• It has been demonstrated by GIZ through its seed exchange experiment that indigenous varieties will succeed where HYV have failed. • Indigenous rice varieties and traditional varieties of coarse cereals, millets, pulses, fruits and vegetables are protected and propagated under integrated farming system to overcome climate change hazards and ensure food security as these crops are grown as insurance against failure of one or two crops due to CC thereby ensuring food and nutritional security • Additional income from NTFP (honey) persuades tribal economy to realise value from standing forests rather than through slash and burn. • Recovery rate of jhum is hastened through replanting and agro-forestry models • Stressful dry conditions are delayed/ avoided through crop saving irrigation as water from perennial and seasonal schemes is collected in farm ponds and used for crop saving irrigation through ramp up pumps or rainwater harvesting. Water resource can be maintained as water bank for crop saving in stressful times of prolonged draughts

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
6	Lack of energy is the main cause of jhum cultivation where tribes prefer to use slash and burn technique to get productive soils as it requires less human labour as compared to improving productivity through investments that require energy in the form of electricity or fossil fuel. Therefore issues of CC in jhum areas can be addressed by making available renewable energy at reasonable price.	**6. Green energy management of Jhum stabilization** 6.1.1 Community managed hydrogers for generating electricity from flowing streams 6.1.2 Solar power generating units for lighting of homes and use of hold equipment 6.1.3 Ramp up pump for water lifting from streams 6.1.4 Community managed zero energy cold storage for improving shelf life of perishable agriculture commodities 6.1.5 Harvesting of crops by manual hydroger connected thrasher 6.1.6 Post harvesting processing using Solar dryer and pedal run grinders	• Use of renewable energy will enhance production and productivity of jhum lands and eliminate need for frequent shifting of agriculture field thereby extending jhum cycle • Electrification will help in promoting permanent cultivation, diversified livelihood, increased sources of income etc. • Post- harvest management of crops though availability of green energy will results into higher income and low wastage of perishable commodities prone to damage due to increased temperature / moisture conditions (climate change) thereby supporting food and nutritional security
7	Farmers are not organised and intermediaries dominate value chains as they collect jhum products from villages at low prices where farmers do not have any access to market	**7. Access to market for traditional rice varieties and other jhum crops varieties** 7.1.1 Farmers are organized into grower associations and aggregation, sorting and grading center and common	• Market access initiative will ensure eenhanced access to regional and national markets for indigenous and organic products of jhum areas in Nagaland • Improved price discovery and price realization • Capital flow/ formation in traditional farm management systems thereby reinforcing ecologically sound and climate resilient agriculture practices

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
	information and means of realising true market value. This results in exploitation of farmers. lower income for farmers ultimately leads to no/low capital formation / investments in traditional farming systems which degrade over time and become vulnerable to vagaries of climate change	service center are established 7.1.2 Rice milling 7.1.3 Packaging and transportation 7.1.4 Market information collection and dissemination 7.1.5 Branding and marketing	• Community common facility centers become operational and crops are collectively processed (milling etc.) packaged and marketed bringing economies of scale • Collective marketing results in better bargaining power to the farmers • Price decision is taken on the basis of correct information available with the farmers. • Bank linkages help in improving holding capacity of the farmers till acceptable prices are realized
8	Presently most government departments work in silos and international and national research institutions working of CC issues do not have ground presence. There are no systems for capturing traditional knowledge and combining it with scientific research to provide efficient CCA tools especially in agriculture sector.	**8. Accompanying measure in technical collaboration with GIZ** 8.1.1 Collaboration with research institutions like ICAR, IRRI etc. 8.1.2 Training and awareness 8.1.3 Workshop and exposure visit for knowledge sharing and 8.1.4 Knowledge management 8.1.5 Risk management (PMSBY, PMJJBY, PMFBY, KCC) 8.1.6 Appointment of village facilitators as link between government departments and VCs	• Training and capacity will generate a cadre of trained facilitators, officials, farmers as knowledge facilitators under the project for current and future assistance / deployment in CC projects • Knowledge tools such as scientific seed exchange calendar when developed can be used for bio-diversity budgeting • Material for information, education and communication will developed to provide CCA training to stakeholders • Other schemes such as RKVY will also draw knowledge from the project in convergence mode • Frequent sharing of information between partners in knowledge network will be facilitated

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
	So called risk management through introduction of HYV increase risk and most agriculture insurance products are available for farming of HYV.		• Knowledge management will help Jhum dependent communities enhance their knowledge base on ecosystem resilience of sustainable integrated agriculture, diversification of their livelihood, income and food security, access to market through collective action etc. • Capacities of stakeholders for using bio-diversity conservation as tool for food security and CCA will develop and communities will become self-reliant through development and implementation of CCA relevant agriculture development plans in Jhum areas • CC issues will get internalized in developmental policies • Awareness generation on systems of community based management of resources will strengthened though learning from other collaborative institutions • Risk management systems such as PMSBY, PMFBY, PMJJBY) can be implemented effectively through the project
9	Presently there is no project management unit for implementation of such projects under convergence mode involving communities and government departments. As a result of which communities do not have much say in the	**9. Project Management with community participation** • Project Management Unit will establish under the supervision of Agriculture Production Commissioner where VC representatives will also be the members. • Project schedule will be drawn and all	• Long term cooperation plans will get established between communities and the department concerned • Specific project management needs of a multi-departmental CCA project will be realized as climate change issues run across sectors and require collaborative approach. A model for holistic convergence will evolved. • Communities are trained on self-monitoring and their capacities are built to take collective decisions

S. No	Baseline/ Business as usual scenario based on stakeholder consultation[9] (CC hazards)	Specific adaptation activities to reduce climate change vulnerability.	Justification for adaptation activity for contributing to climate resilience
	decision making	department concerned will get oriented to the project needs • Plan of convergence will be drawn in collaboration with all department concerned of the GoN. • Fund allocation is made for project management where operations cost will be met through non-planned budget of the State Government and convergence with centrally and state sponsored schemes will be achieved from planed budgets • Monitoring and evaluation mechanism will be put in place with MIS formats • Departmental human resource will be deployed with specific responsibilities • Transport and communication arrangements will be made from the project	• Network of the community with scientific institutions are established and communities directly interact with these institutions to get scientific and technical support in future.

b) Economic, social and environmental benefits of project

Discussed in previous section 3(a) as part of column 3 "Justification for adaptation activities for contributing to climate resilience"

c) Sustainability of interventions beyond lifetime of the project

How will the project assure that the benefits achieved through its investments are sustained beyond the lifetime of the project?

Even though the project will be anchored initially by the Executing Entity, it is envisaged that several institutional development initiatives and capacity building initiatives would sustain the initiative beyond the project period. Village facilitators would ensure interface with Village Councils to undertake the operation and management. Under the project community will get trained in each aspect of project management and specially conservation of genetic diversity of agriculture crops, farm management with integrated farming systems and collective marketing of products. Community institutions in Nagaland are very strong and deep rooted. The soil moisture conservation measures will be based on long term climate proofing design and hence are expected to sustain the stress. The emphasis of the project is on combining traditional knowledge with scientific tools to achieve climate resilience. Therefore, the network of communities with State, national and research institutions once developed will ensure exchange of information for long term sustainability. SARS will act as repository of genetic material and will continue to upgrade its gene bank to serve the community and help them in improving their resilience of integrated farming systems.

d) Analysis of the cost-effectiveness of the Proposed Project

*i. **Cost effectiveness** will compare alternatives options available and how the proposed components/ interventions are best for given climate conditions. It will also demonstrate how the community has preferred the selected interventions and their views / concerns are addressed while designing the project. The proposal should compare to other possible interventions that could have taken place to help adapt and build resilience in the same sector, geographic region and / or community. The comparison of the chosen options vis-à-vis alternative options may be provided as per the table given below:*

Table 14 Cost effectiveness of investment options

Proposed Activity	Alternatives	Benefits / Cost Effectiveness
C1: Micro-Sustainable bottoms-up land use planning with PRA and stakeholder consultation.	Macro – top down project planning and implementation	Bottom up planning takes into account social, cultural and technical aspects of project planning. It builds community trust and ensures active participation in project implementation. PRA tool when used for stakeholder consultation can easily identify vulnerable resources, communities, climate hazards, livelihood options and helps in prioritisation of investments. Proposed methodology is proven to be more cost effective
C2: Gene pool conservation of traditional varieties of rice and other jhum crops thorough development of gene bank (ex-situ and in-situ conservation) and farmer to farmer seed exchange	Adoption of HYV developed elsewhere	HYV are not climate resilient and require heavy investments in terms of agriculture inputs such as irrigation, use of chemical pesticides, fertilizers, mechanisation etc which are not available in Nagland. HYV have proved to be more a liability than a resource. Traditional indigenous varieties on the other hand are more climate adaptive, tolerant to draught and heavy rainfall, pest resistant and provide insurance against limited loss under integrated farming system. Traditional varieties are more acceptable the society as they get well with traditional food habits of the people and provide better food and nutritional security under Nagaland conditions as discussed in detail in this document.
C3: Area treatment of traditional rice cultivation and integrated farming under jhum system	Area treatment on mountainous terrain for intensive mono-cropping under Wet Rice Cultivation methodology	Jhum or rotational farming with integrated farming systems and longer cycles are more climate resilient and environmental friendly whereas mono-cropping on mountainous terrain require very heavy investments for land levelling and terrace formation. Under Jhum cultivation terraces are made selectively (30-40%) only on unculturable and/or sensitive lands. Jhum can be easily stabilised with less intensive physical measures (drainage line treatment, g etc.) as vegetative cover provides protection for

		most part of the jhum cycle. Jhuming with long cycles if done correctly does not interfere with the soil conditions thus is more resilient to CC specially in State like Nagaland where it has been practised for centuries.
C4: Soil productivity enhancement through environmentally sensitive measures	Use of chemical fertilizers, pesticides, etc.	Locally available green leaf manure, vermicomposting and use of farm yard manure are more cost effective and efficient in long run.
C5: Propagation on traditional rice varieties under traditional farming system	Same as C2	Same as C2
C6: Use of green energy for jhum stabilisation	Use of fossil fuel and supply of electricity from the main grid	Green energy is renewable, does not require initial heavy investments and is environmentally friendly. NEPeD has expertise to promote such energy in considerably low cost.

ii. Weighting of the project activities

***How much funding will allocated to investment activities, capacity building activities, project management activities respectively*?**

Details are given in section 3(f)

e) Alignment with NAPCC/SAPCC and other Policies/Programmes

The project is closely linked to Agriculture mission under NAPCC and SAPCC. The activities identified in SAPCC which the project is addressing are given in section 1.1 b. Learning from this project will be utilized for development of a major project on these lines covering all the districts for ensuring food security, long term sustainability of land and water resources, jhum stabilization and optimization, livelihood and income generation. It will have linkages with MNREGA, RKVY, IWDP, Swatch Bharat Mission and National Food Security Mission for convergence.

f) Technical standards, cost norms and weighting of cost component

Table 15 Technical standards, cost norms and weighting of cost components

	Particulars	RI/R&M IN 2nd/3rd yr	Govt/Farm. Cont.	Unit	No. of Units/ Vill	Unit cost	Cost Norms	Technical Specification	NAFCC Fund Reqmt. Rs. lakh)
1	**SUSTAINABLE LAND USE PLANNING**								
1.1	Identifiation of CC vulnerable families, Resource mapping and development of LUP in collaboration with VDC for jhum allocation (1 ha. per CC vulnerable family)	0%	0%	No.	1	0.50	Based on sample PRA and SLUP for NAFCC done		**5.00**
2	**CONSERVATION OF GENE POOL OF TRADITIONAL RICE VARIETIES AND FARMER TO FARMER SEED EXCHANGE**								
2.1	Survey, collection of germplasm, characteristion	100%	0%	LS	1	24.20	SARS estimates	SARS Specifications	72.60
2.2	Conservation of genetic material								
2.2.1	In-situ conservation - field gene bank - Jhum rice (5 Ac.)	100%	0%	LS	1	1.05	SARS estimates	SARS Specifications	3.15
2.2.2	In-situ conservation -field gene bank - TRC	100%	0%	LS	1	0.98			2.94
2.2.3	Ex-situ conservation - operation cost of mini gene bank in SARS (5 Ac.)	100%	0%	LS	1	12.00			36.00
2.3	Strengthening of SARS								
2.3.1	Engagement of research scholars	100%	0%	No.	2	6.00	SARS estimates	SARS Specifications	36.00
2.3.2	Packaging and transportation of genetic material for farmer to farmer exchange	100%	0%	LS	1	3.00			9.00
2.3.3	Establishment of mini gene bank and up gradation of current facility	0%	0%	LS	1	30.00			30.00
2.3.4	Purchase of farm equipment	0%	0%	LS	1	2.00			2.00
Total									**191.69**
3	**AREA TREATMENT FOR TRADITIONAL RICE CULTIVATION**								
3.1	Sediment monitoring equipment	0%	0%	No.	1	0.10	GoN Estimate	Lump Sum	1.00
3.2	Physical Measures in Jhum Areas for controlling soil erosion and degradation								
2.2.1	Contour bunding	10%	25%	Ha.	40	0.38	PWD Schedule of Rates	GoN Specifications	136.80
3.3	Drainage line treatment								
3.3.1	Contour trenching	10%	20%	No.	25	0.13	PWD Schedule of Rates	GoN Specifications	31.20
3.3.2	Loose boulder check dams	10%	20%	No.	10	0.10	PWD Schedule of Rates	GoN Specifications	9.60
3.4	Land rejuvenation								
3.4.1	Planting of coarse cereals and pulses	20%	25%	Ha.	30	0.16	GoN Estimate	GoN Specifications	50.40
3.4.2	Land levelling and bench terraces	10%	25%	Ha.	11	1.00	PWD Schedule of Rates	GoN Specifications	99.00
3.4.3	Plantation of area specific tree species	25%	25%	Ha.	100	0.30	Forest Department Rate	GoN Specifications	315.00
Total									**643.00**
4	**SOIL PRODUCTIVITY ENHANCMENT IN JHUM AREAS THROUGH ENVIRONMENTALLY SENSITIVE MEASURES**								
4.1.1	Application of FYM, green leaf, vermi composting	100%	25%	Ha.	100	0.09	S&WC Dept Rates	GoN Specifications	202.50
4.1.2	Use of organic pesticides	25%	25%	Ha.	100	0.07	S&WC Dept Rates	GoN Specifications	78.75
4.1.3	Jhum Sanitation -Toilet for night soil collection for conversion to green manure and low cost jhum sanitation	10%	25%	No.	5	0.30	GoN Estimate	Lump Sum	13.50
4.1.4	Soil testing and introduction of soil health cards	100%	100%	No.	100	0.004	GoN Estimate	Lump Sum	0.00
Total									**294.75**

	Particulars		RI/R&M IN 2nd/3rd yr	Govt/Farm. Cont.	Unit	No. of Units/ Vill	Unit cost	Cost Norms	Technical Specification	NAFCC Fund Reqmt. Rs. lakh)
5	**PROPOGATION OF TRADITIONAL RICE VARIETIES UNDER INTEGTATED FARMING SYSTEMS**									
5.1	CCA integrated farming practices (for 3 years)									
	5.1.1	Traditional rice propagation	50%	30%	Ha.	100	0.16	SARS estimates	SARS Specifications	224.00
	5.1.2	Intercropping with CC resilient crops (seeds)	50%	30%	Ha.	100	0.08	SARS estimates	SARS Specifications	112.00
	5.1.3	Planting of horticulture crops along countour lines	20%	25%	Ha.	45	0.30	SARS estimates	SARS Specifications	141.75
	5.1.4	Honey and other IGA activities	20%	25%	No.	10	0.25	Beekeeping and Honey	Mission estimates	26.25
	5.1.5	Agro-forestry/ regeneration of forest in fallow lands	10%	25%	Ha.	28	0.35			88.20
	5.1.6	Other income generating activities	20%	25%	No.	10	0.40	Market Rates	Market Requirement	42.00
5.2	Irrigation management									
	5.2.1	Farm ponds and water harvesting structure	10%	25%	No.	2	4.00	PWD Schedule of Rates	GoN Specifications	72.00
	5.2.2	Open channels	10%	25%	No.	5	1.26	PWD Schedule of Rates	GoN Specifications	56.70
	5.2.3	Field channels	10%	25%	Ha.	50	0.06	PWD Schedule of Rates	GoN Specifications	27.00
Total										**789.9**
6	**GREEN ENERGY MANAGEMENT FOR JHUM STABILISATION**									
	6.1.1	Community managed hydroger (3kw)	10%	25%	No.	1	5.5	NEPeD estimates and specification		45.38
	6.1.2	Solar power generating unit (2kw)	10%	25%	No.	1	6			49.50
	6.1.3	Ram pump - 4 inch	10%	25%	No.	1	3.7			30.53
	6.1.4	Community managed zero energy cold storage 75 cum	10%	25%	No.	1	8			66.00
	6.1.5	Solar dryer	10%	25%	No.	1	3.75			30.94
	6..6	Hydroger run grinder	10%	25%	No.	1	0.25			2.06
Total										**224.41**
7	**ACCESS TO MARKET FOR TRADITIONAL VARIETIES OF RICE AND OTHER JHUM CROPS**									
	7.1.1	Aggregation, sorting and grading centre and common service center and post harvest storage facility	10%	0%	No.	1	2	Market Rates	Market Requirement	24.00
	7.1.2	Milling (12kg paddy to 7 kg rice) @ Rs.2/kg for 100 ha. / village and 2.5MT/ha.	0%	0%	MT	250	0.02			50.00
	7.1.3	Packaging and transportation of rice @ Rs. 2/kg	0%	0%	MT	145	0.05			72.50
	7.1.4	Market info. collection and dissemination	100%	0%	N0	1	0.02			0.60
	7.1.5	Branding and marketing	100%	0%	LS	1	10			30.00
Total										**177.10**
8	**ACCOMPANYING MEASURES IN TECHNICAL COLLABORATION WITH GIZ**									
	8.1.1	Collaboration with institutions (IRRI, ICAR etc.)	100%	0%	LS	1	2	SARS estimates	Lump Sum	6.00
	8.1.2	Training and awareness (1 per village)	100%	0%	No.	1	0.20	SARS estimates	Lump Sum	6.00
	8.1.3	Workshop and exposure visit within Nagaland for knowledge and experience sharing	100%	0%	No.	1	0.40	SARS estimates	Lump Sum	12.00
	8.1.5	Knowledge management**	100%	100%					From GIZ under CCA-NEF	0.00
	8.1.6	Risk Management***						GoI Schemes	Agriculture, health and life i	0.00
Total										**24.00**
9	**PROJECT MANAGEMENT (GoN)***									
	9.1	Transport and communication	100%	0%	No	1	1.00	GoN Estimate		30.00
	9.2	Monitoring and evaluation						Mid Term and End Term Review by External Agen		0.00
	9.3	Purchase of office equipment for project mgt	0%	0%	LS	1	15.00	GoN Estimate		15.00
Total										**45.00**
10 NABARD FEES										**73.91**
GRAND TOTAL										**2468.76**

Contour bunding: Contour bunds (commonly know as echo) is practised to intercept the runoff flowing down the slope by an embankment with either open or closed ends to conserve moisture as well as reduce erosion. The land treatment in between the bunds is desirable for uniform conservation of moisture. The project envisages construction of contour bunds either in continuous or staggered form with locally available materials to ensure creation of various bund structures such as stone bund, bamboo split bund, log wood bund etc. The earthen bunds will be of trapezoidal shape and will be constructed in sloppy jhum lands having an average slope of 50%.

Design specification

Top width: 0.35m
Base width: 0.70m
Height: 0.70m
Slope: 50%
Vertical interval=0.3(50/3+2)=3m
Horizontal interval= 3 x100/50=6m
Length of bund per ha=10000/6=1666m

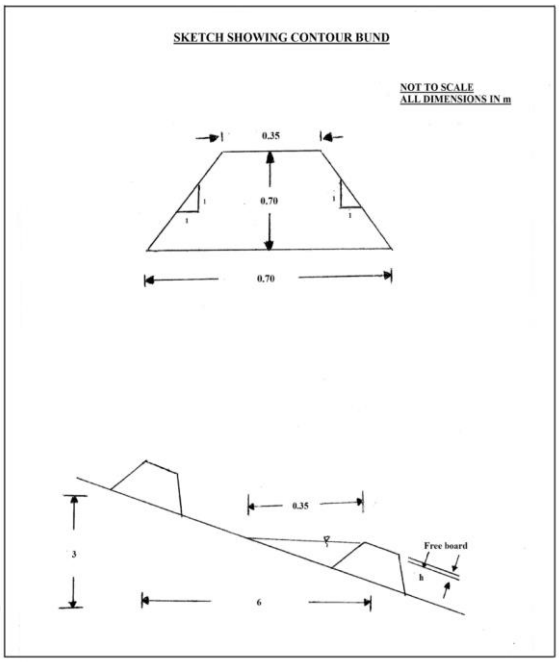

Figure 34 Sketch of contour bund

Planting of Grasses and other crops on soil and water conservation measures: Cultivation of "erosion permitting crops" in sloping lands can cause maximum runoff and top soil erosion and thereby causing loss of soil nutrients and reduced soil moisture holding capacity for crop production. On the other hand, cultivation of erosion permitting crops and erosion resisting crops in combination as strip cropping will ensure safe conveyance of runoff and thereby reduce soil erosion. Crops such as coarse grain, millets (Job's tears), pulses, tuber crops, etc can be cultivated along the contour bunds and serve the purpose of erosion resisting crops. Cultivation of upland paddy as main crop and cultivation of colocasia, tapioca, soyabean, grams etc in the bunds has been proposed in the proposed jhum field for effective soil conservation measures and economic crop production. About 6ha area of the bunds in jhum land will be used for cultivation of erosion resisting grasses and crops.

Photo: 9 Colocassia as soil conserving crop

Photo: 10 Grass cultivation along field channels

Photo: 11 Contour strip cropping with maize

Gully plugs: These are constructed in first order streams with gully depth less than 2m and slope less than 10% having facility for side spillway

Design specification

Top width: 0.6m
Bottom width:2.50m
Side slope on u/s and d/s: 2:1
Maximum height: 3.0m
Minimum height: 1.0m
Stone pitching: upto full supply level of water (FSL) on u/s

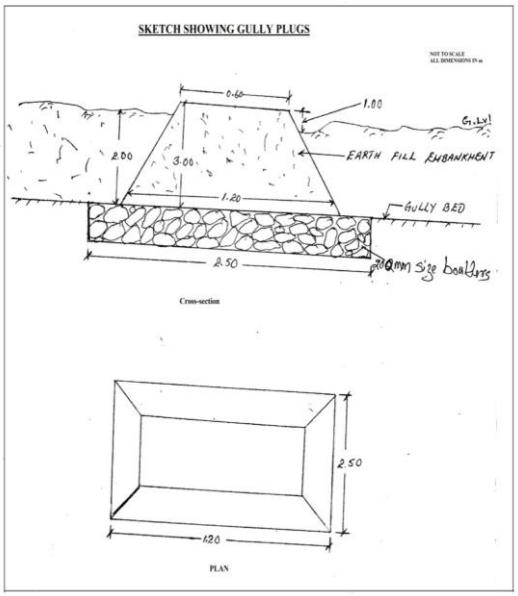

Figure 35 Sketch of gully plug

Photo: 12 Traditional method of controlling water velocity

Photo: 13 Traditional water retention structures

Loose bounder check dams/ structures: To control channel erosion and to stabilize gully heads. It is constructed where adequate quantities of stones are available

Design specification
Top width: 1.5m
Base width: 2.5m
Side slopes: 1:1
Depth of foundation: 1.8m
Height above ground level: 1.3m
Keying into stable portions of banks: 0.5m

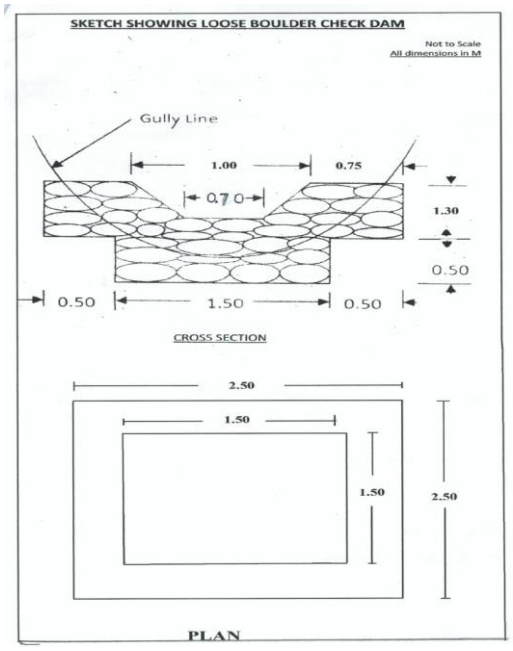

Figure 36 Sketch of loose boulder stru.

Bench Terraces: Terraces are effective means of soil conseravation that provide base for settled cultivation on steep slopes

Design specification

Average slope: 30%
Depth of cut: 0.30m
Clear width of terrace: 2.00m
Vertical interval: 0.86m
Horizontal interval: 2.86m
Volume of earthwork/ha:750 cum

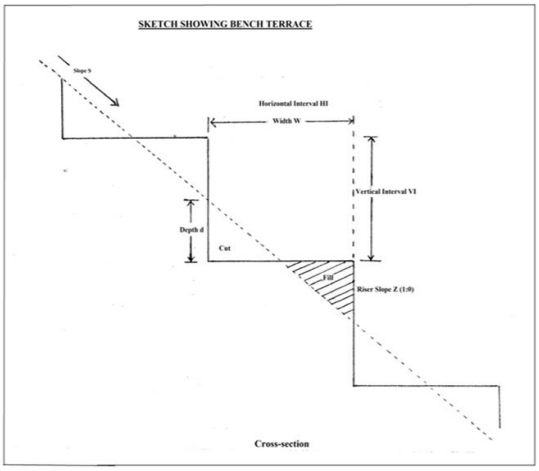

Figure 37 Sketch of bench terrace

Photo: 14 Terrace cultivation in jhum fields

Dugout ponds

Design specification

Top length and breadth: 5m
Bottom length and breadth: 4m
Batter: 1.5 : 1
Depth:1.6m
Volume of pond: 83.12 cum

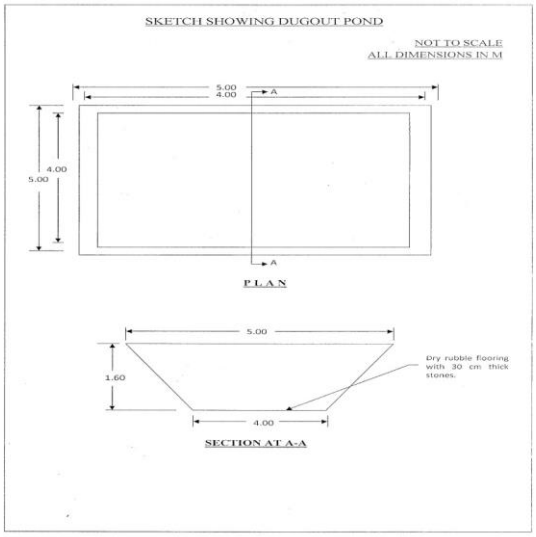

Figure 38 Sketch of dug out pond

Farm Pond: To be constructed at the upper elevation catchment of the project site that will be fed by perennial water source

Design specification

Top length and breadth: 25m
Bottom length and breadth: 15m
Batter: 1.5 : 1
Depth: 1.5m
Volume of pond: 600 cum

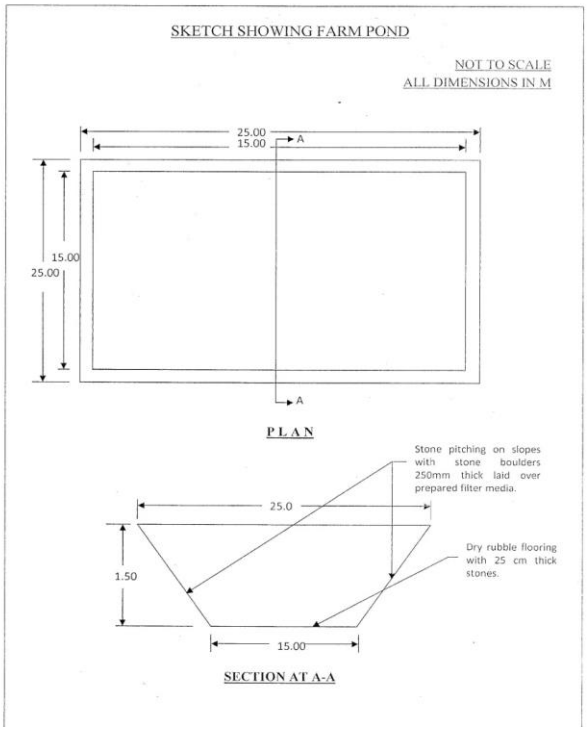

Figure 39 Sketch of farm pond

Photo: 15 Farm pond

Rainwater harvesting

Photo: 16 Rain water harvesting in jhum areas

Afforestation gap filling/ agroforestry/ plantations : Much of the catchment area had been subjected to jhum cultivation as such canopy cover is sparse and mosaic and there is any dense tree growth. Therefore, it is proposed to undertake artificial regeneration of forest in this degraded catchment. Plantation of most economic and soil friendly tree species such as Alder (*Alnus nepalensis*, Yongchak (*Parkia roxburghii*) and locally available tree species has been proposed. The activities will include; advance work involving jungle clearing, burning and removal of stumps; creation and maintenance for a period of three years. Apart from afforestation work, agroforestry comprising of agriculture and soil friendly tree species will be maintained in the jhum land suitable for such activities to bolster multiple economic return.

Photo: 17 Agroforestry in jhum areas

g) Duplication check

Table 16 Duplication check

Project	Objectives	Complementarity	Geographical Coverage/Agency
Integrated watershed development project (IWDP)	Soil and water conservation and improvement of livelihood	The jhum areas are proposed to be treated under the project. The emphasis in on soil and water conservation and productivity enhancement on delineated jhum areas in selected villages	Different approach; No duplication; 10 representative villages in 10 blocks (1 village in each block) in five districts (2 blocks in each district) selected based on specified criteria irrespective of watershed in which they lie.
RKVY	Agricultural and allied activities	Emphasis is on conservation of traditional rice varieties through convergence. Any investment under RKVY will be taken as govt. / beneficiary contribution.	No duplication
PMSBY, PMJJBY, PMFBY	Comprehensive life and crop insurance	These schemes will also be promoted in project villages and ensured that all farmers are covered under the scheme	Entire project area – 100% coverage but no duplication.

h) Details on stake-holder consultation

Table 17 Stakeholder consultation

Consultation	Date/Place	Participation	Objective	Outcome
Consultation on NAFCC	Date: 07.04.2016 Kohima	All department	Understanding NAFCC framework	NAFCC scope and potential in Nagaland discussed in detail
GIZ	Date 08.06.2016 Kohima	GIZ consultant	Discuss results of seed exchange Programme	Conservation of genetic material and seed exchange are possible solution to threat to food security due to CC
GIZ and all departments	Date: 28.06.16 Kohima	GIZ and all departments	Selection of sector for preparation of NAFCC project	Agriculture and allied activities unanimously selected as top priority
SARS and departments concerned	Date: 13.07.16 Kohima	GIZ consultant and officials of departments concerned	Development of formats for stakeholder consultation and PRA for CC vulnerability assessment	Sensitization of the departmental staff on CC vulnerability analysis and bottoms up planning Development of project village selection criteria
SARS and all departments concerned and VC representatives	Date: 04-06.08.2016 Mokokchung	Officials of departments and VC and villagers	Stakeholder consultation and PRA is a representative village for development of DPR	Issues of CC vulnerability and its relation to biodiversity conservation of agricultural crops (mainly rice) and investment requirements identified. Framework of project with associated risks

				discussed in detail
All departments concerned and VC representatives	Date: 12.08.2016 Kohima	Official and VC representatives	Cost norms for investment in jhum areas agreed	Preparation of project budget by adoption of cost norms Sharing of responsibilities between stakeholders for project implementation
With Stakeholder Departments	Date: 18.08.2016 Kohima/ Mokokchung	Various line Department	Data collection	Basic data gathered for DPR preparation
With Stakeholder Departments and community representatives	Date 20.09.2016	Various line Department and community representatives	Agreement on DPR	DPR agreed for implementation

i) Learning and knowledge management component

A full set of activities has been marked for generating audio-visual case studies to document the experience. In addition, the policy brief and monitoring report will provide a good insight into the project. The project will include modules/knowledge products like:

- Display of project activities, experience and learning on Government of Nagaland website
- Compilation of farm based schemes of the Government of India and Government of Nagaland that can have convergence with the project
- Manual for stakeholder consultation for climate change vulnerability assessment and hazard analysis and planning for CC resilience and adaptation
- Development of guidelines and genetic conservation of agriculture crops in line with guidelines issues by Center for Genetic Resource on Food and Agriculture
- GIZ success stories on past seed exchange programmes in Nagaland
- Training material for seed selection, collection and multiplication of traditional crop varieties specially rice (pictorial with both English and local language).
- Manual for field operation for soil and water conservation measures
- Manual for scientific crop selection based on micro-environmental conditions
- Planning module for crop – water budgeting.
- A document on ex-ante and ex-post measures of adaptation outcome and lesson.
- Development of knowledge network with NMSHE, IRRI, ICAR, FAO and CGRFA
- Policy documents in water, food and livelihood security
- Material for climate resilience of livelihoods
- Case studies of success stories and learning from the project developed
- Programme broadcast on radio and television conducted for knowledge sharing and information dissemination in collaboration with SARS
- Exposure visits for community awareness generation
- Manual for monitoring and evaluation of the project activities

j) Sustainability of the project outcomes in project design

Table 18 Sustainability of project outcomes

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
C1: Sustainable land use planning • Availability of scientific basis and enhanced understanding for project action plan and its components for addressing risks associate with CC • General consensus on the concept of climate change, conservation of bio-diversity and its relation to food security • Planned approach to development with community participation	• Stakeholder consultation in target villages • Detailed baseline survey and inventory with characteristics of resources for better targeting of Jhum area in 10 villages • Identification of families vulnerable to climate change and allocation of at least 1 ha. jhum area per family for treatment, • Social profile of selected villages and general agreement of the village council on the plan of action • Identification of key livelihood of the people and critical resources on which these livelihoods depend. • Vulnerability and resilience assessment of critical sectors and hazard mapping with development of hazard calendar	• 10 villages are selected based on objective selection criteria discussed in the report • PRA for stakeholder is conducted and documented with peoples participation • Survey results are analyzed and used for SLUP • Vulnerable families are identified and their rights and obligations are delineated • Social profile is recorded and authenticated to reduce any conflicts • Agreement / MoU is signed with in village council • Key livelihoods and critical resources are identified and their vulnerability to climate hazards are recorded and understood by stakeholders to seek their active participation • Partner institutions are identified	All partner agencies lead by APC and Project Steering Committee

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
	and assessment of likely impact of hazards on resources • Prioritization of vulnerable sites (hotspot) and their treatment options keeping in mid the project objectives • Assessment of coping and adaptation strategies and implementation mechanism for food security and conservation of traditional rice (and other seed) varieties • Identification of institutional partnership for CC adaptation • Development of adaptation plan and identification of investments for CC adaptation	and their role discussed and clarified to get their long term commitment and involvement • Adaptation plan is prepared and agreed between stakeholders to reduce conflicts • Nodal department and other departments are trained in conducting PRA and CCA relevant planning so that departments cooperate in development planning • Community is equipped and trained to make positive contribution in the planning process • Confidence of Naga tribes and VC concerned is arrived through judicious allocation of jhum areas for treatment • Beneficiaries understand the associated risk and possible lower return in short. Short sighted approach of greedy individual is handled by VCs • Project is not politicized in selection of villages	

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
C2.Conservation of gene pool of traditional and indigenous rice varieties and farmer to farmer seed exchange **Outcome 2** • Genetic erosion of indigenous agricultural crops mainly rice is checked and farmers varieties are protected through identification, conservation, and seed exchange programme and more climate resilient indigenous varieties are available for farmers ensuring continuity of production, availability of food and increased income • Gene pool conservation of staple food crops becomes national priority and an important component of CC strategy • Network of farmers is developed and interest generated for on farm conservation of indigenous rice and other crop varieties • Gene pool utilized by research	• Guidelines, framework, and policy implications based on the synthesis of past experiences for on-farm management of plant genetic resources are developed by SARS • Survey is conducted and germplasm of traditional rice varieties and other indigenous crops are collected in 11 districts of Nagaland • Indigenous rice varieties are characterized and their traits, requirement of growing conditions, resistance to pest and tolerance to climate variables along with nutritional, medicinal and aromatic properties are documented in consultation with the community • A substantial quantity of rice germplasm of both the *jhum* and TRC added to the ones already under maintenance at SARS. • Development of field gene bank	• Seeds material of all traditional rice varieties and other crops (millets, pulses etc.) are collected specially by SARS • Selected varieties are exchanged in project villages as per the CCA plan and SLUP • A well catalogued document on indigenous rice biodiversity developed for future reference is developed • Quality seed materials as per seed banking protocol are collected for in-situ and ex situ conservation from the field gene bank and seed deposited in the seed bank and accession number for each cultivars received • 5 Acres of ex-situ and 5 Acres of in-situ field gene banks is developed • State of art gene pool storage facility at SARS is developed • Information of gene pool is shared with IRRI and other research institutions • Records of farmer under the project	SARS and Agriculture Department

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
organization for further enhancement of rice varieties to enhance CC resilience and food security • SARS is established as knowledge center for indigenous rice varieties	for in-situ conservation and research of promising varieties as backup for seed exchange in 10 villages and control for research trial. Separate field gene bank for jhum rice and terrace rive will be developed • Collection, packaging and transportation of selected promising seeds varieties for exchange with farmers across the project villages and across the State • Network of farmers developed and interest generated for on farm conservation of indigenous rice and other crop varieties	and their results are maintained • Research papers are published in national and international journals	
C3. Area treatment for traditional integrated farming particularly rice cultivation including soil and water conservation and land rejuvenation **Outcome 3:** • Land is made suitable for longer	• 1000 ha. is jhum area is stabilised for conducive cultivation of traditional rice varieties through physical and vegetative measures • 40% of the area is treated with contour bunds to ensure soil and water conservation specially on steeper slopes and for	• Suitability parameters for stabilisation of jhum are developed and treated area is certified to be complaint to those parameter • Erosion sensitive area is delineated and appropriate soil and water conservation measure are constructed	S&WC Dept.,

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
tem / permanent cultivation of agricultural crops and integrated livelihood especially related to indigenous rice, pulses, coarse cereals, vegetable and other food requirement of Naga people etc. • Resilience and long term utility of land as an important resource for livelihood as CCA measure is enhanced	improvement of soil quality • Sufficient number of contour trenches and gully plugs using local material are made to check soil erosion during extreme events • Loose boulder check dams are constructed on sites prone to extensive soil erosion • Already exposed vulnerable areas are covered with trees and soil quality is improved with cultivation of nitrogen fixing traditional pulses, coarse cereals with soil binding capacity • Culturable wasteland in target area in each village is recovered by construction of bench terraces and land levelling	• S&WC measures and land reclamation / rejuvenation measures are indicated on maps on the basis of vulnerability and hazard mapping to meet future challenges • Agreement and consensus within the community of the location of S&WC measured is reached without any conflict with VC giving priority to CC hazard sensitive areas managed by vulnerable section of the community	
C4. Soil productivity enhancement through environmentally sensitive measures **Outcome 4** • Productivity of soils in jhum	• Nutrient content of soil is enhanced through application of Farm Yard Manure (FYM) and vermin composting • Acidic soils in the jhum areas are treated through lime application	• Periodic soil testing becomes basis for nutrient management and community is trained to crop selection based in micro-environmental conditions • Soil health cards are continued to be	Agriculture and land resource development department

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
areas are enhanced through sustainable means and need to move to new areas through slash burn is reduced resulting into increase into jhum cycle by at least 50% • Production in Jhum areas are increased by at least 30%	if required • Soil nutrient plans are prepared and soil testing is conducted periodically. • Soil health card are introduced for all farmers in selected villages under GoI scheme • Chemical pesticides are replaced by organic pesticides in village	practiced by the community • Vermi composting units developed under the project are used for future too • Soil become neutral after application of amendments such as lime their neutrality is maintained by proper crop selection and manure application • Production and use of organic pesticides becomes norm and villages say no to artificial chemicals in farm management.	
C5. Propagation of traditional rice varieties under integrated rotational farming (optimised jhum) system **Outcome 5:** • Indigenous rice varieties and traditional varieties of coarse cereals, millets, pulses, fruits and vegetables are protected and propagated under integrated farming system to overcome climate change hazards and ensure food security	• Indigenous rice varieties are propagated in 1000 ha. along with other traditional crops under integrated farming system • Horticulture crops (fruits and vegetable crops) are grown at least 20% of treated area in jhum areas thus reinforcing traditional farming system • Income generations activities such as collection of Non Timber Forest Produce (NTFP) such as honey collection from natural	• Multiple and integrated cropping systems are popularized and preferred form of farming with increase in indigenous crop varieties • Coarse cereals, pulses, millets and staple rice crops are grown as insurance against failure of one or two crops due to CC thereby ensuring food and nutritional security • Honey production and processing units are established in the project area which ensures ready market for	Agriculture Department. Horticulture and Forestry Department, Department, Land Resource Development Department Honey Mission etc.

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
• Additional income from NTFP persuades tribal economy to realize value from standing forests rather than through slash and burn. • Recovery rate of jhum is hastened through replanting and agro-forestry models • Stressful dry conditions are delayed/ avoided through crop saving irrigation	forests are undertaken • Agro-forestry models are developed and selected forest trees species necessary to rehabilitating the area are replanted while moving from one plot of land to another • Farm ponds and water harvesting structure are developed for conjunctive use of water during extremely dry seasons • 100 ha per village land is brought under minimal irrigation (crop saving) through construction of field and open channels	honey produced and collected from the wild. • Water from perennial and seasonal schemes is collected in farm ponds and used for crop saving irrigation through ramp up pumps or rainwater harvesting that sustains the cropping systems promoted under the project beyond the project period • People realize that food security is primary basic need rather than quick and risky return from hybrid seed varieties that require higher inputs • Water resource is maintained as water bank for crop saving in stressful times of prolonged draughts	
C6. Green energy management for jhum stabilization **Outcome 6:** • Use of renewable energy will enhance production	• Remote areas under jhum cultivation are electrified through generation of electricity by hydrogers (technology developed by NEPeD)	• Availability of renewable energy helps in making permanent investments in farm lands and reduced need form shifting. Thus jhumming is either reduced or given	NEPeD

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
and productivity of jhum lands and eliminate need for frequent shifting of agriculture field thereby extending jhum cycle • Electrification will help in promoting permanent cultivation, diversified livelihood, increased sources of income etc. • Post- harvest management of crops results into higher income and low wastage of perishable commodities prone to damage due to increased temperature / moisture conditions (climate change) thereby supporting food and nutritional security	• Solar power unit are established • Irrigation facilities are extended by lifting water from seasonal/permanent streams by using ramp up pump and stored in farm ponds • Zero energy consuming cold storages are developed for enhancing shelf life of perishable commodities • Agriculture is mechanized using renewable energy and drying, grinding and threshing units are established	up. • Mechanisation help in post- harvest value additions and increased income on sustained basis • NEPeD will implement renewable energy units and ensure their maintenance beyond project period through a revenue model	
C7. Access to market for traditional varieties of rice and other jhum crops **Outcome 7** • Enhanced access to regional	• Farmers are organized into grower associations • Village level common facility centers are established as economically viable entities with	• Grower association will function for long term benefit of the farmer • Community common facility centers become operational and provide services beyond project period	Specialised marketing agency hired by the project, PMU

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
and national markets for indigenous and organic products of Nagaland • Improved price discovery and price realization • Capital flow/ formation in traditional farm management systems thereby reinforcing ecologically sound and climate resilient agriculture practices	facilities to support collective agri-business activities • Post-harvest management activities of indigenous rice and other crops are established • Crop produced under integrated rotational farming system are collectively branded and marketed • Market information is made available to farmers and community based collateral management systems are established.	• Crops are harvested and collectively processed (milling etc.) packaged and marketed bringing economies of scale • Collective marketing results in better bargaining power to the farmers • Price decision is taken on the basis of correct information available with the farmers. • Bank linkages help in improving holding capacity of the farmers till acceptable prices are realised	
C8. Accompanying measures in technical collaboration with GIZ: Training and Capacity Building, Knowledge Management, Collaboration with other technical institutions etc. **Outcome 8:** • Comprehensive insurance cover as risk management tool is provided	• PMSBY, PMFBY, PMJJBY are implemented in the project • Cadre of trained facilitators, farmers, Govt. officials established for CCA relevant agriculture management, sustainable land use planning and jhum stabilization • Crop-biodiversity budgets and seed exchange calendars established	• Profits from the project will be used for providing comprehensive insurance to the farmers • List of trained facilitators, officials, farmers is prepared and circulated as knowledge facilitators under the project for current and future assistance / deployment • Knowledge tools such as scientific seed exchange calendar are developed and used for bio-diversity budgeting • Material for information, education	All departments concerned

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
• Effective knowledge helps Jhum dependent communities enhance their knowledge base on ecosystem resilience of sustainable integrated agriculture, diversification of their livelihood, income and food security, access to market through collective action etc. • Capacities of stakeholders for using bio-diversity conservation as tool for food security and CCA is developed and communities become self-reliant through development and implementation of CCA relevant agriculture development plans in Jhum areas • CC issues are internalized in developmental policies Awareness on systems of community based management of resources is strengthened though learning from other collaborative institutions	• Training and awareness on jhum stabilization, conservation of traditional crop varieties and land use planning are conducted • Exposure visits to successful demonstration sites are conducted and exchange of ideas for CCA relevant agriculture • Modules on self-monitoring and evaluation developed and implemented • Convergence with RKVY and other GoI and GoN schemes ensured • Traditional knowledge of indigenous rice varieties are documented (also covered in C2) • Knowledge networks with IRRI, ICAR, NMSHE and GIZ's CCA-NER established	and communication developed • All stakeholder are provide relevant training • Other schemes such as RKVY also draw knowledge from the project in convergence mode • Frequent sharing of information between partners in knowledge network happens	

Expected outcomes	Expected concrete outputs	Sustainability Mechanism	Responsible party/ies
C9: Project Management by Government of Nagaland Outcome 9 Specific project management needs of a multi-departmental CCA project are realized as climate change issues run across sectors and require collaborative approach. A model for holistic convergence is evolved.	• Project Management Unit is established under the supervision of Agriculture Production Commissioner • Project schedule is drawn and all department concerned are oriented to the project needs • Plan of convergence is drawn in collaboration with all department concerned of the GoN • Fund allocation is made for project management • Monitoring and evaluation mechanism is put in place and related MIS formats are developed • Departmental human resource is deployed with specific responsibilities • Transport and communication arrangements are made	• Long term cooperation plans are established between communities and the department concerned • Convergence ensure long term sustainability • Communities are trained on self-monitoring and their capacities are built to take collective decisions • Network of the community with scientific institutions are established and communities directly interact with these institutions to get scientific and technical support in future.	SARS, PMU and PSC

k) Environmental and social impacts

Table 19 Environmental and social impact of project

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks-further assessment and management required for compliance
Compliance with the Law	Will be observed	Not required
Access and Equity	Ensured	Ex-post monitoring
Marginalized and Vulnerable Groups	Ensured	Ex-ante required
Human Rights	Ensured	Ensured by VCs
Gender Equity and Women's Empowerment	Ensured	Ensured by VCs
Core Labour Rights	Will be ensured	Ex-post, concurrent
Indigenous Peoples	Mostly followed under Section VI of the constitution	Ex-post, concurrent
Involuntary Resettlement	Not envisaged	Not envisaged
Protection of Natural Habitats	Will be done	Will be assessed
Conservation of Biological Diversity	Prime objective – will be ensured	Will be assessed
Climate Change	Addressed	Will be addressed
Pollution Prevention and Resource Efficiency	Ensured with replacement of chemical by natural manure, pesticides etc.	Will be done
Public Health	Ensured through nutritional security	Will be done
Physical and Cultural Heritage	Ensured	Ensured
Lands and Soil Conservation	Ensured	Ex post monitoring

Against the detailed checklist of environmental and social principles, no violation is seen

l) Risk assessment and mitigation

Table 20 Environmental and social risk assessment and mitigation

Current Scenario	Envisaged Scenario	Risk	Proposed Mitigation	Risk Assessment	Impact of the envisaged Scenario
• No planning of land capability and its utilisation under jhum farming	• Land utilisation under jhum is planned and allocated to families for based on their vulnerability to climate hazards, resilience capacity and equitable distribution of assets	• VC is at times dominated by big land owners who get larger share of jhum for cultivation. Such individuals may create hurdle in land allocation	• VC represents all families in the village and land utilisation is planned for sustenance of the community by the VC	• Risk is medium cannot be ignored and should be handled by VC in a responsible manner	• Land is allocated equitably for vulnerable sections of the society • Active participation of the community is ensured in planning and decision making which is necessary for the success of the project
• Erosion of genetic resource in farming due to CC and anthropogenic factors specially staple crops (rice), coarse cereals, millets and pulses • Heavy emphasis of HYV of rice	• Traditional knowledge of farming systems and rice varieties are documented for CC resilience, food security • HVY with CC risk are restricted to only low lying fields where irrigation	• Target approach under RKVY and food security mission lay emphasis only on HYV • Jhum through allocated by VCs are not properly regulated for	• Selected traditional varieties are propagated and exchanged with farmers for CC resilience • Guidelines, framework, and policy implications based on the synthesis of past	• Original risk though high can be minimised with GoN driving the project with community participation and involvement of VCs and civil society backed by scientific research intuitions • SARS has	• Farmers' indigenous crops are conserved and propagated • Indigenous varieties of rice and other traditional crops are documented, collected and conserved through a gene pool conservation

Current Scenario	Envisaged Scenario	Risk	Proposed Mitigation	Risk Assessment	Impact of the envisaged Scenario
which require assured supply of inputs and irrigation, chemicals, fertilizers, mechanisation etc. • Specialisation of stable crops resulting into non-availability of diverse food items necessary for nutritional security • No guidelines for genetic conservation • TRC and Jhum are practices side by side and only emphasis on jhum will alienate TRC farmers	facilities are available • SARS develops guidelines and food policy with emphasis on conservation of genetic material • A substantial quantity of rice germplasm of both the jhum and TRC added to the ones already under maintenance at SARS and Jhum and TRC will be handled simultaneously as part of the plan • Development of field gene bank for in-situ conservation and research of promising varieties as	sustainability, crop integration and resource conservation • Guidelines developed by SARS are not followed by communities • SARS research staff needs to be fully trained in assigned tasks • Inter tribe rivalry between Naga communities may effect acceptance of farmer to farmer seed exchange • Any failure of seed propagation due to unknown	experiences for on-farm management of plant genetic resources are developed by SARS • Survey is conducted and germplasm of traditional rice varieties and other indigenous crops are collected in 11 districts of Nagaland • Indigenous rice varieties are characterized and their traits, requirement of growing conditions, resistance to pest and tolerance to climate variables along with nutritional, medicinal and aromatic properties are documented in consultation with the	extensive experience in conservation of genetic resources and its documentation. These skill can be improved with sufficient training from IRRI and ICAR	strategy by SARS • Increased productivity and production • Multiple cropping and optimum utilisation of land and other resources • Availability of diverse food items to meet diverse nutritional and food requirement of Naga community • Conservation of genetic resource for future generations • Community combines its traditional knowledge with scientific guidelines of conservation of genetic material • Network of farmers

Current Scenario	Envisaged Scenario	Risk	Proposed Mitigation	Risk Assessment	Impact of the envisaged Scenario
	backup for seed exchange in 10 villages and control for research trial. Separate field gene bank for jhum rice and terrace rive will be developed • Collection, packaging and transportation of selected promising seeds varieties for exchange with farmers across the project villages and across the State	circumstance can be politicised as failure of the project	community • Civil society can help in achieving synergy between tribes for success of the programme • Only most promising varieties will be exchange under the project and strict monitoring of growth and productivity parameters will be employed		developed and interest generated for on farm conservation of indigenous rice and other crop varieties
• Land is utilised under jhum cultivation as per convenience and local assessment of productivity leading to shorter	• Jhum cycle is increased by 30% and investment is made to improve soil productivity, enhance suitability of land	• Capital investment if not properly planned for maximising community benefits may be	• Micro level vulnerability assessment is done with community consultation • Physical and human investments are	• Risk is low as VC understands the issues and are equally concerned about long term sustainability of their farming	• Capital formation in jhum lands • Enhanced productivity and production • Increase in jhum cycle with

Current Scenario	Envisaged Scenario	Risk	Proposed Mitigation	Risk Assessment	Impact of the envisaged Scenario
jhum cycle with no investment or capital formation in the land	for longer duration due to investments in soil and water conservation measures.	cornered by few dominant individuals	planned keeping in view concerns of climate change, food security, income generation and livelihood	systems	integration of agriculture, horticulture and forestry crops for food security
• Department working in Silos: Various Government Department work in silos and are guided by their respective targets	• Comprehensive and integrated agriculture management plans are developed with contribution from all relevant department	• Departmental official are used to working in silos. They need to be sensitized and trained on need, ways and means of convergence.	• Project is Chaired by APC who is common head of all the concerned departments • Departmental directors are part of the project steering committee • Each department is given specific task at the field level • Incentives are introduced for achievement on convergence in the form of departmental promotions etc.	• The risk envisaged is low APC in the guiding force for involvement of all departments concerned.	• Integrated approach to development make communities more resilient to climate change and their adaptive capacity if increased through increase production of food, productivity of land with enhanced livelihood and income
• No insurance coverage	• All farmers are provided insurance cover	• Life and crop failure	• PMJJBY, PMSBY, PMFBY extended to all farmers	• Low risk	• Comprehensive insurance cover and CC resilience

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3 IMPLEMENTATION ARRANGEMENTS

3.1 Arrangement of project implementation arrangements

i) Who will implement the project and what are their comparative advantages and capacity compared to other potential implementing institutions?

The Project will be implemented in convergence mode State Nodal Officer on Climate Change. Following departments/agencies will be involved in project implementation.

- Agriculture Department
- Soil and Water Conservation Department
- Land Resource Development Department
- Horticulture Department
- Forest Department
- New and Renewable Energy Department

Agencies / Resource Agencies/ Technical Service Providers

- State Agriculture Research Centre
- Nagaland Empowerment of People through Energy Development
- Nagaland Bee Keeping and Honey Mission
- Nagaland Bio- Resource Mission
- Village Councils (10) and civil society
- GIZ
- International Rice Research Institute, ICAR etc.

Detailed interventions by each department / agency is discussed in section 1.3 b. The Department of Agriculture will deal with the rice component, while as Departments such as horticulture, forestry, soil and water conservation, land resources, Nagaland Bee Keeping and Honey Mission, Nagaland Empowerment of People through Energy Development, State Agriculture Research Centre, etc. will deal with the areas of their specialization and expertise. Research agencies such as SARS will provide expertise in ex-situ conservation, storage and management of genetic material.

ii. *How will the project be coordinated with (and/or mainstreamed into) related development activities of the targeted sector?*

The project will be steered by a Project Steering Committee (PSC) with State Chief Secretary as Chairman of the Committee. as the chairman of the committee. The project will be coordinated through the Project management unit comprising of State Nodal officer on Climate change and designated nodal officers of concerned departments.

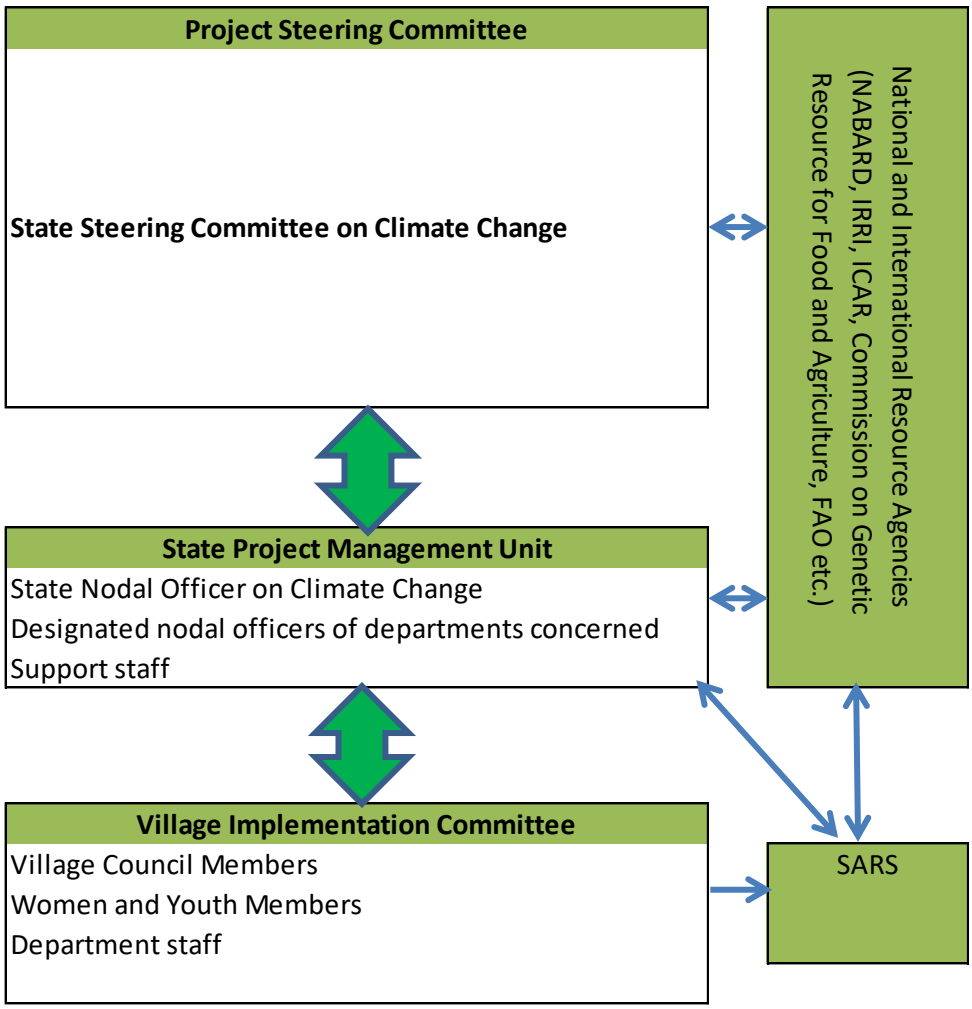

Figure 40 Project coordination structure

A Project Management Unit (PMU) will be established with designated nodal officers from various departments. This unit will be given required resources to implement the project. The State Nodal Officer on CC will be the Chairperson of the PMU.

At the district level the project will be steered by the district unit having designated nodal officers and district level officers of departments concerned with support staff.

The project will draw heavily from national and international learning especially of NABARD, FAO, IRRI, ICAR, CGRFA etc.

The project will draw from national and international learning especially of NABARD, FAO, IRRI, ICAR, CGRFA etc.

State Nodal officer on CC will coordinate with NIE (NABARD) for funding mechanism and fund flow to the line departments and other agencies. For smooth functioning NIE will sign an agreement with State nodal officer on behalf of the Department of environment and forests and climate change (notified nodal deptt.). Desired fund flow mechanism is suggested below

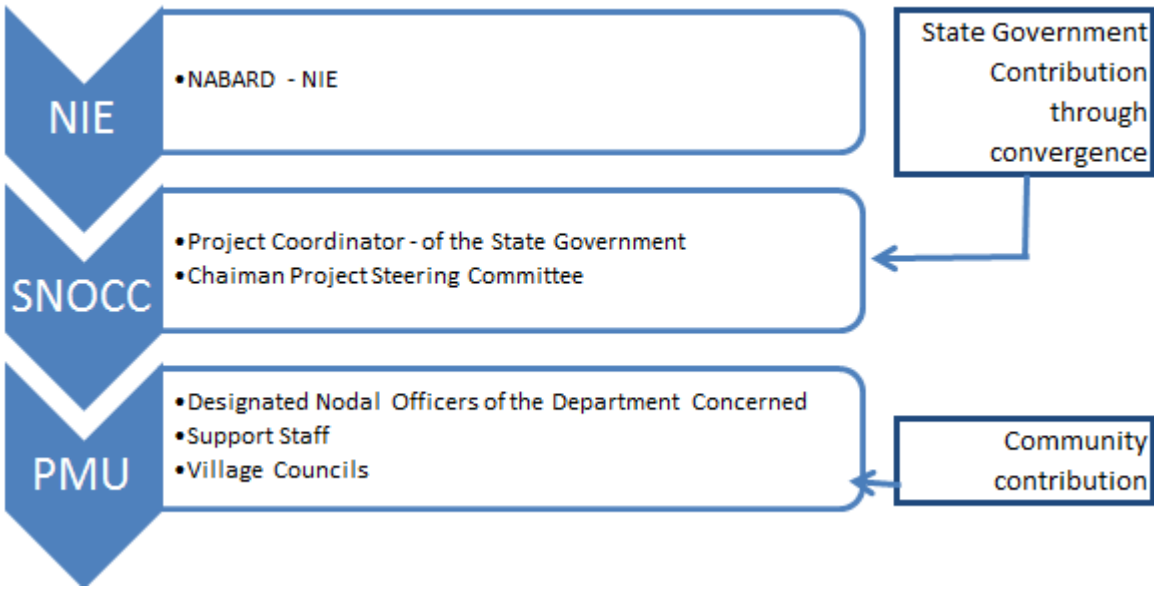

Figure 41 Fund flow mechanism

It being an CC project all activities are season based and time bound, where release of money places very crucial role for timely completion of the project. Sometimes, money may even be required in advance to meet unforeseen circumstance due to climate change events. Hence it is

important to pool annual funds requirement in the office of State Nodal Officer on Climate Change and have shortest fund flow mechanism for efficient and effective project implementation.

The State PMU in-charge will prepare annual activity wise budget and seek funds from NABARD through Nodal In-charge on Climate Change. Funds will flow directly from SNOCC to State PMU, concerned departmental units at the district level, resources agencies (SARS etc.) and Village Councils.

3.2 Financial and other project risk management

Describe the measures for financial and project/programme risk management (also include environmental and social risk, if any)

Table 21 Risk management

Risk	Rating	Mitigation Measure
Project	Medium	The project is moderately scientific and technical in nature with long term practical implication. It depends on synthesis of technical and traditional knowledge for well-being of the community. Community needs to understand the concept of CC and how their issues of food security, livelihood and traditional farming practices, traditional wisdom can be handled simultaneously through a scientific approach.
Financial	Low	It is assume that fund flow will be smooth and without interference. Nodal department is apt in handing agriculture projects and its associated fund flows
Environmental	Low	The project is aimed at bio-diversity conservation and environmental restoration and all applicable standards will be maintained
Social	Low	Social and cultural homogeneity of Naga community and community leadership structure in each village make is viable to implement the project in 3 years which other would have taken many years

3.3 Monitoring and evaluation

Describe the monitoring and evaluation arrangements and provide a budgeted M & E plan. (Monitoring and evaluation cost need to be included in executing entity management cost)

Table 22 Monitoring and evaluation schedule

Monitoring and Evaluation Plan	Responsible person	Yr. I	Yr. II	Yr. III	Total Rs. lakh	Time frame
1. Start of project - supervision and review of development of village development plans for sustainable land use planning and allocation of jhum land to vulnerable communities	SNOCC and nodal officers on CC of various departments	April 2017			GoN	Start of the project
2. Revision of village plans if required	SLCC and SNOCC		June 2018		GoN	On completion of 1 year
3. Approval of village plans	SNOCC	June 2017			GoN	ASAP after the plans are ready
4. Review of design of survey, collection of germ plasm, characterization and documentation, development of gene banks and storage of germplasm	Director SARS	May 2017 and Nov 2017	May 2017 Nov 2018	May 2019 Nov 2019	GoN	Half yearly
5. Supervision of area treatment of traditional rice cultivation activities	SNOCC and PMU	Oct 2017	Oct 2017	Oct 2018	GoN	After rains each year
6. Supervision and review of soil productivity enhancement activities	SNOCC and PMU	April 2017 Feb 2018	Feb 2019	Feb 2020	GoN	Once start of the project and then in winters every year
7. Supervision and review Integrated farming planning and review of progress	SNOCC and PMU	April 2017 Oct 2017	Oct 2018	Oct 2019	GoN	Once start of the project and after rains each year
8. Supervision and review of management of green energy for jhum stabilization	SNOCC and PMU		Oct 2018	May 2019	GoN	Annual plan in May and review

Monitoring and Evaluation Plan	Responsible person	Yr. I	Yr. II	Yr. III	Total Rs. lakh	Time frame
				Oct 2019		in Oct
9. Supervision and review of activities related to market access	SNOCC and PMU	Oct 2017	May 2018 Oct 2018	May 2019 Oct 2019	GoN	Annual plan in May and review in Oct
10. Supervision and review of project management	SLCC	May 2017 Oct 2017	May 2018 Oct 2018	May 2019 Oct 2019	GoN	Annual review
11. Annual review of project	SLCC and NABARD		May 2018	May 2019	GoN	End of 1st and 2nd year
12. Independent midterm review	External expert from NABARD		April 2019		NABARD	After internal review in Oct 2018
13. End of the project review and impact analysis	External expert from NABARD			May 2020	NABARD	End of the project
Total					NABARD	

SNOCC State Nodal Officer for Climate Change, , SLCC –State Level Committee on Climat Change; VC-Village Council, GoN- Govt. of Nagaland contribution.

3.4 Result framework for the project proposal

The result framework for the project is given in Annexure 1 as per the format.

3.5 Detailed activity wise budget (Rs. Lakh)

Table 23 Activity wise budget

	Particulars	Total cost of the project				Assistance - NAFCC			
		Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
1	**SUSTAINABLE LAND USE PLANNING**								
1.1	Identifiation of CC vulnerable families, Resource mapping and development of LUP in collaboration with VC for jhum allocation (1 ha. per CC vulnerable family)	**5.00**	**0.00**	**0.00**	**5.00**	**5.00**	**0.00**	**0.00**	**5.00**
2	**CONSERVATION OF GENE POOL OF TRADITIONAL RICE VARIETIES AND FARMER TO FARMER SEED EXCH**								
2.1	Survey, collection of germplasm, characteristion and documentation	24.20	24.20	24.20	72.60	24.20	24.20	24.20	72.60
2.2	Conservation of genetic material								
2.2.1	In-situ conservation - field gene bank - Jhum rice (5 Ac.)	1.05	1.05	1.05	3.15	1.05	1.05	1.05	3.15
2.2.2	In-situ conservation -field gene bank - TRC	0.98	0.98	0.98	2.94	0.98	0.98	0.98	2.94
2.2.3	Ex-situ conservation - operation cost of mini gene bank in SARS (5 Ac.)	12.00	12.00	12.00	36.00	12.00	12.00	12.00	36.00
2.3	Strengthening of SARS								
2.3.1	Engagement of research scholars	12.00	12.00	12.00	36.00	12.00	12.00	12.00	36.00
2.3.2	Packaging and transportation of genetic material for farmer to farmer exchange	3.00	3.00	3.00	9.00	3.00	3.00	3.00	9.00
2.3.3	Establishment of mini gene bank and up gradation of current facility	30.00	0.00	0.00	30.00	30.00	0.00	0.00	30.00
2.3.4	Purchase of farm equipment	2.00	0.00	0.00	2.00	2.00	0.00	0.00	2.00
Total		**85.23**	**53.23**	**53.23**	**191.69**	**85.23**	**53.23**	**53.23**	**191.69**

	Particulars	Total cost of the project				Assistance - NAFCC			
		Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
3	**AREA TREATMENT FOR TRADITIONAL RICE CULTIVATION**								
3.1	Sediment monitoring equipment	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
3.2	Physical Measures in Jhum Areas for controlling soil erosion and degradation								
2.2.1	Contour bunding	152.00	15.20	15.20	182.40	114.00	11.40	11.40	136.80
3.3	Drainage line treatment								
3.3.1	Contour trenching	32.50	3.25	3.25	39.00	26.00	2.60	2.60	31.20
3.3.2	Loose boulder check dams	10.00	1.00	1.00	12.00	8.00	0.80	0.80	9.60
3.4	Land rejuvenation								
3.4.1	Planting of coarse cereals and pulses	48.00	9.60	9.60	67.20	36.00	7.20	7.20	50.40
3.4.2	Land levelling and bench terraces	110.00	11.00	11.00	132.00	82.50	8.25	8.25	99.00
3.4.3	Plantation of area specific tree species	300.00	60.00	60.00	420.00	225.00	45.00	45.00	315.00
Total		**653.50**	**100.05**	**100.05**	**853.60**	**492.50**	**75.25**	**75.25**	**643.00**
4	**SOIL PRODUCTIVITY ENHANCMENT IN JHUM AREAS THROUGH ENVIRONMENTALLY SENSITIVE MEASURE**								
4.1.1	Application of FYM, green leaf, vermi composting	90.00	90.00	90.00	270.00	67.50	67.50	67.50	202.50
4.1.3	Use of organic pesticides	70.00	17.50	17.50	105.00	52.50	13.13	13.13	78.75
4.1.4	Jhum Sanitation -Construction of toilets in Jhum Areas	15.00	1.50	1.50	18.00	11.25	1.13	1.13	13.50
4.1.5	Soil testing and introduction of soil health cards	4.00	4.00	4.00	12.00	0.00	0.00	0.00	0.00
Total		**179.00**	**113.00**	**113.00**	**405.00**	**131.25**	**81.75**	**81.75**	**294.75**
5	**PROPOGATION OF TRADITIONAL RICE VARIETIES UNDER INTEGTATED FARMING SYSTEMS**								
5.1	CCA integrated farming practices (for 3 years)								
5.1.1	Traditional rice propagation	160.00	80.00	80.00	320.00	112.00	56.00	56.00	224.00
5.1.2	Intercropping with CC resilient crops (seeds)	80.00	40.00	40.00	160.00	56.00	28.00	28.00	112.00
5.1.3	Planting of horticulture crops along countour lines	135.00	27.00	27.00	189.00	101.25	20.25	20.25	141.75
5.1.4	Honey and other IGA activities	25.00	5.00	5.00	35.00	18.75	3.75	3.75	26.25
5.1.5	Agro-forestry/ regeneration of forest in fallow lands	98.00	9.80	9.80	117.60	73.50	7.35	7.35	88.20
5.1.6	Other income generating activities	40.00	8.00	8.00	56.00	30.00	6.00	6.00	42.00
5.2	Irrigation management								
5.2.1	Farm ponds and water harvesting structure	80.00	8.00	8.00	96.00	60.00	6.00	6.00	72.00
5.2.2	Open channels	63.00	6.30	6.30	75.60	47.25	4.73	4.73	56.70
5.2.3	Field channels	30.00	3.00	3.00	36.00	22.50	2.25	2.25	27.00
Total		**711.00**	**187.10**	**187.10**	**1085.20**	**521.25**	**134.33**	**134.33**	**789.90**

		Particulars	Total cost of the project				Assistance - NAFCC			
			Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
6	**GREEN ENERGY MANAGEMENT FOR JHUM STABILISATION**									
	6.1.1	Community managed hydroger (3kw)		55.00	5.50	60.50		41.25	4.13	45.38
	6.1.2	Solar power generating unit (2kw)		60.00	6.00	66.00		45.00	4.50	49.50
	6.1.3	Ram pump - 4 inch		37.00	3.70	40.70		27.75	2.78	30.53
	6.1.4	Community managed zero energy cold storage 75 cum		80.00	8.00	88.00		60.00	6.00	66.00
	6.1.5	Solar dryer		37.50	3.75	41.25		28.13	2.81	30.94
	6.1.6	Hydroger run grinder		2.50	0.25	2.75		1.88	0.19	2.06
Total			**0.00**	**272.00**	**27.20**	**299.20**	**0.00**	**204.00**	**20.40**	**224.40**
7	**ACCESS TO MARKET FOR TRADITIONAL VARIETIES OF RICE AND OTHER JHUM CROPS**									
	7.1.1	Aggregation, sorting and grading centre and common service center and post harvest storage facility	20.00	2.00	2.00	24.00	20.00	2.00	2.00	24.00
	7.1.2	Milling (12kg paddy to 7 kg rice) @ Rs.2/kg for 100 ha. / village and 2.5MT/ha.	50.00	0.00	0.00	50.00	50.00	0.00	0.00	50.00
	7.1.3	Packaging and transportation of rice @ Rs. 2/kg	72.50	0.00	0.00	72.50	72.50	0.00	0.00	72.50
	7.1.4	Market info. collection and dissemination	0.20	0.20	0.20	0.60	0.20	0.20	0.20	0.60
	7.1.5	Branding and marketing	10.00	10.00	10.00	30.00	10.00	10.00	10.00	30.00
Total			**152.70**	**12.20**	**12.20**	**177.10**	**152.70**	**12.20**	**12.20**	**177.10**
8	**ACCOMPANYING MEASURES IN TECHNICAL COLLABORATION WITH GIZ**									
	8.1.1	Collaboration with institutions (IRRI, ICAR etc.)	2.00	2.00	2.00	6.00	2.00	2.00	2.00	6.00
	8.1.2	Training and awareness (1 per village)	2.00	2.00	2.00	6.00	2.00	2.00	2.00	6.00
	8.1.3	Workshop and exposure visit within Nagaland for knowledge and experience sharing	4.00	4.00	4.00	12.00	4.00	4.00	4.00	12.00
	8.1.5	Knowledge management**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8.1.6	Risk Management***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total			**8.00**	**8.00**	**8.00**	**24.00**	**8.00**	**8.00**	**8.00**	**24.00**
9	**PROJECT MANAGEMENT (GoN)***									
	9.1	Transport and communication	10.00	10.00	10.00	30.00	10.00	10.00	10.00	30.00
	9.2	Monitoring and evaluation		0.00	0.00	0.00		0.00	0.00	0.00
	9.3	Purchase of office equipment for project mgt	15.00	0.00	0.00	15.00	15.00	0.00	0.00	15.00
Total			**25.00**	**10.00**	**10.00**	**45.00**	**25.00**	**10.00**	**10.00**	**45.00**
10	**NABARD FEES**						**43.79**	**17.90**	**12.22**	**73.91**
GRAND TOTAL			**1819.43**	**755.58**	**510.78**	**3085.79**	**1464.72**	**596.65**	**407.38**	**2468.75**

*RI/R&M - Repeat investment/ repairs

Notes

1.** Knowledge management support will be made by GIZ from its CCA-NER project

2. All project management cost except fuel for transportation and communication cost will be borne by Govt. of Nagaland

3. Amount spent in marketing will be collected from sale proceeds and will be maintained as village corpus for future

4. Mid term and end term review of the project will be conducted by the Government of Nagaland/ NABARD

5. Risk management: Project farmers will be insured under new health, life and agriculture crop insurance scheme of GoI

3.6 Disbursement schedule

Table 24 Disbursement schedule

Date of disbursement	Installment (INR Lakh)	Milestone
1 April 2017	1464.72	Commencement of the project
1 April 2018	596.65	End of the 1st year progress report
1 April 2019	407.38	Mid-term review and End of 2nd year progress report
Total	2468.75	

Annexure 1: Result Framework for the Project Proposal

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C1. Sustainable land use planning					
Outcome 1 • Availability of scientific basis and enhanced understanding for project action plan and its components for addressing risks associate with CC • General consensus on the concept of climate change, conservation of bio-diversity and its relation to food security • Planned approach to development with community participation					
• Stakeholder consultation in target villages • Detailed baseline survey and inventory with characteristics of resources for better targeting of Jhum area in 10 villages • Identification of families vulnerable to climate change and allocation of at least 1 ha. jhum area per family for treatment, • Social profile of selected villages and general agreement of the village council on the plan of action • Identification of key livelihood of the people and critical resources on	• 10 villages are selected based on objective selection criteria discussed in the report • PRA for stakeholder is conducted and documented • Survey results are analyzed and used for SLUP • Vulnerable families are identified and their rights and obligations are	• PRA and stakeholder consultation in one representative village in Mokokchung district conducted by GoN to understand the minute details of project planning and decide on the project components • GoN staff	• 10 project villages • 10 PRA reports, • 10 survey and vulnerability analysis reports • 10hazard mapping • At least one partner institutions per district • 10 CCA plans	• Mapping of 10 villages and agreement of VCs. • PRA results • Vulnerability analysis reports • Resource inventory and hazard mapping • Social profile • Livelihood profile • Agreements	• Nodal department and other departments are trained in conducting PRA and CCA relevant planning specially • Community is equipped and trained to make positive contribution in the planning process • Departments cooperate in development planning • Naga tribes and VC concerned do not object to allocation of jhum areas for treatment • Beneficiaries understand the associated risk and possible lower return in

which these livelihoods depend. • Vulnerability and resilience assessment of critical sectors and hazard mapping with development of hazard calendar and assessment of likely impact of hazards on resources • Prioritization of vulnerable sites (hotspot) and their treatment options keeping in mid the project objectives • Assessment of coping and adaptation strategies and implementation mechanism for food security and conservation of traditional rice (and other seed) varieties • Identification of institutional partnership for CC adaptation • Development of adaptation plan and identification of investments for CC adaptation	delineated • Social profile is recorded and authenticated • Agreement / MoU is signed with in village council • Key livelihoods and critical resources are identified and their vulnerability to climate hazards are recorded and understood by stakeholders • Partner institutions are identified and their role discussed and clarified • Adaptation plan is prepared and agreed between stakeholders	oriented in PRA, stakeholder consultation and survey methodology of CC vulnerability assessment by GIZ consultant • GIZ survey reports on jhum farming and seed exchange programmes already available as baseline for the project		with partner institutions • Adaptation plan with detailed project components	short. Short sighted approach of greedy individual is handled by VCs • Project is not politicized in selection of villages

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C2.Conservation of gene pool of traditional and indigenous rice varieties and farmer to farmer seed exchange					
Outcome 2 • Genetic erosion of indigenous agricultural crops mainly rice is checked and farmers varieties are protected through identification, conservation, and seed exchange programme and more climate resilient indigenous varieties are available for farmers ensuring continuity of production, availability of food and increased income • Gene pool conservation of staple food crops becomes national priority and an important component of CC strategy • Network of farmers is developed and interest generated for on farm conservation of indigenous rice and other crop varieties • Gene pool utilized by research organization for further enhancement of rice varieties to enhance CC resilience and food security • SARS established as knowledge center for indigenous rice varieties					
• Guidelines, framework, and policy implications based on the synthesis of past experiences for on-farm management of plant genetic resources are developed by SARS • Survey is conducted and germplasm of traditional rice varieties and other indigenous crops are collected in 11 districts of	• Survey results • Seeds material of all traditional rice varieties are collected specially 867 traditional rice varieties identified by SARS • Selected varieties are exchanged in project villages as per the CCA plan and SLUP for growing in 100 ha.	• 867 rice varieties identified by SARS • GIZ has conducted and documented benefits of seed exchange programme as tool for CC resilience	• Documentation of 900+ varieties of rice and 100+ varieties if seeds of other important crops • Selection of most promising 10-15 varieties to address CC risks • Plot of 5 Acre each for ex-situ	• Records, reports and documents developed by SARS	• SARS has basic critical capacity/ resource and knowledge of providing technical support to the project or capacity/ resource can be acquired in the shortest period of time • Traditional knowledge is available with the

Nagaland • Indigenous rice varieties are characterized and their traits, requirement of growing conditions, resistance to pest and tolerance to climate variables along with nutritional, medicinal and aromatic properties are documented in consultation with the community • A substantial quantity of rice germplasm of both the jhum and TRC added to the ones already under maintenance at SARS. • Development of field gene bank for in-situ conservation and research of promising varieties as backup for seed exchange in 10 villages and control for research trial. Separate field gene bank for jhum rice and terrace	Per village*10 villages=1000 ha. • A well catalogued document on indigenous rice biodiversity developed for future reference is developed • Quality seed materials as per seed banking protocol are collected for in-situ and ex situ conservation from the field gene bank and seed deposited in the seed bank and accession number for each cultivars received • 5 Acres of ex-situ and 5 Acres of in-situ field gene banks is developed • State of art gene pool storage facility at SARS is developed • Information of gene	and food security which needs to be expanded • Awareness generated through CCA-NER and public opinion is positive • IIRRI guidelines and scientific methodology available on rice conservation which can be modified to suite local conditions • Naga tribes are already conserving few seed varieties to meet their medicinal, aromatic and	and in-situ conservation developed by SARS • Gene pool storage facility developed in SARS • Indigenous knowledge of CC resilient varieties are documented, shared and used in decision making by communities • CC resilient seed varieties are made available to farmers • 2-3 research papers by SARS published • Farmers from each village participate in knowledge		community in a form that can be exchanged and understood as per the requirement of the project • Field staff can be recruited and quickly trained in scientific methodology of germ plasm collection and handling before the commencement of the project • GIZ's experience can be replicated as there will be no change of critical staff in the Govt. departments specially SARS during the project period • Communities will accept traditional varieties of rice used by other communities and

rive will be developed • Collection, packaging and transportation of selected promising seeds varieties for exchange with farmers across the project villages and across the State • Network of farmers developed and interest generated for on farm conservation of indigenous rice and other crop varieties	pool is shared with IRRI and other research institutions • Records of farmer under the project and their results are maintained • Research papers are published in national and international journals • Events and conference for experience sharing are organised by the State Government	food requirement	sharing events and conferences		tribes • Records are properly maintained so that any isolated failure of the exchanged seed variety under some unexpected specific is not construed as failure of the entire programme and used as alibi for negative publicity

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C3. Area treatment for traditional integrated farming particularly rice cultivation including soil and water conservation and land rejuvenation					
Outcome 3: • Land is made suitable for longer tem / permanent cultivation of agricultural crops and integrated livelihood especially related to indigenous rice, pulses, coarse cereals, vegetable and other food requirement of Naga people etc. • Resilience and long term utility of land as an important resource for livelihood as CCA measure is enhanced					
• 1000 ha. is jhum area is stabilised for conducive cultivation of traditional rice varieties through physical and vegetative measures • 40% of the area is treated with contour bunds to ensure soil and water conservation specially on steeper slopes and for improvement of soil quality • Sufficient number of gully plugs using local material are made to check soil erosion during extreme events • Loose boulder check dams are constructed on sites prone to extensive soil erosion • Already exposed vulnerable are	• Suitability parameters for stabilization of jhum are developed and treated area is certified to be complaint to those parameter • Erosion sensitive area is delineated and appropriate soil and water conservation measure are constructed • S&WC measures and land reclamation	Short jhum cycle and communities frequently moving to other sites with degradation of present site conditions S&WC department has developed low cost models for S&WC using local material that can be replicated	• Models of jhum stabilization are developed and replicated • Complete area is treated with different S&WC measures so that positive impact is visible and negative impact of climate event are	•Project impact evaluation	• Resistance from timber mafias who use jhum as an excuse for illegal timber extraction • Agreement and consensus within the community of the location of S&WC measured is reached without any conflict with VC giving priority to CC hazard sensitive areas managed by vulnerable section of the community

covered with trees and soil quality is improved with cultivation of nitrogen fixing traditional pulses, coarse cereals with soil binding capacity • Culturable wasteland in target area in each village is recovered by construction of bench terraces and land levelling	/ rejuvenation measures are indicated on maps on the basis of vulnerability and hazard mapping	in target area Hazard sensitive areas are left untreated that usually lead to loss of adjoining productive lands	minimized		

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C4. Soil productivity enhancement through environmentally sensitive measures					
Outcome 4 • Productivity of soils in jhum areas are enhanced through sustainable means and need to move to new areas through slash burn is reduced resulting into increase into jhum cycle by at least 50% • Production in Jhum areas are increased by at least 30%					
• Nutrient content of soil is enhanced through application of Farm Yard Manure (FYM) and vermin composting • Acidic soils in the jhum areas are treated through lime application • Soil nutrient plans are prepared and soil testing is conducted periodically. • Soil health card are introduced for all farmers in selected villages • Chemical pesticides are replaced by organic pesticides in village	• Soil testing is done in all classes of soils and nutrient management plans are prepared and implemented • Issue and maintenance of soil health cards • 100 Vermi composting units are established in each village for nutrient recycling in 100 ha. per village • Soil become neutral after application of	• Ash of burnt forests are used for improving soil productivity • Soils become acidic due to loss of ameliorating vegetative cover and loss of nutrient with rains • No pesticides being used and crops are	• All agriculture lands use environmentally responsible means of soil productivity enhancement	Soil sample tests and records of VC and project implementing agency showing optimum application of FYM and vermin compost Soil nutrition enhancement	• Low monetized demand for vermin compost in agriculture economy in general • Increasing use of chemical fertilizers in permanent field • Non availability of skilled manpower for soil nutrient management

	amendments such as lime • Production and use of organic pesticides	left to the mercy of pests and diseases		plans	

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C5. Propagation of traditional rice varieties under integrated rotational farming (optimised jhum) system					
Outcome 5: • Indigenous rice varieties and traditional varieties of coarse cereals, millets, pulses, fruits and vegetables are protected and propagated under integrated farming system to overcome climate change hazards and ensure food security • Additional income from NTFP persuades tribal economy to realize value from standing forests rather than through slash and burn. • Recovery rate of jhum is hastened through replanting and agro-forestry models • Stressful dry conditions are delayed/ avoided through crop saving irrigation					
• Indigenous rice varieties are propagated in 1000 ha. along with other traditional crops under integrated farming system • Horticulture crops (fruits and vegetable crops) are grown at least 20% of treated area in jhum areas thus reinforcing traditional farming system • Income generations activities such as collection of Non Timber Forest Produce (NTFP) such as honey	• Multiple cropping systems are followed in project area. Indigenous crop varieties increase during project period • Agriculture crops are integrated with horticulture and agro-forestry • Honey production and processing units are established in the project area	• Crop varieties are reducing over time as more and more varieties are becoming victim to climate change and unsustainable form of cultivation	• Coarse cereals, pulses, millets and staple rice crops are grown as insurance against failure of one or two crops due to CC thereby ensuring food and nutritional security	• Comparison of baseline and post project evaluation survey • Mid and post project evaluation	• Farmers have traditional knowledge for integrated farming and are not averse to re-introduction of traditional varieties in their farm lands. • Food security is primary

collection from natural forests are undertaken • Agro-forestry models are developed and selected forest trees species necessary to rehabilitating the area are replanted while moving from one plot of land to another • Farm ponds and water harvesting structure are developed for conjunctive use of water during extremely dry seasons • 100 ha per village land is brought under at least minimal irrigation (crop saving) through construction of field and open channels	• Water from perennial and seasonal schemes is collected in farm ponds and used for crop saving irrigation through ramp up pumps or rainwater harvesting	• Wild honey is collected and sold in unprocessed form • Jhuming is done under rainfed conditions and no irrigation facilities are available	• Honey collection and processing provides increased income to farmers and honey bees help in pollination most multiple crops • Water resource is maintained as water bank for crop saving in stressful times of prolonged draughts		basic need rather than quick and risky return from hybrid seed varieties that require higher inputs • Some form of water sources are available near to each project village

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C6. Green energy management for jhum stabilization					
Outcome 6: • Use of renewable energy will enhance production and productivity of jhum lands and eliminate need for frequent shifting of agriculture field thereby extending jhum cycle • Electrification will help in promoting permanent cultivation, diversified livelihood, increased sources of income etc. • Post- harvest management of crops results into higher income and low wastage of perishable commodities prone to damage due to increased temperature / moisture conditions (climate change) thereby supporting food and nutritional security					
• Remote areas under jhum cultivation are electrified through generation of electricity by hydrogers (technology developed by NEPeD) • Solar power unit are established • Irrigation facilities are extended by lifting water from seasonal/permanent streams by using ramp up pump and stored in farm ponds • Zero energy consuming cold storages are developed	• At least one hydroger is installed in each project area • Solar units, ramp up pumps zero energy cold storage are established • Mechanisation level in post- harvest management increases	Electricity is or other form of energy for field operations are not available in jhum areas	• Availability of renewable energy helps in making permanent investments in farm lands and reduced need form shifting. Thus jhumming is either reduced or given up. • Mechanisation help in post-harvest value additions and increased	• VC reports and project impact evaluation reports	• NEPeD will be able to implement renewable energy units and ensure their maintenance beyond project period

for enhancing shelf life of perishable commodities • Agriculture is mechanized using renewable energy and drying, grinding and threshing units are established			income		

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C7. Access to market for traditional varieties of rice and other jhum crops					
Outcome 7 • Enhanced access to regional and national markets for indigenous and organic products of Nagaland • Improved price discovery and price realization • Capital flow/ formation in traditional farm management systems thereby reinforcing ecologically sound and climate resilient agriculture practices					
• Village level common facility centers are established as economically viable entities with facilities to support collective agri-business activities • Post-harvest management activities of indigenous rice and other crops are	• Community common facility centers become operational and provide services • Crops are harvested and collectively processed (milling etc.) packaged and marketed • Collective marketing	• Agriculture inputs, information and services are availed individually by farmers based on their capacity to pay and access to resources	• Common facility centers become drivers of agriculture economy through collective action • Marketing institutions/	• Records of number of farmers using common facility centers • Market data on priced pre and post project	• Common facility centers are developed as independent viable business units • There is enough demand for such agri-business centers in the project area

established • Crop produced under integrated rotational farming system are collectively branded and marketed • Market information is made available to farmers and community based collateral management systems are established.	results in better bargaining power to the farmers • Price decision is taken on the basis of correct information available with the farmers. • Bank linkages help in improving holding capacity of the farmers till acceptable prices are realized	• Surplus is individually marketed or collected by Marwaris at the farm gate at lower prices	federations are developed • Access to market information strengthens decision making capacity of the farmers and ability to hold produce till they get acceptable prices		• Collective decisions are based on technical and fundamental analysis of markets and price realized is acceptable to individual farmers

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C8. Accompanying measures in technical collaboration with GIZ: Training and Capacity Building, Knowledge Management, Collaboration with other technical institutions etc.					
Outcome 8: • Effective knowledge helps Jhum dependent communities enhance their knowledge base on ecosystem resilience of sustainable integrated agriculture, diversification of their livelihood, income and food security, access to market through collective action etc. • Capacities of stakeholders for using bio-diversity conservation as tool for food security and CCA is developed and communities become self-reliant through development and implementation of CCA relevant agriculture development plans in Jhum areas					

• CC issues are internalized in developmental policies • Awareness on systems of community based management of resources is strengthened though learning from other collaborative institutions					
• Cadre of trained facilitators, farmers, Govt. officials established for CCA relevant agriculture management, sustainable land use planning and jhum stabilization • Crop-biodiversity budgets and seed exchange calendars established • Training and awareness on jhum stabilization, conservation of traditional crop varieties and land use planning are conducted • Exposure visits to successful demonstration sites are conducted and exchange of ideas for CCA relevant agriculture • Modules on self-monitoring and evaluation developed and implemented • Convergence with RKVY	• List of trained facilitators, officials, farmers is prepared and circulated as knowledge facilitators under the project • Knowledge tools such as scientific seed exchange calendar are developed and used for bio-diversity budgeting • Material for information, education and communication developed • All stakeholder are provide relevant training • Other schemes such as RKVY also draw	• Department and research institutions are working in silos • Stakeholders have limited information and knowledge for decision making to alleviate risks of climate change and its impact on agriculture	• Indigenous and scientific knowledge gel together to provide decision tools to avert and alleviate climate vulnerability • Early warning systems are developed based on the leaning of the project to handle loss of bio-diversity of agriculture crops • Convergence is achieved in letter and spirit with internalization of CC concerns in polices and	• Records of project participants, impact evaluation of the project	• Departments collaborate to move out of their comfort zone to provide support and share information • Learning from the project are made available in a form understandable to general public

and other GoI and GoN schemes ensured • Traditional knowledge of indigenous rice varieties are documented (also covered in C2) • Knowledge networks with IRRI, ICAR, NMSHE and GIZ's CCA-NER established	knowledge from the project in convergence mode • Frequent sharing of information between partners in knowledge network happen		plans		

Outcome/ Output	Indicator	Baseline	Target	Source of verification	Assumptions/ Risks
C9: Project Management by Government of Nagaland					
Outcome 9 • **Specific project management needs of a multi-departmental CCA project are realized as climate change issues run across sectors and require collaborative approach. A model for holistic convergence is evolved.**					
• Project Management Unit is established under the supervision of Agriculture Production Commissioner • Project schedule is drawn and all department concerned are oriented to the project needs • Plan of convergence is drawn in collaboration with all department concerned of the GoN • Fund allocation is made for project management • Monitoring and evaluation mechanism is put in place and related MIS formats are developed • Departmental human resource is deployed with specific responsibilities • Transport and communication arrangements are made	• PMU becomes operations with all required resources	Not applicable	• Best management practices are applied for effective and efficient delivery of project results	• Project MIS	• Trained and dedicated staff is deployed by concerned departments for the project

Annexure 2: Project Cost Calculation (Rs. lakh)

RI/R&M = Repeat Investment / Repair and maintenance in 2nd and 3rd year

	Particulars	RI/R	Govt/	Uni	No.	Unit	Total cost per village				Assistance - NAFCC per vill				Total cost of the project				Assistance - NAFCC			
							Yr1	Yr2	Yr3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13								
1	**SUSTAINABLE LAND USE PLANNING**																					
	1.1 Identifiation of CC vulnerable families, Resource mapping and development of LUP in collaboration with VC for jhum allocation (1 ha. per CC vulnerable family)	0%	0%	No.	1	0.50	**0.50**	**0.00**	**0.00**	**0.50**	**0.50**	**0.00**	**0.00**	**0.50**	**5.00**	**0.00**	**0.00**	**5.00**	**5.00**	**0.00**	**0.00**	**5.00**
2	**CONSERVATION OF GENE POOL OF TRADITIONAL RICE VARIETIES AND FARMER TO FARMER SEED EXCHANGE**																					
2.1	Survey, collection of germplasm, characteristion and documentation	100%	0%	LS	1	24.20									24.20	24.20	24.20	72.60	24.20	24.20	24.20	72.60
2.2	Conservation of genetic material																					
	2.2.1 In-situ conservation - field gene bank - Jhum rice (5 Ac.)	100%	0%	LS	1	1.05									1.05	1.05	1.05	3.15	1.05	1.05	1.05	3.15
	2.2.2 In-situ conservation -field gene bank - TRC	100%	0%	LS	1	0.98									0.98	0.98	0.98	2.94	0.98	0.98	0.98	2.94
	2.2.3 Ex-situ conservation - operation cost of mini gene bank in SARS (5 Ac.)	100%	0%	LS	1	12.00									12.00	12.00	12.00	36.00	12.00	12.00	12.00	36.00
2.3	Strengthening of SARS																					
	2.3.1 Engagement of research scholars	100%	0%	No.	2	6.00									12.00	12.00	12.00	36.00	12.00	12.00	12.00	36.00
	2.3.2 Packaging and transportation of genetic material for farmer to farmer exchange	100%	0%	LS	1	3.00									3.00	3.00	3.00	9.00	3.00	3.00	3.00	9.00
	2.3.3 Establishment of mini gene bank and up gradation of current facility	0%	0%	LS	1	30.00									30.00	0.00	0.00	30.00	30.00	0.00	0.00	30.00
	2.3.4 Purchase of farm equipment	0%	0%	LS	1	2.00									2.00	0.00	0.00	2.00	2.00	0.00	0.00	2.00
Total															**85.23**	**53.23**	**53.23**	**191.69**	**85.23**	**53.23**	**53.23**	**191.69**

	Particulars		RI/R	Govt/	Uni	No.	Unit	Total cost per village				Assistance - NAFCC per vill				Total cost of the project				Assistance - NAFCC			
								Yr1	Yr2	Yr3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
			1	2	3	4	5	6	7	8	9	10	11	12	13								
3	**AREA TREATMENT FOR TRADITIONAL RICE CULTIVATION**																						
3.1	Sediment monitoring equipment		0%	0%	No.	1	0.10	0.10	0.00	0.00	0.10	0.10	0.00	0.00	0.10	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
3.2	Physical Measures in Jhum Areas for controlling soil erosion and degradation																						
	2.2.1	Contour bunding	10%	25%	Ha.	40	0.38	15.20	1.52	1.52	18.24	11.40	1.14	1.14	13.68	152.00	15.20	15.20	182.40	114.00	11.40	11.40	136.80
3.3	Drainage line treatment																						
	3.3.1	Contour trenching	10%	20%	No.	25	0.13	3.25	0.33	0.33	3.90	2.60	0.26	0.26	3.12	32.50	3.25	3.25	39.00	26.00	2.60	2.60	31.20
	3.3.2	Loose boulder check dams	10%	20%	No.	10	0.10	1.00	0.10	0.10	1.20	0.80	0.08	0.08	0.96	10.00	1.00	1.00	12.00	8.00	0.80	0.80	9.60
3.4	Land rejuvenation																						
	3.4.1	Planting of coarse cereals and pulses	20%	25%	Ha.	30	0.16	4.80	0.96	0.96	6.72	3.60	0.72	0.72	5.04	48.00	9.60	9.60	67.20	36.00	7.20	7.20	50.40
	3.4.2	Land levelling and bench terraces	10%	25%	Ha.	11	1.00	11.00	1.10	1.10	13.20	8.25	0.83	0.83	9.90	110.00	11.00	11.00	132.00	82.50	8.25	8.25	99.00
	3.4.3	Plantation of area specific tree species	20%	25%		100	0.30	30.00	6.00	6.00	42.00	22.50	4.50	4.50	31.50	300.00	60.00	60.00	420.00	225.00	45.00	45.00	315.00
Total								**65.35**	**10.01**	**10.01**	**85.36**	**49.25**	**7.53**	**7.53**	**64.30**	**653.50**	**100.05**	**100.05**	**853.60**	**492.50**	**75.25**	**75.25**	**643.00**
4	**SOIL PRODUCTIVITY ENHANCMENT IN JHUM AREAS THROUGH ENVIRONMENTALLY SENSITIVE MEASURES**																						
	4.1.1	Application of FYM, green leaf, vermi composting	100%	25%	Ha.	100	0.09	9.00	9.00	9.00	27.00	6.75	6.75	6.75	20.25	90.00	90.00	90.00	270.00	67.50	67.50	67.50	202.50
	4.1.3	Use of organic pesticides	25%	25%	Ha.	100	0.07	7.00	1.75	1.75	10.50	5.25	1.31	1.31	7.88	70.00	17.50	17.50	105.00	52.50	13.13	13.13	78.75
	4.1.4	Jhum Sanitation -Construction of toilets in Jhum Areas	10%	25%	No.	5	0.30	1.50	0.15	0.15	1.80	1.13	0.11	0.11	1.35	15.00	1.50	1.50	18.00	11.25	1.13	1.13	13.50
	4.1.5	Soil testing and introduction of soil health cards	100%	100%	No.	100	0.004	0.40	0.40	0.40	1.20	0.00	0.00	0.00	0.00	4.00	4.00	4.00	12.00	0.00	0.00	0.00	0.00
Total								**17.90**	**11.30**	**11.30**	**40.50**	**13.13**	**8.18**	**8.18**	**29.48**	**179.00**	**113.00**	**113.00**	**405.00**	**131.25**	**81.75**	**81.75**	**294.75**
5	**PROPOGATION OF TRADITIONAL RICE VARIETIES UNDER INTEGTATED FARMING SYSTEMS**																						
5.1	CCA integrated farming practices (for 3 years)																						
	5.1.1	Traditional rice propagation	50%	30%	Ha.	100	0.16	16.00	8.00	8.00	32.00	11.20	5.60	5.60	22.40	160.00	80.00	80.00	320.00	112.00	56.00	56.00	224.00
	5.1.2	Intercropping with CC resilient crops (seeds)	50%	30%	Ha.	100	0.08	8.00	4.00	4.00	16.00	5.60	2.80	2.80	11.20	80.00	40.00	40.00	160.00	56.00	28.00	28.00	112.00
	5.1.3	Planting of horticulture crops along countour lines	20%	25%	Ha.	45	0.30	13.50	2.70	2.70	18.90	10.13	2.03	2.03	14.18	135.00	27.00	27.00	189.00	101.25	20.25	20.25	141.75
	5.1.4	Honey and other IGA activities	20%	25%	No.	10	0.25	2.50	0.50	0.50	3.50	1.88	0.38	0.38	2.63	25.00	5.00	5.00	35.00	18.75	3.75	3.75	26.25
	5.1.5	Agro-forestry/ regeneration of forest in fallow lands	10%	25%	Ha.	28	0.35	9.80	0.98	0.98	11.76	7.35	0.74	0.74	8.82	98.00	9.80	9.80	117.60	73.50	7.35	7.35	88.20
	5.1.6	Other income generating activities	20%	25%	No.	10	0.40	4.00	0.80	0.80		3.00	0.60	0.60	4.20	40.00	8.00	8.00	56.00	30.00	6.00	6.00	42.00
5.2	Irrigation management																						
	5.2.1	Farm ponds and water harvesting structure	10%	25%	No.	2	4.00	8.00	0.80	0.80	9.60	6.00	0.60	0.60	7.20	80.00	8.00	8.00	96.00	60.00	6.00	6.00	72.00
	5.2.2	Open channels	10%	25%	No.	5	1.26	6.30	0.63	0.63	7.56	4.73	0.47	0.47	5.67	63.00	6.30	6.30	75.60	47.25	4.73	4.73	56.70
	5.2.3	Field channels	10%	25%	Ha.	50	0.06	3.00	0.30	0.30	3.60	2.25	0.23	0.23	2.70	30.00	3.00	3.00	36.00	22.50	2.25	2.25	27.00
Total								**71.10**	**18.71**	**18.71**	**102.92**	**52.13**	**13.43**	**13.43**	**78.99**	**711.00**	**187.10**	**187.10**	**1085.20**	**521.25**	**134.33**	**134.33**	**789.90**

	Particulars	RI/R	Govt/	Uni	No.	Unit	Total cost per village				Assistance - NAFCC per vill				Total cost of the project				Assistance - NAFCC			
							Yr1	Yr2	Yr3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total	Yr. 1	Yr. 2	Yr. 3	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13								
6	**GREEN ENERGY MANAGEMENT FOR JHUM STABILISATION**																					
6.1.1	Community managed hydroger (3kw)	10%	25%	No.	1	5.5		5.50	0.55	6.05		4.13	0.41	4.54		55.00	5.50	60.50		41.25	4.13	45.38
6.1.2	Solar power generating unit (2kw)	10%	25%	No.	1	6		6.00	0.60	6.60		4.50	0.45	4.95		60.00	6.00	66.00		45.00	4.50	49.50
6.1.3	Ram pump - 4 inch	10%	25%	No.	1	3.7		3.70	0.37	4.07		2.78	0.28	3.05		37.00	3.70	40.70		27.75	2.78	30.53
6.1.4	Community managed zero energy cold storage 75 cum	10%	25%	No.	1	8		8.00	0.80	8.80		6.00	0.60	6.60		80.00	8.00	88.00		60.00	6.00	66.00
6.1.5	Solar dryer	10%	25%	No.	1	3.75		3.75	0.38	4.13		2.81	0.28	3.09		37.50	3.75	41.25		28.13	2.81	30.94
6.1.6	Hydroger run grinder	10%	25%	No.	1	0.25		0.25	0.03	0.28		0.19	0.02	0.21		2.50	0.25	2.75		1.88	0.19	2.06
Total							**0.00**	**27.20**	**2.72**	**29.92**	**0.00**	**20.40**	**2.04**	**22.44**	**0.00**	**272.00**	**27.20**	**299.20**	**0.00**	**204.00**	**20.40**	**224.40**
7	**ACCESS TO MARKET FOR TRADITIONAL VARIETIES OF RICE AND OTHER JHUM CROPS**																					
7.1.1	Aggregation, sorting and grading centre and common service center and post harvest storage facility	10%	0%	No.	1	2	2.00	0.20	0.20	2.40	2.00	0.20	0.20	2.40	20.00	2.00	2.00	24.00	20.00	2.00	2.00	24.00
7.1.2	Milling (12kg paddy to 7 kg rice) @ Rs.2/kg for 100 ha. / village and 2.5MT/ha.	0%	0%	MT	250	0.02	5.00	0.00	0.00	5.00	5.00	0.00	0.00	5.00	50.00	0.00	0.00	50.00	50.00	0.00	0.00	50.00
7.1.3	Packaging and transportation of rice @ Rs. 2/kg	0%	0%	MT	145	0.05	7.25	0.00	0.00	7.25	7.25	0.00	0.00	7.25	72.50	0.00	0.00	72.50	72.50	0.00	0.00	72.50
7.1.4	Market info. collection and dissemination	100%	0%	N0	1	0.02	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.06	0.20	0.20	0.20	0.60	0.20	0.20	0.20	0.60
7.1.5	Branding and marketing	100%	0%	LS	1	10									10.00	10.00	10.00	30.00	10.00	10.00	10.00	30.00
Total							**14.27**	**0.22**	**0.22**	**14.71**	**14.27**	**0.22**	**0.22**	**14.71**	**152.70**	**12.20**	**12.20**	**177.10**	**152.70**	**12.20**	**12.20**	**177.10**
8	**ACCOMPANYING MEASURES IN TECHNICAL COLLABORATION WITH GIZ**																					
8.1.1	Collaboration with institutions (IRRI, ICAR etc.)	100%	0%	LS	1	2									2.00	2.00	2.00	6.00	2.00	2.00	2.00	6.00
8.1.2	Training and awareness (1 per village)	100%	0%	No.	1	0.20	0.20	0.20	0.20	0.60	0.20	0.20	0.20	0.60	2.00	2.00	2.00	6.00	2.00	2.00	2.00	6.00
8.1.3	Workshop and exposure visit within Nagaland for knowledge and experience sharing	100%	0%	No.	1	0.40	0.40	0.40	0.40	1.20	0.40	0.40	0.40	1.20	4.00	4.00	4.00	12.00	4.00	4.00	4.00	12.00
8.1.5	Knowledge management**	100%	100%				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.1.6	Risk Management***						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total							**0.60**	**0.60**	**0.60**	**1.80**	**0.60**	**0.60**	**0.60**	**1.80**	**8.00**	**8.00**	**8.00**	**24.00**	**8.00**	**8.00**	**8.00**	**24.00**
9	**PROJECT MANAGEMENT (GoN)***																					
9.1	Transport and communication	100%	0%	No	1	1.00	1.00	1.00	1.00	3.00	1.00	1.00	1.00	3.00	10.00	10.00	10.00	30.00	10.00	10.00	10.00	30.00
9.2	Monitoring and evaluation															0.00	0.00	0.00		0.00	0.00	0.00
9.3	Purchase of office equipment for project mgt	0%	0%	LS	1	15.00									15.00	0.00	0.00	15.00	15.00	0.00	0.00	15.00
Total							**1.00**	**1.00**	**1.00**	**3.00**	**1.00**	**1.00**	**1.00**	**3.00**	**25.00**	**10.00**	**10.00**	**45.00**	**25.00**	**10.00**	**10.00**	**45.00**
10	**NABARD FEES**																		**43.79**	**17.90**	**12.22**	**73.91**
GRAND TOTAL							**170.72**	**69.04**	**44.56**	**278.71**	**130.87**	**51.35**	**32.99**	**215.22**	**1819.43**	**755.58**	**510.78**	**3085.79**	**1464.72**	**596.65**	**407.38**	**2468.75**

*RI/R&M - Repeat investment/ repairs and maintenance in 2nd and 3rd year

Notes

1.** Knowledge management support will be made by GIZ from its CCA-NER project

2. All project management cost except fuel for transportation and communication cost will be borne by Govt. of Nagaland from its own reqources

3. Amount spent in marketing will be collected from sale proceeds and will be maintained as village corpus for future marketing and promotion activities

4. Mid term and end term review of the project will be conducted by the Government of Nagaland/ NABARD

5. Risk management: Project farmers will be insured under new health, life and agriculture crop insurance scheme of GoI