

DETAILED PROJECT REPORT
ON
MANAGEMENT OF ECOSYSTEM OF KAZIRANGA
NATIONAL PARK BY CREATING CLIMATE RESILIENT
LIVELIHOOD FOR VULNERABLE COMMUNITIES
THROUGH ORGANIC FARMING AND POND BASED
PISCICULTURE
for
NATIONAL ADAPTATION FUND ON
CLIMATE CHANGE



SUBMITTED
TO
MINISTRY OF ENVIRONMENT, FOREST &
CLIMATE CHANGE,
GOVERNMENT OF INDIA
Indira Paryavaran Bhavan, Jorbagh Road,
New Delhi - 110003

<p>Title of Project/Programme: Management of ecosystem of Kaziranga National Park by creating climate resilient livelihood for vulnerable communities through organic farming and pond based pisciculture</p>
<p>Project/Programme Objective/s:</p> <p>The proposed project entails the following broad objectives:</p> <ul style="list-style-type: none"> ▶ Rejuvenating selected beels which are presently completely dry and doesn't hold any water, which includes de-siltation of the beel to increase the depth and thus the augment the water holding capacity of the beel. ▶ Increase in livelihood option for vulnerable communities living in vicinity of Kaziranga National Park through organic farming and pond based fisheries ▶ Management of watersheds through check dams and ponds <p>Organic farming is envisaged for the vulnerable communities within the southern periphery of the national park. A focused livelihood generation from fisheries is also envisaged for the fishing communities living in the in the north bank of Brahmaputra.</p>
<p>Project/ Programme Sector:</p> <ul style="list-style-type: none"> ▶ Forestry, agriculture, fisheries and ecosystem
<p>Name of Executing Entity/ies/Department:</p> <ul style="list-style-type: none"> ▶ Kaziranga National Park (KNP) under Department of Environment & Forests (DoEF), Government of Assam.
<p>Beneficiaries:</p> <ul style="list-style-type: none"> ▶ Vulnerable communities living in the periphery of Kaziranga National Park (KNP), Assam
<p>Project Duration: 3 years Start Date: October 2016 End Date: September 2019</p>
<p>Amount of Financing Requested (INR.): 2,473.08 Lakhs</p>
<p>Project Location: The list of finalised project sites are as under. North Bank: Tewaripal and Gorpai South Bank: Rangalu, Difalu Pathar, Mohpara, Chepenakubua, No.1 and No. 2 Kohora EDC, Kuthori State: Assam District: - Kaziranga National Park lies partly in three districts namely Golaghat, Nagaon and Sonitpur and borders Karbi Anglong district of Assam. The two civil sub divisions namely Bokakhat and Kaliabor and two Police Stations namely Bokakhat and Jakhlabandha control the whole civil area falling south of the Park boundary. On the north, the civil jurisdiction belongs to the Tezpur Civil Sub-Division, Biswanath Sub Division, and Gohpur Civil Sub-Division, and there are seven Police Stations namely Gohpur, Helem, Behali, Gingia, Biswanath, Sootea and Jamuguri on the northern side, and two Police Stations namely Bokakhat, (with Kohora Outpost additionaly) in Golaghat district and Jakhlabandha (with Kuthuri Outpost additionaly) in Nagaon district. The Forest divisions of Golaghat, Nagaon, Sonitpur East and West fall on the periphery of the Park.</p>
<p>Contact Details of Nodal Officer of the Executing Entity/ies/: Director, Kaziranga National Park (KNP), Department of Environment & Forests, Government of Assam, Bokakhat, Golaghat District, Assam, PIN 785612 INDIA</p>
<p>Email: dir.knp@assam.gov.in</p>
<p>Mobile: Tel: 03715-295759</p>

1. PROJECT BACKGROUND

1.1. Project / Programme Background and Context:

- a) Provide brief information on the problem the proposed project/programme is aiming to solve

Background of Kaziranga National Park and its ecological importance:

The Kaziranga National Park is one of the oldest wildlife conservancy reserves of India, first notified in 1905 and constituted as Reserved Forest in 1908 with an area of 228.825 sq km specially established for conservation and protection of the Greater One Horned Rhinoceros (*Rhinoceros unicornis*) whose number was estimated at twenty pairs then. Kaziranga was declared a Game Sanctuary in 1916 and opened to visitors in 1938. It was declared a Wildlife Sanctuary in 1950, and notified as Kaziranga National Park in 1974 under the Assam National Parks Act, 1968, with an area of 429.93 sq km. A series of additions namely 1st, 2nd, 3rd, 4th, 5th, and 6th Addition to Kaziranga National Park in several stages were notified taking the total area to 884.43604 sq km. Kaziranga National Park is famous for the Big Five namely the Rhinoceros (*Rhinoceros unicornis*), Royal Bengal Tiger (*Panthera tigris*), Asian Elephant (*Elephas maximas*), Asiatic Wild Buffalo (*Bubalus arnee*) and the Eastern Swamp Deer (*Rucervus duvauceli ranjitsinhii*). It houses the largest population of the Greater One Horned Rhinoceros in the world and houses about 68% of the entire world population. It also has one of the highest densities of tigers in the wild in the world. It also houses almost entire population of the Eastern Swamp Deer. Besides these big five, Kaziranga supports immense floral and faunal biodiversity. It has 555 no. of recorded plant species, 38 species of Mammalia of which 17 are endangered and vulnerable, 553 species of avifauna of which 25 are globally important and 23 threatened, 42 species of Pisces, 17 species of fresh water turtles, 35 snake species, 29 species of lizards and 24 species of Amphibia.

The Kaziranga National Park and its addition areas are spread over the three districts of Assam namely Golaghat, Nagaon and Sonitpur, and form a conservation complex with the Karbi Anglong Hills in the south. Kaziranga Karbi Anglong complex is a notified Elephant Reserve known as Kaziranga Karbi Anglong Elephant Reserve. The adjoining Hills of Karbi Anglong serve as natural corridors and migration route for large mammals such as elephants, rhinoceros and tigers. The hills of Karbi Anglong make the watershed for the rivers that feed into Kaziranga National Park, noted among them being Difaloo river, Mori Difaloo river, Mori Dhansiri river and Deopani river, all of which drain into the Kaziranga National Park and its addition areas. The Kaziranga National Park has on its North the mighty river Brahmaputra, entire stretch of which from Golaghat district boundary on the east to the Kaliabhomora Bridge on the river on the west has been constituted into the 6th Addition to Kaziranga National Park, contributing to the already existing area of the park in the north bank.

Kaziranga has a very fragile ecosystem, where on one hand the annual flood waters of the river Brahmaputra bring nourishment, leading to a very high productive biomass, and on the other hand, the phenomenon of erosion takes away lot of valuable and prime habitat. Kaziranga so far has lost more than 84 sq km of its prime habitat to the river Brahmaputra. The 6th Addition supports a huge population of local fish species and serves as a large natural hatchery for downstream consumption. It also supports one of the largest Gangetic River Dolphin populations. Since Kaziranga is a product of the complex geological and

geomorphological dynamics of the river Brahmaputra and underlying tectonics, the Kaziranga National Park is ecologically very sensitive to changes especially in the upstream of the river Brahmaputra. The Kaziranga National Park has in its vicinity several notified forest and protected areas namely Panbari RF and Deopahar PRF in Golaghat district, Kukrakata Hill RF, Bagser RF, Kamakhya Hill RF and Deosur Hill PRF in Nagaon district, Bhumuraguri RF in Sonitpur district, North Karbi Anglong Proposed Wildlife Sanctuary in Karbi Anglong district; all these reserved forests and protected areas not only have their own conservation and biodiversity values, but also are of great ecological importance to the Kaziranga National Park, serving as prime habitat and shelter for the migrating wildlife of the Park.

The proposed project is envisaged on selected sites located in close vicinity of Kaziranga National Park on the north bank and south bank of the Brahmaputra river. A brief background and concerns of north bank and south bank sites are discussed as under:

NORTH BANK: Since inception of Kaziranga in 1908, till the time the sixth addition to KNP was conceptualised in 1999, the north of the Brahmaputra river which lies north of Kaziranga was outside the Kaziranga National Park (KNP). The people inhabiting the north bank have been traditionally fishing communities and their main source of livelihood has been fishing with large boats in the Brahmaputra River. As these areas were outside (as far removed as 10 to 15km away from the park boundary) KNP, the park authorities never paid any attention for developing community participation for conservation. The intervention of the park authorities has mostly been in the form of raids and anti-poaching activities in pursuit of suspected poachers which might be taking shelter in these areas. However, after declaration of the Sixth Addition to Kaziranga National Park which was done to minimize anthropogenic influence on the vulnerable ecosystem already effected by climate change, since 2008, the entire area came under the direct jurisdiction of the park authority. In 2010, a Range Office was established in the northern range with head office in Biswanath and which has jurisdiction over entire north bank. The forest department is contemplating strengthening of jurisdiction further in the north bank by creating another Range Office by the name of Northern Assam Range Division. Further, it needs to be mentioned that the area of north bank right up to the NH 52, has been proposed to be constituted into the Eco-Sensitive Zone of the Kaziranga National Park. The proposal has already been sent by the Government of Assam (GoA) to the Ministry of Environment Forest & Climate Change (MoEF&CC) for notification. All the villages selected for this project fall within the Eco-Sensitive Zone of the KNP. The park authorities off late are in the process of constituting Eco-Development Committees (EDCs) in some of the areas sensitive to rhino poaching. The villages proposed under this project under the north bank are the ones which are heavily dependent on fishing and have high quotient of involvement of possible poaching cases. It is expected, that once the right livelihood interventions are carried out, this population would discontinue giving shelter to poachers and also stop illegal fishing in the sixth addition areas of the park.

SOUTH BANK: In the past, adjoining forests of Karbi Anglong and grasslands of KNP formed a single unit of sparsely populated area. However, with the opening of southern side of the National Highway No. 37 the forest-cover diminished and got fragmented resulting in loss of natural wild habitat. The southern bank also saw establishment of tea gardens as early as 1870s. Following these

establishments, human habitation and agricultural activities started multiplying in manifolds in the southern bank on the fringes of the constituted Kaziranga National Park. The situation has only worsened over time with the changing land use pattern and widening of the gap between the Park and the hills by human settlements, affecting the movement of wildlife from grasslands to highlands in the south of the park during floods and otherwise. The wildlife confined in the grasslands during floods fall easy prey to the poachers.

Further, the southern part of Nagaon district in central Assam valley and adjoining parts of Karbi Anglong form a rain-shadow zone where annual rainfall is as low as 800-1200 mm. Water scarcity is a constraint for the people living in this rain shadow zone and absence of effective irrigation system or water harvesting practices has limited the yield from agricultural land. As the population is primarily agrarian, this adds on to their vulnerability to climate change. Through this project, surface water sources will be rejuvenated which will reduce pressure on the limited ground water resources, improve hydrological balance of the ecosystem, reduce flood intensity in surrounding areas, and provide with improved opportunity for adapting multi-cropping practices.

b) Outline the economic, social development and climate change in line with the State Action plan on Climate Change and relevant Missions under National Action Plan on Climate Change

Impact of climate change on economic development of Assam:

Assam's economy is still agrarian as seen from the fact that 86% of its rural population is dependent on agriculture and allied activities such as agriculture, fisheries and forests, which together contribute 34% of the GSDP. Agriculture in Assam is a water intensive sector given that 81% of the water withdrawn from the available sources is for irrigation. Due to climate change, decrease in annual rainfall and increased extreme rainfall events have caused flash floods, severely impacting agricultural production. High run offs during these extreme rainfall events also cause siltation in surface water bodies thereby reducing their water holding capacity. Further, flash floods also affect the rate of ground water recharge, hence affecting access to potable water. Based on estimates made by Government of Assam, the state loses 80000 hectares of fertile land every year during flood.¹ This has a huge impact on the Assam's GSDP.

The proposed initiative (under National Adaptation Fund) aims to rejuvenate available surface water bodies to develop fisheries and practice climate resilient agriculture, in-sync with the economic requirement of Assam (As per the SAPCC).

Impact of climate change on social development of Assam:

As per the State Action Plan on Climate Change (SAPCC), in 2011-12, as 31.98% of the State's population lived below the poverty line against all India average of 21.92%, with majority of the population, especially the people living in interior rural areas, in areas inhabited by Scheduled Caste & Scheduled Tribe population,

¹ <http://www.ndtv.com/india-news/gone-in-the-assam-floods-8-000-hectares-of-fertile-land-every-year-1217667>

tea garden areas and far flung “char” (riverine) lack facilities of safe drinking water, sanitation etc.

A Socio-economic survey of the existing 33 EDC (Eco Development Committee) villages in KNP by WWF indicates that 85% of the families living in these EDCs are marginal and landless. These communities have limited capacity to adapt to climate change related vulnerability. Many families in these EDCs lack minimal facilities like safe drinking water, sanitation, health facilities. These developmental gaps and lack of socio economic infrastructure are common to the communities vulnerable to climate change.²

Relevance to State Action plan on Climate Change and Missions under National Action Plan on Climate Change

This project is aligned with the Assam’s State Action Plan on Climate Change (SAPCC) and Missions under National Action Plan on Climate Change. The following points illustrates the actions proposed by state and national programs to address the development as well as climate risk related to water, forestry, fisheries, wildlife and agriculture.

SAPCC:

The SAPCC of Assam identifies ensuring sustainability of agriculture systems as a major concerns related to sustainability of critical ecosystems including **agro-ecosystems** (agriculture, fishery, and livestock) to ensure livelihood security in a changing climate scenario. The following section of the SAPCC will be relevant to the proposed project:

Forests and Biodiversity

Like rest of the North Eastern region of India, Assam is blessed with forest/ tree cover. Together with tree cover outside the forests, the total green cover in Assam extends over an area of 253 sq. km which is 37.29% of the total geographical area of the State. Apart from providing a variety of products for daily needs, such as, firewood, fodders, medicinal plants, bamboos, fruits, essential oils and so on, the forest also are the recharge zone of rain water in the spring sheds in the mountain areas. Further, they also provide livelihood opportunities to over a million people in the State, who trade in various timber and non-timber products. However, open forests in the State in 2013, as recorded by the FSI covered 51% (14,882 sq. km) of the total green cover of the State and very dense forests were only 5% of the green cover (see Figure 14). This is because the forest area is suffering from habitat degradation, encroachments, fuel wood extraction etc.

² Detailed report on issues and Possible Solutions for Long Term Protection of the Greater One Horned Rhinoceros in Kaziranga National Park. Pursuant to the Order of The Hon'ble Guwahati High Court

The forests here experience extreme rainfall and extended dry periods and, thus sustainable watershed management is a need within the forest areas of Assam. The concerns are elaborated in the SAPCC as follows:

- ▶ **Extreme Rainfall in Hilly areas:** Extreme rain fall events are likely to lead to heavier run off along the hills, thus the potential ground water recharge in the spring sheds is likely to reduce, along with heavy soil erosion.
- ▶ **Longer Dry periods:** With longer drought periods, biodiversity- both floral and faunal are likely to be affected and forest fires may become the norm, with increasing man-animal conflict. Thus affecting the various types of timber and NTFP produce and hence the livelihood of the people dependent on the same.

Strategies for sustainability of agriculture and horticulture systems:

- ▶ Assessing District wise exposure and vulnerability of agriculture systems to climate variability and change and developing climate smart Adaptation Strategies through Stakeholder consultation for all 27 districts taking into consideration the agro-climatic zone in which they are located
- ▶ Establishing demonstrative integrated farming systems by introducing agro-forestry and agro pastoral practices
- ▶ Restore natural water bodies to conserve run off and reduce likelihood of catastrophic flooding
- ▶ Sustainable eco-friendly horticulture in hilly areas which will reduce run off and soil erosion in the hills, thereby checking siltation and drying up of spring sheds

Strategies for sustaining fish production in Assam in a changing climate context

- ▶ Backyard fisheries in small tanks in same area where water use efficiency will be piloted in agriculture
- ▶ Reclamation of ponds and beels wherever possible, to convert them into fisheries and for using them as a source to meet demand for water in the dry season.

The Wildlife Management Plan called the Tiger Conservation Plan of Kaziranga Tiger Reserve has been prepared in two parts namely Core and Buffer. While the core plan deals with the core areas of the Kaziranga Tiger Reserve, namely the Kaziranga National Park and its various additions (1,2,3 & 5), wherein habitat improvement is a recommended agenda. The Buffer Plan covers the areas of the buffer and the fringe villages for whom a Microplan based development initiative has been envisaged. All the project villages under this scheme shall have a Microplan in collaboration with civil society organisations and community members which being strategized for combating poaching, securing identified animal corridors, reducing human-animal conflict, sustaining conservation initiatives and public sensitization on conservation animal habitats and corridors.

Natural Disturbance Model Habitat Management will be used to plan activities for conserving animal habitats. This entails identification of a natural disturbance condition in the surrounding of the park that resembles the human disturbance followed by quantification of the vegetation in the naturally disturbed area. The data gathered is used to build a model for revegetation and is also used as reference to evaluate the success of introduced restoration treatments and recommended improvisations.

National Missions:

- ▶ One of the key thrust areas to be addressed under **the National Mission for Sustainable Agriculture (NMSA)** includes dryland agriculture. The NAPCC also mentions one of its objectives as to devise strategies to make Indian agriculture more resilient to climate change by focusing on improving the productivity of rain fed agriculture. Aligned with the same objective is **Paramparagat Krishi Vikas Yojna**, which is an elaborated component of Soil Health Management (SHM) under NMSA. Under PKVY Organic farming will be promoted through adoption of organic village by cluster approach and Participatory Guarantee System (PGS) certification. Fifty or more farmers will be motivated to form a cluster having at least 50 acres of land to take up organic farming under the scheme. This scheme promotes commercial organic production and will link the produce with the market, raising farmer's income and creating potential market for traders. The project components relate to the three main dimensions targeted by NMSA and these are- 'Water use efficiency', 'Nutrient Management' and 'Livelihood diversification'. The project objective agrees to the mandate of progressively shifting towards environment friendly technologies through the components like vermicomposting under the organic agriculture activity. Also, the project components of rejuvenating surface waterbodies will also indirectly relate to NMSA objective for achieving "More crop per drop". Further, project also links with the Sub-Mission on Agro-Forestry (SMAF) under NMSA. Based on the field survey, trees like *Phyllanthus emblica* (Amla), *Artocarpus heterophyllus* (Jackfruit), *Citrus limon* (Assam lemon), *Areca catechu* (Betel nut) and high yielding climbers like *Piper nigrum* (Black pepper).

- ▶ **National Water Mission** seeks to develop new regulatory structures, combined with appropriate entitlements and pricing. It will seek to optimize the efficiency of existing irrigation systems, including rehabilitation of systems that have been run down and also expand irrigation, where feasible, with special effort to increase storage capacity. Incentive structures will be designed to promote water-positive technologies, recharging of underground water sources and adoption of large scale irrigation programmes which rely on drip irrigation and ridge

and furrow irrigation. Efficient usage of water ensures less exploitation of water resources available in drought affected regions of Assam and will help drought management. If water usage can be optimized through efficient agricultural practices and irrigation system, the additional water available can be utilized for additional area by more marginal farmers. This will help improve social equity.

- ▶ **National Mission on Sustaining Himalayan Ecosystem** recognises importance of scientific and technical inputs required for sustaining the fragile Himalayan Ecosystem. In line with the same, State Knowledge Cells will be established under the mission which will address action of laying out sector specific and cross-sectoral time bound priorities which are – building human and knowledge capacities; building institutional capacities; building capacities for evidence-based policy implementation; and building capacities for continuous learning and proactive designing of development strategies. This cell provides scope for enhanced institutional functioning, aiding in effective implementation of strategies and documentation of success and challenges. This will consequently build ground better planning and implementation of activities, thereby contributing in building climate resilience of the habitat and communities.

- ▶ This is with reference³ to **Mahatma Gandhi NREGA and Agriculture convergence guidelines issued in 2009** (Available on www.mgnrega.nic.in under the icon "convergence"). Rural poor are most vulnerable to climate change, as their livelihood is directly dependent on environmental resources. As extreme events increase, the potentiality of longer and more severe drought, and increased water stress would be greater. These will have an adverse impact on agriculture, water sources, forest and coastal areas. Several studies have indicated that, as the surface temperature of earth rises, climate change will reduce crop productivity; this will be more pronounced in rain fed areas, and would further increase the vulnerability often the rural poor. A study on Environmental Benefits and Climate Change Vulnerability Reduction through MGNREGA has been conducted by Indian Institute of Science (IISc, Bangalore) and GIZ across 5 states, Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Sikkim. The study showed that wherever MGNREGA is being implemented effectively it is generating multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production. MGNREGA works are also helping reduce soil erosion and increase area under plantations. Overall the study concludes that MGNREGA works have contributed to improving the adaptive capacity of rural people and reducing their vulnerability to climate risks.

³³ http://nrega.nic.in/netnrega/convergence/%5Cwritereaddata%5CConvergence%5Ccirculars%5CConvergence_Prog_Min_Agriculture.pdf

c) *Include climate analysis and vulnerability analysis.*

Climate analysis

Earlier studies indicate that over the last few million years, the strength of the Asian monsoon has often varied in response to changing global processes⁴. There is therefore every possibility that current and predicted changes in climate and precipitation will have impacts on the Brahmaputra River. Research suggests that the types of environmental changes predicted in climatic models are already taking place. Studies on many animals and plants that show significant alterations in range or behaviour that is not due to direct pressure from humans find that climate change is the most consistent explanation⁵. Studies in other parts of India such as Gujarat⁶ and the Western Ghats⁷ suggest that changes in species will soon or are already taking place as a result of climate change, even within protected areas.

Given the extent to which the ecology of Kaziranga is dependent on the variations in annual river flow, climate-induced changes could have a major effect on the park's ability to maintain biodiversity over time. Firm evidence of a long-term regional trend in area-averaged precipitation for Asia has yet to be found⁸. However, various models have been developed to predict the possible effects of climate change on the climate the region. Although the results differ in extent, all agree that an increase in water levels and thus possibly also of flooding is likely. One atmosphere-ocean-land model suggests that the Ganga-Brahmaputra discharge could increase by as much as 49 percent, due to an increase in the absolute humidity of air and the intensification of the South Asian monsoon circulation⁹. A climate change scenario using UKTR results (a high resolution transient climate change experiment carried out by the Hadley Centre in the UK) show the peak discharge of the Brahmaputra increasing by 13 percent following a 60C global mean temperature rise¹⁰.

4 ⁴Kale, VS, Gupta A & Singhvi AK 2004, 'Late Pleistocene-Holocene Palaeohydrology of Monsoon Asia', *Journal of the Geological Society of India*, vol. 64, no. 4, pp. 403-418.

5 ⁵Santer, BD, Wigley, TML, Barnett, TP & Anyamba E 1996, 'Detection of climate change and attribution of causes', in Houghton, JT, Meira, LG, Filho, Callander, BA, Harris, N, Kattenberg, A & Maskell, K (ed.s) *Climate Change 1995: The Science of Climate Change. Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York.

6 ⁶Clark, B & Duncan, P 1992, 'Asian wild asses—hemionos and kiangs', in *Zebra, Asses and Horses: An Action Plan for the Conservation of Wild Equids*, The World Conservation Union (IUCN), Gland, Switzerland.

7 ⁷Katti, M & Price, T 1996, 'Effects of climate on palearctic warblers over wintering in India', *Journal of the Bombay Natural History Society*, vol 93, pp. 411-427

8 ⁸Mirza, MMQ, Warrick, RA, Ericksen, NJ & Kenny, GJ 2001, 'Are floods getting worse in the Ganges, Brahmaputra and Meghna basins?' *Environmental Hazards*, vol 3, no.2, pp. 37-48

9 ⁹Manabe, S, Milly, PCD & Wetherald, R 2004, 'Simulated long-term changes in river discharge and soil moisture due to global warming' *Hydrological Sciences*, vol. 49, no. 4, pp. 625-642

10 ¹⁰Mirza, MMQ, Warrick, RA, & Ericksen, NJ 2003, The Implications of Climate Change on Floods of the Ganges, Brahmaputra and Meghna Rivers in Bangladesh, *Climatic Change*, vol. 57, no. 3, pp. 287-31

The State Action Plan on Climate Change (SAPCC) for Assam acknowledges the climate related issues impacting water availability. As per the SAPCC, State level climate data for the period 1951 to 2010 has been analysed by the India Meteorological department¹¹. In Assam, the analysis is based on data collected from 6 Stations for temperature and 12 Stations for rainfall. The analysis indicates that the mean temperature in the State has increased by +0.010C/year. There is also an increase in seasonal temperatures across seasons with pronounced warming in post monsoon and winter temperatures. The annual rainfall has also decreased by -2.96 mm/years during the same period.

Table 1: Climate trends in Assam between 1951 and 2010

	Annual	Winter	Summer	Monsoon	Post Monsoon
Mean Max Temp (oC/yr)	+0.02	+0.01	No trend	+0.01	+0.02
Mean Min Temp (oC/yr)	+0.01	+0.02	+0.01	+0.01	+0.02
Mean Temp (oC/yr)	+0.01	+0.01	No trend	+0.01	+0.02
Rainfall (mm/yr)	-2.96	+0.08	-0.56	-2.19	-0.75

During the same period, the average annual rainy days have decreased by 1.61, 0.58 and 0.14 days in the project districts of Golaghat, Nogaon and Sonitpur respectively. In 2004, Sonitpur also encountered two devastating floods impacting flora, fauna and human habitat in this region¹². Decrease in rainfall and extreme flash floods adversely affect ground water recharging. The same is elaborated under section 1.b.

As per the SAPCC the current practices such as over exploitation of ground water, Jhum cultivation in hilly (practiced in southern part of KNP) areas, mono cropping etc. and recurrent floods and droughts are putting pressure on the agriculture system. Exacerbation of climate change induced hazards are likely to further make the agriculture production system of the State uncertain, and these issues need to be addressed within the developmental plans of the State.

If current trend continues, climate change will negatively impact the water resources sector by increasing freshwater scarcity, which is already a problem for Assam in the summer. The predicted increase in average temperature and decrease in the number of rainy days due to climate change will further stress water resources. This problem is compounded by high levels of groundwater

11 ¹¹Rathore L S, A D Attri and A K Jaswal, 2013. State Level Climate Change Trends in India. Meteorological Monograph No. ESSO/IMD/EMRC/02/2013. India Meteorological Department. Ministry of Earth Sciences. Gol

12 ¹²State Action Plan on Climate Change, Assam

extraction, which can be expected to continue given Assam’s growing population and reliance on agriculture.

Kaziranga benefits the downstream populations living along the river Brahmaputra by serving as an extensive nursery/ hatchery for fishery and other aquatic flora and fauna. Its almost 300 waterbodies, rivulets and streams capture more than 1000 McuM water during floods, thereby acting as flood cushion. If properly maintained and conserved, these natural landscape has sufficient potential to reduce the probabilities of catastrophic flood events, under a possible climate change extreme scenario. On the other hand, the watershed of the national park has a network of thousands of streamlets which if not preserved and improved can have potentially hazardous outcome for the populations residing in the foothills and valley areas as well as can spell irrecoverable disaster for the ecosystems of the Kaziranga National Park. The approximate area of the watershed, excluding the Kukrakata RF, and Panbari RF, comes to 750 sq. km, of which approximately 515 sq. km falls in Karbi Anglong. The watershed area pertaining to Golaghat is about 125 sq. km and the rest falls in Nagaon district, amounting to 110 sq. km. It has been seen that this watershed has about 3000 1st order streams, 670 2nd order streams, 145 3rd order streams, 30 4th order streams, 8 no.s 5th order streams and 2 no.s 6th order stream (which is same as that of the river Brahmaputra). The mean stream-length is 0.62 km, stream frequency per sq km is 5.00, drainage density is 3 km per sq. km, drainage texture is 16.36, texture ratio is 12.62 and circulatory ratio is 0.18 for this watershed. Restoration, preservation and maintenance of these ecosystem services are of utmost importance as a whole and in particular, to address the possible outcomes of climate anomalies.

An analysis of annual average rainfall, average maximum and minimum temperature data collected from two tea-gardens located in the southern and northern bank of Brahmaputra, which are adjacent to the Kaziranga National Park area is presented as under -

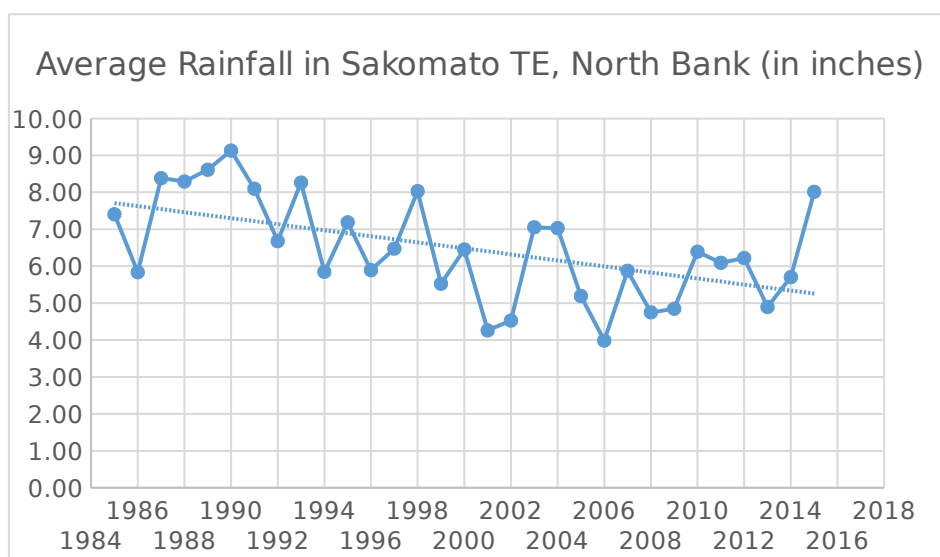


Fig 1: Average annual rainfall (inches), Sakomato TE, North Bank

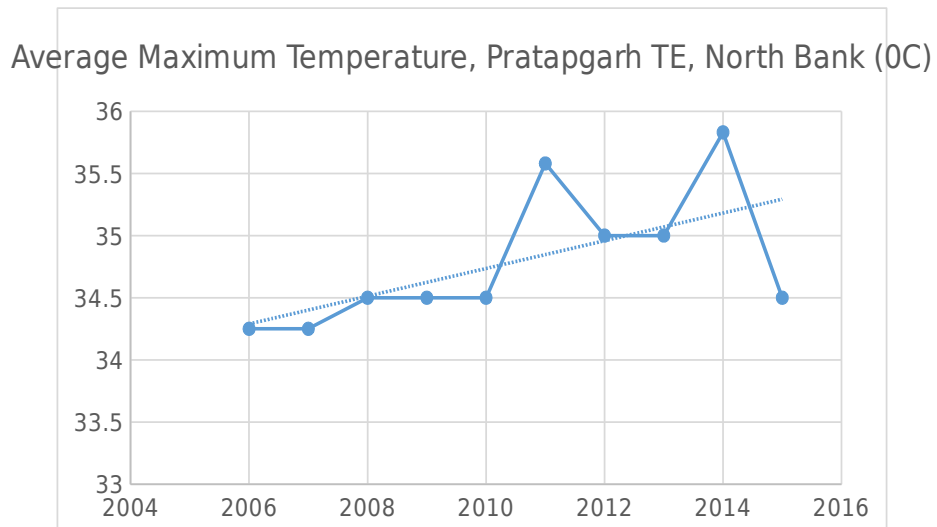


Fig 2: Average Maximum Temperature, (0C) Pratapgarh TE, North Bank

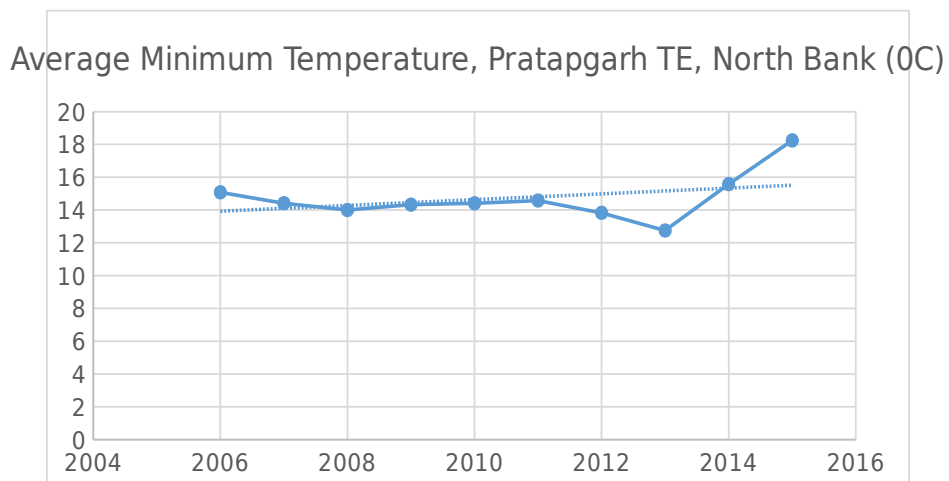


Fig 3: Average Minimum Temperature, (0C) Pratapgarh TE, North Bank

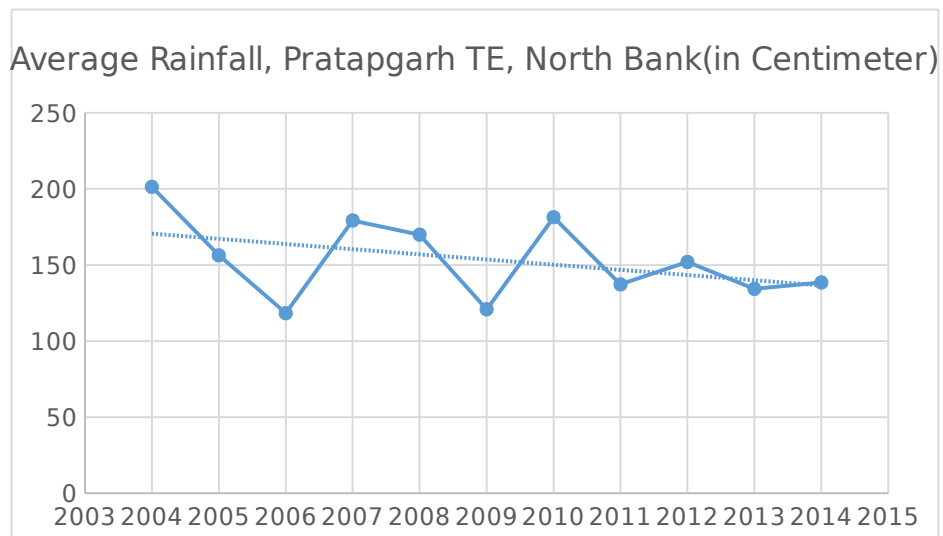


Fig 4: Average Annual Rainfall (cm) Pratapgarh TE, North Bank

The available data shows a declining trend for rainfall in these locations, while increasing trend was observed for annual maximum and minimum temperature.

The available annual average rainfall data for Golaghat district¹³ also shows a declining trend. However, amount of data available is limited to conclude about the significance of the observed trend.

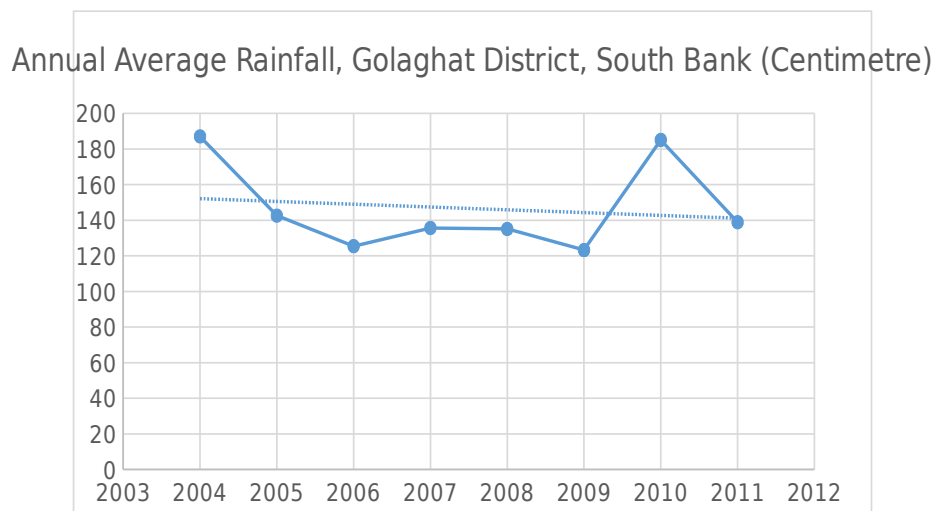


Fig 5: Annual Average Rainfall (cm), Golaghat District, South Bank

Vulnerability related challenges Faced by the Fringe Village Communities around Kaziranga National Park

As can be seen from the field survey, most communities are very poor, landless and have little or no means of survival. Some of the key vulnerability challenges faced by them are: -

1. Around 85% families are daily wage earners, livelihood options are very limited. Hence, most of the villagers are small or marginal farmers and are subject to climate related vulnerabilities like drought and floods.
2. Loss of agricultural land and livelihood due to wild animal depredation. Around 278 hectares of agricultural land is rendered unfit for agriculture due to depredation by wild boar and wild elephant. Due to climate impacts like draughts and flash floods, the animals leave their natural habitat and venture inside the agricultural area (in search of food).
3. Loss of livelihood due to non-availability of Grazing land for Livestock population: Sixth addition of Kaziranga National Park has led to loss of traditional grazing fields inside Panpur RF and Char areas.
4. Loss of Livelihood due to extinguishing of fishing rights inside Sixth addition of Kaziranga National Park. Those villagers who were traditional fishermen have lost their livelihood. This was done to minimize anthropogenic influence on the vulnerable ecosystem already effected by climate change. However, the scope of collection of water in natural ponds and beels for fishery projects is limited. If the livelihood concerns of the fishing communities are addressed sustainably, this will also help reducing the population pressure on the natural resources of the park area.

13 www.indiawaterportal.org/sites/...org/.../imd_district-wise_rainfalldata_2004-2010.xls

5. Again, the southern part of Nagaon district in central Assam valley and adjoining parts of Karbi Anglong form a rain-shadow zone where annual rainfall is as low as 800-1200 mm. Water scarcities are a potential constraint for the people living in this rain shadow zone and absence of effective irrigation systems or water harvesting practices adds to the vulnerability of the people. Limited agricultural yield from land in southern part of the national park due to inadequate availability of water.
6. Limited or no access to clean drinking water, power and LPG. The populations living in the watershed areas, Bagser RF and Kukrakata RF have virtually no access to clean drinking water. They have to depend solely upon stream water which appears to be highly impacted by possible climate change impacts. According to the inhabitants of these areas, not only quantum, but also quality of water has considerably reduced from these streams. The level of arsenic and fluoride in the ground water has started making its present felt in some of the areas.
7. Lack of amenities such as school, hospital, veterinary centre.
8. Increasing human animal interface due to encroachment by human and spill over of forest animals into the adjoining villages.

d) Project Location details - villages, block/ mandal, district

The sites of the pilot project were identified through an initial survey and consultation with local community and state government officials.

Project Sites:

North bank:

- a. Gorpai
- b. Tewaripal

South bank:

- a. Kaziranga Hukuma
- b. Kunjuri-Gelabeel
- c. Amguri Chang and Phulaguri Chang
- d. Japori Beel

District: - Kaziranga National Park lies partly in three districts namely Golaghat, Nagaon and Sonitpur and borders Karbi Anglong district of Assam.

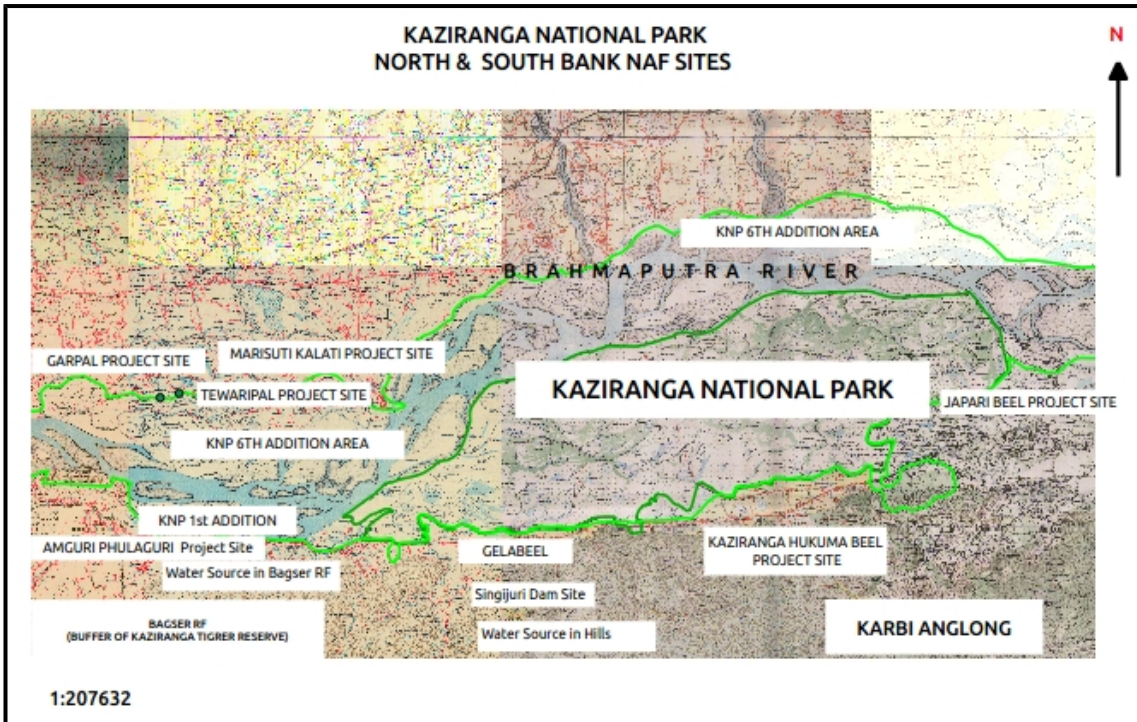


Fig 6: Satellite map of Kaziranga National Park (KNP)



Fig 7: Land use within KNP

e) *Demographic details of the population – total population (for area in operation), sex- disintegrated data, etc.*

NORTH BANK:

The demographic profile for the villages selected from the North Bank of Brahmaputra is given below:

a. Gorpal

No of Household	Total Population	Total Male	Total Female
280	1481	750	731

b. Tewaripal (Naloni & Merisuti Beel)

No of Household	Total Population	Total Male	Total Female
283	1568	805	763

SOUTH BANK:

The demographic profile for the villages selected from the South Bank of Brahmaputra is given below:

a. Kaziranga & Hukuma

No of Household	Total Population	Total Male	Total Female
946	4461	2351	2110

b. Kunjuri-Gelabeel

No of Household	Total Population	Total Male	Total Female
316	1480	790	690

c. Amguri Chang and Phulaguri Chang

No of Household	Total Population	Total Male	Total Female
258	695	410	285

d. Japori Beel

No of Household	Total Population	Total Male	Total Female
108	364	195	169

Total Beneficiaries (Direct & Indirect):

Site	Total Beneficiaries (No. of families)
Gorpal	280
Tewaripal	293
Kaziranga-Hukuma	400
Kunjuri-Gelabeel	1000
Amguri-Phuloguri	284
Japori	108

1.2. Project/ program objective

The proposed project entails the following broad objectives:

- ▶ Rejuvenating selected beels which are presently completely dry and doesn't hold any water, which includes de-siltation of the beel to increase the depth and thus the augment the water holding capacity of the beel. This will help in reducing the intensities of flood as well as provide options for managing and tackling drought conditions under a possible climate change scenario.
- ▶ Increase in livelihood options for vulnerable communities living with the vicinity of Kaziranga National Park through organic farming and pond based fisheries. Organic farming increases the climate resilience potential of agricultural sector by banking on integrated crop management techniques, which include time-tested indigenous technological know-how of the farming communities, increased capacity of the soils to hold more moisture, more nutrients and drain better, thereby increasing the potential of organically replenished soils to adapt better in climate extremes like drought, vagaries of rainfall, floods etc. Further, being a more diverse system of cropping, with focus on local crops/varieties, organic agriculture provides better option for climate contingent farming¹⁴. Similarly, fishery is an activity that can provide two benefits simultaneously-direct livelihood option as well as facilitating water regime rejuvenation in the nearby areas, thus making cropping practices more resilient to water stresses that may occur from climate catastrophes.
- ▶ Management of watersheds through check dams and ponds to restore and maintain hydrological balance of the ecosystem, to build its resilience towards climate change affects.

1.3. Details of program/ project executing agency

a) Name, Registration No. & Date, Registered Address, Project Office Address (for the proposed project)

The Department of Forestry, Government of Assam will be project executing agency. The nodal office which will be responsible for the current project is:

Director, Kaziranga National Park (KNP),
Department of Environment & Forests, Government of Assam,
Bokakhat, Golaghat District, Assam, PIN 785612 INDIA

b) Available technical manpower for the proposed project implementation:

The KNP is a part of Eastern Assam Wildlife Division is headed by a Divisional Forest Officer (DFO). He is assisted by three Assistant Conservators of Forest (ACF). A Wildlife Research Officer (WLRO) is also posted in Kaziranga who

¹⁴ Technical paper on Organic Farming and Climate Change, http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Sectors/Fair_trade_and_environmental_exports/Climate_change/Organic_Farming_Climate_Change.pdf

assist the DFO in all the research related matter. The Division is divided into five Ranges which are looked after by the Forest Range Officer (FRO). The FROs are assisted by Dy FRO, Forester -I, Forester-II, Forest Guards, and other field staffs. The overall control of the Park is looked after by the Director who is a Chief Conservator of Forests (CCF) level Officer. He is assisted by a Conservator of Forests (CF) and three Deputy Conservator of Forests (DCF). The total sanctioned strength in Kaziranga is 562 at Divisional level. As of now 456 personnel are in position. In addition, there is deployment of personnel of the Assam Forest Protection Force, Home Guards, Fixed Pay and casual Workers for protection duties. Their tentative strength is about 600

c) Three largest Climate Change Adaptation Projects handled (if already implemented)

KNP and the Department of Forest, Government of Assam are/ were involved in various projects addressing issues on bio diversity, forestry, and livelihood and resource management. The following projects have components related to climate change.

i. Assam Project on Forest and Biodiversity Conservation program (APFBC)¹⁵

APFBC Society envisages successful integration of sustainable forest management interventions with special emphasis on income generation and livelihood security of forest dependent communities. The overall goals of the Society of the Forest Department of GOA for its Assam Forest and Biodiversity Conservation Project are to restore forest ecosystems, in collaboration with the forest dependent communities, to enhance their livelihoods and ensure conservation and sustainable use of biodiversity. This is done by:

- ▶ Managing and operating the multi-dimensional, inter-department linked forest and biodiversity conservation process through the Assam Project on Forest and Biodiversity Conservation;
- ▶ To meet the intent of the organizational mission, vision and objective statements to focus on restoration and rehabilitation of forest ecosystem in target areas and strengthening of human, technical and infrastructural capacities of the Forest Department for management and assured availability of forest goods and services to the people of Assam and ensuring livelihood and income security of the forest dependent communities in such areas;
- ▶ Managing quantity, quality control and assurance as well as operational and technical processes that ensure the implementation framework and guidelines of the agencies financing GoA;

15 ¹³<http://apfbcs.nic.in/about-apfbcs.html#agenda>

- ▶ Work programs are adhering to and meet the stated objectives of sustainable forest management and biodiversity conservation in participatory mode; and
- ▶ Developing and integrating traditional and new and innovative community based livelihood program focused on poverty and gender to generate income, employment and employability amongst marginalized forest dependent communities in target areas using participatory approaches for management and resource utilization and non-forest livelihood alternatives.

The APFBC has provided 25 Lakhs to 10 EDCs (Eco-Development Committees) registered with the KNP in 2015. It is proposed to fund about 20 registered EDC through APFBC project. This will increase the resilience of the people in the fringe area of the KNP against Climate Change.

ii. Village Energy Security Programme (VESP)

Under Village Energy Security Programme (VESP) of the Ministry of Non-Conventional Energy Sources, Govt. of India, 14 projects for total energy security in select 11 JFM villages have been sanctioned during 2005-06. The total project cost is Rs 319.42 lakhs to electrify 1230 households covering a population of 7550. 23 Biomass gasifiers, 75 biogas plants, 14 oil expellers and 1230 improved smokeless chullahs will be installed.

d) Three largest community based NRM based projects handled

The Department of Forest, Government of Assam are/ were involved in the following project execution in Assam.

i. Assam Project on Forest and Biodiversity Conservation

As described above, this project aims at integration of sustainable forest management interventions with special emphasis on income generation and livelihood security of forest dependent communities.

ii. Natural Resource Management and Integrated Livelihood

NaRMIL (Natural Resource Management and Integrated Livelihood), an integrated approach for community based rural development and natural resource conservation would be tasted involving demand-driven integrated micro planning to develop community livelihood opportunities in both forest and non-forest activities and improve linkage between forest communities and market for non-timber forest products. It is part of Assam Agricultural Competitiveness Project (AACP)

iii. Natural habitat management program in Kaziranga¹⁶

Habitat management in Kaziranga is basically restoration of grasslands- main habitat of most of the Herbivores. Management intervention is minimal.

¹⁶<http://kaziranga.assam.gov.in/wp/habitat-management/>

- ▶ *Controlled Burning*
- ▶ *De-siltation of water-bodies and channels*
- ▶ *Weed control & eradication*
- ▶ *Water retention temporary dam*

e) Three largest Climate Change Adaptation / NRM projects of State / Central Government

The Department of Forest, Government of Assam are/ were involved in the following project execution in Assam.

- ▶ Assam Project on Forest and Biodiversity Conservation
- ▶ Natural Resource Management and Integrated Livelihood
- ▶ Natural habitat management program in Kaziranga

f) Comment of availability of suitable infrastructure for implementation proposed projects (vehicles, computers, required software/ tools, etc.)

The items like availability of vehicles, computers, software tools, etc. will not be a concern or constraint for implementation of the proposed project in general. KNP has staff strength of about 456 and requisite number of staff will be deputed for the activities proposed under this project. The point below elaborates on the infrastructure available with KNP and can be used for the proposed project.¹⁵

KNP is well stocked with all the necessary required for implementation of the Projects. All the Ranges have at least two Maruti gypsies, one truck, Mahindra Camper, Bolero, Tractors etc. The Division HQ has five Maruti Gypsy, One ambulance, One Mahindra Thar, Camper, Bolero Invader and Five Motorcycle. The Park has sufficient numbers of vehicles for the movement. The Park also has 8 Floating large vessels which serve as camps, two Rubber Boats, 11 Speed Boats, three mechanized boats and more than 150 country boats.

There are 55 elephants in Kaziranga which has been rendering yeoman service to the Park. Each range Office is equipped with atleast two Computers, wireless and the HQ is well equipped with latest Computers and Laptops with Wi-Fi.

The Department also has procured latest GPS for monitoring in the field. The wireless communication system was set up in Kaziranga as early as 1987 with the assistance of Webel, a Govt. of West Bengal enterprise. The network was revamped in 1990 with financial assistance from Aaranyak-DSWF. Currently there are 266 handsets, 9 vehicular sets, 37 base stations and no repeater stations. The wireless network is slated for up-gradation in 2016-17 for which a new set of equipment, base stations, repeater stations and handsets are being procured.

Additionally, KNP/DoF will make a co-financing of INR 30.00 Lakhs per annum from the Kaziranga Tiger Conservation Foundation¹⁷, additionally the project will be able use the resources like vehicles, computers, required software/ tools etc.

¹⁷Tiger Conservation Plan of Kaziranga Tiger Reserve Core Area (Part I & II) 2015-16 To 2025-26

g) Whether Executing Entity (EE) was blacklisted, barred from implementation of projects, faced any charges / legal cases related to mismanagement of project and funds. (please list any such incidences and reasons):

The entity is not blacklisted, barred from implementation of projects, faced any charges / legal cases related to mismanagement of project and funds.

1.4. Project / Programme Components and Financing:

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (INR lakhs)
Preparation of detailed project report (DPR)	Identify precise activity wise budget for the pilot projects identified within the selected areas with KNP	<ul style="list-style-type: none"> - Project implemented as per action plan. - Demarcation of suitable area for carrying out project activities in the north & south side of the park 	10.00
Baseline assessment/survey	Situational Assessment Report including Climate Vulnerability Village wise detailed report	<ul style="list-style-type: none"> - Benchmarking - Identification of suitable technology options - Tabulation of Government and other schemes which are aligned to the project activity 	70.00
Training the primary or major stakeholders (Train the trainers at village level)	<ul style="list-style-type: none"> - Development of suitable training programs for farmers/beneficiaries - Train the trainers - Farmer field school 	<ul style="list-style-type: none"> - Enhance participation of farmers/beneficiaries - Knowledge transfer - Knowledge enhancement 	80.00

	(Training the trainer program)		
Capacity Building (Knowledge proliferation among larger group of audience)	Workshops and audio visual materials	<ul style="list-style-type: none"> - Optimal outreach of scientific and social acceptable resource management practices. - Involvement of policy makers, people's representatives, all sections of primary stakeholders to facilitate comprehensive community programming for watershed based resource management throughout the State. 	20.00
Water Shed Management	Number of check dams / ponds and water recharge	<ul style="list-style-type: none"> - Increase in water table through water harvesting - Availability of drinking water - Availability of water for farming and fisheries 	803.56
Organic Farming	<ul style="list-style-type: none"> - Optimum utilization of land for agricultural purpose - Increase in number of crops being harvested - Increase in agricultural yield 	Generation of additional livelihood options for local community	500.00
Pilot project Fisheries	- Number of beels	- Availability of time and thus	897.49

(including Shrimp Cultivation)	rejuvenated or fish and shrimp cultivation - Tons of fishes sold / consumed	providing opportunity for generation of additional livelihood options. - Reduce poaching - Generation of additional livelihood options for local fishing community	
1.	Project/ Programme Execution ancillary cost/ expert support		00.00 #
2.	Exit strategy		20.00
3.	Total Project/ Programme Cost		2,401.05
4.	Project/Programme Cycle Management Fee charged by the Implementing Entity (@3%)		72.03
Amount of Financing Requested (in INR Lakhs)			2,473.08

KNP will contribute INR 30.00 Lakhs per annum for 3 years for activities related to Project/ Programme Execution ancillary cost/ expert support. The total project/ programme execution ancillary cost/ expert support for the project will be INR 90.00 Lakhs. Further, KNP authority will utilize their existing resources for project execution and no additional fund is requested from National Adaptation Funds to support those activities.

1.5. Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme (projects which have four or more than four years of implementation period would require having mid-term review after two years of implementation).

The expected start date of activities based on the milestones is tabulated below:

Milestone	Expected start date
1. Start of Project/Programme Implementation	October 2016
2. Mid-term Review (if planned)	April 2018
3. Project/Programme Closing	August 2019
4. Terminal Evaluation	September 2019

2. PROJECT / PROGRAMME JUSTIFICATION

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

i. What is the business-as-usual (BAU) development for the targeted sector?

The business as usual development includes managing watershed or channel based irrigation system for communities. Government programs like Scheme of Repair, Renovation and Restoration (RRR) of Water Bodies and Integrated Water Shed Management Program (IWMP) help in managing the water resources. Projects like Assam Project on Forest and Biodiversity Conservation, Natural Resource Management and Integrated Livelihood and Natural Habitat Management Program in Kaziranga also help in managing the natural resources.

However, projects in BAU scenario are not focused on managing climate risk and building the adaptive capacity of local community.

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

The project aims to implement slew of adaptation interventions in the selected five sites. The proposed adaptation interventions, as a whole include -

- ▶ Organic Farming - Organic farming increases the climate resilience potential of agricultural sector by banking on integrated crop management techniques, which include time-tested indigenous technological know-how of the farming communities, increased capacity of the soils to hold more moisture, more nutrients and drain better, thereby increasing the potential of organically replenished soils to adapt better in climate extremes like drought, vagaries of rainfall, floods etc. Further, being a more diverse system of cropping, with focus on local crops/varieties, organic agriculture provides better option for climate contingent farming¹³. Systems like Agro-forestry, homestead gardening adopted in organic farming strategies, also have the potential for increasing climate resilience potential of the marginal farming communities.
- ▶ Pond based fishery - Fishery is an activity that can provide two benefits simultaneously. First, it provides a resilient livelihood option for the farmer and second, it facilitates water regime rejuvenation in the nearby areas of the water body, thus making cropping practices more resilient to water stresses that may occur from climate catastrophes.
- ▶ Watershed Management - Improves the complete hydrological balance of an ecosystem around the watershed, thus helping to reduce intensities of climate extremes like drought and flood, better ground water recharge, increasing surface water availability. These benefits add to the climate resilience of a watershed or the ecosystem as a whole. Restored water bodies can act as redundant water source during drought.

The sites, selected for this project have been grouped based on their location into: North bank sites and South bank sites. Site-wise detailed interventions are given below:

NORTH BANK

a) Gorpāl

Brief Background:

Assam has endowed huge floodplain wetlands, locally called as Beels, spread across the various districts. The Gorpāl-Kasamari beel, lies in the middle of the Kasamari village (Khagarijan block) of Nagaon district and No. 2 Gorpāl (Na Duar block) of Sonitpur district in Assam. The neighbouring villages on the boundaries of beel area are heavily dependent on the water stored in the beel primarily for sustenance agriculture.

The Gorpāl-Kasamari beel covers a surface area of 4,00,000 m² (or 40 hectare) along the Brahmaputra river. It is located 26°39'57.1''N and 093°01'14.8''E on the edge of sixth addition of the Kaziranga National Park and is separated by earthen dykes which regulate the water levels.

The Gorpāl-Kasamari beel area is illustrated in the figure placed below:

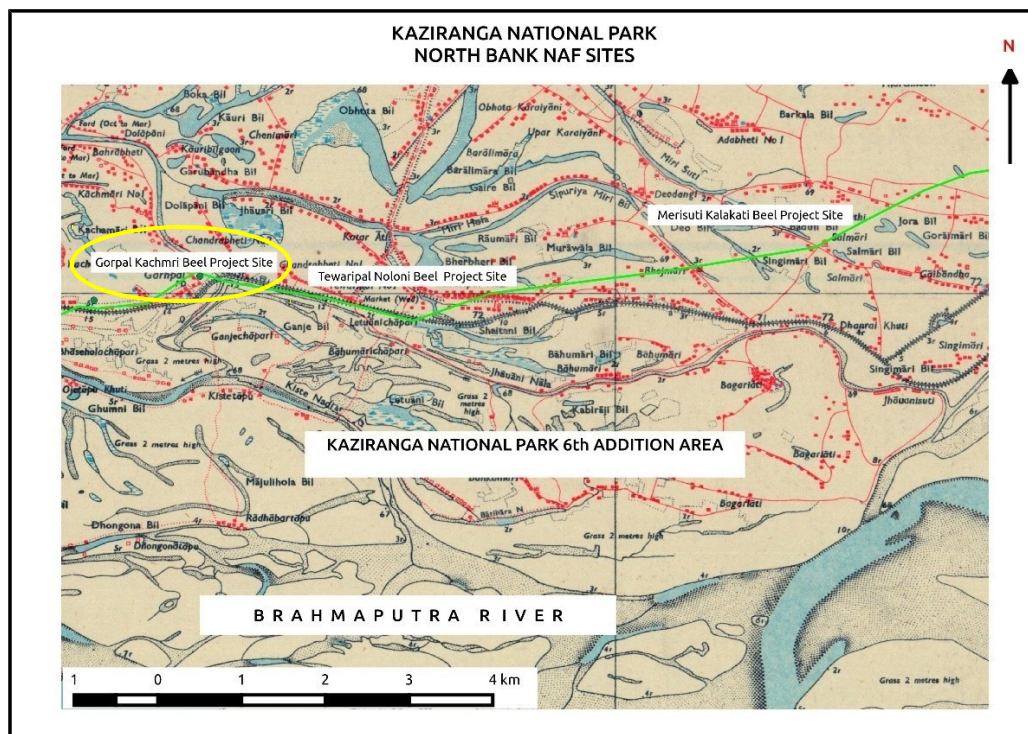


Fig 8: Gorpāl-Kasamari beel

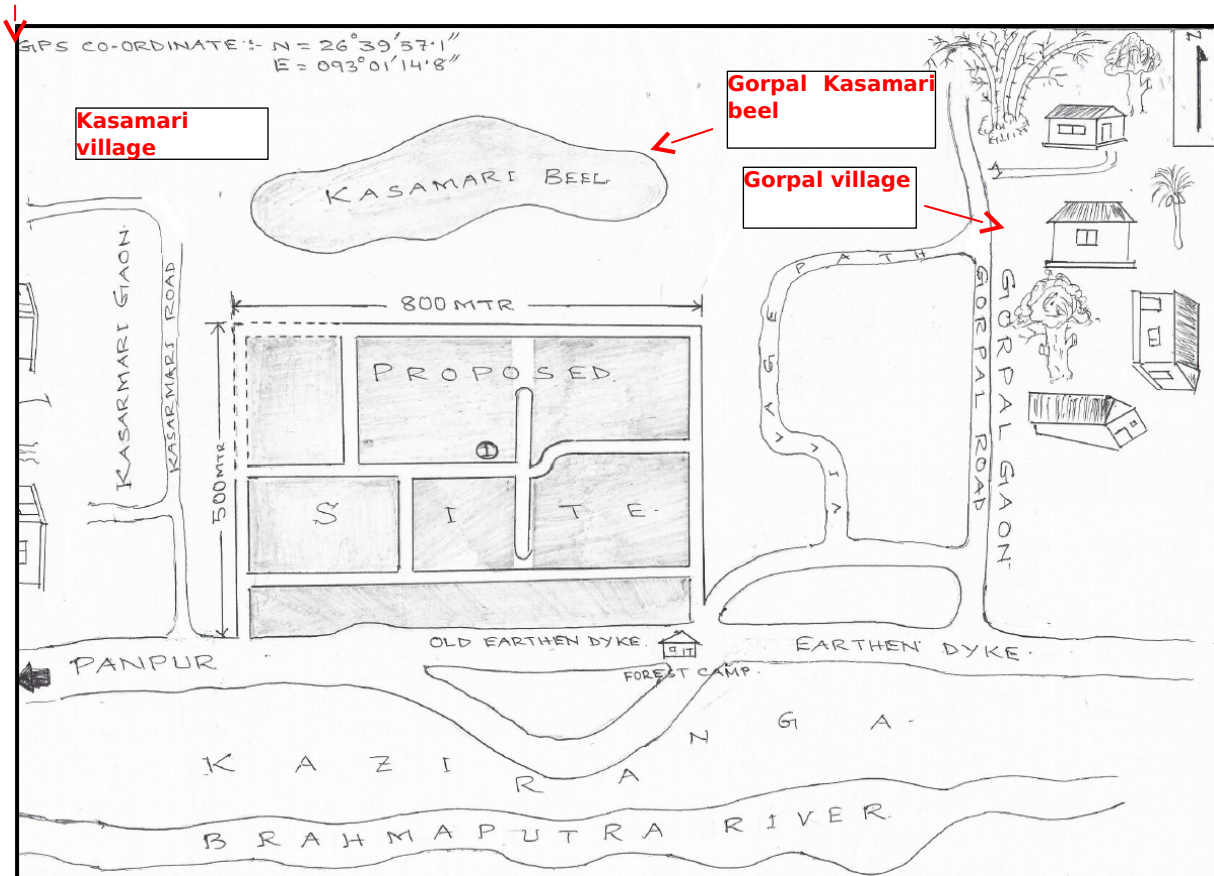


Fig 9: PRA Map of Project site

The local community primarily comprises of the marginal agriculture farmers and fishermen groups. The beel once harboured variety of flora and fauna adding to the biodiversity of the Gorpall area.

Over last few years, the situation has malformed intensely in the Gorpall area resulting into accumulation of silt in the Gorpall-Kasamari beel. Incessant rainfall, lack of planned afforestation and soil conservation measures, unplanned embankment coupled with other anthropogenic interventions have been root causes for siltation of the beel, thereby declining the water holding capacity of the beel and thus causing flood and other damages to cropland and infrastructure including roads and bridge and habitations. The livelihood of the local populace dependent on agriculture and fisheries has been adversely affected over years.

Approximately 280 families across the beel have been bearing the brunt of the ecological imbalance, which has negatively impacted their livelihood sources.

Image 1: Actual image-I of the Gorpall-Kasamari beel

Image 2: Actual image-II of the Gorpall-Kasamari beel



Activities Proposed:

Under the Gorpai-Kasamari beel project, the proposed adaptation related interventions include the following:

- ▶ Rejuvenating the Gorpai-Kasamari beel which is presently completely dry and doesn't hold any water, which includes de-siltation of the beel to increase the depth and thus augment the water holding capacity of the beel.
- ▶ Organic farming in the areas around the beel can be practiced as an alternative agricultural system wherein fertilizers of organic origin such as compost, manure, green manure, etc can be applied. Under organic farming, use of naturally occurring substances can be promoted while prohibiting or strictly limiting synthetic substances.
- ▶ Community based fishery practices in the beel can be introduced, which will provide livelihood for the population of the area.
- ▶ Afforestation activities along the length of the stream to reduce soil erosion, improve ground water recharge and improving ecological balance in the degraded area.

Lemon tree, Olive tree, Gooseberry tree or any other cash generating alternative can be planted. Trees like these help in reducing erosion, better soil moisture retention and thus helps in managing problems like drought or erosion. This activity will also help in local fruit biodiversity conservation, thereby contributing to increased climate adaptive potential.

Advantages of rejuvenating Gorpai-Kasamari beel:

- ▶ Excavation of beel will improve the water holding capacity of the Gorpai beel to 0.32 million cubic metre which can further result into a positive impact in the ground water regime of Gorpai area.
- ▶ This will also help in increasing surface water availability in the area, thereby reducing the dependency on ground water resource, thus restricting over-exploitation of the same.
- ▶ Organic farming, as a sustainable practice will maintain the soil fertility in the long run and also add to the nutritional value of the farm products for the consumers. Farmers practicing organic farming will have additional income source which will be more than the traditional agriculture. In addition to the nutritional value of the vegetable production, the marketing skills of Household families around selected sites will be enhanced. Local community's linkage to the input providers, for improved seed and for improving access to market by aggregating, collecting and transporting produce will be established. The initiative will also involve and strengthen community based institutions like SHGs, Village federation, Producer's Organization which will further help the target population attain economic sustainability.

- ▶ Ecological balance will be maintained through the proposed interventions as the surface water availability and ground water replenishment will also support the plantations in the nearby areas.
- ▶ Availability of water resource during dry season will result into higher crop yields and farmer's income.
- ▶ It will promote fishery which eventually will open an alternate livelihood opportunity for the local community members
- ▶ Promotion of fishery and organic agriculture in the locality will help in reducing the dependency of the population on the sixth addition of the Kaziranga National Park, which will reduce the anthropogenic pressure on the forest resources.
- ▶ Restored water bodies will eventually provide habitats to the avifauna and other wildlife, thus elevating the prospects of tourism.
- ▶ Formation of highland from the excavated silt during desilting process can potentially serve the purpose of temporary shelter ground for animals during flood period.
- ▶ Cash generating plantations will ensure flow of income for the EDCs after their establishment.
- ▶ Above all, the combined benefit will make the local population more climate resilient.

b) **Tewaripal**

Brief Background:

The Tewaripal area is located 26°40'7.54" N and 93°2'0.59" E in the Sonitpur district of Assam and expands across Naloni beel and Merisuti Kalakati beel.

- **Naloni Beel:**

Ghiladhari tributary of Brahmaputra River originating in the hills of Arunachal Pradesh forms a perennial source of water for the Naloni Beel (also known as Doloni Bil). Although Ghiladhari is a perennial stream in nature, seasonal decline has been observed and recorded during dry period. The Dolapani and Ubhota water bodies are linked to Merisuti stream in upstream and are further connected to the Naloni beel in the downstream.

Around 240 hectares of land is cultivated by the local community from the nearby villages which include Chandra Ati, Chubba basti, Tewaripal, No 1 revenue Gorpall village. Approximately 193 families would be the direct beneficiaries of this project.



Fig 10: Tewaripal Doloni Beel

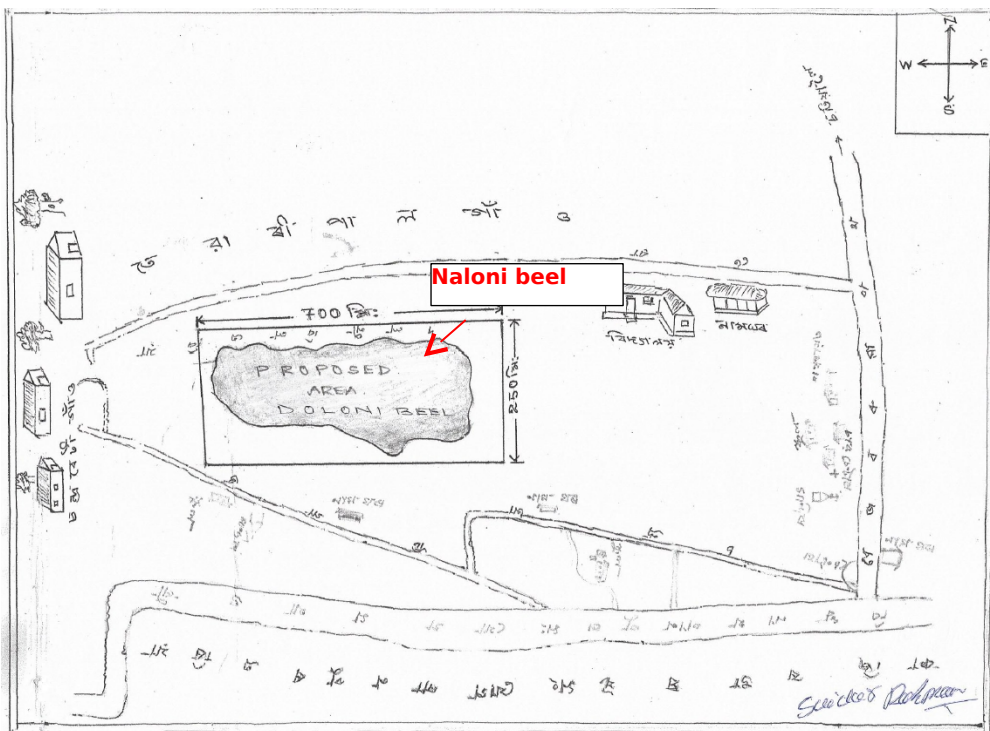


Fig 11: PRA map of Project Site

Image 3: Actual photograph of Naloni beel



- **Merisuti Kalakati beel**

Merisuti and Ghiladhari streams of Brahmaputra River originating in the hills of Arunachal Pradesh form a perennial source of water for the Merisuti Kalakati beel.

Mirihola, Dakshin Kalakati, Uttar Kalakati, Koroioni, Pub Kalakati villages are on the fringes of the beel and are highly dependent on the Merisuti Kalakati beel for agriculture and fisheries purpose. Around 14 hectare of land can be potentially cultivated by the local community in the Merisuti Kalakati beel area, given optimal availability of water resource in the beel. **Around 100 families can be possibly benefitted from the interventions proposed.**

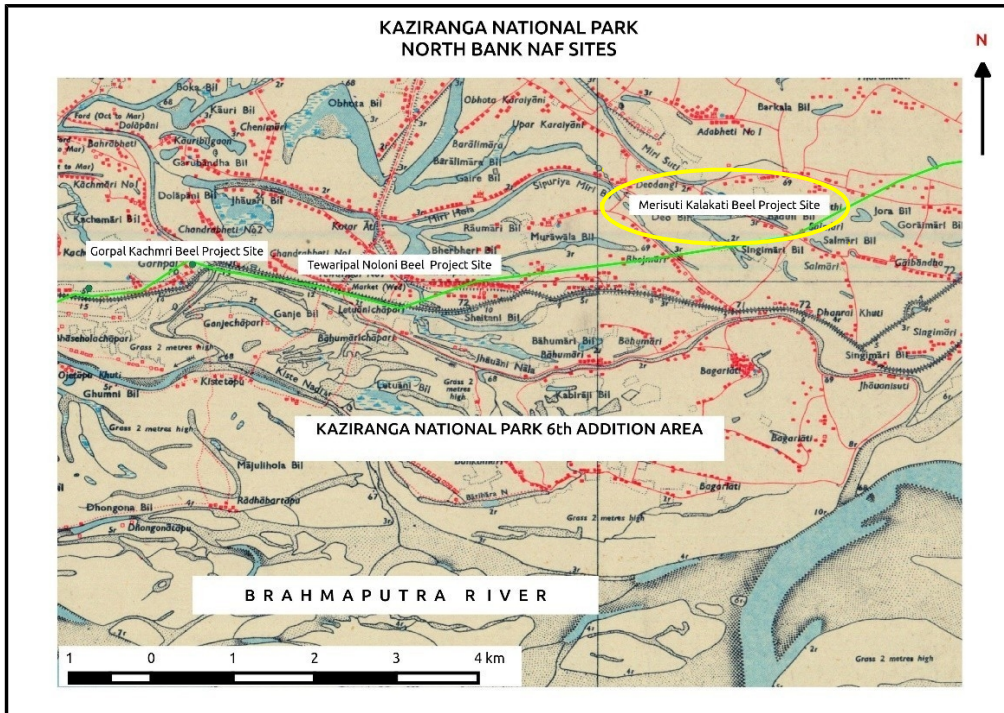


Fig 12: Merisuti Kalakati Beel

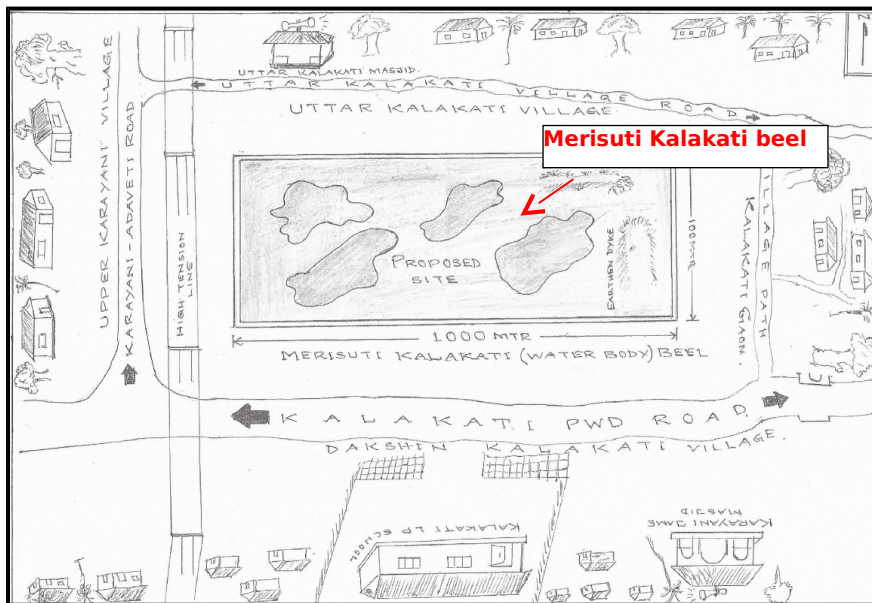


Fig 13: PRA map of the Project Site

Image 4: Actual photograph of Merisuti Kalakati beel beel



Presently, the local community in the Naloni and Merisuti Kalakati beel comprises of landless and marginal farmers and share-croppers, mostly below poverty line. The agricultural income has not been economical and viable. Traditionally, the community has been growing a single crop of paddy during the year, which is limiting the income generation opportunities for the farmers. The agricultural production has been very limited, i.e. around 1,700kg/hectare of rice. Unavailability of water has also added to the decline in the agricultural productivity. Meagre income generation through agriculture has forced the communities for illegal fishing in the sixth addition areas and often indulging in to sheltering poachers.

Activities Proposed:

Under the Naloni and Merisuti Kalakati beel project, the proposed adaptation related interventions include the following:

- ▶ Rejuvenating the Naloni and Merisuti Kalakati beel which are presently completely dry and have very limited capacity to hold water, which includes de-siltation of of the beel to increase the depth and thus the augment the water holding capacity of the beel. Water conservation measures will also be taken up around the beel boundaries.
- ▶ Organic farming in the areas around the beel can be practiced as an alternative agricultural system wherein fertilizers of organic origin such as compost, manure, green manure, etc can be applied. Importance will be given on introducing vermicomposting, cultivation of cash crops with low water demand etc.
- ▶ Fishery activities in the rejuvenated beels will add to securing livelihood of the local population.

- ▶ Afforestation activities on the beel boundaries can be started to reduce soil erosion, improve ground water recharge and improving ecological balance in the degraded area. Cash generating alternative can be planted.
- ▶ Anti-depredation squad is proposed to be formed comprising of local youths, which can be provided with adequate training, necessary basic equipments like torches and provisions of *Tongighar* (Raised platform based small huts for observation/vigilance).

Advantages of rejuvenating Naloni and Merisuti Kalakati beel:

- ▶ Excavation of Naloni and Merisuti Kalakati beels will improve the water holding capacity. The combined water holding capacity will increase to 0.19 million cubic metre for both the beels, which can further result into a positive impact in the ground water regime of Tewaripal area.
- ▶ Surface water availability will enhance, thus reducing the over-exploitation of ground water resources. Organic farming practices will help in generating alternative livelihood, thereby ensuring economic sustainability and strengthening of community based institutions. Ecological balance will be maintained through the proposed interventions as the ground water replenishment as well as surface water availability will also support plantations. This will also help in water conservation in the site.
- ▶ Availability of water resource during dry season will result into higher crop yields and farmer's income.
- ▶ It will promote fishery which will ensure livelihood security of for the local community members. This will also help reducing illegal fishing activities within the sixth addition area.
- ▶ Restored water bodies will eventually provide habitat to the avifauna including migratory birds. Post monsoon period, the Kaziranga National Park remains closed for next 6 months. Coming of birds will not only conserve and promote biodiversity but also stimulate tourism, resulting into alternate livelihood and additional income source for the local community.
- ▶ Formation of highland from the excavated silt during desilting process can potentially serve the purpose of temporary shelter ground for animals during flood period.
- ▶ Formation of anti-depredation squad will help in protection of the villages from the affects of human-wildlife conflict.
- ▶ Improved climate resilience of the communities.



SOUTH BANK

a) Kaziranga and Hukuma

Brief Background:

Kaziranga beel is one of the oldest water bodies in the Kaziranga landscape which carries the name of Kaziranga and in all probability the national park might have derived its name from this water body. However, in the process of conservation that was started in 1905, Kaziranga beel continued to remain outside the notified boundaries of the Kaziranga RF, Kaziranga Game Sanctuary, Kaziranga Wildlife Sanctuary, Kaziranga National Park and now Kaziranga Tiger Reserve. Kaziranga beel used to be a wonderful habitat of wildlife including migratory avifauna and hence tourist attraction in the past. Hukuma beel is a sister water body adjoining Kaziranga beel on the western side but bigger in size. The twin water bodies are fed from various streams flowing from the adjoining Karbi Anglong hills on the south, noted among them being Kohora river, Nijori, Lohor Juri, bogori Juri etc. Kohora riverstream is draining in to these water bodies. The outflows from these two beels flow through Kohora river which meets Singimari river in the downstream and drains in to Moradifaloo river which flows just about 500-1000 metres north of these water bodies.

The Kaziranga and Hukuma beel are being threatened from population pressure, encroachment, extension of agriculture, heavy grazing pressure besides being heavily affected by siltation. As a result of reduction of the water holding capacities of these water bodies, phenomena of flooding of late has started occurring in the surrounding villages during rainy season. Flooding in these areas was earlier unknown as reported by the local people. Due to heavy anthropogenic disturbances, the beels have lost much of their charm and are less frequently visited by migratory birds. However, it is often reported that carnivores such as Tigers take shelter in order to hunt easy prey in the form of grazing cattle. The two water bodies have immense tourism potential and can be developed on an eco-tourism model with active participation of the local communities.

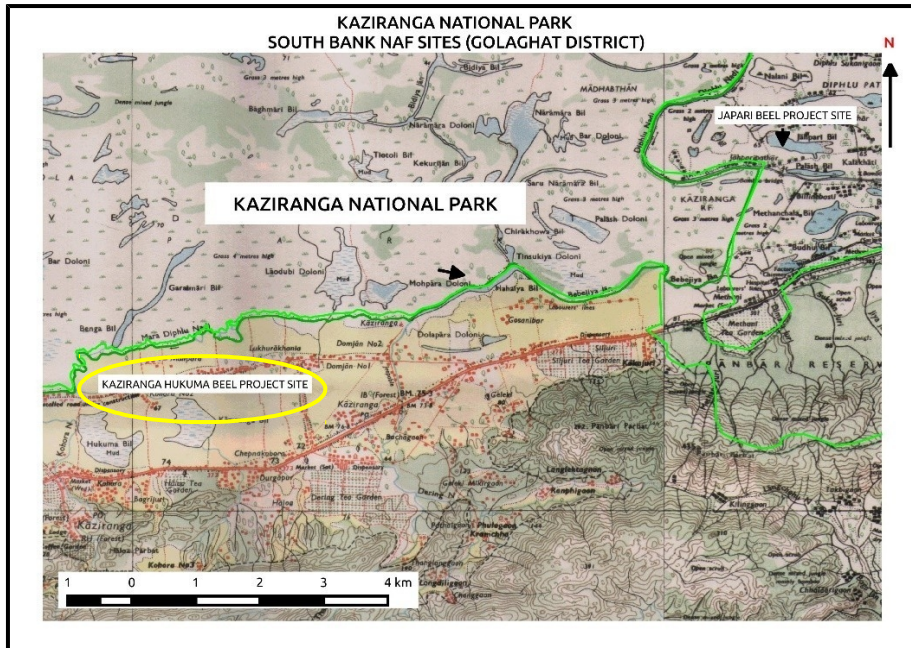


Fig 14: Kaziranag Humkuma Beel

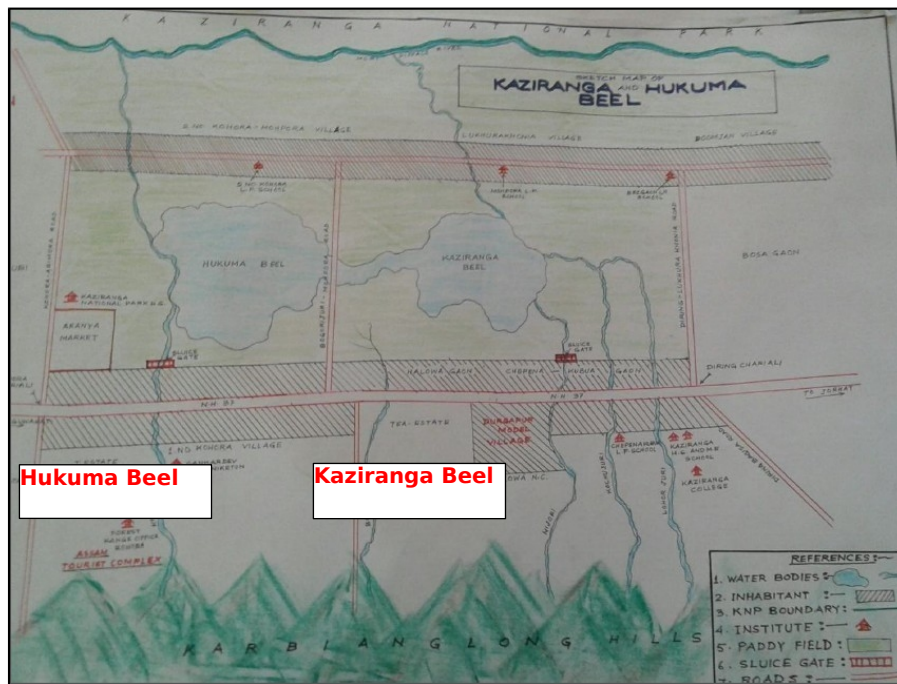


Fig 15: PRA map of the Project Site

Image 4: Actual photograph of Kaziranga Hukuma Beel



The list of villages which lies in/near the path of water stream and are dependent on it is placed below:

- ▶ Durgapur village
- ▶ Kohora
- ▶ Chepena-Kubua gaon
- ▶ Halowa gaon
- ▶ Bosagaon

The habitants of Chepena-Kubua and Halowa gaon are mostly farmers engaged in agriculture and fisheries as occupation. However, over the period of time due to upstream de-forestation, the beels have almost silted of causing inundation of the surrounding areas. 400 families of these and neighbouring villages are bearing the brunt of the ill effects of this fallout as the cultivation of paddy have been virtually stopped due to unavailability of natural water source rendering almost 1500 hectare of land remaining un-cultivated. Earlier, the same agricultural fields were cultivated twice or thrice due to the availability of sufficient water from the beels.

Activities Proposed:

Under the Kaziranga & Hukuma project, following components have been contemplated:

- ▶ Rejuvenating the Kaziranga beel which is presently completely dry and doesn't hold any water
- ▶ Rejuvenating the Hukuma beel which also is completely dry and doesn't hold any water
- ▶ Repair of existing culverts
- ▶ New construction of three box culverts joining both the beels
- ▶ Afforestation and soil conservation measures
- ▶ De-siltation and repair of Kohora dam
- ▶ Fishery activities in the rejuvenated beels
- ▶ Organic farming in the areas around the beel can be practiced as an alternative agricultural system wherein fertilizers of organic origin such as compost, manure, green manure, etc can be applied. Cash generating

crops with low water demand as well as local fruit plants with sufficient income generation potential can also be taken up.

Advantages of rejuvenating Kaziranga & Hukuma beel:

- ▶ Increased water retention capacity of the Kaziranga beel to approximately 2.7 million cubic metre and Hukuma beel to approximately 2.9 cubic metre, leading to flood reduction in the surrounding villages, thus increasing flood resilience of the ecosystem even under a climate change scenario.
- ▶ Increased availability of surface water in the beel areas will reduce the pressure on the ground water resources.
- ▶ Increased number of various wildlives including migratory avifauna, leading to increased tourist foot fall. Since Kaziranga National Park remain closed for 6 months of the year during which it can be developed as bird sanctuary (as a community reserve under the Wildlife Protection Act, 1972) which may result in tourism and additional revenue source for the locals during lean period.
- ▶ Organic farming, as a sustainable practice will maintain the soil fertility in the long run and also add to the nutritional value of the farm products for the consumers. Farmers practicing organic farming will have additional income source which will be more than the traditional agriculture. In addition, the marketing skills of Household families around selected sites will be enhanced. Local community's linkage to the input providers as well as the market access will be improved. The initiative will also involve and strengthen community based institutes like SHGs, Village federation, Producers Organization which will further help the target population attain sustainable economic stage. This will increase adaptability of the agricultural system, increasing climate resilience of the communities.
- ▶ It will provide agricultural opportunities to nearby villages as presently the land is cultivated only during the rainy season and also promote fishery as alternate livelihood opportunity
- ▶ Recharging ground water/water table of the surrounding area.
- ▶ Planting cash generating crops such as lemon tree, olive tree, goosebeery tree will ensure flow of income for the EDCs. Planting trees like lemon will also help in reducing human-elephant conflict in the nearby areas.
- ▶ Creation of highland from the earth excavated during desilting process can act a shelter to wild life during the floods.
- ▶ Maintenance of soil fertility due to reduction of soil erosion.

b) Kunjuri Gelabeel

Brief Background:

Singijuri is a small stream having source at the Kunjuri hill in Karbi Anglong, south of Kaziranga National Park falling under the Western Range, Bagori. The stream flows by the Kuthori area and drains into Gelabeel, which is a waterbody located to the west of Bagori and lying adjacent to the Moridifaloo river, which forms the southern boundary of the Kaziranga National Park. The stream had perennial supply of water in the past from the Kunjuri hills and villagers had been using the water stream traditionally for cultivation. Degradation of forest cover due to shifting cultivation in the hill slopes and human/machine operation for collection of forest product like stone boulder, gravel, earth etc. along the

drainage line has resulted in heavy soil erosion, thus leading to the loss of the capacity of the streams, siltation of river beds, reservoirs, sand and gravel deposition on agricultural fields making fertile lands unfit for cultivation. These adversities in the ecosystem has caused the streams from Kunjuri hills to die down virtually, thereby, depriving people of water for drinking and cultivation.

This has also adversely impacted the Gelabeel which dries up totally during the dry season. As the Gelabeel is adjacent to the park boundary, it was earlier a very good foraging and wallowing ground for wildlife, but now it is devoid of water and aquatic vegetation.



Fig 14: Kunjuri - Singijuri -Gelabeel

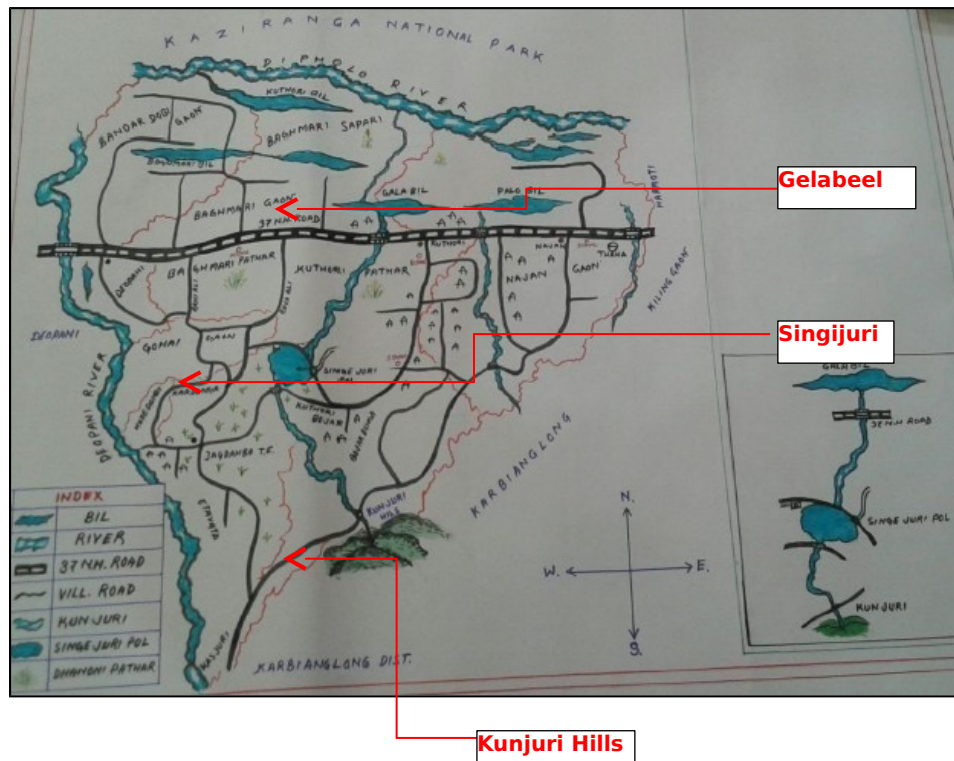


Fig 15: PRA map of Project Site

The list of villages which lies in/near the path of water stream and are dependent on it is also mentioned below:

- ▶ Jagdamba tea estate
- ▶ Etavata
- ▶ Kuthori Bojar
- ▶ Kardonga
- ▶ Gonai Gaon
- ▶ Kuthori Pathar
- ▶ Baghmari Pathar
- ▶ Baghmari Gaon
- ▶ Baghmari Sapari

The Kuthori and Baghmari are fringe villages of Kaziranga National Park cum Tiger Reserve. 95% of the people of Kuthori and Baghmari villages which fall under Kaliabor Revenue Circle of Nagaon district are chiefly cultivators. The agricultural production, especially in the fields adjoining both the sides of the stream from Singijuri to Gelabeel have been adversely affected due to the changes in the stream hydrology, thus threatening the livelihood security of the population.

Image 5: Photographs of Kunjuri



Perennial water stream has been reduced to a thin water channel because of continuous excavation and deforestation at the source of hill

The water source have been pushed back by 30 to 45 metres by excavation and deforestation from the point where it actually used to be thus greatly affecting the flow

livelihood options and yield per hectare.

In this context, the Irrigation Department, Nagaon, tried addressing the concern by setting up a dam at Singijuri for an amount of INR 44,00,000 (forty-four lakhs), earmarked in 2012-13 for irrigating the cultivated land of Kuthori and Baghmari villages. However, the villagers were not benefitted as perceived during conceptualization of the project since the water flow in the dam decreased due to silting during floods and drying up of the source during winter season rendering the Gelabeel non-functional. This project also included construction of cement canals for irrigating the lands in the downstream. However, as the entire source to sink drainage holistically was not considered, the project failed to deliver the expected outcome envisaged. In the current scheme of things being proposed, the entire system from source to sink has been studied and concerns addressed. The concerns arising out of the previous project are being addressed currently as

- ▶ Water and soil conservation measures in the upstream of the dam including restoration of the damages due to hill cutting and mining

- ▶ Adequate afforestation measures all along the stream
- ▶ Preservation of the natural flow of water by removing existing sluice gates and providing gradient for natural flow

Provision of check dams across the drainage line will arrest the silt and allow de-silted water to pass through to the agricultural fields both in terraced land and valley bottomland. Steep gradient induced heavy soil erosion can also be reduced by these check dams, thereby reducing the silt load in the streams. Moisture stress due to lack of vegetative cover in upper reach will get some relief and rate of **infiltration** which directly related to recharge of ground water expected to be increased. Further, rejuvenation of dam and excavation of the beel will hold the first stress of **run-off** that carries silt and gravel flowing down through check dams of upper catchment.

Image 6: Photograph of cemented canal connecting Singijuri dam to Gelabeel



Around 1000 families of Kuthori, Baghmari and neighbouring villages are bearing the effects of this fallout as the cultivation of Sali Rice, Boro Rice, Mustard etc. have now been completely stopped due to unavailability of water source rendering the 2500 hectare of land barren.

Image 7: Photographs of actual site showing non-irrigating land



Further effects of this fallout are evident if we move more downstream i.e. Gelabeel & Baghmari beel where the local people used to practice fishery and earn their livelihood. The natural linkages as well as the cement canal between Singijuri water dam and Gelabeel has been disrupted, thus rendering the beel dry completely except some patches/pot holes with water accumulated during rainy season. This has led to imbalance in the beel ecosystem as a whole.

The people of Kuthori and Baghmari would greatly benefit from any effort that would revive and rejuvenate the Singijuri and Kunjuri streams ensuring perennial flow of water. The present proposal envisages undertaking soil and water conservation measures along the stream from source to sink, de-siltation of Singijuri dam and repair works thereof including removal of sluice gates, de-

siltation of Gelabeel, construction of check dams, revival of the natural channels, and afforestation measures.

Activities Proposed:

Under the Kunjuri project, following components have been contemplated:

- ▶ De-silting and Rejuvenation of the Gela beel that has been dried completely
- ▶ Reviving of natural drainage channels throughout the length of the stream as well as removal of sluice gates that prevent natural flow of water
- ▶ De-siltation and rejuvenation of the Singijuri dam
- ▶ Construction of check dam at the source in the Kunjuri hill for water and soil conservation
- ▶ Afforestation activities along the length of the stream to reduce soil erosion, improve ground water recharge and improving ecological balance in the degraded area

- ▶ Organic farming in the areas around the beel can be practiced as an alternative agricultural system
- ▶ Fishery activities in the rejuvenated beels will add to securing livelihood of the population

Advantages of rejuvenating Gelabeel:

- ▶ Increased water retention capacity of the dam to 1.32×10^{-3} , cubic metre and thus increased water availability and ground water recharge of the area
- ▶ Surface water sources will be rejuvenated thus reducing over-exploitation of ground water.
- ▶ Revival of agriculture in the nearby villages, thus ensuring livelihood security
- ▶ It will promote fishery which eventually will open an alternate livelihood opportunity for the local inhabitants
- ▶ Provide suitable habitat for the avifauna including migratory birds and other wildlife. This will also increase the potential of the beel as a tourist attraction
- ▶ Afforestation will help restoration of the degraded ecology of the area. Planting cash generating crops such as lemon tree, olive tree, gooseberry tree will ensure flow of income for the EDCs.
- ▶ Organic farming, as a sustainable practice will maintain the soil fertility in the long run and also add to the nutritional value of the farm products for the consumers. Farmers practicing organic farming will have additional income source which will be more than the traditional agriculture. This will also initiate the avenues for community strengthening in terms of improved market linkages, strengthened community based institutions etc, thus ensuring socio-economic sustainability.
- ▶ Organic farming, rejuvenation of hydrological balance will help in adding to the climate resilience potential of the otherwise vulnerable population of the area.

Advantages of reviving the Singijuri dam and recreating the natural channels up to Gelabeel:

- ▶ Revival of natural flow of water leading to rejuvenation of the beel, restoration of impaired hydrological balance in the ecosystem
- ▶ Multi-cropping can be practiced instead of current mono-cropping practices, which will provide additional livelihood support to the farmers throughout the year. This, being a diverse system will increase the climate resilience of the farming communities.
- ▶ With availability of water, the local communities will start organic farming on the Baari/Wadi (Homestead gardens) programme basis, which will ensure livelihood as well as conservation of local biodiversity
- ▶ Increased infiltration and reduced run-off leading to ground water recharge and reduced soil erosion
- ▶ Restoration of soil fertility

- ▶ Improved ecological balance of the area

c) Amguri Phuloguri Chang

Brief Background:

Amguri stream and Dakbangla stream originate from Baghsheer Hills. The terrain is hilly and undulating. Two reservoirs at Amguri site are located at 26°33'33.6" N 093°03'25.2" E and 26°33'37.8"N 093°03'45.3" E respectively. The location of reservoir at Phuloguri site is 26°33'23.7"N 93°05'18.6" E. Project site includes following villages:

- ▶ Amguri Chang
- ▶ Amguribagan village
- ▶ Phuloguri village

The project area is adversely affected by illegal excavation and extensive deforestation, leading to reduced water flow in the streams. As a result of decreased water flow, the project sites have been facing water scarcity. Around 72 households in Amguri and 212 households in Phuloguri are settled in around project site and can be potentially benefitted from the project interventions.

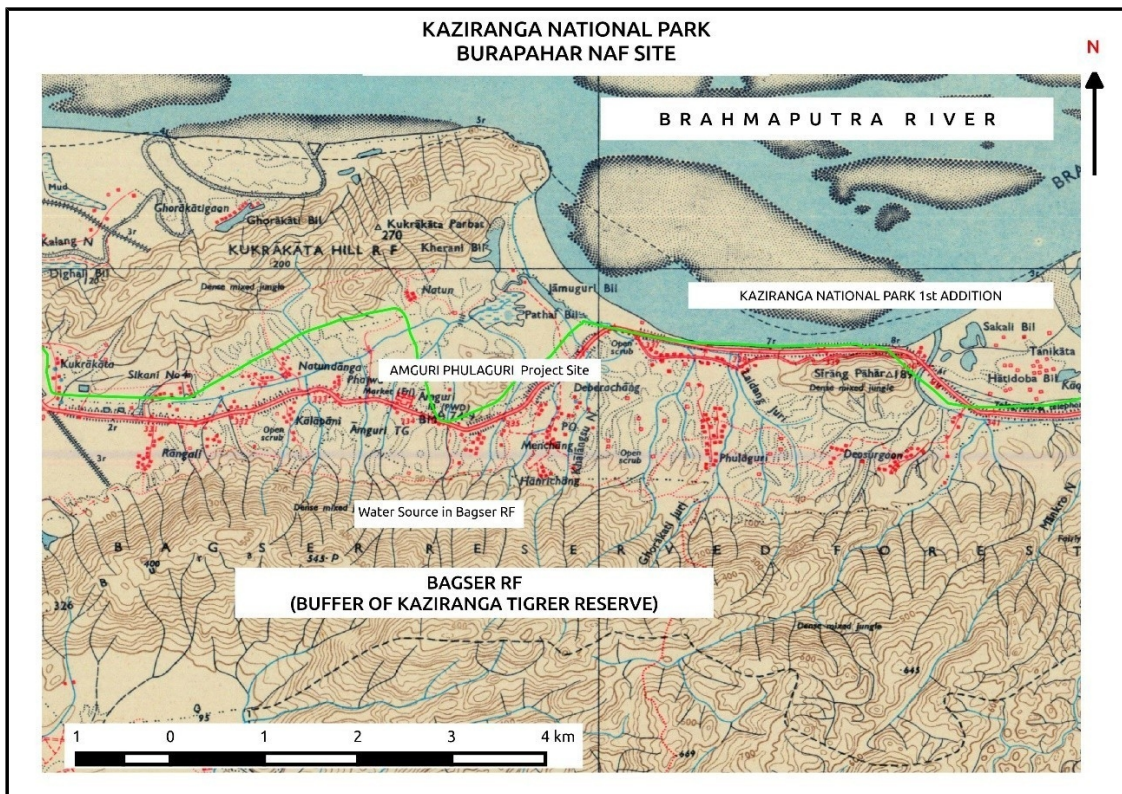


Fig 16: Amguri – Phuloguri village

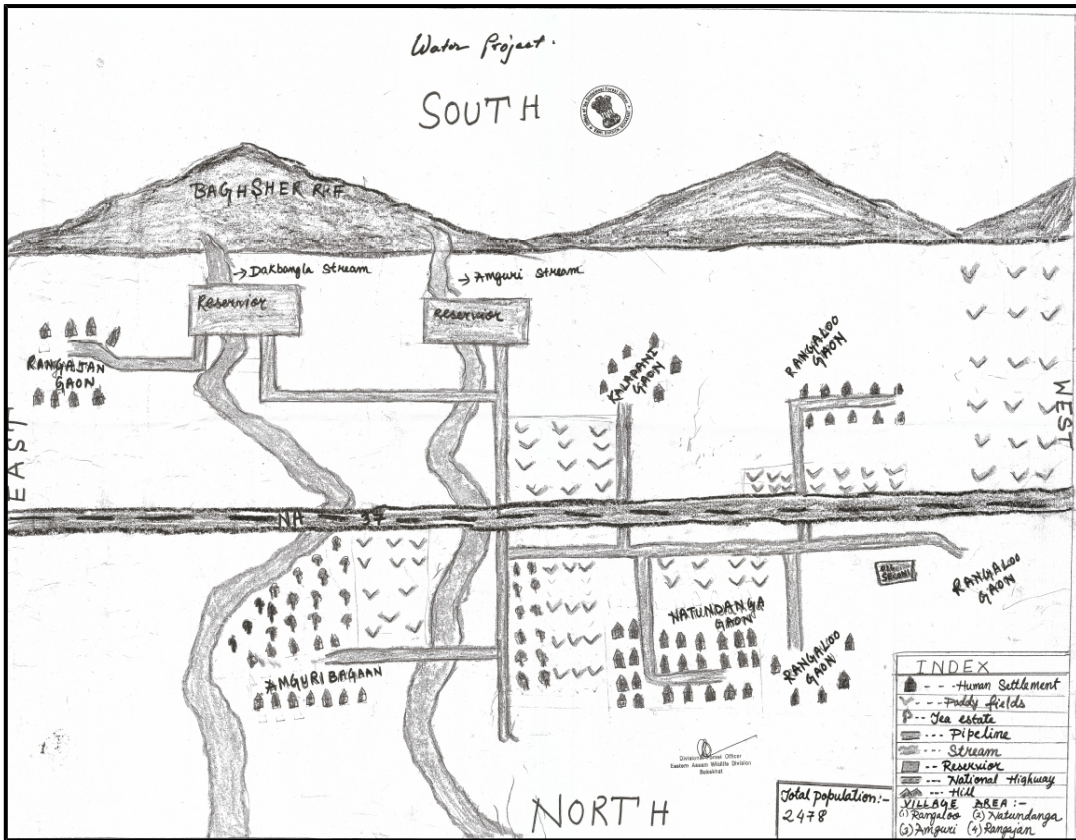


Fig 17: PRA map of Amguri site

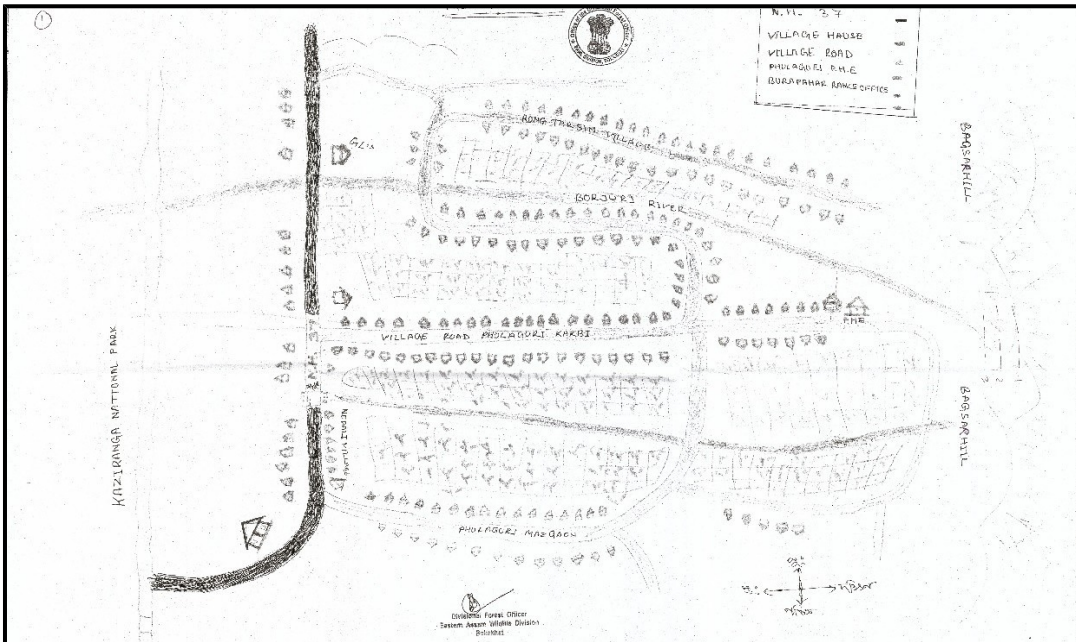
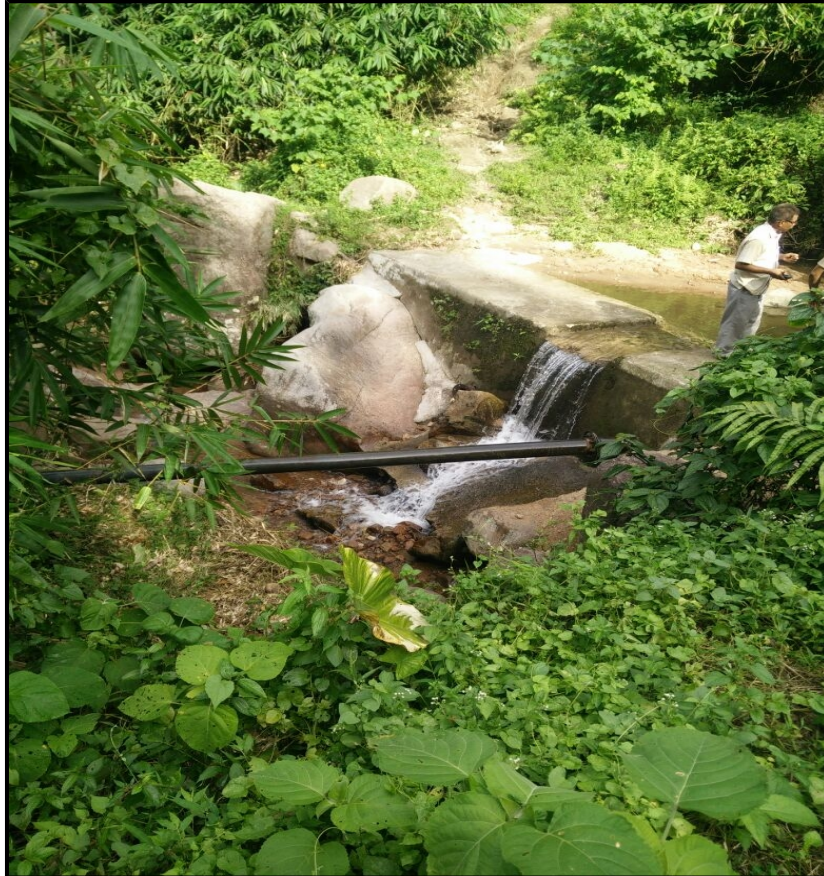


Fig 18: Figure 1: PRA map of Phulaguri site

Image 8: Actual photograph of Project Site



Activities Proposed:

- ▶ Provision of reservoir along with a good network of pipeline. The reservoir can hold the water upto 1.3×10^3 million cubic metre.
- ▶ Organic farming in the areas around the beel can be practiced as an alternative agricultural system wherein fertilizers of organic origin such as compost, manure, green manure, etc can be applied. Under organic farming, use of naturally occurring substances can be promoted while prohibiting or strictly limiting synthetic substances. Importance will be given on introducing vermicomposting, cultivation of cash crops with low water demand etc.
- ▶ Conversion of teak plantation done by the Department of Forest in this area to fruit bearing trees like wild bananas, Reeds, Nal, Khagori etc. These trees are source of food for the elephants and other animals and having them in periphery of the villages will stop them from raiding villages for food, thus reducing human-animal conflict.

Advantages of project intervention:

- ▶ Provision of reservoir along with a good network of pipeline will make water easily accessible for the villagers.
- ▶ Organic farming, as a sustainable practice will maintain the soil fertility in the long run and also add to the nutritional value of the farm products for the consumers. Farmers practicing organic farming will have additional income source which will be more than the traditional agriculture.
- ▶ Organic farming activities as community based enterprises will help in empowering the marginal farming communities, with respect to market linkage and access to markets, skill development, strengthening of community level institutions, thus ensuring sustainable socio-economic development of the population.
- ▶ Improved climate resilience potential of the vulnerable communities
- ▶ Growing fruit bearing trees like wild bananas, Reeds, Nal, Khagori etc in periphery of the villages will stop elephants and other animals from raiding villages for food as these trees are source of food for these animals, thereby reducing human-animal conflict.

d) Japori Beel

Brief Background:

Japori beel is an important water body within the Difalu Pathar area of Kohora Range of Kaziranga National Park, with an area of 29.3 ha. The beel is fed mainly from the Difalu river, flowing in the south direction of the beel, which is originated in the Karbi Anglong ranges. The beel is located within N 26.64003° E 93.52014° and N 26.64381°E 93.51409° respectively. Degradation of the forest cover in the upstream areas of the Difaloo river, causing extensive soil erosion has led to deposition of silt in the beel. Further, extensive infestation of the beel by water hyacinth (*Eichhornea crassipes*) has also added to the worries of the beel, thereby reducing its viability and water retention capacity. As a result, the beel dries up considerably during the winter season.

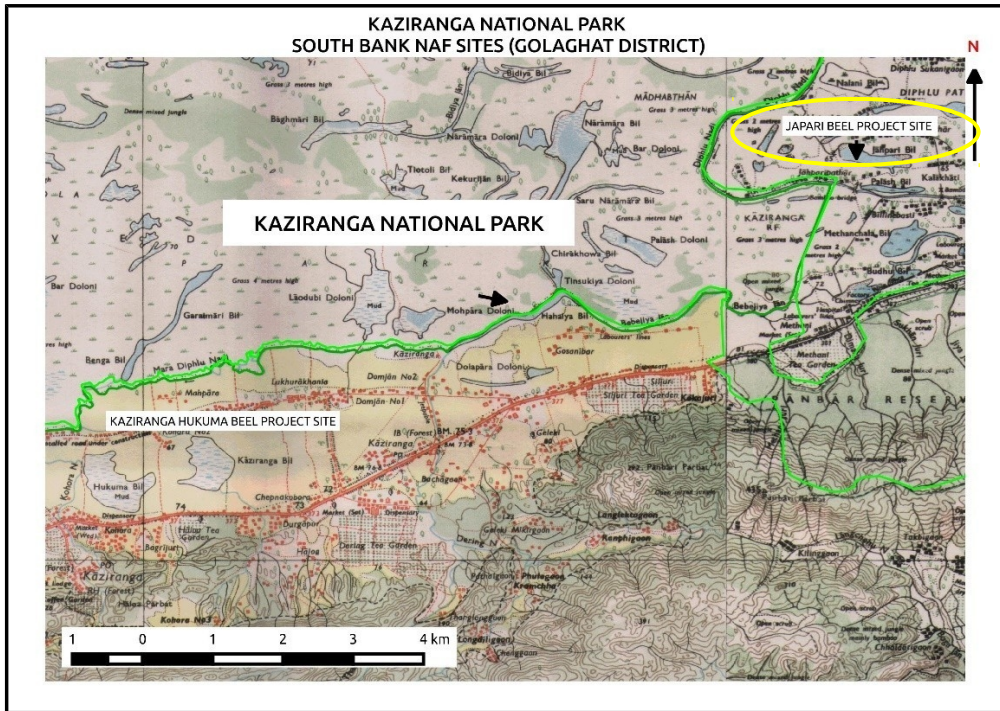


Fig 19: Japori Beel

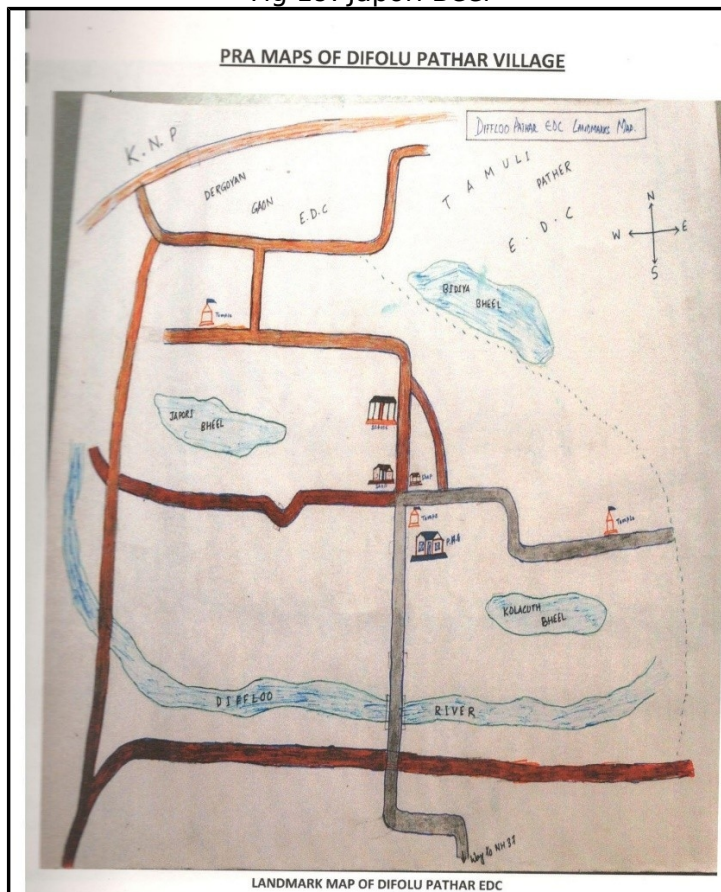


Fig 20: PRA map of the Project Site

Image 9: Actual photograph of the Project Site



This village, located towards the east of the national park, is mainly inhabited by farmers mostly practicing agriculture with a considerable livestock rearing activities. A total of 108 households are there within the village area. Although the farming community has been introduced to double cropping with cultivation of Boro rice with shallow tube well facility apart from the traditional Sali paddy, extensive damage is caused to the crops due to animal raiding, thus leading to loss of livelihood for the farmers. The livestock are also being lifted by carnivores like Tiger from the adjoining forest areas also causes damage to the income source of these marginal farmers. Further, the population significantly depends on ground water resources for household as well as agricultural use. Surface water use is very less in the area. So, rejuvenation of the beel can provide alternate livelihood option for the 108 families of the village around the beel, apart from improving availability of surface water resources.

Activities Proposed:

- ▶ Rejuvenation of the beel by de-silting and dredging to increase water retention capacity of the beel.
- ▶ Fishery activities on community basis as an alternative livelihood option

Advantages of the project intervention:

- ▶ Rejuvenation of the beel will increase the water retention capacity of the beel by removing silt deposits as well as water hyacinth infestation.
- ▶ Fishery activity will generate alternate livelihood opportunity for the sustenance farmers, who lost their crop due to perennial animal raiding.
- ▶ Rejuvenating beel will create conducive habitat for various avifauna, including migratory guests, thus increasing tourist attraction of the locality, which will help additional revenue generation.
- ▶ Surface water resource will be augmented.
- ▶ Ground water recharge will increase; hydrological balance will be restored.
- ▶ Better climate resilience potential of the communities and the ecosystem as a whole.

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

The proposed adaptation interventions contribute to building resilience and coping capacity of the local community through following ways:

- ▶ **Rejuvenating the beels** which are presently completely dry and hold no water will not only provide water to the local community during dry season but also lead to flood reduction in the surrounding villages, in areas with incidence of flood. It will provide agricultural opportunities to nearby villages as presently the land is cultivated only during the rainy season. In addition, it will also help in recharging ground water/water table of the surrounding area, thereby increasing water availability even during climate induced water scarcity, thus building their resilience to climate change.
- ▶ **Promoting fisheries** will open an alternate livelihood opportunity for the local community members, which will ensure livelihood during the weather aberrations causing crop failure. And for north bank sites, where illegal fishing for livelihood is a menace to the sixth addition areas of the national park, the chances or incidences of such activities will also reduce.
- ▶ **Organic farming** will maintain the soil fertility in the long run and also add to the nutritional value of the farm products for the consumers. Organic farming will provide additional income source to the farmers, which will be more than traditional agriculture. Organic farming will contribute to increased soil moisture availability, thus increasing soils capacity to withstand drought under a climate change scenario. Further, being a more diverse system of cropping, this will also improve the inherent capacity of the agricultural ecosystem to sustain climate hazards, thus making it more climate resilient. These community based organic farming will also help in empowerment of the marginal farming communities in these areas through skill development, improved market linkage and market access as well as strengthening of the community institutions. This will help the areas to attain socio-economic sustainability.
- ▶ **Construction of check dam** will ensure reduction of soil erosion and thus conserving soil, which will also result into reduction of silt which is presently getting accumulated in the beels reducing the water retention capacity of the beels. This will also increase infiltration of water, thereby recharging the ground water resources of the areas, hence building the resilience of the system against climate induced water hazards like drought and flood.
- ▶ **Afforestation** will help restoration of the degraded ecology of the area, thus contributing to better climate adaptability in the system.

b) Details on Economic, social and environmental benefits of project / programme

Components/ Activities	Key Benefits (Direct)		
	Social	Economic	Environmental
Preparation of detailed project report and baseline assessment/survey	<ul style="list-style-type: none"> - The study will help identify social groups which are more vulnerable 	<ul style="list-style-type: none"> - The study will help quantify economic status of the vulnerable communities (under baseline scenario) 	<ul style="list-style-type: none"> - Identify areas within the park where the environmental concerns are higher (eco hot spots).
Training the primary or major stakeholders and capacity building of the key stakeholders (Knowledge proliferation among larger group of audience)	<ul style="list-style-type: none"> - Social acceptance of water resource management and sustainable farming measures will increase - Shift from Jhum based single cropping to organic cropping/ horticulture - Shift from river based fishing to pond based fishing 	<ul style="list-style-type: none"> - Higher quantity and better quality of agricultural yield will generate higher revenue for farmers. - Livelihood options for fishermen who lost their fishing rights due to inclusion of their fishing areas inside Sixth addition of Kaziranga National Park 	<ul style="list-style-type: none"> - Water conservation and management - Breeding of local variety of crop (including horticulture) and fishes. - Lessen usage of artificial pesticides & insecticides - Minimize burning of forest land (jhum)
Implementation of pilot projects namely - Water Shed Management , organic farming in southern part of KPN and fisheries	<ul style="list-style-type: none"> - Marginal farmers and schedule tribes will be benefited - Improved economic condition due to 	<ul style="list-style-type: none"> - Enhanced output in terms of agricultural produce and fish will add to higher income generation - Contribute to Assam's GSDP 	<ul style="list-style-type: none"> - Compare project condition with baseline scenario to quantify impact on environment - Reduce carbon emission due to reduction of Jhum (involves

(including Shrimp Cultivation) in the Northern Part of KPN	higher agricultural yield (quality & quantity). Similarly financial condition of the fishermen will also improve. Better economic condition will improve the health and wellbeing of the vulnerable communities living in KNP.		burning of forest land) based cultivation <ul style="list-style-type: none"> - Restoration of surface water bodies will help in reducing over-exploitation of ground water resources. This will also reduce the health effects of contaminated ground water consumption in certain locations. - Improved socio economic condition will reduce man-animal conflict within the park.
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c) Sustainability of intervention

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

The project will be participatory in nature where the local community will be actively involved through the existing and upcoming EDCs. To create a sense of ownership, local community will be required to contribute to the project in terms of labor, local resources, etc. As fishery & agriculture are primary livelihood activities of the local community, it is envisaged that the community will maintain it as it's the mainstay of livelihood beyond the lifetime of the project. Further, this was also highlighted by the EDC members and local community members during the initial consultations.

Under the current project, focus will remain on implementing the demonstration projects and capturing the lessons learnt. The recommendations will be documented and widely disseminated in the form of pamphlets, testimonials for replication an up-scaling purpose.

Activities	Methodology
Documentation of progress and findings of the pilot projects	The forest department officials will document the detailed process adopted for the pilot programme (details have been described in Monitoring &

	Verification (M&V) section). The benefits accrued will be shared with fishing & farming community across the park precincts in the capacity building workshops.
Reaching out to the NGOs working in the state in the same arena, if required	The forest department will rope in active NGOs working in the same sector in the state of Assam. The NGOs will assist in carrying out the message in a simple manner which will further help in sustaining the project.
Central focal point for future assistance or suggestion	A common point of contact will be established by the forest department for any support required by the fishing & farming community members. The interaction will strengthen community's relation with the forest department even after the lifetime of the project.

d) Analysis of the cost-effectiveness of the proposed project / programme:

- i. Cost effectiveness will compare alternative options available and how the proposed components/ interventions are best for given climatic conditions.*

The current project will utilize existing resources available with KNP (Department of Forest). In addition to the assigned technical man power and logistic support (car, boats, wireless, computers, office equipment, stationaries etc.), KNP will also allocate annual contribution of INR 30 lakhs. The amount will be contributed for 3 years (project lifetime). Because of the contribution by KNP in cash and kind, the proposed climate change adaptation project will have a wider coverage compared to a scenario where man power and logistic support would have been spent from the project budget.

A comparison of the chosen options vis-à-vis alternative options has been provided in the table below:

Activity	Existing Alternatives	Benefits
Climate smart fishing using existing and new ponds	Fishing in Brahmaputra using mechanised fishing methods	No adverse ecological impact.
Organic farming	Cultivation using artificial fertilizer	No adverse ecological impact.

- ii. *Weighting of project activities: How much funding will be allocated to 'investment activities', 'capacity building activities' and 'project management activities' respectively?*

How much funding will be allocated to 'investment activities', 'capacity building activities' and 'project management activities' respectively?

Type of Activity	List of Activities	Funding Requirement (INR Lakhs)
Investment	Component 1: Water Shed Management	2,201.05
	Component 2: Organic Farming in southern part of KPN	
	Component 3: Fisheries (including Shrimp Cultivation) in the Northern Part of KPN	
Capacity building	Training the primary or major stakeholders (Train the trainers at village level)	100.00
	Capacity Building of the key stakeholders (Knowledge proliferation among larger group of audience)	
Project management	Baseline assessment/ survey	172.03
	DPR preparation	
	Project/ Programme Execution ancillary cost/ expert support	
	Project/Programme Cycle Management Fee charged by the Implementing Entity (@3%)	
	Exit strategy	

*# KNP will contribute **INR 30.00 Lakhs per annum for 3 years** for activities related to Project/ Programme Execution ancillary cost/ expert support. The total project/ programme execution ancillary cost/ expert support for the project will be **INR 90.00 Lakhs**. Further, KNP authority will utilize their existing resources for project execution and no additional fund is requested from National Adaptation Funds to support those activities.*

- e) *Alignment with the National and State Action Plans and other Policies / Programmes:*

(Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist)

This project is aligned with the Assam's State Action Plan on Climate Change (SAPCC) and Missions under National Action Plan on Climate Change. The following points illustrates the actions proposed by state and national programs to address the development as well as climate risk related to water forestry, fisheries and agriculture.

SAPCC

The SAPCC identifies ensuring sustainability of agriculture systems as a major concerns related to sustainability of critical ecosystems including **agro-ecosystems (agriculture, fishery, livestock)** to ensure livelihood security in a changing climate scenario. The following section of the SAPCC will be relevant to the proposed project:

Forests and Biodiversity: Like rest of the North Eastern region of India, Assam is blessed with forest/ tree cover. Together with tree cover outside the forests, the total green cover in Assam extends over an area of 253 sq km which is 37.29% of the total geographical area of the State. Apart from providing a variety of products for daily needs, such as, firewood, fodders, medicinal plants, bamboos, fruits, essential oils and so on, the forest also are the recharge zone of rain water in the spring sheds in the mountain areas. Further, they also provide livelihood opportunities to over a million people in the State, who trade in various timber and non-timber products. However, open forests in the State in 2013, as recorded by the FSI covered 51% (14,882 sq km) of the total green cover of the State and very dense forests were only 5% of the green cover (see Figure 14). This is because the forest area is suffering from habitat degradation, encroachments, fuel wood extraction etc. The forests in Assam experience extreme rainfall and extended dry period and sustainable watershed management is a need within the forest areas of Assam. The concerns are elaborated in the SAPCC as follows:

- ▶ **Extreme Rainfall in Hilly areas:** Extreme rain fall events are likely to lead to heavier run off along the hills, thus the potential ground water recharge in the spring sheds is likely to reduce, along with heavy soil erosion.
- ▶ **Longer Dry periods:** With longer drought periods, biodiversity- both floral and faunal are likely to be affected and forest fires may become the norm, with increasing man-animal conflict. Thus affecting the various types of timber and NTFP produce and hence the livelihood of the people dependent on the same.

Strategies for sustainability of agriculture and horticulture systems:

- ▶ Assessing District wise exposure and vulnerability of agriculture systems to climate variability and change and developing climate smart Adaptation Strategies through Stakeholder consultation for all 27 districts taking into consideration the agro-climatic zone in which they are located

- ▶ Establishing demonstrative integrated farming systems by introducing agro-forestry and agro-pastoral practices
- ▶ Restore natural water bodies to conserve run off and reduce likelihood of catastrophic flooding
- ▶ Sustainable eco-friendly horticulture in hilly areas

Strategies for sustaining fish production in Assam in a changing climate context

- ▶ Backyard fisheries in small tanks in same area where water use efficiency will be piloted in agriculture
- ▶ Reclamation of ponds and beels wherever possible to convert them into fisheries and for using them as a source to meet demand for water in the dry season.

National Missions:

- ▶ One of the key thrust areas to be addressed under **the National Mission for Sustainable Agriculture (NMSA)** includes dryland agriculture. The NAPCC also mentions one of its objectives as to devise strategies to make Indian agriculture more resilient to climate change by focusing on improving the productivity of rain fed agriculture. This project will also relates to the scheme **Paramparagat Krishi Vikas Yojana (PKVY)** under NMSA, which aims to promote organic agriculture under a Soil Health Management component. The mission has been elaborately discussed in the section 1.1 (b) above.
- ▶ **National Water Mission** seeks to develop new regulatory structures, combined with appropriate entitlements and pricing. It will seek to optimize the efficiency of existing irrigation systems, including rehabilitation of systems that have been run down and also expand irrigation, where feasible, with special effort to increase storage capacity. Incentive structures will be designed to promote water-positive technologies, recharging of underground water sources and adoption of large scale irrigation programmes which rely on sprinklers, drip irrigation and ridge and furrow irrigation. Efficient usage of water ensures less exploitation of water resources available in drought affected regions of Assam and will help drought management. If water usage can be optimized through efficient agricultural practices and irrigation system, the additional water available can be utilized for additional area by more marginal farmers. This will help improve social equity.
- ▶ **National Mission on Sustaining Himalayan Ecosystem** recognises importance of scientific and technical inputs required for sustaining the fragile Himalayan Ecosystem. In line with the same, State Knowledge Cells will be established under the mission which will address action of laying out sector specific and cross-sectoral time bound priorities. This will consequently build ground better planning and implementation of activities, thereby contributing in building climate resilience of the habitat

and communities. The mission has been elaborately discussed in the section 1.1 (b).

- ▶ **Pradhan Mantri Krishi Sinchayee Yojana** - The project also envisages activities that will relate to the following objectives of the scheme PMKSY - expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce wastage of water, enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop), enhance recharge of aquifers and introduce sustainable water conservation practices. The PMKSY components that are relevant to this project are - PMKSY (Har Khet Ko Pani) Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchay); PMKSY (Watershed) - Water harvesting structures such as check dams, nala bund, farm ponds, tanks etc.

- ▶ This is with reference¹⁸ to **Mahatma Gandhi NREGA** and **Agriculture convergence guidelines issued in 2009** (Available on www.mgnrega.nic.in under the icon "convergence"). Rural poor are most vulnerable to climate change, as their livelihood is directly dependent on environmental resources. As extreme events increase, the potentiality of longer and more severe drought, and increased water stress would be greater. These will have an adverse impact on agriculture, water sources, forest and coastal areas. Several studies have indicated that, as the surface temperature of earth rises, climate change will reduce crop productivity; this will be more pronounced in rain fed areas, and would further increase the vulnerability often the rural poor. A study on Environmental Benefits and Climate Change Vulnerability Reduction through MGNREGA has been conducted by Indian Institute of Science (IISc, Bangalore) and GIZ across 5 states, Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Sikkim. The study showed that wherever MGNREGA is being implemented effectively it is generating multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production. MGNREGA works are also helping reduce soil erosion and increase area under plantations. Overall the study concludes that MGNREGA works have contributed to improving the adaptive capacity of rural people and reducing their vulnerability to climate risks.

- ▶ **Chief Minister Samagra Gramya Unnayan Yojana (CMSGUY)** - The project can also be partially linked with the CMSGUY scheme in Assam which aims to double farm income in Assam within the next five years through direct economic activities, infrastructure/logistics support including market linkages and community mobilisation/support. The

¹⁸http://nrega.nic.in/netnrega/convergence/..%5Cwritereaddata%5CConvergence%5Ccirculars%5CConvergence_Prog_Min_Agriculture.pdf

scheme will be implemented through nine sub-missions, which essentially includes missions like Fishery Sub-Mission, Organic Agriculture Sub-Mission, Marketing Linkage Sub-Mission, which can be integrated with the project proposal at different stages to avoid duplicity of the intervention.

f) Component wise technical standards:

(Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, standards related to pollution control, etc. The details need to be provided for each of the interventions proposed)

List of standards are given in the table below:

Activity	Applicable Standard	Application to project
Watershed management (development check dams and ponds)	<ul style="list-style-type: none"> - IWMP Common Guidelines 2008 - IWMP Revised Common Guidelines 2011 - IWMP Livelihoods, Production system and microenterprises guide I - IWMP Livelihoods, Production system and microenterprises guide II - National and state guidelines on micro irrigation, sustainable agriculture, watershed management 	As per standard methods
Climate smart fisheries	<ul style="list-style-type: none"> - FAO Code of Conduct for Responsible Fisheries 	<ul style="list-style-type: none"> - Fisheries Management - Aquaculture Development
Climate smart agriculture	<ul style="list-style-type: none"> - National Standards for Organic Products (India) 	It is a system of farm design and management to create an eco-system, which can achieve sustainable productivity without the use of artificial external inputs such as chemical fertilizers and pesticides

A feasibility study can be carried out in order to gauge the applicability of the various provisions of the applicable standards (like IWMP guidelines, FAO Code of Conduct for Responsible Fisheries and National Standards for Organic Products (India)). The provisions of the Code of Conduct found to be feasible can also be incorporated as Key Performance Indicators during the Monitoring and Evaluation phase of the project.

g) Duplication Check:

(Describe if there is duplication of project / programme with other funding sources, if any)

Presently, no project in KNP is providing solution to enhance fishing and agriculture produce on a pilot basis. Most of the fishing & farming community in KNP are still deploying old practices & technologies for availing farm produce and fish yields. Local community is not aware of proposed remedial/ adaptive measures. The project proposes to develop successful large scale demonstration of farming & fishery management strategy.

The project activity is a first-of-its-kind initiative in terms of climate risk objective as well as coverage.

Project	Objectives	Complementarity	Geographical Coverage/Agency
NA	NA	NA	NA

h) Details on Stake-holder consultation:

(Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations).

In order to carry out the project, we would require the buy-in of local farmers and villagers. The project area has 10 villages. Detailed consultations were organized during the baseline study. Details of stakeholder consultation are given below:

Consultation	Date/Place	Participation	Objective	Outcome
Preliminary level of consultation with villagers	03 February 2016/KNP	Villagers living in Tamulipathar and the EDC president of the Tamulipathar EDC,	To understand the climate change adaptation related issues within the project area	Broad insight on local climate change adaptation issues The EDC President to sensitize the larger number of masses for joining in initiatives for climate smart agriculture and better conservancy models in the fringes of KNP

Preliminary level of consultation with villagers	04 February 2016/KNP	EDC Presidents and Executive Members of the Amguri, Rangalu and Natundanga EDCs	To understand the climate change adaptation related issues within the project area	Broad insight on local climate change adaptation issues
Preliminary level of consultation with villagers	05 February 2016/KNP	Villagers living in Gorpāl area	To understand the climate change adaptation related issues within the project area	Broad insight on local climate change adaptation issues
Field visit by KNP officials in the watershed areas and interaction with locals	07 February 2016/KNP	People from the Watershed areas in Karbi anglong and Bagser RF	To assess the stream health and water availability	Broad insight on local water issues

i) Learning and knowledge management component to capture and disseminate lessons learned for the proposed project.

The knowledge created through this climate adaptation project will be uploaded in the Assam Climate Change Knowledge Portal proposed in Assam SAPCC. The nodal agency, Kaziranga National Park, Department of Forest, Gov. of Assam will work closely with proposed Assam Climate change Management Society (proposed in SAPCC) in developing the knowledge management materials.

Additionally, capacity building and knowledge sharing workshops and sessions will be held for the stakeholders and beneficiaries to report and disseminate the lessons learnt during the project. During these workshops, the stakeholders will be trained to ensure sustainability of the program. These sessions will also empower stakeholders to replicate similar project in other areas of the state.

Maintenance of knowledge mine and proliferation of knowledge will be key activities to be performed by the nodal agency. A knowledge manual will be developed as part of the exit strategy.

j) Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

No	Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks- further assessment and management required for compliance
1.	<i>Compliance with the Law</i>	The project activities are in line with the Second National Communications to the UNFCCC, National Action Plan on Climate Change and State Action Plan on Climate Change	No risk
2.	<i>Access and Equity</i>	The project provides fair and equitable access to the project beneficiaries and is based on clear vulnerability aspects linked to agriculture, and water. The activities will not impede access to any of the other requirements like health, clean water, sanitation, energy, education, housing, safe and decent working conditions and land rights.	No risk
3.	<i>Marginalized and Vulnerable Groups</i>	The beneficiaries of the project will be marginalised vulnerable local community members.	No risk
4.	<i>Human Rights</i>	The project does not foresee any violation of human rights	No risk
5.	<i>Gender Equity and Women's Empowerment</i>	Project would ensure participation by women fully and equitably, receive comparable socio-economic benefits and that they do not suffer adverse effect.	No risk
6.	<i>Core Labour Rights</i>	Payments to labour under the project will be made as per Government approved norms duly following minimum wage rate and hence ensuring core labour rights.	No risk
7.	<i>Indigenous Peoples</i>	Not applicable to this project	No risk
8.	<i>Involuntary Resettlement</i>	Not applicable to this project	No risk
9.	<i>Protection of Natural Habitats</i>	Project does not affect any of the natural habitats	No risk

10.	<i>Conservation of Biological Diversity</i>	The project would not cause any impact on biodiversity values.	No risk
11.	<i>Climate Change</i>	The project is basically for enhancing the adaptive capacity of the small and marginal farmers and fishermen against adverse impact of climate change and is not expected to contribute to GHG emissions.	No risk
12.	<i>Pollution Prevention and Resource Efficiency</i>	Project is not expected to create any environmental pollution.	No risk
13.	<i>Public Health</i>	No adverse impact on public health related issues is envisaged.	No risk
14.	<i>Physical and Cultural Heritage</i>	No adverse impact on cultural heritage related issues is identified.	No risk
15.	<i>Lands and Soil Conservation</i>	Rejuvenation of beels and recharging of ground water is envisaged to help in land and soil conservation and will not create any damage to land & soil resources.	No risk

3. IMPLEMENTATION ARRANGEMENTS

a) *Describe the arrangements for project / programme implementation.*

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

The proposed project area is located in the periphery of Kaziranga National Park (KNP). KNP Authorities, Department of Environment, Forest & Climate Change, Government of Assam have major operational control over the area within and in the fringes of the park. As the park authorities have considerable man power and other resources (refer section 1.3 (b) along with past experience of implementing large scale resource management projects within the vicinity of the park, KNP is better placed for implementing this project.

Implementation of this project will be in consultation with other institutions and organisations. Assam Climate Change Management Society – a special purpose vehicle established under State Action Plan on Climate Change will act as an interface between the Ministry of Environment, Forest & Climate Change, Government of India, NABARD and the state department. NERIWALM, AAU and EDCs comprising of community members of all project sites along with the civil society organisation in the region will extend technical support to the project.

Further, given the interventions proposed will address issues related soil conservation, irrigation, fisheries, and agriculture, the state respective state departments will take an advisory role in this project.

Assam Agricultural University and North Eastern Regional Institute on Water and Land Management (NERIWALM) will provide technical expertise for relevant components of the project under NAMSA and Integrated Water Resource Management.

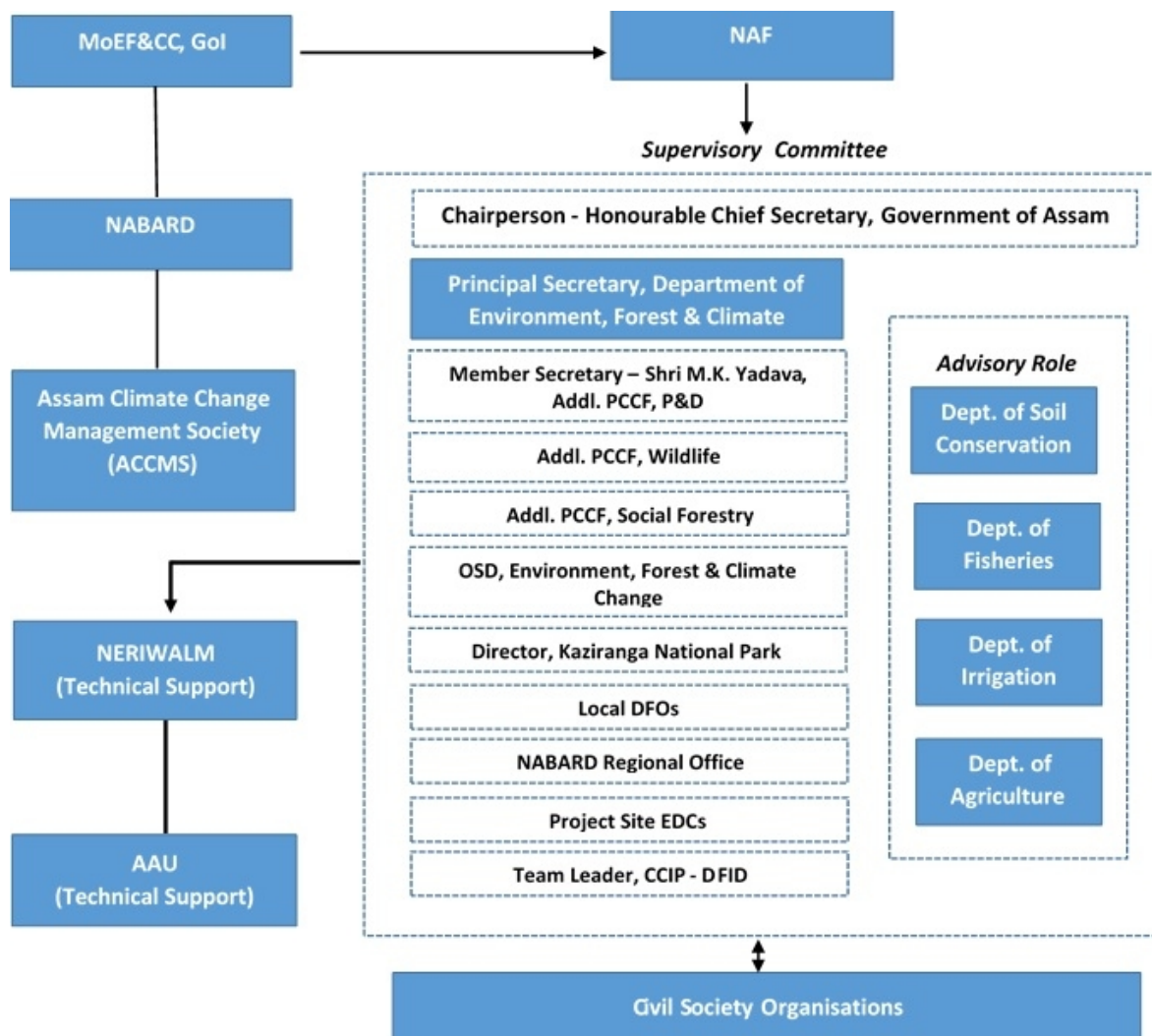


Fig 21: Institutional Arrangement for Project Implementation

Assam Climate Change Management Society: - A Special Purpose Vehicle has been created (to be notified by Feb, 2016) in the State, which will coordinate all SAPCC related activities and other activities related to climate change and will be an interface between line departments, State Government and domestic and international funding agencies that are providing technical and financial assistance to implement SAPCC and other Climate Change related activities.

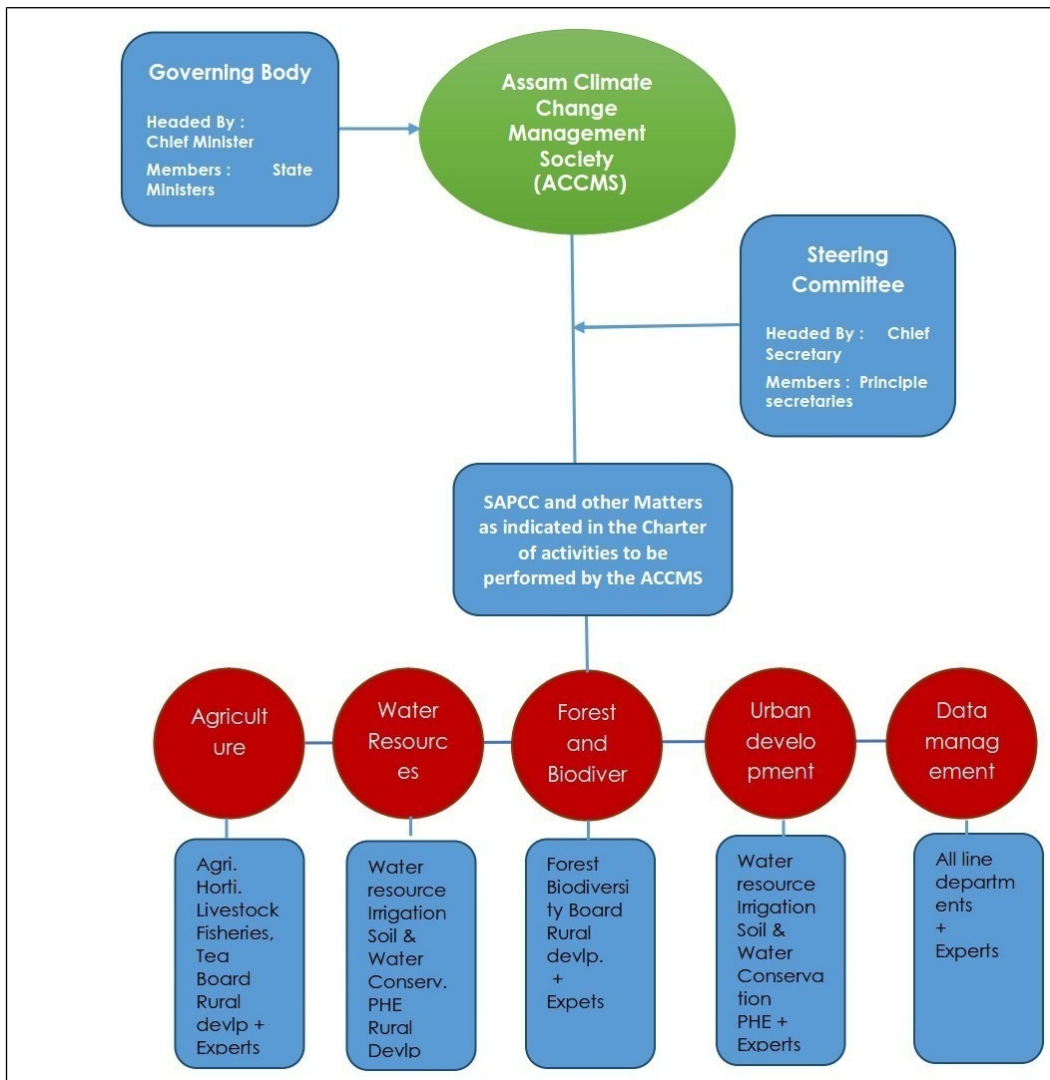


Fig 22: Schematic representation of implementation arrangement

The current project area is on the periphery of KNP. KNP Authorities, Department of Forest, Government of Assam have major operational control over the area within and in the fringes of the park. The park authorities have considerable number man power and other resources (refer section 1.3 (b)). They also have past experience of implementing large scale resource management projects within the vicinity of the park. Hence, KNP will be better placed to execute this project when compared to other departments like water resource, fisheries or agriculture.

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

The project will be coordinated under the leadership of Director, Kaziranga National Park (KNP), Department of Forest; Government of Assam. KNP will work closely with ACCMS (after its inception) so that the knowledge developed from this project can be mined and proliferated across the state.

The project will also utilize main stream funding opportunities like Integrated Watershed Management Program (the program promotes village institutions like watershed committee through gram shabha), Mahatma Gandhi National Rural Employment Guarantee Act (for creating check dams, digging ponds etc.), PMKSY, CMSGUY for future replication. Once pilot project is successful, the project plans to request for additional funds from international climate finance schemes like Green Climate Fund (GCF). The international funds will be used for large scale replication within the state.

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

Risk	Rating (High / Medium / Low, etc.)	Mitigation Measure
Lack of Market for shrimp, fish and organic crop and vegetables.	Low	Market linking activities will include roping in of the hotels and resorts (private and government) within the vicinity of KNP. This will ensure steady demand for local produce. After large scale replication, the local demand may not be able to consume the produce. KNP can create its own brand of organic food products. It can either commission in-house food processing units or tie up with existing food processing units within the state. The produce can be sold through large multi brand retail stores. An end to end supply demand chain will be structured which will be of mutual benefit to all concerned parties.
Heavy rainfall leading to damage of bunds and sluice gates	Low	The bund / check dams will be constructed robustly in order to minimize damage; periodic checks will be carried out to check for damage.
The local community members practicing fish rearing & farming should	Low	The initial concern will be addressed by devising a sustainable monitoring & verification mechanism which will keep a tab on regular progress and adherence to agreed practices.

understand and adapt to the climate change requirements. They should utilize, adhere and practice the techniques/ technologies proposed.		
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c) Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan. (Monitoring and evaluation (M&E) cost need to be included in executing entity management cost).

Supervision will be a continuous process right from the beginning of climate change adaptation activities. The KNP team under the Department of Forest, Government Assam would undertake a periodic evaluation of impact of various project activities. Based on the early benefits (after completion of year one) the implementation plan will be reviewed and revised accordingly. Further, as per the guidelines, the Monitoring & Evaluation of activities will be undertaken by NABARD and third party evaluation by MoEF&CC.

Monitoring and evaluation plan Activity	Responsible person	Yr. I	Yr. II	Yr. II	Total	Timeframe
Capacity building related activities - Training, workshops, knowledge management	Nodal agency	4 visits by Forest Ranger, 1 visits by ACF	4 visits by Forest Ranger, 1 visits by ACF	4 visits by Forest Ranger, 1 visits by ACF	12 visits by Forest Ranger, 3 visits by ACF	October 2016 to September 2019 Regular review by Forester 1; Quarterly review by Forest Ranger and yearly review by Assistant Conservator of Forest (ACF)

Investment - Demonstration project for the selected villages	Nodal agency	4 visits by Forest Ranger, 2 visits by ACF, 1 visit by DCF	4 visits by Forest Ranger, 2 visits by ACF, 1 visit by DCF	4 visits by Forest Ranger, 2 visits by ACF, 1 visit by DCF	12 visits by Forest Ranger, 6 visits by ACF, 3 visit by DCF	October 2016 to September 2019 Regular review by Forester 1; Quarterly review by Forest Ranger and yearly review by Assistant Conservator of Forest (ACF) and 1 visit per year by Deputy Conservator of Forest (DCF)
Project evaluation (exit strategy)	Third party agency appointed by Nodal agency			1 visit covering all areas included in the project	1 visit covering all areas included in the project	September 2019 Independent external agency.

d) Include a results framework for the project proposal, including milestones, targets and indicators with gender disaggregated data (as per the format in annexure1).

Outcome/Output	Indicator	Baseline	Target	Source Verification	Risks and Assumptions
Component 1: Water Shed Management					
Output	Number of check dams / ponds and water recharge	Water scarcity	To make water available	Physical verification	Improper maintenance and increase in population
Outcome 1	Increase in water table	Reducing water table trend and confirmation through a baseline survey.	To increase the water table over a period	Hydrogeological Study	Effectiveness of recharge points
Outcome 2	Availability of drinking water	Scarcity of drinking water through a baseline survey against a standard requirement.	To make adequate drinking water available throughout the year	Survey of households post implementation	Maintenance of pipelines, valves.
Outcome 3	Availability of water for farming and	Baseline survey to capture current	Adequate storage of water to ensure	Survey of households post implementation.	Equitable distribution of water

	fisheries	availability and shortage.	availability through the year.		
Outcome 4	Availability of surface water for household use and other activities	Very limited or no availability	To augment surface water resources for reducing over-exploitation of ground water	Physical verification	Mishandling of surface water bodies and improper management along with increased population pressure
Component 2: Organic Farming in southern part of KPN					
Output	Increase in number of crops being harvested per annum Increase in agricultural yield Optimum utilization of agricultural land	Single cropping and Jhum base cultivation. Baseline will be quantified through a baseline survey	Increase the number of crops/year from baseline levels. Increase in agricultural yield	Survey of households post implementation	Agricultural productivity and a noticeable change in the income of the households.
Outcome 1	Generation of additional	The livelihood is affected because of	To increase the per capita income of the farmers/	Survey of households post implementation	Buy-in from local farmers No off take of additional

	livelihood options for local community	unavailability of sufficient water	local community		produce in the market
Outcome 2	Optimum utilization of land for agricultural purpose	Current acreage of land and land availability shall be captured using a baseline survey	Increase the land from fallow agricultural / wastelands or /marginal land for agricultural purpose	Survey of households post implementation. Survey of agricultural land post project implementation	Availability of land.
Component 3: Fisheries (including Shrimp Cultivation) in the Northern Part of KPN					
Output	Number of natural beels rejuvenated for fish and shrimp cultivation Tons of fishes sold/ consumed per annum	Currently, this happens in Brahmaputra flowing through Kaziranga National Park. Inclusion of area under 6th zone to preserve the eco system of KNP has restricted natural right of fishing of fishing communities.	To balance and then to increase the per capita income of the people affected by the restriction.	Survey of households post implementation	Availability of land (for digging ponds) and buy in from fisherman in the vicinity. Mechanism/ basis to decide the distribution of the produce. Buy-in from local fishing communities

		Baseline scenario will be reported through a formal study.			
Outcome 1	Availability of additional time and thus providing opportunity for generation of additional livelihood options.	Currently, people have to go out of the villages for fishing. Hence a considerable amount of time is spent.	Additional time can be used for practising other avenues like processing of forest products, handicraft etc.	Survey of households post implementation.	Knowhow of the community. Facilitator/ aggregator to link produce to the market
Outcome 2	Reduce poaching	Reports released by KPN indicates that the fishing boats used in Brahmaputra are often hired by poachers	Reduction of river centric fishing will minimize the logistic options available to poachers	Post implementation survey	Assumption is that currently the poachers are using fishing boats for water transport

e) Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Type of Activity	List of Activities	Rationale for the activity	Funding Requirement (INR in Lakhs)
Investment	Component 1: Water Shed Management (detailed cost given below)	Demonstrate quantifiable results for generating climate resilient livelihood. Identification of actual barriers.	803.56
	Component 2: Organic Farming in southern part of KPN	Develop strategies to overcome barriers. Encourage replication.	500.00
	Component 3: Fisheries (including Shrimp Cultivation) (detailed below)		897.49
Capacity building	Training the primary or major stakeholders (Train the trainers at village level)	Development of suitable training programs for farmers/ beneficiaries Train the trainers Farmer field school (Training the trainer program)	80.00
	Capacity Building (Knowledge proliferation among larger group of audience)	Optimal outreach of scientific and social acceptable resource management practices. Involvement of policy makers, people's representatives, all sections of stakeholders to facilitate comprehensive community programming.	20.00
Project management	Baseline assessment/survey	To create a situational assessment report which will benchmark the	70.00

ent		current climate risks	
	DPR preparation	To develop village wise detailed report including village level action plans.	10.00
	Project/ Programme Execution ancillary cost/ expert support	To engage subject matter experts to advise the project team. Ancillary project costs like development of decision support tools (based on the results in project village) to support large scale implementation.	00.00#
	Project/Programme Cycle Management	Project Cycle Management fee to National Implementing Entity (NIE) i.e. NABARD	72.03
	Exit strategy	Develop exit strategy including strategy for large scale implementation	20.00

KNP will contribute INR 30.00 Lakhs per annum for 3 years for activities related to Project/ Programme Execution ancillary cost/ expert support. The total project/ programme execution ancillary cost/ expert support for the project will be INR 90.00 Lakhs. Further, KNP authority will utilize their existing resources for project execution and no additional fund is requested from National Adaptation Funds to support those activities.

Detailed costing for Watershed Management for selected sites is given below:

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)
A	Gorpai beel	8.00	ha		
1	Excavation in soil	1,20,000	m3	75	90,00,000

2	Earth work in excavation in foundation of Structure	19,200	m3	378	72,57,600
3	Adding Contingencies				18,000
4	Total				162,75,600
B	Tewaripal	6.00	ha		
1	Excavation in soil	90,000	m3	75	67,50,000
2	Earth work in excavation in foundation of Structure	14,400	m3	378	54,43,200
3	Adding Contingencies				18,000
4	Total				122,11,200
C	Kaziranga beel	5.50	ha		
1	Excavation in soil	82,500	m3	75	61,87,500
2	Earth work in excavation in foundation of Structure	13,200	m3	378	49,89,600
3	Adding Contingencies				18,000
4	Total				111,95,100
D1	Hukuma beel	9.00	ha		
1	Excavation in soil	1,35,000	m3	75	101,25,000
2	Earth work in excavation in foundation of Structure	21,600	m3	378	81,64,800
3	Adding Contingencies				18,000

4	Total				183,07,800
D 2	Kohora Dam				
1	Gabion structure for River Training works and protection works with wire crates	276	m3	3968	1095168
2	Earth work in filling Embankment with approved materials	586.16	m3	153	89682.48
3	Providing and laying Pitching on slopes with Stone Boulder	129.98	m3	1091	141808.18
4	Adding Contingencies				3342
5	Total				13,30,001
E	Kunjuri to Gela Beel				
1	Bund Work	1320	m3	228.45	3,01,554
2	Sluice gate	1	per unit	100140	1,00,140
3	Material requirement				70,00,000
4	Labour Charge				10,00,000
5	Excavation of 2 km existing canal	4000	m3	59	2,36,000
6	Total				86,37,694
F1	Water Supply Piping to Amgurichang Village near Kaziranga National Park ,2016-17				
	Material requirement				
1	200mm dia DI Pipe	548	m	2649.8	14,52,090
2	150mm dia GI Pipe	1800	m	1381.7	24,87,060
3	100mm dia GI pipe	1400	m	888.9	12,44,460
4	150mm shocket	300	nos	4855	14,56,500

5	100mm shocket	235	nos	1556	3,65,660
6	Reducing Shocket 150x100mm	10	nos	2080	20,800
7	Flange 150mm	32	nos	621	19,872
8	Tee 150mmx100mm	16	nos	4434	70,944
9	Shocket 15mm dia	30	nos	78	2,340
10	Nipple 15mm dia 225mm long	30	nos	40	1,200
11	Bib cock	30	nos	210	6,300
12	Labour Charge				
13	Piping work 200mm dia	548	m	60.4	33,099
14	150mm dia	1800	m	40.2	72,360
15	100mm dia	1400	m	25	35,000
16	Flange /welding joint 150mm	16	nos	443.1	7,090
17	Flange /welding joint 100mm	16	nos	383.69	6,139
18	Civil Work for CC Dam 10.00x1.50x1.20=18.00 m3. As per APWD(Blgd.). SOR 2013-14. M20/or in Prop.1:1.5:3	18	m3	6063.65	1,09,146
19	Form work with 38mm thick plank in foundation 1x1.50x10.00x2=30.00m ²	30	m2	276.07	8,282
20	Sub Total				73,98,342
F2	Water Supply Piping to Phulaguri Village near Kaziranga National Park ,2016-17				

	Material requirement				
1	200mm dia. DI Pipe	1800	m	2649.8	47,69,640.00
2	Shocket 15mm dia.	25	nos	78	1,950.00
3	Nipple 15mm dia. 225mm long	25	nos	40	1,000.00
4	Bib cock	25	nos	210	5,250.00
6	Labour Charge				
7	Piping work 200mm dia.	1800	m	60.4	1,08,720.00
9	Civil Work for CC Dam 8.00x1.50x1.20=14.40 m3 As per APWD(Blgd.) SOR 2013-14 M20/or in Prop.1:1.5:3	14.4	m3	6063.6 5	87,317.00
14	Form work with 38mm thick plank in foundation 1x1.50x8.00x2=24.00m2	24.00m ²		276.07	6,626.00
15	Misc. work like welding Joints	l/s		l/s	19,497.00
20	Sub Total				50,00,000
	Grand Total				803,55,737

Site wise costing for Fisheries:

Placed below is the tabulated summary of cost incurred for fisheries whereas the project wise cost estimate is chronologically detailed accordingly.

Name	Costing (INR)
Gorpal beel	412,41,050
Tewaripal beel	243,96,850
Kaziranga beel	31,97,563
Hukuma beel	53,32,375
Japori beel	156,81,450
TOTAL	897,49,288

1. GORPAL BEEL FISHERY COST ESTIMATE

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)	Basis for Quantity	Basis for Price
A	Gorpal beel	22	ha				
1	Capital Cost						https://www.nabard.org/pdf/composite.pdf
2	Construction of pond in additional 14 ha used for fishing (excavation of soil)	2,10,000	m3	75	1,57,50,000		-
3	Construction of pond in additional 14 ha used for fishing (Earth work in excavation in foundation of Structure)	33,600	m3	378	1,27,00,800		-
2	Diesel Pump Set	3	hp	30,000	19,80,000		NABARD
3	Inlet/outlet sluices		L/S	8,0	1,76,0		NABARD

				00	00		
4	Store Room/rest room	50	1	Sq. ft.	3 00	9,90,0 00	NABARD
5	Nets and other implements			L/S	12,0 00	2,64,0 00	NABARD
6	Misc.			L/S	6,0 00	1,32,0 00	NABARD
	Total Capital cost					3,19,92,8 00	
7	Operational cost for one crop (one year)						NABARD
8	Drying, desilting and ploughing			L/S	6,0 00	1,32,0 00	NABARD
9	Lime	00	5	kg	7	77,0 00	The soils/ tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level. NABARD
10	Single Super Phosphate	50	2	kg	7	38,5 00	Inorganic fertilisation to be undertaken after 15 days of organic manuring. NABARD
11	Urea	25	1	kg	7	19,2 50	Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below. However any one of the nitrogen and phosphate fertilisers could be used as per given rate. NABARD
12	Raw Cow Dung	10		ton	8 00	1,76,0 00	Organic manure to be applied after a gap of 3 days from the date of liming. Cow dung @ 5000 kg/ha or any other organic manure in equivalent manurial value. NABARD
13	Fish Seed Catla, Rohu, Mrigal and shrimp/ha @Rs 5 each	00	5,0	nos.	5	5,50,0 00	NABARD
14	Fish Feed	00	6,0	nos.	14	18,48,0 00	NABARD

15	Harvesting charges per kg	4,0 00	kg	1. 50	1,32,0 00	Harvesting is generally done at the end of 1st year, when the fishes attain average weight of 800 gm to 1.25 kg.	NABARD
16	Miscellaneous		L/S	5,0 00	1,10,0 00		NABARD
17	Total Recurring Cost for 3 years				92,48,2 50		
18	Total project cost				4,12,41,0 50		

2. TEWARIPAL BEEL FISHERY COST ESTIMATE

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)	Basis for Quantity	Basis for Price
A	Tewaripal beel	14	ha				
1	Capital Cost						https://www.nabard.org/pdf/composite.pdf
	Construction of pond in additional 8 ha used for fishing (excavation of soil)	1,20,0 00	m3	75	90,00,0 00		-
	Construction of pond in additional 8 ha used for fishing (Earth work in excavation in foundation of Structure)	19,2 00	m3	378	72,57,6 00		-
2	Diesel Pump Set	3	hp	30,0 00	12,60,0 00		NABARD
3	Inlet/outlet sluices		L/S	8,0 00	1,12,0 00		NABARD

4	Store Room/rest room	50	1	Sq. ft.	3 00	6,30,0 00		NABARD
5	Nets and other implements			L/S	12,0 00	1,68,0 00		NABARD
6	Misc.			L/S	6,0 00	84,0 00		NABARD
	Total Capital cost					1,85,11,6 00		
7	Operational cost for one crop (one year)							NABARD
8	Drying, desilting and ploughing			L/S	6,0 00	84,0 00		NABARD
9	Lime	00	5	kg	7	49,0 00	The soils/ tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level.	NABARD
10	Single Super Phosphate	50	2	kg	7	24,5 00	Inorganic fertilisation to be undertaken after 15 days of organic manuring. Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below. However any one of the nitrogen and phosphate fertilisers could be used as per given rate.	NABARD
11	Urea	25	1	kg	7	12,2 50		NABARD
12	Raw Cow Dung	10		ton	8 00	1,12,0 00	Organic manure to be applied after a gap of 3 days from the date of liming. Cow dung @ 5000 kg/ha or any other organic manure in equivalent manurial value.	NABARD
13	Fish Seed Catla, Rohu, Mrigal and shrimp/ha @Rs 5 each	00	5,0	nos.	5	3,50,0 00		NABARD
14	Fish Feed	00	6,0	nos.	14	11,76,0 00		NABARD

15	Harvesting charges per kg	00 4,0	kg	1.50	00 84,0	Harvesting is generally done at the end of 1st year, when the fishes attain average weight of 800 gm to 1.25 kg.	NABARD
16	Miscellaneous		L/S	5,000	00 70,0		NABARD
17	Total Recurring Cost for 3 years				58,85,250		
18	Total project cost				2,43,96,850		

3. JAPORI BEEL FISHERY COST ESTIMATE

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)	Basis for Quantity	Basis for Price
A	Japori beel	6	ha				
1	Capital Cost						https://www.nabard.org/pdf/composite.pdf
	Construction of pond in 6 ha used for fishing (excavation of soil)	00 90,0	m3	75	67,50,000		-
	Construction of pond in 6 ha used for fishing (Earth work in excavation in foundation of Structure)	00 14,4	m3	378	54,43,200		-
2	Diesel Pump Set	3	hp	30,000	5,40,000		NABARD
3	Inlet/outlet sluices		L/S	8,000	48,000		NABARD

4	Store Room/rest room	50	1	Sq. ft.	3 00	2,70,0 00		NABARD
5	Nets and other implements			L/S	12,0 00	72,0 00		NABARD
6	Misc.			L/S	6,0 00	36,0 00		NABARD
	Total Capital cost					1,31,59,2 00		
7	Operational cost for one crop (one year)							NABARD
8	Drying, desilting and ploughing			L/S	6,0 00	36,0 00		NABARD
9	Lime	00	5	kg	7	21,0 00	The soils/ tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level.	NABARD
10	Single Super Phosphate	50	2	kg	7	10,5 00	Inorganic fertilisation to be undertaken after 15 days of organic manuring. Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below. However any one of the nitrogen and phosphate fertilisers could be used as per given rate.	NABARD
11	Urea	25	1	kg	7	5,25 0		NABARD
12	Raw Cow Dung	10		ton	8 00	48,0 00	Organic manure to be applied after a gap of 3 days from the date of liming. Cow dung @ 5000 kg/ha or any other organic manure in equivalent manurial value.	NABARD
13	Fish Seed Catla, Rohu, Mrigal and shrimp/ha @Rs 5 each	00	5,0	nos.	5	1,50,0 00		NABARD
14	Fish Feed	00	6,0	nos.	14	5,04,0 00		NABARD

15	Harvesting charges per kg	00 4,0	kg	1.50	00 36,0	Harvesting is generally done at the end of 1st year, when the fishes attain average weight of 800 gm to 1.25 kg.	NABARD
16	Miscellaneous		L/S	5,000	00 30,0		NABARD
17	Total Recurring Cost for 3 years				25,22,250		
18	Total project cost				1,56,81,450		

4. KAZIRANGA BEEL FISHERY COST ESTIMATE

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)	Basis for Quantity	Basis for Price
A	Kaziranga beel	5.5	ha				
1	Capital Cost						https://www.nabard.org/pdf/composite.pdf
2	Diesel Pump Set	3	hp	30,000	4,95,000		NABARD
3	Inlet/outlet sluices		L/S	8,000	44,000		NABARD
4	Store Room/rest room	50 1	Sq. ft.	300	2,47,500		NABARD
5	Nets and other implements		L/S	12,000	66,000		NABARD
6	Misc.		L/S	6,000	33,000		NABARD
	Total Capital cost				8,85,500		
7	Operational cost for one crop (one year)						NABARD
8	Drying, desilting and ploughing		L/S	6,000	33,000		NABARD

9	Lime	00 5	kg	7	19,2 50	The soils/ tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level.	NABARD
10	Single Super Phosphate	50 2	kg	7	9,6 25	Inorganic fertilisation to be undertaken after 15 days of organic manuring. Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below. However any one of the nitrogen and phosphate fertilisers could be used as per given rate.	NABARD
11	Urea	25 1	kg	7	4,8 13		NABARD
12	Raw Cow Dung	10	ton	8 00	44,0 00	Organic manure to be applied after a gap of 3 days from the date of liming. Cow dung @ 5000 kg/ha or any other organic manure in equivalent manurial value.	NABARD
13	Fish Seed Catla, Rohu, Mrigal and shrimp/ha @Rs 5 each	00 5,0	nos.	5	1,37,5 00		NABARD
14	Fish Feed	00 6,0	nos.	14	4,62,0 00		NABARD
15	Harvesting charges per kg	00 4,0	kg	1. 50	33,0 00	Harvesting is generally done at the end of 1st year, when the fishes attain average weight of 800 gm to 1.25 kg.	NABARD
16	Miscellaneous		L/S	5,0 00	27,5 00		NABARD
17	Total Recurring Cost for 3 years				23,12,0 63		
18	Total project cost				31,97,5 63		

5. HUKUMA BEEL FISHERY COST ESTIMATE

	Item	Quantity	Unit	Rate (in Rs)	Total Cost (INR Lakhs)	Basis for Quantity	Basis for Price
A	Hukuma beel	9	ha				
1	Capital Cost						https://www.nabard.org/pdf/composite.pdf
2	Diesel Pump Set	3	hp	30,000	8,10,000		NABARD
3	Inlet/outlet sluices		L/S	8,000	72,000		NABARD
4	Store Room/rest room	50	1 Sq. ft.	300	4,05,000		NABARD
5	Nets and other implements		L/S	12,000	1,08,000		NABARD
6	Misc.		L/S	6,000	54,000		NABARD
	Total Capital cost				14,49,000		
7	Operational cost for one crop (one year)						NABARD
8	Drying, desilting and ploughing		L/S	6,000	54,000		NABARD
9	Lime	500	5 kg	7	31,500	The soils/ tanks which are acidic in nature are less productive than alkaline ponds. Lime is used to bring the pH to the desired level.	NABARD
10	Single Super Phosphate	50	2 kg	7	15,750	Inorganic fertilisation to be undertaken after 15 days of organic manuring.	NABARD

11	Urea	25 ¹	kg	7	75 ^{7,8}	Requirement of nitrogenous and phosphate fertilisers would vary as per the nature of the soil fertility indicated below. However any one of the nitrogen and phosphate fertilisers could be used as per given rate.	NABARD
12	Raw Cow Dung	10	ton	8 ⁰⁰	72,0 ⁰⁰	Organic manure to be applied after a gap of 3 days from the date of liming. Cow dung @ 5000 kg/ha or any other organic manure in equivalent manurial value.	NABARD
13	Fish Seed Catla, Rohu, Mrigal and shrimp/ha @Rs 5 each	00 ^{5,0}	nos.	5	2,25,0 ⁰⁰		NABARD
14	Fish Feed	00 ^{6,0}	nos.	14	7,56,0 ⁰⁰		NABARD
15	Harvesting charges per kg	00 ^{4,0}	kg	1. ⁵⁰	54,0 ⁰⁰	Harvesting is generally done at the end of 1st year, when the fishes attain average weight of 800 gm to 1.25 kg.	NABARD
16	Miscellaneous		L/S	5,0 ⁰⁰	45,0 ⁰⁰		NABARD
17	Total Recurring Cost for 3 years				37,83,375		
18	Total project cost				52,32,375		

Organic Farming

Isolated organised organic farming initiatives have been taken up by the tea sector in Assam. Farmers in the region have been found to practise the organic way of cultivation of food grains and vegetables, however, they are not organised to be able to optimise their returns in the absence of appropriate market linkages and awareness on the benefits of organic food and way of cultivation. This project intends to address these gaps by forming cluster of farmers under **Pramparagat Krishi Vikas Yojna** in the project sites, and support them in gaining required organic certifications to build their links with the market.

The Kaziranga National Park being tourist attraction has several resorts and hotels operating in its fringes, and with effective product placement, these businesses can emerge as a potential market for the produce from the region. To ensure the sustainability of the intervention, a value chain analysis to identify the blockages in reaching out to more markets will be carried out to strengthen the implementation plan.

Cost Estimate for Organic Farming

The total cost for organic farming is INR 5 crore for approximately 17 hectare of land. Per hectare cost for organic farming is placed below:

S. No.	Activity	Unit	No. of unit	Rate per unit	Amount	Remark
1	Feasibility survey and soil testing	Survey	1	3000	3000	
2	Weed removal & land preparation with drainage system	LP	1	200000	200000	
3	Fencing & creation of buffer zone	Buffer	1	600000	600000	
4	Composting and vermicomposting unit	Tank & shade	1	200000	200000	
5	Bamboo made bio-intensive raised beds	Bed	100	8000	800000	

6	UV film to protect the beds	Roll	25	7000	175000	
7	Drip irrigation installation	Drip system	1	120000	120000	Jain irrigation cost
8	Solar nano pump for water lifting	Pump	1	20000	20000	
9	Certification cost (annual)	hectare	1	400	400	Control Union cost
10	Seed and bio pesticide cost	Lump sum			100000	
11	Farm implement kit	kit	1	3000	3000	
12	Bio-pesticide manufacturing unit	Unit	1	50000	50000	
13	Labor cost (one crop cycle)	Lump sum			150000	
14	Dairy unit with 5 cattle inclusive of shade	Unit	1	350000	350000	
15	Storage and post-harvest	Lump sum			200000	
	Total				29,71,400	

f) Include a disbursement schedule with time-bound milestones at the component level

Project/Programme Components	Amount (INR Lakhs)	Disbursement date
1. Preparation of detailed project report	10.00	October 2016
2. Baseline assessment/ survey	70.00	November 2016
3. Training the primary or major stakeholders (Train the trainers at village level)	80.00	December 2016
4. Capacity Building of the key stakeholders (Knowledge proliferation among larger group of audience)	20.00	December 2016
5. Pilot project:1: Water Shed Management	803.56	February 2017
6. Pilot project 2: Organic Farming in southern part of KPN	500.00	February 2017
7. Pilot project 3: Fisheries (including Shrimp Cultivation) in the Northern Part of KPN	897.49	February 2017
8. Project/ Programme Execution ancillary cost/ expert support	00.00 #	Not applicable
9. Exit strategy	20.00	September 2019
10. Project/Programme Cycle Management Fee charged by the Implementing Entity (@3%)	72.03	October 2016

Annexure-1

Project Supervision Unit (PSU):

Project Supervision is a pertinent activity and will be a continuous process right from the beginning of developmental activities. The state government personnel would undertake a periodic evaluation of the activities at various levels of implementation. The Park authorities shall make available Rs. 30.00 lakh annually for 3 (three) years for the project supervision activity through the Kaziranga Tiger Conservation Foundation (KTCF). The support will be in cash and kind where the forest department will take care of all the supervision infrastructure requirements like office, vehicles, computers, printers, etc. along with manpower who will visit the site on day to day basis, and all other local costs of holding meetings, EDC local costs reimbursements etc for management of the project. This contribution of the KTCF shall be treated as contribution to local development of the EDC villages.

The following structure will broadly be in place for constant supervision:

- 1) State level supervision team would be constituted and represented by all the concerned stakeholders including the EDCs, field experts, NGOs working in the region/district in the same field, and others. EDCs form major local institution and will play a significant role in making the project participatory and sustainable in nature as well as in overall supervision activity by actively participating in the field visits with the government officials.
- 2) The State Level NAF Supervisory committee would be meeting & reviewing the project on a quarterly basis and would be chaired by the Honourable Chief Secretary, Government of Assam. Mr. M. K. Yadava, Additional Principal Chief Conservator of Forests (PCCF), Planning and Development, DoEF&CC will function as Member Secretary and the committee will consist of Principal Secretary, DoEF&CC; PCCF; Addl. PCCF (Wildlife); Addl. PCCF (Social Forestry); NABARD Regional Office; Soil Conservation Department; Irrigation Department; Agriculture Department; Department of Fisheries; Director, KNP; Local DFOs; EDC members; and Team Leader, Climate Change Innovation Programme - Department for International Development; as members. The committee may also decide on convening the meeting out of turn for discussing any necessary matter which may be addressed to it or when some decision needs to be taken with the assistance of EDCs.
- 3) A Kaziranga NAF Monitoring Committee headed by the Director Kaziranga and concerned stakeholders will be constituted for monthly monitoring & review of the project. The committee would be submitting and presenting a quarterly basis report to the State level committee about the progress of the project. The committee would also be setting up agenda and concerns upon which decision need to be taken up by the State level committee.
- 4) A DFO level officer/s would be identified for making a visit to the site once in every 7 days for understanding positive and negative outcomes of the activities being implemented. He would be responsible for interacting with the stakeholders on a regular basis and thus addressing their concerns at his level. In case of any major concern he would refer the matter to the Kaziranga Forest level committee which according to the authority entrusted upon (by State level committee) may look into. Representative

of the EDC will be accompanying the officials in site visits and also act as a connecting link between government officials and local community.

- 5) A Range Officer level officer would also be identified for day to day supervision of the activities and document its findings. This documentation can be utilized and promulgated at the end of the program for replication in all other districts having similar conditions.
- 6) The Range Officer level officer, under supervision from the DFO would also be responsible for interacting and guiding the stakeholders for day to day support on how to adopt the modern practice. The stakeholders, although may be quick in understanding the merit of the efforts, however, an initial hand holding during the transition period may be beneficial for building confidence and foreseeing that the right kind of process is followed.

Template for Supervision:

Result framework templates would be formulated by Kaziranga NAF Monitoring Committee headed by Director, Kaziranga and approved by the State Level Committee. The template would be formulated for officers at different level associated with the project like for junior, mid and senior level officers. The officers would be required to populate the template whenever they are supposed to visit the site. For example, if a junior level officer is required to visit and monitor the progress on day to day basis then he will report the day progress in the template and share it with his superiors who will review it and submit it to the DFO on a fortnightly basis. The DFO would submit a monthly report to the Kaziranga NAF Monitoring Committee headed by Director. The DFO and Kaziranga NAF Monitoring Committee would be accountable to supervise whether the project is being implemented in the order perceived or there is some deviation. In case of any anomaly the DFO/ committee would bring the matter in notice of the State Level committee who may like to convene the committee meeting before the schedule timelines, if desired.

Further, a common point of contact would be also established for the project/s so that in case of support the stakeholders can reach out even after handing over the entire project in near future for assistance.

Need for Capacity Building:

The public platforms and expert reports are awash with findings that organic farming is more profitable for farmers than conventional agriculture as a price premium of 22 - 35 percent over the same conventionally grown food, despite yields being 18 percent lower for organics. But the claims of improved profitability for farmers run up against some hard facts: even as sales of organic foods are increasing sharply, albeit from a very low base. If there's so much money to be made in organics, then why aren't more farmers switching?

Instead more & more organic farmers are oscillating back to inorganic farming which they foresee as more profitable in spite of demand for organic products increasing. There are a number of reasons for the same including lack of knowledge and some of the most widely faced challenges are placed below for which capacity building & guidance is required:

1. **No chemicals = more labor:** Conventional farmers use all of those chemicals & synthetic pesticides because they end up reducing the cost of production by getting the job done faster and more efficiently. Without them, organic farmers have to hire more workers for tasks like hand-weeding, cleanup of polluted water, and the remediation of pesticide contamination.
2. **Higher cost of fertilizer for organic crops:** Organic farmers eschew these inexpensive solutions in order to keep their crops natural and instead use compost and animal manure, which is more expensive to bear.
3. **Crop rotation:** Instead of using chemical weed-killers, organic farmers conduct sophisticated crop rotations to keep their soil healthy and prevent weed growth. After harvesting a crop, an organic farmer may use that area to grow "cover crops," which add nitrogen to the soil to benefit succeeding crops. Conventional farmers, on the other hand, can use every acre to grow the most profitable crops. Because crop rotation reduces the frequency in which organic farmers can grow profitable crops, they're unable to produce the larger quantities that are most cost-effective for conventional farmers.
4. **Post-harvest handling cost:** In order to avoid cross-contamination, organic produce must be separated from conventional produce after being harvested. Conventional crops are transported in larger quantities since conventional farms are able to produce more. Organic crops, however, are handled and transported in smaller quantities since organic farms tend to produce less, and this result in higher costs.
5. **Organic certification:** If desired, acquiring organic certification is no easy — or cheap — task. In addition to the usual farming operations, farm facilities and production methods must comply with certain standards, which may require the modification of facilities. And organic farms must pay an annual inspection/certification fee, depending on the agency and the size of the operation.

6. **Organic food grows more slowly:** Time is money. Not only are organic farms typically smaller than conventional ones, but they also, on average, take more time to produce crops because they refrain from using the chemicals and growth hormones used by conventional farmers.

Training components for capacity building:

Organic Farming:

1. Training on Vermi – Composting
2. Training on Integrated Nutrition Management
3. Training on Integrated Pest Management
4. Training on Integrated Weed Management
5. Practical training on beneficial organisms on field
6. Training on package of practice for Organic Farming
7. Scientific compost making methods
8. Training on harvest and storage of organic produce

Pisciculture:

1. Training on selective fishing gear and sustainable fishing method
2. Capacity Building on strengthening fisher organizations.

Ecosystem Management

1. Capacity Building of Anti-Depredation Squad on human-animal conflict management

Detailed components of capacity building:

1. Identification of subject matter expert who can come down to Kaziranga National Park and impart knowledge to all concerned stakeholders including the farmers.
2. Concerned expert's travelling cost, stay expenses, honorarium, etc. need to be covered under the capacity building initiative since he would be making several site visits
3. Expert would also be making site visits in between to oversee and guide farmers to practice the right techniques which he has imparted initially
4. Other stakeholders like NGO members, forest officers (who are later going to oversee supervision activities), etc. need to be trained so that they can guide & support the farmers once subject expert goes back

5. Expert would assist in developing best practice manuals and guidebooks for all stakeholders which they can refer as per their requirement.
6. Expert would also recommend and suggest the cropping pattern & latest techniques which the farmers should follow based on north & south side of the bank. The recommendation would also take into consideration that elephants can depredate the crop
7. Expert would also assist the farmers to go for organic certification which will enable them to demand a premium for the product. This premium will help them in offsetting the lower produce vis-à-vis conventional farming
8. Capacity building workshop will encapsulate the material cost and cost for providing basic refreshments like tea & water. Considering one workshop for each site this activity costing has been computed.
9. Hiring services of consultant/subject matter expert who will study the local conditions, markets, existing government support policies, etc. in developing a go to market strategy where the farmers can sell the organic produce because unless the complete value chain is not developed the organic farming practice cannot be sustainable. In absence of end market the farmers will oscillate back to conventional ways. The consultant /expert would also be responsible for making the model operational. Like, for example, if usage of organic produce to local resorts/hotels in Kaziranga is planned then the consultant/expert would connect the hotel/resort with the farmers and facilitate an agreement.

S. No.	Description of Activity	Cost (in INR)
1.	Identification of subject matter expert and associated cost for his multiple visits like travelling cost, stay expenses, honorarium, etc.	10 Lakhs
2.	Cost for conducting workshops 30 workshops considering a) individual workshops would be conducted for each site in north south bank b) Repeat workshop & meeting for overseeing the actual progress, where expert would be handholding the farmers (implementation support) would also be conducted at each location separately during the year	30 Lakhs
3.	Development, compilation & preparation of manuals, best practice guide books, training modules and other material in local language	15 Lakhs

4.	Development & implementation of go to market strategy i.e. development of centres where the farmers can sell the end produce at premium and offset the lower produce	40 Lakhs
5.	Coverage of basic cost incurred by other stakeholders (who are trained by expert like NGOs) when they would be assisting the farmers on ground	5 Lakhs
6.	Total cost of capacity building component	100 Lakhs

Annexure-3

Question: Activities under watershed management are basically rejuvenation of surface water bodies through de siltation, dredging, excavation etc. and piped/ channelled water supply to some vulnerable villages. In this regard, it is observed that funds under head of watershed have been requested for activities like excavation of soil, earthwork in excavation in foundation of structure for beels of Gorpai, Tewaripal, Kaziranga, Hukuma. For the beels situated in same localities, substantial amount has been requested under fisheries also. A clarification is needed whether fishing activities can be accomplished in beels rejuvenated under head of watershed management thereby curtailing amount shown under head fisheries on page 77. Alternatively a proper justification on requirement of fund under fisheries may be appended.

Response:

The present proposal intends to implement following two activities in two different parts of selected beels:

- ▶ Watershed management
- ▶ Fisheries

The 'watershed management' activity includes de-siltation, dredging, excavation in one part of the beel (Section I of the beel) which will most importantly help in recharging the water table. Post beel rejuvenation, the water collected in this Section of the beel will be primarily used to meet the water requirement of the local community for irrigation and other related purposes.

Fishery is an alternative livelihood practice for the community after agriculture in the region. For 'Fisheries' activity, excavation in other part of the beel (section II of the beel) will be carried out. This section will majorly be used in rearing fishes like *rohu*, *catla* and shrimps, providing the communities with an alternative source of income.

As the two activities are planned on the same water body, for calculation purpose, the excavation proposed for collecting water to meet water requirement of the community has been considered as one activity and excavation proposed for cultivating fisheries has been considered as second activity.