

Chapter IV(A & B)

Study of the Agrarian Structure of the fringe villages in the Kaziranga National Park Area in relation to their socio economic life. In this chapter we are trying to examine the basic issues and solutions thereto in respect of the socio economic status of the farmers in the fringe areas of KNP.

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Abstract:

Agriculture and allied activities have always been the prime source of livelihood in the locality of the fringe areas of the Kaziranga National Park area. With agriculture as livelihood the locality faces daunting experiences with the perennial issues of natural calamities such as heavy flood lashing away large swathes of crop lands and the irrepressible intrusion of wild animals – rhinos, wild elephants, swamp deer etc. destroying crop plantations and crop fields. Due to such instability in agricultural livelihood, and having poor access to agricultural sources most of the localities have taken up other non-agricultural livelihood activities as it provided a better living standard. The socio-economic status of the locality remained more or less grim with some villages having a better off condition comparatively to the ones with poor economic condition. This paper explains the agrarian structure of the socio-economic life of the locality in the fringe areas of the K.N.P area. With emphasis on the importance of biodiversity conservation, it therefore, brings out an inter linkage between the biodiversity and agriculture in the region.

Keywords: Agriculture, Livelihood, Agrarian practices, Biodiversity conservation

Introduction:

Agriculture, for decades, has immensely contributed in production of food crops but today it provides more than food. It has flourished widely in the areas of marketing, processing, and distribution of crops, fruit cultivation, dairy, poultry, mushroom, bee keeping, arbitrary, agricultural technology and trade, in areas of livestock products, a source to eliminating hunger and poverty, and a key to food security to meet the needs of the rising human population. Out of this entire human population, it is the rural poor that depend on agriculture as their livelihood. Agriculture is the key growth sector of rural areas (Start) . Studies revealed that more than 3 billion people live in the rural areas of developing countries that depends on agriculture as livelihood (Climate change:). Today in India, over 58% of the rural households depends on agriculture as their principle means of livelihood (2015). However with time, despite being the economic backbone of the rural economy diversification has been observed from agricultural livelihood to other livelihood activities. Various places give varied explanations of this diversification.

Importance of Agriculture:

Around 60.3 percent of India's land area is agricultural land (Vivek Kaul, 2015). According to IBEF, at 157.35 million hectares; India holds the second largest agricultural land globally. Today, agriculture along with its allied activities like fisheries and forestry accounts for one-third of India's G.D.P and its share was 16.1 percent of the Gross value added during 2014-15 at 2011-12 prices (India Brand Equity Foundation, 2015) . Agriculture is at the heart of livelihoods of the rural people is therefore considered to play an important role in the lives of the rural household populations thereby influencing on their socio- economic conditions.

Before understanding the agrarian structure of the local communities with respect to its socio-economic life we need to understand what socio- economic condition states. Socio economic condition is an important determinant of livelihood that influences the levels of income, consumption patterns, and the cultural and economic status of a region. It is an important tool that determines the overall picture of human development of a region. According to researchers like Dutton and Levine, socio-economic status is the composite that typically incorporates economic status measured by income, social status measured by education and work status measured by occupation. (Socio-Economic Status of Rural Population: An Income Level Analysis, 2014). However there are various factors that determines the socio-economic conditions of the rural people that varies from place to place. The rural poor considered as the marginalized section of the society usually are the most affected and show up poor socio-economic status compared to the urban population. Various policy measures are thereby undertaken to improve their conditions (World Bank, 2014). These socio- economic conditions, in turn, are influenced by the livelihoods they take up to; since livelihood status is the state that indicates the socio-economic condition of an individual/ region.

In this paper, the study is made to analyze the agrarian structure of the locality residing in the fringe areas of the Kaziranga area, Assam with respect to arable land, cropping practices of the locality, usage of agricultural technology, market accessibility of the agricultural produce, income sources from agricultural and non-agricultural sources. These following factors are therefore undertaken to understand the underlying objectives mentioned below.

Research objectives:

- To determine whether agriculture as livelihood has been able to provide food and livelihood security to the locality in the Kaziranga National Park (K.N.P) area.
- To assess the role of agriculture in preserving the biodiversity of the area with the agrarian practices practiced by the locality enabling to biodiversity conservation.
- To understand the communities' perception on agricultural livelihood or if there is diversification towards non-agricultural activities in enhancing socio economic status.
- To understand whether sustainable agriculture can be a potential source of livelihood for the community.

The entire report is divided into different parts. Part I describes the basic introductory portion with the underlying objective of the study mentioned above. Part II explains the background and contextual understanding of the KNP area. Part III portrays the role of agriculture and its importance on the locality of the fringe areas and explains the conceptual approach of biodiversity and agriculture inter linkage. Part IV includes the methodology and data collected for the study. Part V includes the data analysis followed by interpretations and Part VI sums up the conclusion and the recommendations forwarded.

Background and contextual understanding of the KNP area.

This section describes the study region and the study site followed by the methods so used for the analysis.

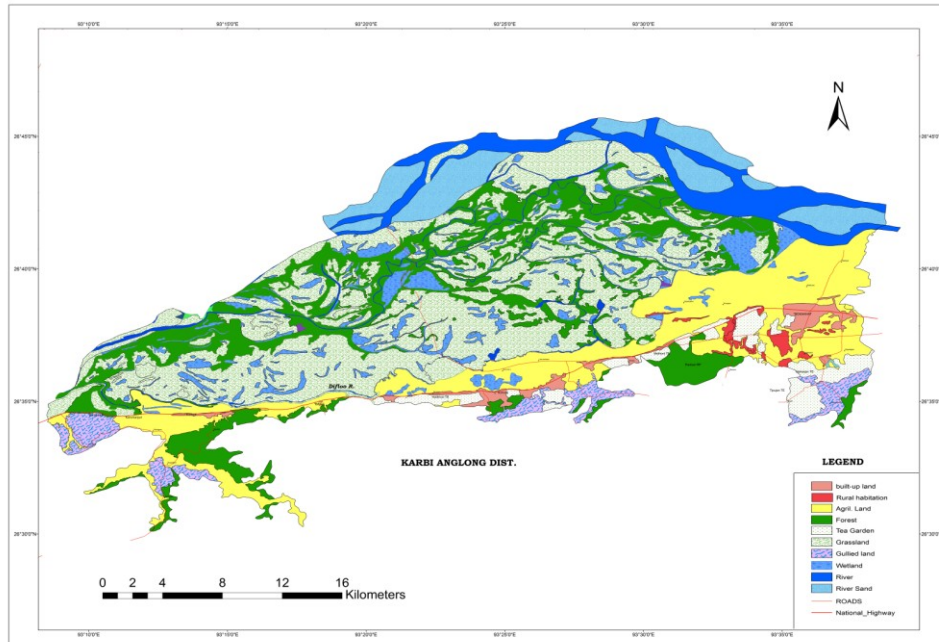
Fringe areas of Kaziranga – the study region:

Kaziranga, which is situated on the southern bank of the Brahmaputra River at the foot of the Mikir - Karbi Anglang Hills is 8 km from Bokakhat and 220 km east of Guwahati, the Assam state capital. Its coordinates are 26° 30' to 26° 45'N and 93° 05' to 93° 40'E. It is spread over the civil jurisdictions of Nagaon, Golaghat and Sonitpur districts in Assam with the Brahmaputra river on the north and verdant Karbi Anglong hills on the south. With six number of additions, having national park status, and two reserved forests namely, Panbari and Kukurakata reserve forests coming under the administrative control of the Kaziranga National Park, the geographical area then lies between Latitudes 26°33' N to 26°48' N and Longitudes 92°51' E to 93° 39' E including a part in civil jurisdiction of Sonitpur district. The Head Quarter of the Park is at Bokakhat, a developing township in Golaghat District of Assam(INDIA). The tourist centre is mostly located at Kohora, which is about 25 km west of Bokakhat (Kaziranga National Park). The fringe areas of the region lie in and around the periphery of the Kaziranga National Park area.

Kaziranga has always known as one of the biggest biodiversity hot spot in the world. It is a refuge for a wide number animal and plant species, a landscape marked for its eternal diversity of flora and fauna. The entire Kaziranga is situated in the area formed by the alluvial deposits of the Brahmaputra river and its small tributaries which carry a great amount of silt during the rainy season every year. Studies found that the land masses gets stabilized with the formation of the riverine area but again gets eroded away before any other pioneering tree species takes its succession (Gogoi B. , 2009-10). The entire area around Kaziranga was very thinly populated and permanently settled villagers existed only at Bokakhat and towards its east on one side and Jakhlabanda and westwards on the other

side. The area intervening these two places was full of wild animals in the adjoining forests of the Karbi Anglong Hills and the grassland of Kaziranga, which formed one single unit of the ideal wildlife habitat (Kaziranga National Park) . The region was mainly dominated by a sizeable number of tribes of Assam namely: the Mikirs, the Nepalis, the Kacharis who apart from their traditional hunting and shooting practices also lived on the agrarian practices. It was mainly the un-classed forests areas where the lands were utilized for agricultural activities (Saikia, 2009). A wide variety of agricultural activities was generally characterized by small peasant holdings with scattered peasant cultivation that have remained the habitat during those times (Saikia, 2009). Cultivable activities were carried out on leased land as the peasants were not entitled to any tenure rights. With the land bestowed with ecology of reed and grass coverage and low water bodies, it provided ample opportunities for the peasant mainly for the winter crop cultivation. However shifting cultivation was another agrarian practice that came into existence with expansion of agrarian acreage. Apart from agriculture, other livelihood activities were mainly based on dairy businesses, where some were into trading and other business activities. Some also earned their livelihood working as forests guards or watchers to prevent poaching which yet today have remained a prolonged issue of the area. Agrarian practices were therefore carried out seasonally with mainly winter crop cultivation. But with passage of time, the area which was once conserved for the wildlife habitat has now turned into an area which has opened up for human defrayal and massive tea cultivation is what that dominates the area (From Bokakhat sub-division to Jakhlabandha subdivision).

Figure-1



Source: ARSAC Division of ASTEC, Government of Assam

The Kaziranga area comes under the Bokakhat Block which envelopes four different zones namely-Mari Dhansiri, Pub- Kaziranga , Madhya Kaziranga and Paschim Kaziranga in the study. Under each zone different villages are clustered. In our study, 10 villages are taken under consideration that falls under different zones and hence classified as follows:

Table -1

GP Names	Villages under the GP
Mari Dhansiri	Bamungaon, Kumaroni ati, Bohikhuwa 1 and Bohikhuwa 2
Pub- Kaziranga	Tamulipathar,
Madhya Kaziranga	Lukhurakhonia and Doomjan
Paschim Kaziranga	Kohora 1 , Kohora 2 and Sildubi

Source - Primary data collected by author.

In order to study, the agrarian aspect in context to the socio-economic front, a brief outlook of the socio-economic profile with respect to the indicators such as : ST, SC and literacy percentages is depicted below. The distinctive classification of the villages is described considering the following indicators.

Table-2.

Villages	% ST population	%SC population	% literates
Lukhurakhonia	0	0	82.81
tamuli pathar	0	0	71.91
kohoro 2	0	0	59.97
Bamungaon	97	0	27.27
Bohikhuwa 1	80	4	46.43
kumaroni ati	0	0	20.62
Sildubi	50	0	70.03
Doomjan	0	0	53.08
kohoro 1	1.7	2.4	76.51
Bohikhuwa 2	80	3	46

Source: 2011 Census, Assam

Role of Agriculture and Allied Activities in the Socio Economic life of the Area:

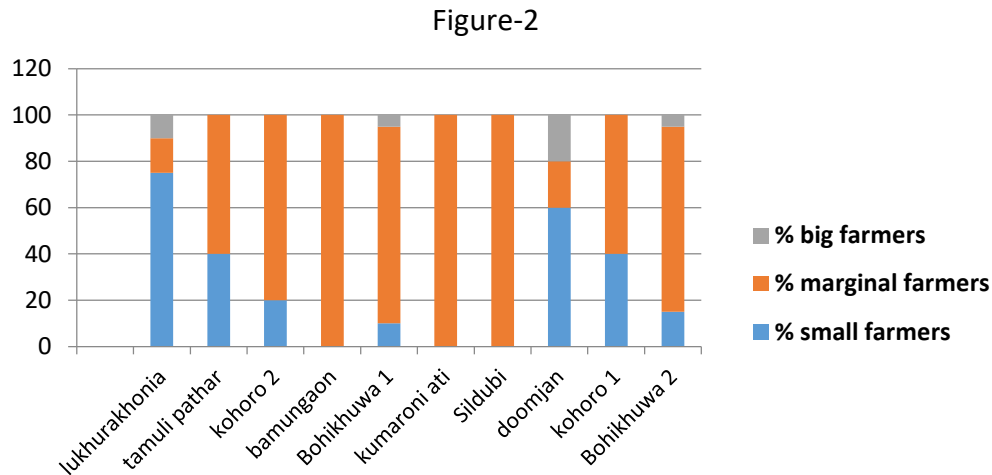
It is always known that agriculture has remained the ultimate source of livelihood mainly for the rural based population of Assam. Agriculture and its allied activities, being the major contributor of the economy of Assam have always played an important role in the socio-economic development of the State .The current growth rate of the agricultural sector of Assam is 4.4%(however comparatively lower than previous year growth rate-4.8%). Agriculture also plays an important role in providing livelihood opportunities to a significant rural population where 98.4% of the total land mass (Census, 2011) comprises of the rural poor in Assam (Economic Survey, Assam, 2013-14).

From the socio-economic classification of the village households mentioned above, it can be depicted that the scenario of the socio-economic life of the people of the fringe areas of Kaziranga has remained more or less grim.

The majority of the area is rural based and on an average of 90% of the population is engaged with the agricultural activities in the area (Basic Information Report Golaghat Sub-division , 2014). The agricultural activities are carried out with traditional farming practices mostly bullock driven where majority lives on subsistence farming. From the primary

survey, it was found that the household community is categorized into small, marginal and big farmers where the composition of big farmers is very negligible (3.5%). While the composition of small and marginal farmers stood at 26% and 70% respectively. From this, it could be observed that it is the marginal communities that dominate the area. With poor economic conditions, the communities rely on small scale agriculture with labour intensive methods for their livelihood and living.

In the following the % composition of small, marginal and big farmers are depicted for each of the village households taken under study.



Source: Primary data collected by author

The rural communities of the fringe areas are mainly cultivators with agriculture as prime livelihood. These cultivators in the area are directly engaged in producing and managing crops and livestock. They are also involved in leasing out their land to the landless laborers both for farm and non-farm activities. Apart from cultivators, there are non-cultivators, which are considered the poorest among the poor (Khan, 2001). It was found that among the rural households majority of them came under this category. They usually depended on seasonal demand for labor in agriculture, and engaged mostly in services like carpentry, small scale services like wood carving, cattle rearing, as workers in nearby resorts etc. However apart from cultivators and non-cultivators the area also comprised of the marginalized workers that was around 60% of the total work force. It is this section of the population that generally lived on subsistence consumption with farming as livelihood. They own small pieces of land, cultivate the crop suitable on their land that depended mostly on weather conditions. And it's their dependency on nature that awaits them for next crop cultivation.

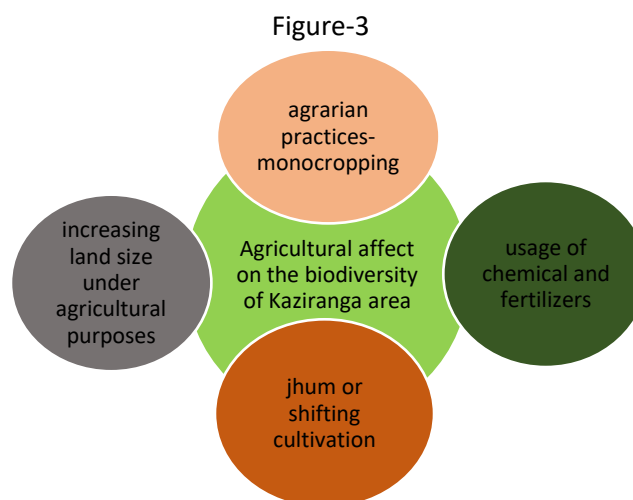
Conceptual approach: Inter linkage of Biodiversity and agriculture in the area.

Famously known as the land of world's largest Great one-horned Rhinoceros, land of tigers, wild elephants, wild buffaloes and swamp deer, it is also known for its rich diversity of various tall elephant grass, marshland and tropical moist grass leaves forests. At present apart from rich flora and fauna, the area crisscrosses with beautiful rivers and small water bodies known as beels.

Now what is biodiversity and what is its importance? “Biodiversity refers to the variety of life and its processes. The concept is closely associated with “ecosystems” and “habitats” (Agriculture and Rural Development, 2015) . The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests etc. are all part of a biologically diverse Earth that forms the biodiversity (GLOBAL ISSUES, 2015). Importance of biodiversity is essential and its conservation must be a key target for development of an economy. A healthy biodiversity mainly results to ecological services like protection of water resources, climate stability, biological services such as food, wood products and social benefits such as boosting tourism, cultural values etc. (GLOBAL ISSUES, 2015)

In this paper, the interlink age between biodiversity and agriculture is depicted by understanding how the biodiversity of the Kaziranga area is or can be affected by the agrarian practices practiced by the local communities in the area. Biodiversity and agriculture share an age-old relationship as both are inter-dependent to each other. Most of the agricultural activities are based on natural resources. Biodiversity of the area can be only maintained if there is optimum usage of these natural resources like- water bodies for crop cultivation purposes, fuel wood, rapid conversion of forests land areas into agricultural land, indiscrimination in bamboo harvesting etc. Studies have been made that protection and optimum use of natural resources through conventional land management systems, and conventional farming practices will lead to improving plant nutrient efficiency, contain pesticides and chemical fertilizer usage, better water management systems thereby leading to improve productivity of crops (Linking agriculture and biodiversity can help feed the planet, 2013).

In the fringe areas of Kaziranga National Park area, dominated by the habitat of rural poor households, their livelihood mainly depends on agricultural livelihood. With increasing population and rising demands for food, the area has been witnessed with expansion of more agricultural land followed with agrarian practices. The following factor that affects the biodiversity conservation of the area due to the agricultural livelihood of the locality is depicted below.

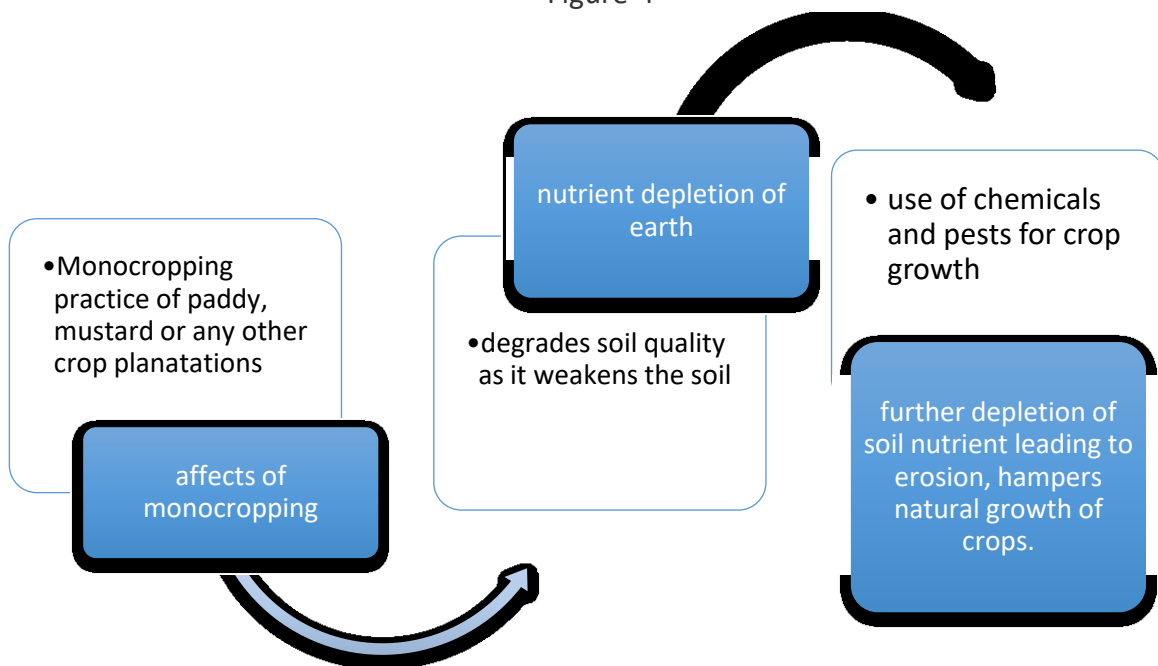


*the factors affecting the biodiversity indicated in the above figure are considered with reference to the agrarian practices practiced by the locality in the KNP area.

Monocropping and its impact on biodiversity:

Monocropping is an agrarian practice which is based on single crop variety cultivated in large swathes of land. In the Kaziranga area it is mainly the paddy cultivation based on monocropping crop pattern that. As mentioned above earlier, three types of paddy cultivation are cultivated with dominance of mostly summer and winter paddy .i.e. Boro and Sali almost throughout the year. Though the autumn paddy i.e. Ahu cultivation is carried out in small land size comparatively to the other, it also follows the monocropping crop pattern in the area. In case of other crops, mustard cultivation, rubber plantation is also widely carried out on monocropping pattern.

Figure-4



Vicious circle of mono-cropping effects on biodiversity (in terms of soil)

As the region is mainly dominated with the population of small and marginal farmers, these farmers with the hope of lowering their costs of cultivation with increasing margins practice such kind of cropping pattern unaware of the environmental effects on the soil of the region. But such kind of monocropping practices in the area might cause degradation of soil which in turn may increase the usage of fertilizer and pests in the soil. In monocropping, plantation of the same crop year after year is done, which zaps the nutrient of the earth followed by soil erosion thereby leading to use of more chemical fertilizers aggravating depletion of soil texture.

Usage of chemical fertilizers and pests :

Chemical fertilizers and pests though used up by a small fraction of the locality in the area , it's over usage might be detrimental to the environment of that area. However its over usage is recognized mainly in case of monocropping of crops and its effect turns severe when these chemical and pests penetrates the ground level water affecting the wide habitat of fishes, birds, animals and also the human habitat that are refuged in the locality.

It may also cause water borne diseases causing environmental pollution hampering human and animal habitats in the region.

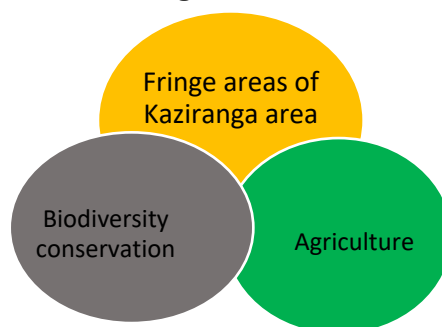
Increasing land size under agriculture:

Encroachment of land by locals or by people outside the region has always been a common prolonged issue in the Kaziranga area which has tremendously affected the biodiversity of the region. Apart of encroachment, studies revealed that conversion of unclassed forest land for non-forests uses is threatening to disrupt the ecological balance of the area, as well as eroding the culture of human-animal co-existence existing therein (Gogoi M. , 2015). Studies have also found that conversion into agricultural land from unclassed forests land has gained a momentum over last few years (Gogoi M. , 2015). Again, the massive tea plantations carried out close to the park boundaries has immensely affected the wild habitats of the area. Over a last few years it has not only pose a serious threat through pesticides run-off but have also affected the exotic species contained such as mimosa, wild rose etc. (VERMA) . On the other hand , monocropping of rubber plantations are carried out in vast unclassed forests land which in turn have been a reason of biodiversity loss affecting wide variety of flora and fauna of the eco- sensitive area (Gogoi M. , 2015). On the other hand, deforestation carried out by some locals might also pose a threat to the biodiversity of the area.

Affect of Jhum cultivation

Although the samples /data collected in our study did not cover any area under jhum cultivation which are mostly found on the southern part of the KNP across the National Highway (Karbi Anglong side), It is important to take int account the affects of jhum cultivation. Jhum cultivation or shifting cultivation carried out by some of the localities¹ might be another reason of biodiversity loss in the area. These cultivation is practiced by the locality in smaller land sizes that not only detriments the natural vegetation of plants also depletes the soil nutrient of the area causing erosion thereby threatening the biodiversity of the region. On the other hand, studies found that, due to small productivity of this cultivation, the communities of the area are bringing into new land thereby occupying areas under forests cover (Gogoi M. , 2015). Such consequences might in turn hamper the habitat of the flora and fauna of the region causing the eco-sensitive charm of the area.

Figure-5



¹ The localities practising jhum cultivation are mainly the inhabitants located at the foothills of the Karbi-Anglong region, south of the K.N.P area.

Intrinsic link between biodiversity and agricultural activities in the fringe areas of K.N.P

The fringe areas of the Kaziranga area therefore share an intrinsic link between biodiversity and agricultural activities practiced by the local communities in the area. Biodiversity conservation is highly efficient within the area, and thus needs to be maintained for balancing the ecological aspects of the environment.

Methodology and data collected:

The study is based on village level analysis where random samples of 20 village households are taken from each of the 10 villages undertaken for the study (as shown in table 1).The study is made using simple descriptive statistical analysis made on primary data collection and secondary data collection. Primary data were collected from field survey covering all the villages undertaken for study. Secondary data (reports, etc.) were collected from Department of Agriculture, Bokakhat sub-division, women self help groups(SHG) , through interaction with District Forest Revenue Circle officer of Bokakhat Sub-division of Golaghat district, Assam.

Data analysis and interpretations:

In the study certain factors related to agricultural and allied activities are taken as indicators to analyze the agrarian aspect of the locality in context to their socio economic life.

List of indicators are:

- Arable Land cultivated under different crop types
- Cropping practices
- Sources of irrigation
- Access to markets
- Access to agricultural technology
- Sources of Income

Crop types:

With a geographical area of 34926.92 Ha, the net cultivable area is 25145.6 Ha. Among the crop types mainly paddy, black gram and mustard cultivations are mainly carried out depending on the fertility of the soil and on the basis of suitable climatic conditions. As, mentioned earlier, the region is mainly based on winter crop cultivation. With flood remaining the prolonged issue, summer crop mainly comprises of paddy cultivation (i.e. boro/Sali /Ahu) depending on the geographical texture of the soil type of different villages. While in case of Rabi crops it comprises of varied vegetable cultivations where- potato, carrot, brinjal, radish, spinach, green peas are carried out. However vegetable cultivations are generally made throughout the year depending on seasonal variations.

The following table is shown representing the fraction of land under the crop types grown in the area.

Table 3

CROP Name	arable land(in ha)	%land proportion
black gram	22.4	13.95
paddy	103.2	64.26
mustard	21.4	13.33
vegetables	13.6	8.51

Source: Primary data source collected by author.

Representation of % of farmers' engagement in cultivation against different crops and % of land proportion.²

% of farmers across differnt crop types

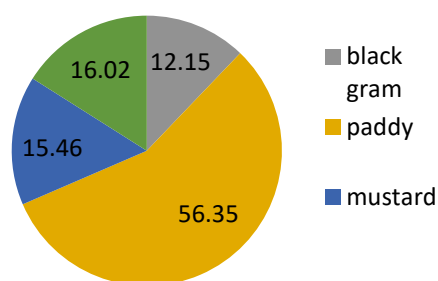


Fig 6(a)

% land proportion

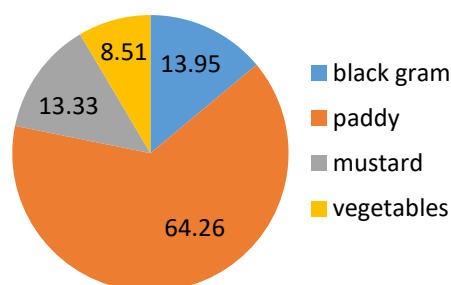


Fig 6(b)

From the above figures , it can be represented that out of all crop types it is paddy crop that is mostly cultivated with also more number of farmers associated with it, while vegetables comprises of least cultivable area. Vegetables are mainly grown throughout the year on seasonal basis and is generally cultivated in own crop land.

Paddy being the widely grown crop in the area is classified into mainly 3 types: *Boro (Summer paddy, Ahu (Autumn paddy) and Sali (Winter paddy)*. Usually its summer paddy and autumn paddy that dominates the area. Flood being the perennial issue does not allow Sali or winter paddy to sustain over a longer period of time. But reporting from the respondents it was found that if Sali cultivation is done, it is done for self-consumption only. While, Ahu or autumn paddy is cultivated with a small land size area compared to other two paddy types as not all villages go for Ahu cultivation in the area.

² Source: Calculated from primay data collected by author.

It was found that nearly 50% of the village households (Sildubi, Kohora 1, Kumaroni ati, and Tamuli Pathar) practiced monocropping of paddy crop almost throughout the year and monocropping of mustard cultivation as Rabi crop. While rests (20-30) % of the village households (Lukhurakhonia, Bohikhua 2, Doomjan and Kohora 2) practiced intercropping of crops mainly- black gram with maize, vegetables mainly carrot with radish , potato and brinjal.

Current scenario of area and productivity under summer paddy, autumn paddy and winter paddy is shown below:

Table-4:

Paddy types	Area(Ha)	Productivity(in quintals)
Summer paddy	2636.73	54
Winter paddy	7283.2	36
Autumn paddy	670.33	45

Source- Basic Information Survey Report Bokakhat Sub-division, 2013-14

The table depicted above has been collected from the Department of Agriculture of Bokakhat Sub-division.³ The table shows that out of all paddy types, it is the winter paddy i.e. Sali rice with highest area under cultivation comparatively while the productivity was the highest in case of Boro paddy cultivation.

Sources of Irrigation:

Different villages showed different responses on their access to irrigation facilities. Sources of irrigation were mainly: Deep tube wells, Shallow tube wells and some villages provided with pump sets. In the following the number of usage of irrigation sources used by the villages under study are shown.

Table-5:

Representation of the different sources of irrigation used

Villages	Sources of irrigation:			
	Pump sets	DTWs	STWs	Rainfed
<u>lukhurakhonia</u>	3	12	0	yes
<u>tamuli pathar</u>	5	3	12	yes
<u>kohoro 2</u>	5	0	0	yes
<u>bamungaon</u>	1	0	0	yes
<u>Bohikhuwa 1</u>	15	0	0	yes
<u>kumaroni ati</u>	10	3	0	yes
<u>Sildubi</u>	0	0	0	yes
<u>doomjan</u>	10	2	0	yes
<u>kohoro 1</u>	2	5	0	yes
<u>Bohikhuwa 2</u>	8	9	0	yes

Source: Primary data source collected by author

³ This is the only data record file available in the Agricultural department of Bokakhat Sub-division with respect to paddy types. The Department has no record file of last years' crop data.

The table shows that the usage of pump sets followed by deep tube wells (DTWs) is the highest compared to other sources. Villages - Bamungaon and Sildubi depend completely on rainfed irrigation and have no irrigational facilities yet. The villages Lukhurakhonia and Doomjan shows that they could have access to proper irrigation facilities compared to all other villages. Since Assam is situated in a highly rainfall zone (Economic Survey, Assam, 2013-14), all the villages receives the benefit of rain fed agriculture by default.

Access to markets:

Reports received from the respondents reveal that out of all crops cultivated it was mainly the vegetables comprising the green leafy vegetables, potato, brinjal, cabbages, reddish, tomato, carrot, French beans, cauliflower that form the bulk which are cultivated mostly on their own household back yard and mostly consumed at home. Some farmers who own larger farm land practice kharif crops commercially in winter. The market prices obtained from these sources align to the general market prices of local markets of the area. However, the rates differ on the basis of distance of the villages from the markets.

As regards paddy the average market price is Rs. (600-1200) approx/- per quintal depending upon the quality of rice cultivated. Rice cultivation is prevalent in almost all the villages with some farmers practicing mustard cultivation during winter. Those who take to cultivation commercially in larger and economically viable farm lands receive good returns by selling their produces in the market. large farmers from villages like Lukhurakhonia, Doomjan, Bohikhuwa 2 produce crops in good quantity on commercial basis while others marginal and small farmers who possess only fragmented and small farm holdings in villages viz. Kohoro 1, Kohoro 2, Bohikhuwa 1, Halodhibari, agoratoli, Beloguri etc have to remain content with produces either meeting their own requirements or marginal surpluses to sell in the market at prevailing market price. These marginal farmers use local varieties of seeds and mostly do not use chemical fertilizers or pesticides and therefore, receive less yields.

Access to agricultural technology:

Improve in agricultural productivity depends on usage of proper utilization of agricultural inputs like seeds, required nutrient composition i.e. usage of chemical fertilizers in crops planted and with better mechanization tools like use of tractors, power tillers etc. With a grim socio-economic life of the locality in the fringe areas majority of the village households stick to traditional agricultural methods with fields mostly bullock driven, poor quality of seed and less usage of tractors and other mechanized farm implements. However, variation in usage has been reflected in having access to the required agricultural technology by the village households.

From observation it could be stated that villages – Lukhurakhonia, Doomjan and Bohikhuwa2 had proper access to the usage of agricultural technology with HYVs, use of tractors and power tillers as compared to the rests of the villages undertaken for the study. While it was found that, almost every village has access to local seed varieties that was preferably used in their crop cultivation. In case of usage of chemical fertilizers in crops it was observed that overall 35% of the village households had its usage. The percentage usage however differed from villages to villages.

It was observed that villages where crop fields are usually tractor-mounted other than traditional ploughing methods reflect the attachment to fertilizer usage. They generally use two types of fertilizers- dry⁴ and mixed fertilizers.⁵⁶ In the following table, say, X is considered as the % of fertilizer composition which is used to classify the % access against the type of fertilizers used.

Table-6:

% composition of fertilizer(x)	Types of fertilizers used
$X \leq 100\%$	Dry and mixed fertilizers
$30\% \leq X \leq 95\%$	Mixed fertilizers
$10\% \leq x \leq 20\%$	Dry fertilizers

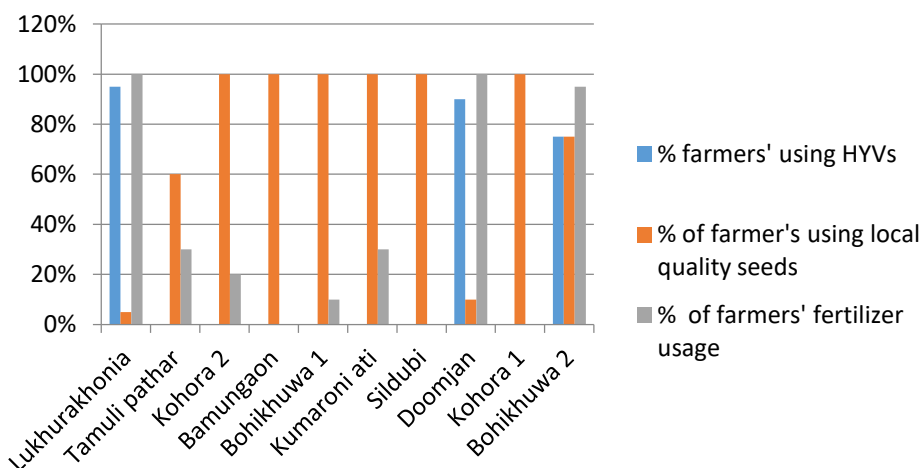
Source: Primary data source collected by author.

It was observed that villages – Lukhurakhonia, Doomjan and Bohikhuwa 2, had better access of fertilizers that used both dry and mixed fertilizers. The frequency of the use of fertilizers on interviewing mainly responded as- once or twice in a year that depended on crop to crop. While villages - tamuli pathar, kumaroni ati and kohoro 2 had access to mixed fertilizers and villages Bamungaon and Sildubi experienced very less access to fertilizer consumption that ranged between (10-20) % respectively .

Diagram: Fig.7 (a) Showing the % of farmers of the villages having access to HYVs and Local varieties of seeds. Fig. 7 (b) Showing the % of fertilizer consumption used by the farmers of the villages.

Figure-7(a)

**Use of HYV, Local Variety and Fertilizers/Pesticides
(village-wise)**



Source: Calculated from primary data source collected by author

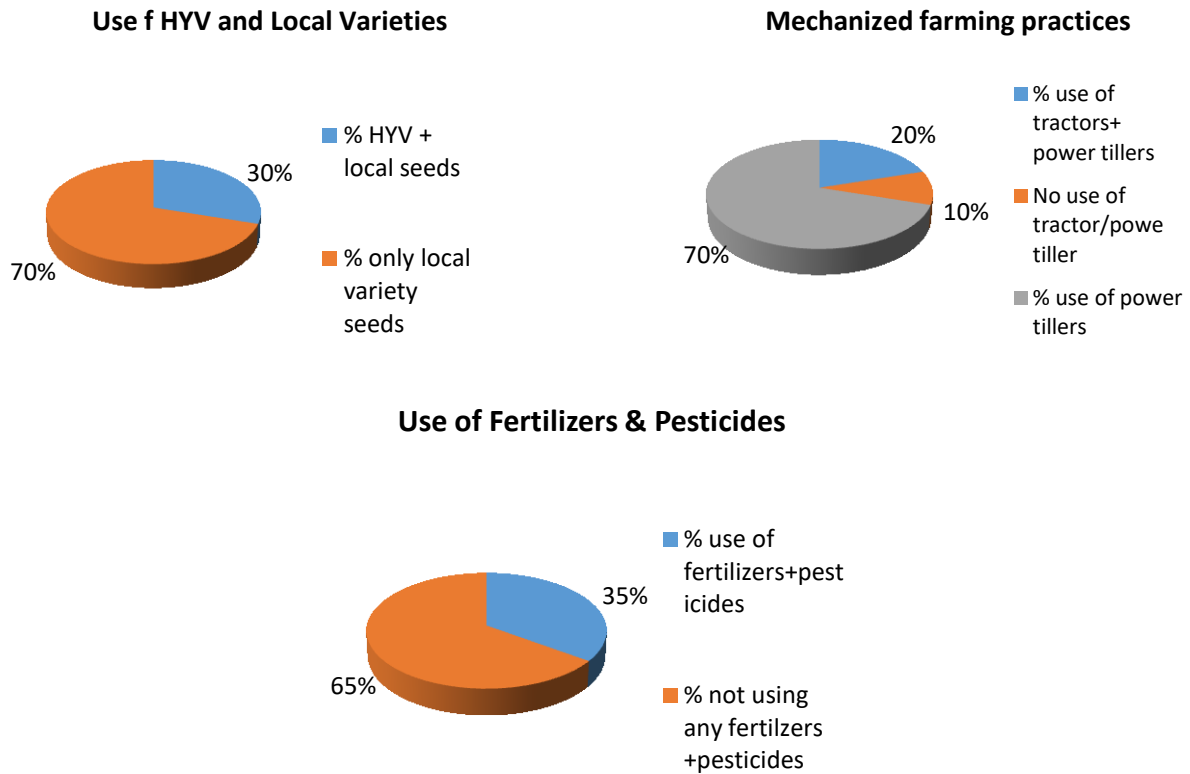
⁴ Dry fertilizers generally are the organic fertilizers suitable for broad area coverage.

⁵ Mixed fertilizers are mixture of fertilizers with more than one nutrient used to promote plant growth.

⁶ Source: Wikipedia.

Figure 7(b)

Representing % of agricultural technology used by the overall villages' households under study:



Source: Calculated from primary data source collected by author

It was observed that % consumption of local varieties was the maximum in all the villages. As local varieties, mainly manure and eco-friendly traditional pests were used that were usually obtained from medicinal plants available in the area. While, a very low of 30% village households only had usage of HYVs as its accessibility depended on the availability and capacity of the farming community to own. Again, as mentioned aforesaid, a fraction of only 35% village households adapted to chemical fertilizer usage in their farming practices. Use of tractors and power tillers also varies within the village households depending on their affordability of the assets. Only 40% have tractors and 80% underwent with power tillage. Rests, 20% of the respondents go for traditional ploughing in the fields.

It was therefore observed that since a higher percentage of power tillage and higher fertilizer consumption was experienced by few of the villages as compared to the other factors it might indirectly affect and pose a serious threat to the biodiversity of the area. Higher power tillage leads to soil quality disruption, soil content moisture hampering crop cultivation and as such high labour costs of production. On the other hand, increase concentration of chemical fertilizers causes natural depletion of the soil nutrient. Some of the respondents reported that fertilizers are sometimes applied on crop plants and sometimes directly to the soil by making estimation. They usually do not measure the right

amount of concentration and prefer giving on their knowledge. So from here, it reflects that though the farmers apply these technologies for their gains in production processes they are directly or indirectly might be affecting the biodiversity of the area which therefore should be taken into account.

Crop productivity:

Increase or decrease in crop productivity is analyzed across the villages. It was found that the village households having access to good mechanization farming techniques such as with time-to-time tilling of land, those of tractor mounted fields, usage of HYVs, optimum usage of fertilizers preferably chemical fertilizers and village households acquired with proper timely irrigation facilities are witnessed with better productivity compared to the traditional way of farming practices and rain-fed irrigation. In the study, percentage of crop productivity across different crop types is also witnessed where percentage productivity of mustard cultivation is found to be the highest.

It was observed that villages with higher and appropriate fertilizer usage, higher HYVs reflected higher average crop productivity (in terms of %) compared to those with poor or inappropriate fertilizer usage, less use of HYVs and farming done with local varieties.

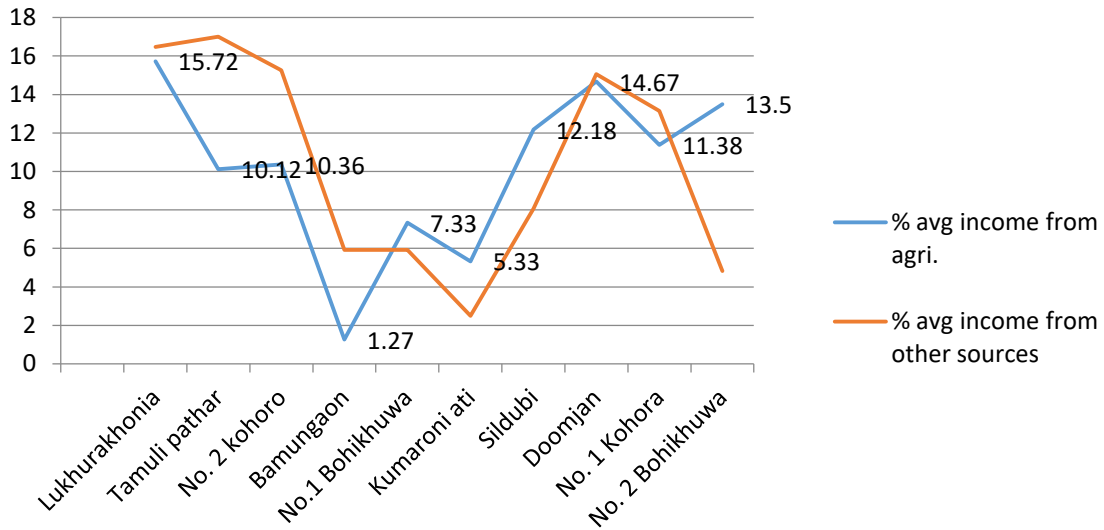
It was observed that villages having access to better utilization of agricultural technology and with better crop productivity considered themselves as self sufficient. However since variation was observed across the areas on the basis of crop productivity with respect to the factors described above, it was found that not all the villages in the area were self sufficient in crop production. In this context, some of the respondents even reported that they rely more on other non-agricultural livelihood sources than on agriculture due to such discrepancy.

Source of income:

The livelihoods of the communities depend upon both agricultural and non-agricultural income sources. In the study, agricultural income is considered as the income earned from cultivation of crops and in case of non-agricultural activities it includes- income earned from livestock and casual non-agricultural laborers.

It was found that the woman of their respective households in the villages basically served as home makers while some engaged in activities like weaving, handloom, and workers in tea-gardens and also remained engaged in cultivations in their own home land mostly vegetable cultivations. Some women of the village households also worked in the fields as casual agricultural laborers mainly during the time of sowing and harvesting. However, considering the average % income earned from agricultural and other non-agricultural sources, it was found that the average income from agriculture was comparatively lower than those earned from non-agricultural activities. The common reason behind such a paradigm shift was unstable returns from crop cultivation compared to stable returns from other non-agricultural sources. The non-agricultural sources mainly included- casual non-agricultural labourers, in petty businesses such as workers involved in carpentry, bamboo and cane works, part-time workers in the nearby resorts and livestock rearing. Some also made their livelihood from fishery, worked as forests guards, owned small roadways shops and others. In the following the graph has been represented that showing the outcome:

Figure-8:
Showing the average % of income earned from agriculture and other non-agricultural sources:



Source: Primary data source collected by author

It was found that, 20% of the respondents were found to be engaged as laborers or workers in carpentry, bamboo and cane works, fishery, and other ancillary activities. An average of 57% of households earned income only from agriculture i.e. from crop cultivation and an average of 43% of households earned income from non-agricultural sources i.e. livestock and others. Income earned from others area from bamboo and cane works, carpentry, as part-time workers in tourism units, nearby resorts and other ancillary activities. However it was found that, households that closely resided near the towns mostly remained engaged in resorts and into tourism.

The respondents reported that the intrusion of wild animals into the crop fields and the vagaries of natural calamities causing flood inundation are the two main reasons behind the unstability of income from agricultural sources compared to non-agricultural sources. Some of the respondents also reported that income from agriculture usually remained unanticipated because of the unpredictable crop losses and untimely distribution of seeds, lack of access to agriculture technological usage, their dependency on soil replenishment after usage of higher concentration of fertilizer and pests in the soil due to previous years' cultivation. Due to such disintegration in the agrarian scenario, despite agriculture being their main source of livelihood, with time majority of the respondents having poor access to agrarian resources preferred livelihood from non-agricultural sources than agriculture.

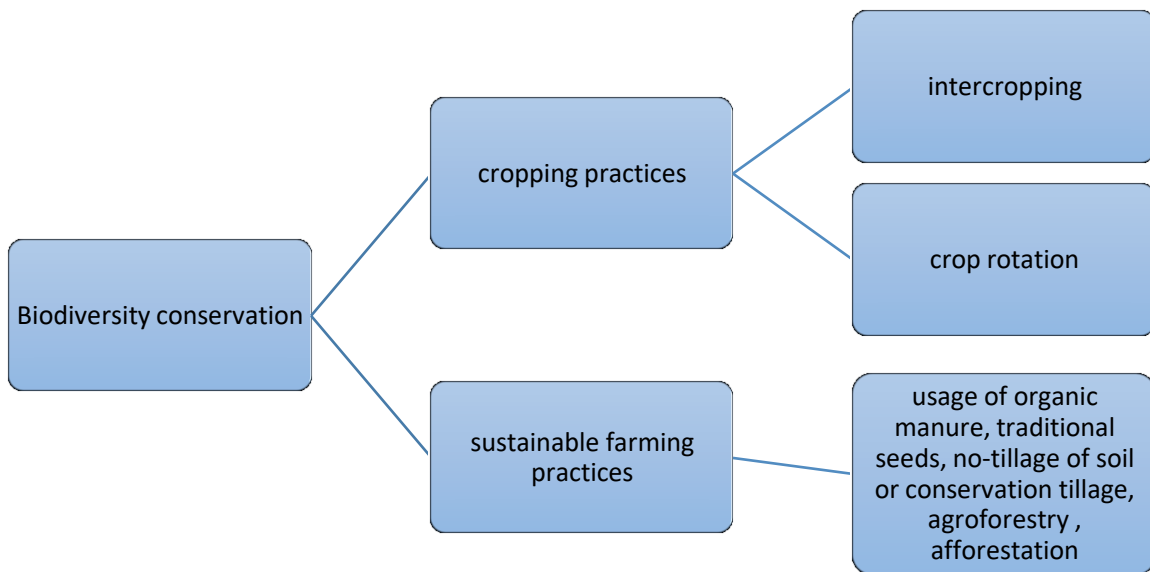
Conclusion:

The locals in the fringe areas of the KNP lead a simple socio-economic life agriculture being their main source of livelihood. The biodiversity of the area consisting the grasslands, floodplains and wide number of exotic flora and fauna shared an intrinsic link with the agrarian practices practiced by the communities. However, agriculture as livelihood of the local communities have been confronted with various issues where intrusion of wild animals such as the wild boar, elephants and rhinos and natural calamities like heavy flood are one of the daunting experiences faced by the locality. Such havocs have turned out as a

serious issue for the entire low lying area. It results in massive crop loss and destruction of crop fields that deteriorates the poor living conditions of the rural poor. Delay in timely availability of seeds, lack of access to efficient agricultural technologies and poor irrigational facilities are some other reasons that dominate the area.

To determine their food and livelihood security with agriculture as livelihood, agriculture continues to remain their prime livelihood. With small land holdings, majority of the localities of villages like- Sildubi, Bamungaon, Kohoro1 and Kumaroni ati mainly lived on subsistence farming. They are happy to feed themselves with whatever they could produce. As long as it could satisfy the hunger of their entire family which further made them felt secured. However not all the villages are benefitted from agriculture as livelihood security compared to the non-agricultural sources. Very less proportion of the households underwent intercropping crop practices. Agrarian practices with more of intercropping farming of crops can provide as a boon to conserve the biodiversity of the area maintain soil fertility and preventing soil erosion.

Figure-9



Some agrarian practices for biodiversity conservation:

Through sustainable agrarian practices like organic farming practices such as crop rotation(cultivating different crops in the same field year after year)and intercropping of crops might help in increasing the soil nutrient. Other practices like conservation tillage practices, making use of beneficial nematodes that act as natural pesticides and replacing chemical fertilizers with organic fertilizers such as cow dung/manure, preservation of local /traditional seeds; the locality might not only improve their farming practices but can also maintain the ecological balance of the area. On the other hand, studies suggests that since flood dominates the region over a crucial period of time, and if flood plains is to be converted to agricultural land, agro forestry practices with natural vegetative cycles must

be taken into account (McNeely, 2007) Therefore, with efficient sustainable agrarian practices Kaziranga landscape can be converted into an agricultural landscape on the brink of biodiversity conservation of the Park area.

Households that faced instability from crop cultivation usually switched over to non-agricultural income sources. While the rests of the community that lived on subsistence farming owning small land holding size somehow made their living rearing livestock and worked as casual agricultural laborers. As reported, although majority of the households reared cattle in their own house they could not do any milk business but used it for self consumption. Development of the non-agricultural areas mainly tourism into eco-tourism units, animal husbandry and with proper market accessibility for the weavers and craftsmen can provide an impetus strengthening the livelihood security of the booming fringe population of the Park area.

Therefore, it can be concluded that despite the era of new technological improvement, majority of the section of the community lived on traditional farming practices and some lived on subsistence. Understanding the impact of agriculture on the socio-economic life of the localities it can be observed that villages such as Lukhurakhonia, Doomjan, Bohikhuwa 2 and Bohikhuwa 1 were found to be in a better off condition while villages Bamungaon and Sildubi lived on subsistence farming with poor socio-economic life. The rests of the villages- Kumaroniati, Tamuli pathar, Kohora 1 and Kohora 2 as compared to the other two categories had passable living conditions. The number of marginal farmers was highest in the study area followed by small farmers. Apart from agriculture, the other livelihood sources that remained the subsidiary occupations are livestock, carpentry, petty businesses, workers in resorts and other non-agricultural activities.

Recommendations:

It can be recommended that the locality of the study area should adapt to sustainable farming practices that can help them earn benefits from farming. Cultivating with more of organic farming practices, preserving the wetlands surrounding the area, turning the landscape into agricultural landscape can make agriculture sustainable and a potential source of livelihood for the community including the wild flora and fauna. Studies found that agricultural landscapes can be designed and managed to host wild biodiversity of many types, with neutral or even positive effects on agricultural production and livelihoods (McNeely, 2007). Apart from crop cultivation, maintenance of such landscapes for terrestrial species can be an add-up for preserving the green spaces around the periphery of the Park area. Therefore, organic farming practices can be a viable option for the locality and must be given a priority that can turn agriculture a potential source of livelihood for the local fringe areas.

The market linkages must be brought into account so that the farmers get easy access to sell their produce with assured prices. Agricultural technology is important for better growth of crop yields but should be applied considering the ecological aspects of the fringe areas. The villages with low literacy levels should be brought into focus where free education materials and other logistic supports to be made a priority so that they can go to school instead of working in fields and working as casual laborers (Akteruzzaman2, FACTORS AFFECTING FARM AND NON-FARM INCOME OF HAOR inhabitants of Bangladesh,

2012) . Although, agriculture has been the prime livelihood of the communities, at the time of crop distress they should be encouraged to engage themselves in non-agricultural activities for assured income and better standard of living in the area.

Role of Village Level Extension Workers (VLEW):

The grassroot workers of the Agriculture Department in a district are the Village Level Extension Workers the Agriculture Department is to guide the farmers through these VLEWs in adopting modern agricultural practices in a methodical way to increase their agricultural produce. One VLEW leads farm families covering 10 to 12 villages which may vary depending on the size of villages within his jurisdiction. Normally the responsibility of a VLEW is to look after the affairs of 800 farm families spreading over a number of villages. They are trained by Agricultural experts of the department of Agriculture. In a district the Agriculture Extension Officers and the VLEWs are in the ratio of 1:8. The A.E.O's in turn are guided by the Sub-Divisional Agricultural Officers. The departmental officers and staff including VLEWs work in close co-ordination with the *Pather Parishalana Samities* (PPS) which are formed at the initiative of the department for promoting agricultural activities.

Apart from this extension activity, the Agriculture Department of the State Government take up and implement various agricultural schemes and services for the promotion of agriculture practices thereby benefitting the farmers. These services and schemes of the Government are viz. training to farmers, distribution of HYV seeds, chemical fertilizers, pesticides & fungicide, agricultural machineries & implements etc. at subsidized rates or sometimes free of cost where demonstrations are conducted. Moreover, licenses have been issued to private parties for dealing the agricultural input business from where farmers can purchase HYV seeds, chemical fertilizer, pesticides, agricultural machineries & implements etc. as and when required.

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Chapter VI-B

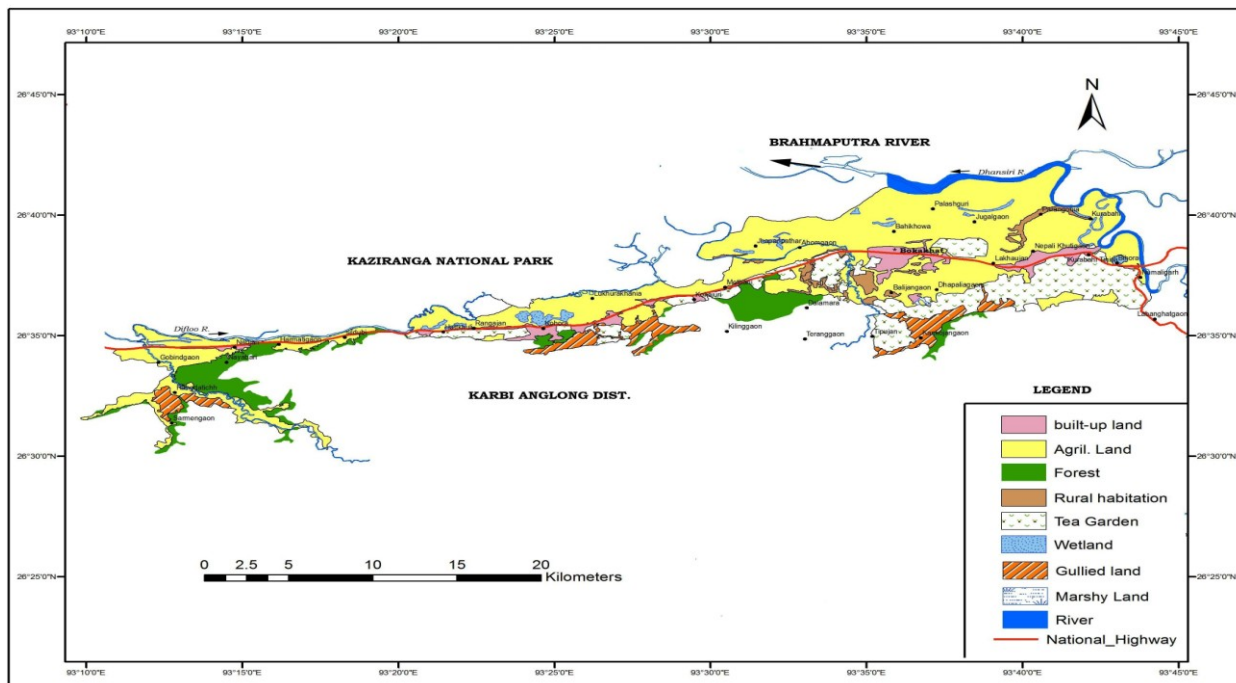
We present here the findings of a detailed survey conducted with the help of the local Sub Divisional office of State Agriculture Department in the area stretching from Bagori to Bokakhat. In this verification **Report we have incorporated** the proposal for intervention in the Agricultural Practices of the local cultivators to enhance the crop productivity aimed at improving their economic background.

Findings of a detailed Survey based on village specific data :

We conducted a survey of the crop area with the help of local office of the State Agriculture Department in the villages viz. Rongajan, 1 No Sildubi, Haldibari, 1 No. Kohora, Haluwa ANC, Durgapur 8 No. Ward, Haluwa ANC, 1 No. Kohora Haluwa ANC Milonpur, 1 No. Kohora Pilkhana, Kohora Pilkhana, Hatikhuli Bagisha Rangajan, Kohora Amguri, Kohora, 2 No Kohora, Kakajuri, Kaziranga, Kaziranga Basagaon, Lakhimpur, Lukhurakhonia, Tamulipathar, Difloo Pathar, 4 No. Da-gaon, Bohikhowa Na Ali, Palashguri, 5 No. Dogaon, Kumarani Ati, Difloopathar, Panbari, Methoni TE, Borjuri Tea Garden 2 No. Borjuri, Japoripathar, Kandulimari, Difolopathar Borigaon, Tamulipathar, Difolopathar Roja gaon & Bongali gaon.

The verification **Report prepared with the help of the Sub Divisional Agriculture Officer, Bokakhat** is summarised below with graphical representation of the village wise agriculture crop produce on an average. We have also proposed intervention in the Agricultural Practices followed by the local cultivators to enhance the crop productivity.

1. The whole area is reverline belt.
2. People go for Rabi crops along with mustard in maximum area.
3. People go for summer paddy as an alternative crop of winter paddy as the fields are chronically flood affected.
4. People do not have adequate numbers of farm machineries and tools for smooth running of agricultural operation.



Map Source: ARSAC Division, Assam Science Technology & Environment Council, Guwahati

The different Government sponsored schemes provide different agricultural inputs such as seeds, fertilizers, pesticide, micronutrients etc. from time to time. Keeping this in view we

make necessary arrangement for assisting the cultivators in regard of mechanization which is in a poor level and which would be a great help in enhancing the productivity and per capita income.

Some machineries and tools may be listed as:

1. **Tractor, power tiller & Rotovator:** Traditional ploughs are not effective and time and labour consuming, so, for pulverization of soil tractor, power tiller and rotovator has great demand in farmers community.
2. **Power pump (Diesel & Electrical operated):** For increasing the effectiveness of the water management system in the summer paddy growing area and Rabi crops area.
3. **Sprinkler irrigation:** For increasing the productivity of the mustard crop, such type of irrigation is in great demand by the farmer.
4. **Drip irrigation:** In some high land area there is great scope for taking up high valued horticultural crop; such type of irrigation facility can be introduced.
5. **Power operated thresher:** For smooth operation of threshing and to minimize the consumption of labour & time.
6. **Oil Expeller:** As the vast area is covered with Mustard, if oil expeller can be provided the unemployed youth can be engaged.
7. **High tech Poly House:** For taking up high valued off season vegetable, Power sprayer & duster.

Actions requiring special attention:

As the area is chronically flood affected the occurrence of pest and disease is comparatively high, so for applications of pesticides, power sprayers and dusters are in a great demand.

Hence, from the overall survey of the area it can be concluded that the farmers of the area can be benefitted by mechanization in the Agricultural sector and as the area is chronically flood affected it would be of great help to the farmers if more importance can be given during summer paddy growing season and rabi crops season.

On the basis of a set of basic information requisites prepared for our study, the following information have been collected from the practicing farmers in the area. The crop pattern and other related data and statistics are presented in tabular forms supported by graphics for our analysis:

Role of Fertilizer in crop productivity:

Table 1

Sl. No.	Basic Information	Villages under Poschim Kaziranga G.P.			
		Halodhibari	1 No. Sildubi	Hatikhuli Bagisa Rongajan	Rongajan
1	Crop Practices:				
2	Different Crop Area:				
a	Sali Paddy	50 Ha.	106 Ha.	66 Ha.	40 Ha.
b	Boro Paddy	-	75 Ha.	30 Ha.	10 Ha.
c	Early Ahu Paddy	-	-	-	-
d	Regular Ahu Paddy	-	-	-	-
e	Mustard	12 Ha.	40 Ha.	3 Ha.	2 Ha.
f	Potato	3 Ha.	10 Ha.	4 Ha.	3 Ha.
g	Lentil	1 Ha.	1 Ha.	-	-
h	Pea	1 Ha.	2 Ha.	1.5 Ha.	1 Ha.
i	Black Gram	1 Ha.	1.5 Ha.	2.5 Ha.	1 Ha.
j	Rabi Vegetables	5 Ha.	5 Ha.	4 Ha.	2 Ha.
k	Kharif Vegetables	2 Ha.	1.5 Ha.	1 Ha.	0.5 Ha.
3	Natural Calamities & Other Factor Affecting the Crop	Flood, drought like situation, wild animal	Flood, drought like situation, wild animal	Flood, drought like situation, wild animal	Flood, drought like situation, wild animal
4	Assessment of loss due to different factors over the years	30% crop area damaged in every year due to different factors showing in above row.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides, fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.			
6	Nos. of actual farmers engaged	30 nos.	73 nos.	90 nos.	78 nos.
7	Shifting of occupation from agriculture to others over the years	10% of actual farmers	20% of actual farmers	20% of actual farmers	20% actual farmers
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory			

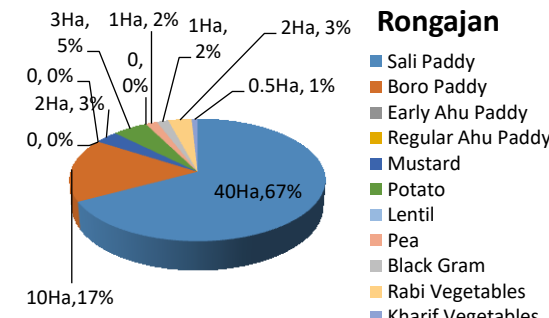
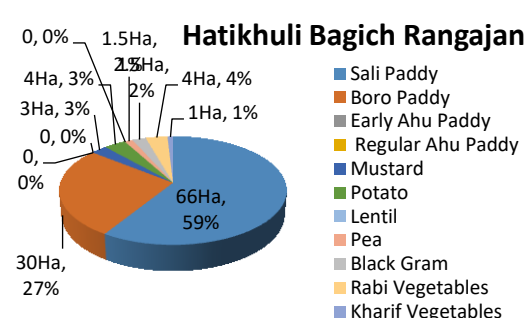
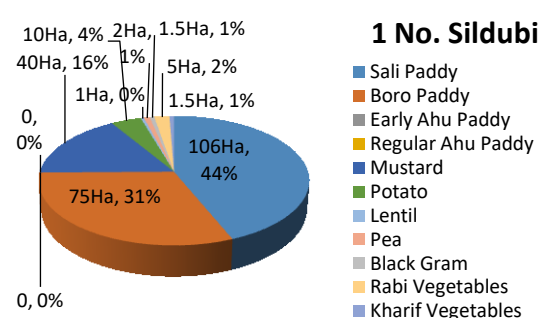
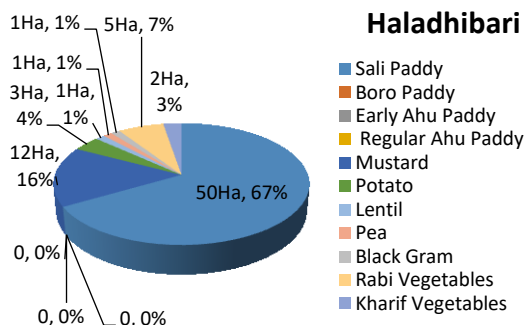


Table 2

Sl. No.	Basic Information	Villages unde Poschim Kaziranga G.P.			
		Kohora Aamguri	1 No. Kohora	2 No. Kohora	Halowa ANC Durgaopur
1	Crop Practices				
2	Different Crop Area:				
a	Sali Paddy	Nil.	126 Ha.	126 Ha.	50 Ha.
b	Boro Paddy	-	-	25 Ha.	5 Ha.
c	Early Ahu Paddy	-	-	-	-
d	Regular Ahu Paddy	-	-	-	-
e	Mustard	-	30 Ha.	40 Ha.	1 Ha.
f	Potato	1 Ha.	7 Ha.	7 Ha.	2 Ha.
g	Lentil	-	0.5 Ha.	0.5 Ha.	-
h	Pea	1 Ha.	0.5 Ha.	2 Ha.	1 Ha.
l	Black Gram	1.5 Ha.	1 Ha.	3 Ha.	0.5 Ha.
J	Rabi Vegetables	1 Ha.	1 Ha.	1.5 Ha.	0.5 Ha.
k	Kharif Vegetables	0.5 Ha.	0.5 Ha.	0.5 Ha.	2 Ha.
3	Natural Calamities & Other Factor Affecting the Crop	Flood, drought like situation, wild animal is the main factors of damaging the crop area in every village.			
4	Assessment of loss due to different factors over the years	30 % crop area damaged in every year due to different factors showing in the above row.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides, fertilizers are distributed to the farmers in different schemes through F.M.C.			
6	Nos. of actual farmers engaged	38 nos.	207 nos.	105 nos.	55 nos.
7	Shifting of occupation from agriculture to others over the years.	10% of actual farmers	30% actual farmers.	20% of actual farmers.	10% of actual farmers.
8	Role of VLEW and other agencies involved.	Role of VLEW in every village is satisfactory			

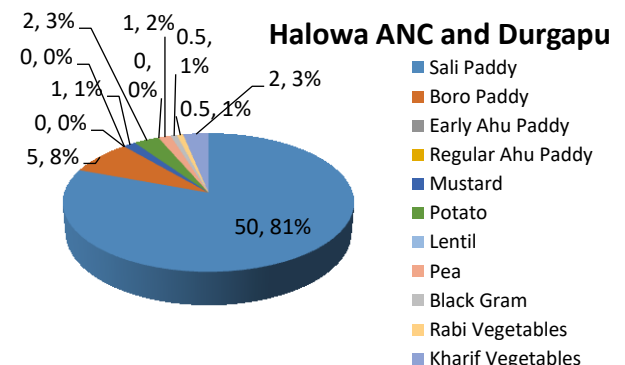
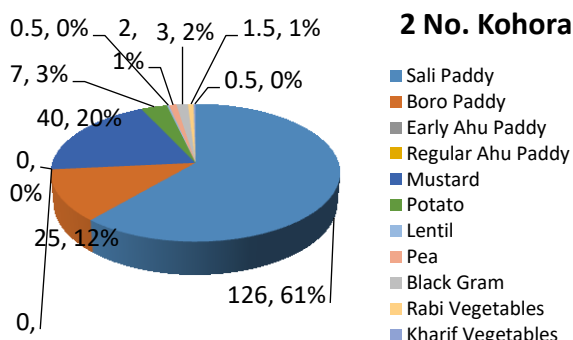
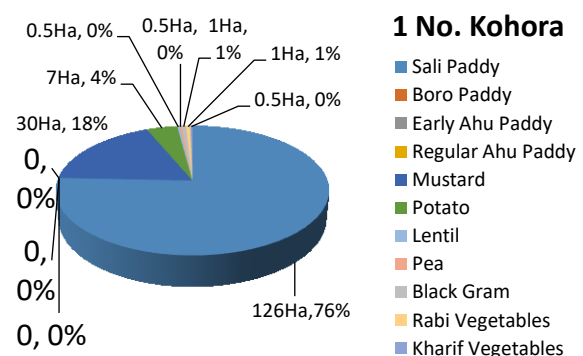
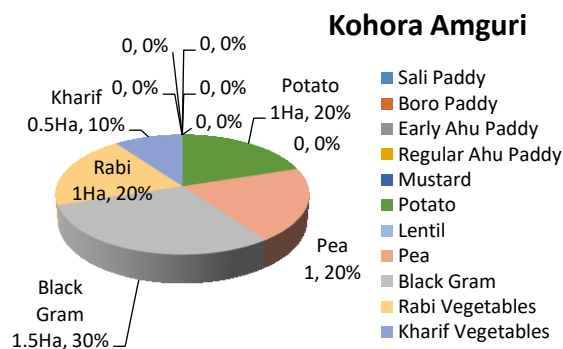


Table 3

Sl No.	Basic Information	Villages under Madhya Kaziranga G.P.			
		Lukhura- Khania	Doomjan	Bosa gaon	Lakhimpur
1	Crop Practices				
2	Different Crop Area:				
a	Sali Paddy	146 Ha.	118.6 Ha.	216 Ha.	20 Ha.
b	Boro Paddy	13 Ha.	-	-	-
c	Early Ahu Paddy	-	30 Ha.	-	-
d	Regular Ahu Paddy	-	-	-	-
e	Mustard	40 Ha.	20 Ha.	10 Ha.	2 Ha.
f	Potato	10 Ha.	15 Ha.	10 Ha.	5 Ha.
g	Lentil	2 Ha.	2 Ha.	2 Ha.	-
h	Pea	2 Ha.	3 Ha.	2 Ha.	1 Ha.
i	Black Gram	3 Ha.	2 Ha.	3 Ha.	1 Ha.
j	Rabi Vegetables	10 Ha.	10 Ha.	7 Ha.	1 Ha.
k	Kharif Vegetables	5 Ha.	5 Ha.	10 Ha.	5 Ha.
3	Natural Calamities & other factor affecting the crop	Flood, Drought like situation, wild animal.	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animal	Drought like situation, wild elephant.
4	Assessment of loss due to different factors over the years	Above 30% crop area damaged due to different factors showing above row in every year.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides and fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.			
6	Nos. of actual farmers engaged	82 nos.	129 nos.	183 nos.	22 nos.
7	Shifting of occupation from agriculture to others over the years	5% of actual farmers.	10% of actual farmers.	20% of actual farmers.	20% of actual farmers.
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory.			

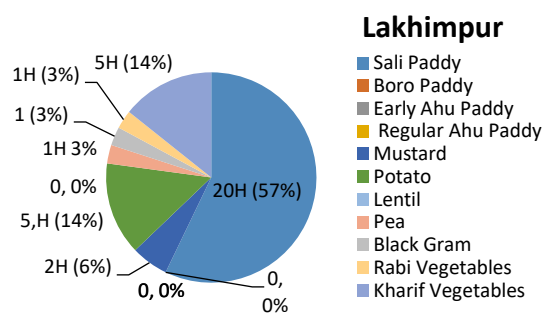
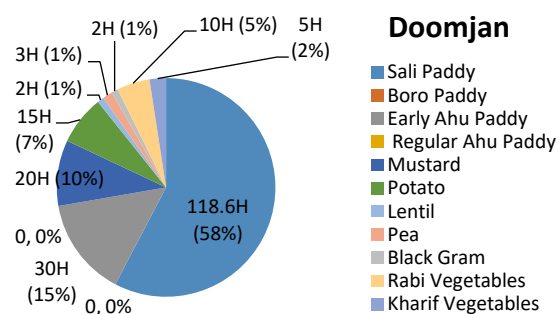
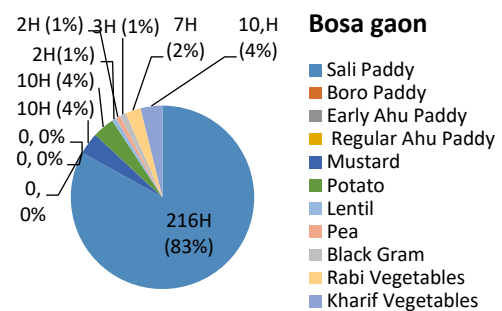
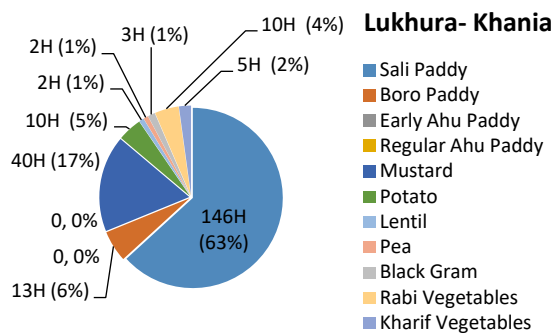


Table 4

Sl No.	Basic Information	Villages under Madhya Kaziranga G.P.			
		Geleki	Gossanibor	Siljuri	Kakojuri
1	Crop Practices:				
2	Different Crop Area:				
a	Sali Paddy	135 Ha.	142 Ha.	85 Ha.	-
b	Boro Paddy	-	50 Ha.	150 Ha.	-
c	Early Ahu Paddy	-	-	-	-
d	Regular Ahu Paddy	-	-	-	-
e	Mustard	2 Ha.	30 Ha.	10 Ha.	-
f	Potato	6 Ha.	15 Ha.	4 Ha.	2 Ha.
g	Lentil	-	-	-	-
h	Pea	1 Ha.	3 Ha.	1 Ha.	-
i	Black Gram	1.5 Ha.	4 Ha.	2 Ha.	1 Ha.
j	Rabi Vegetables	3 Ha.	10 Ha.	7 Ha.	1 Ha.
k	Kharif Vegetables	7 Ha.	10 Ha.	3 Ha.	3 Ha.
3	Natural Calamities & Other Factor Affecting the Crop	Drought like situation, wild elephant.	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animal	Drought like situation, wild elephant.
4	Assessment of loss due to different factors over the years	20% of total area damaged in every year	30% area damaged in every year.	30% area damaged in every year.	10% area damaged in every year.
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides and fertilizers are distributed to the farmers in different Govt. schemes through F.M.C			
6	Nos. of actual farmers engaged	93 nos.	143 nos.	59 nos.	47 nos.
7	Shifting of occupation from agriculture to others over the years	20% of actual farmers.	20% of actual farmers.	10% of actual farmers.	10% of actual farmers.
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory.			

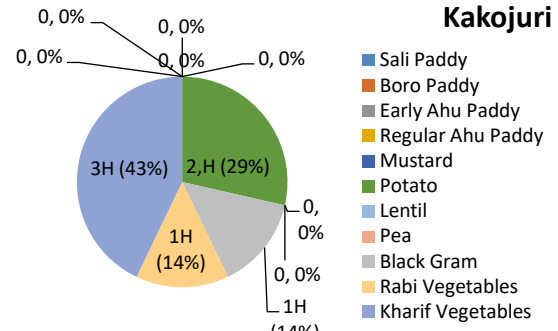
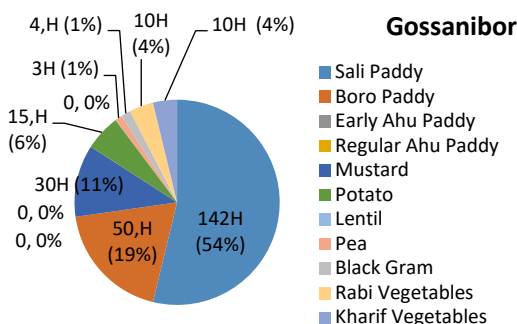
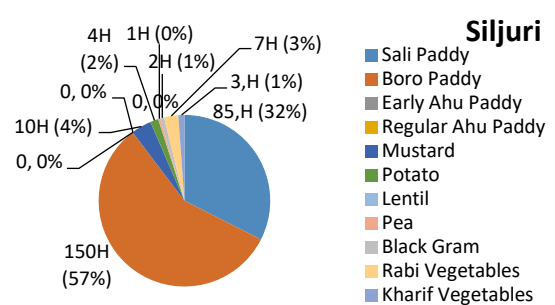
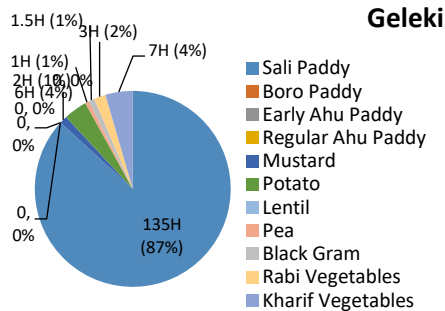


Table 5

Sl.No.	Basic Information	Villages under Pub Kaziranga G.P.			
		Panbari	Methoni T.E.	Borjuri T.E.	2 No Borjuri (Borjuribasti)
1	Crop Practices:				
2	Different Crop Area:				
a	Sali Paddy	220 Bigha	520 Bigha	380 Bigha	1200 Bigha
b	Boro Paddy	-	180 Bigha	60 Bigha	350 Bigha
c	Early Ahu Paddy	-	50 Bigha	-	120 Bigha
d	Regular Ahu Paddy	-	-	-	70 Bigha
e	Mustard	-	70 Bigha	20 Bigha	570 Bigha
f	Potato	28 Bigha	20 Bigha	15 Bigha	120 Bigha
g	Lentil	5 Bigha	-	-	20 Bigha
h	Pea	15 Bigha	15 Bigha	10 Bigha	90 Bigha
i	Black Gram	20 Bigha	5 Bigha	-	30 Bigha
j	Rabi Vegetables	340 Bigha	130 Bigha	60 Bigha	230 Bigha
k	Kharif Vegetables	240 Bigha	80 Bigha	40 Bigha	180 Bigha
3	Natural Calamities & Other Factor Affecting the Crop	Drought like situation, wild animal	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animals	Flood, Drought like situation, wild animals
4	Assessment of loss due to different factors over the years	30-40% crop area damaged in every year due to different factors showing in above row.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides, fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.			
6	Nos. of actual farmers engaged	320 nos.	85 nos.	120 nos.	230 nos.
7	Shifting of occupation from agriculture to others over the years	20% of actual farmers	10% of actual farmers	10% of actual farmers	10% of actual farmers
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory			

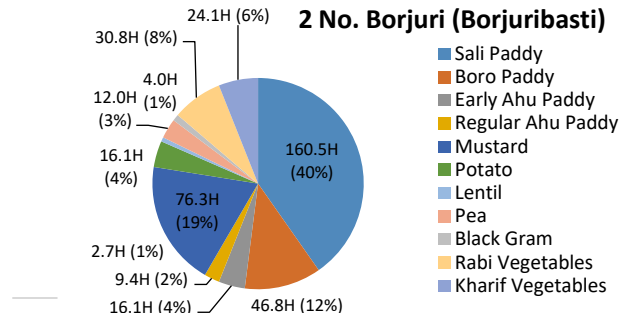
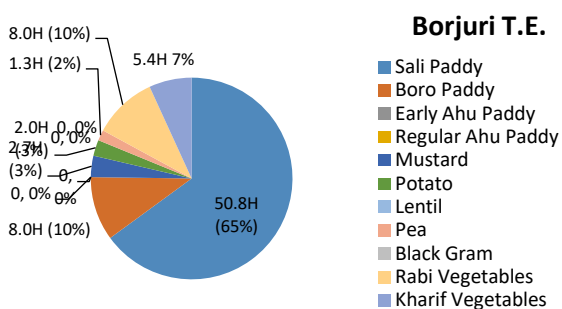
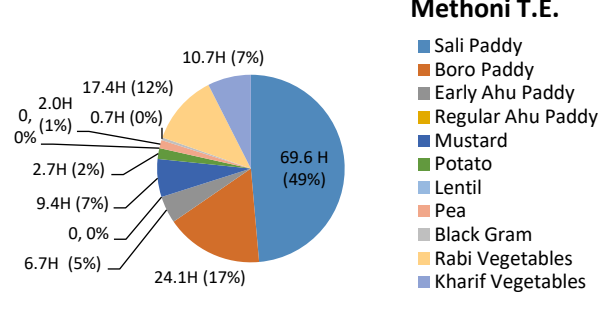
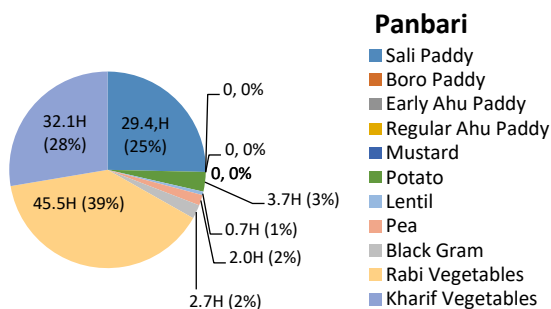


Table 6

Sl. No.	Basic Information	Village under Pub Kaziranga G.P.
		Bongaligaon
1	Crop Practices	
2	Different Crop Area:-	
a	Sali Paddy	180 Bigha
b	Boro Paddy	-
c	Early Ahu Paddy	-
d	Regular Ahu Paddy	-
e	Mustard	10 Bigha
f	Potato	20 Bigha
g	Lentil	-
h	Pea	-
i	Black Gram	10 Bigha
j	Rabi Vegetables	190 Bigha
k	Kharif Vegetables	170 Bigha
3	Natural Calamities & Other Factor Affecting the Crop	Drought like situation, wild animal
4	Assessment of loss due to different factors over the years	30% crop area damaged in every year due to different factors showing in the above row.
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides, fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.
6	Nos. of actual farmers engaged	120 nos.
7	Shifting of occupation from agriculture to others over the years	10% of actual farmers
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory

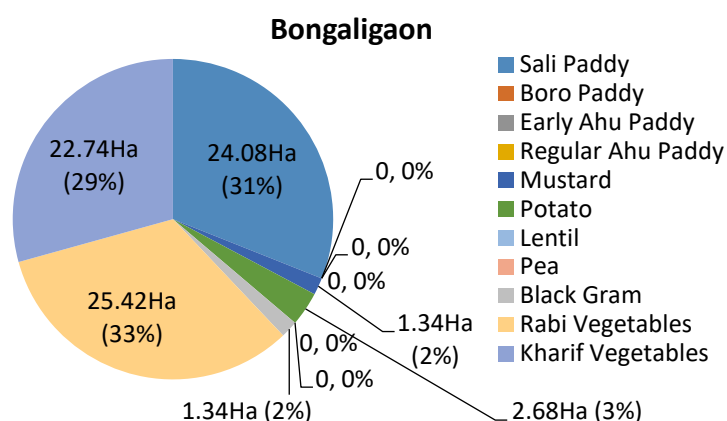


Table 7

Sl No.	Basic Information	Villages uder Pub Kaziranga G.P.			
		Tamuli pathar	Diflooo pathar	Japoni Pathar	Kandhulimari
1	Crop Practices:				
2	Different Crop Area:				
a	Sali Paddy	280 Bigha	1500 Bigha	-	1250 Bigha
b	Boro Paddy	320 Bigha	850 Bigha	350 Bigha	450 Bigha
c	Early Ahu Paddy	-	-	70 Bigha	50 Bigha
d	Regular Ahu Paddy	-	-	-	-
e	Mustard	450 Bigha	350 Bigha	2800 Bigha	850 Bigha
f	Potato	130 Bigha	230 Bigha	120 Bigha	150 Bigha
g	Lentil	30 Bigha	130 Bigha	20 Bigha	70 Bigha
h	Pea	180 Bigha	145 Bigha	150 Bigha	180 Bigha
i	Black Gram	130 Bigha	200 Bigha	210 Bigha	230 Bigha
j	Rabi Vegetables	270 Bigha	450 Bigha	290 Bigha	320 Bigha
k	Kharif Vegetables	220 Bigha	275 Bigha	220 Bigha	270 Bigha
3	Natural Calamities & Other Factor Affecting the Crop	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animal	Flood, Drought like situation, wild animal
4	Assessment of loss due to different factors over the years	30-40% crop area damaged in every year due to different factors showing in above row.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides, fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.			
6	Nos. of actual farmers engaged	108 nos.	683 nos.	80 nos.	314 nos.
7	Shifting of occupation from agriculture to others over the years	10% of actual farmers	25% of actual farmers	20% of actual farmers	20% of actual farmers
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory			

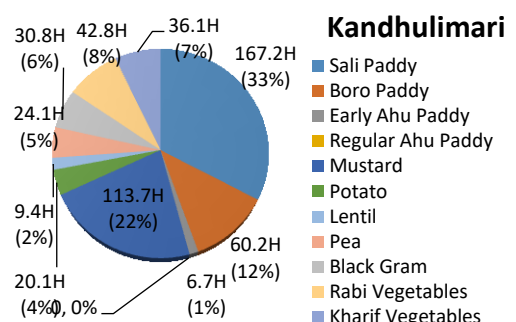
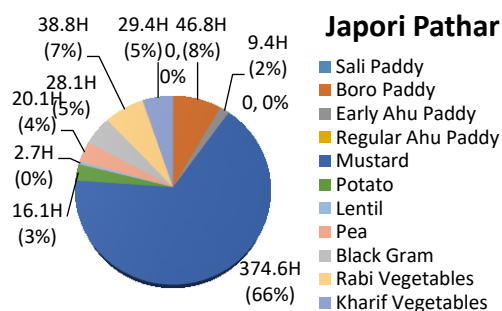
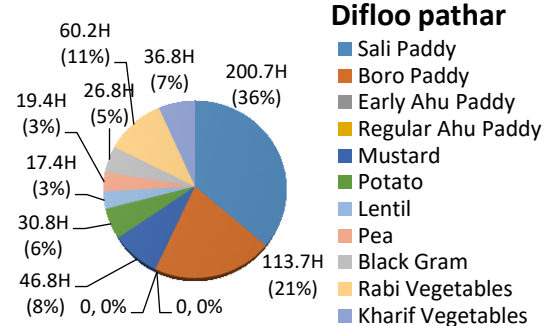
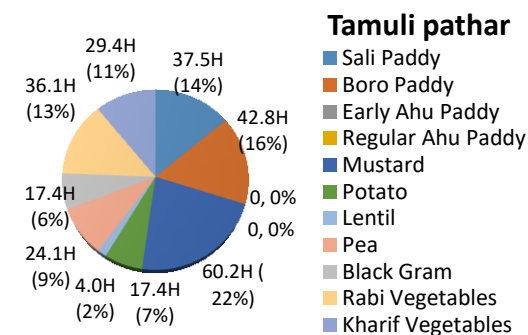
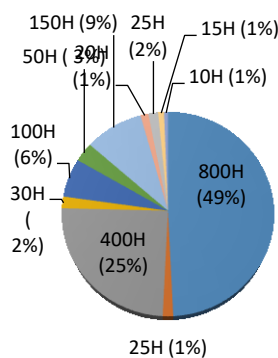


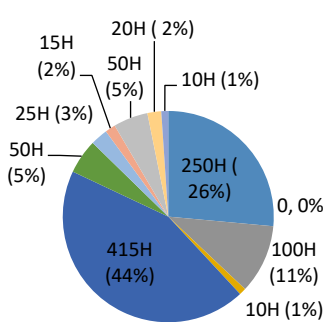
Table 8

Sl.No.	Basic Informations	Villages under Dhanshirimukh G.P.			
		Bohikhowa	Polashguri	Na ali	
1	Crop Practices				
2	Different Crop Area:				
a	Sali Paddy	800 Ha.	250 Ha.	50 Ha.	
b	Boro Paddy	25 Ha.	-	-	
c	Early Ahu Paddy	400 Ha.	100 Ha	25 Ha.	
d	Regular Ahu Paddy	30 Ha.	10 Ha.	10 Ha.	
e	Mustard	100 Ha.	415 Ha.	15 Ha.	
f	Potato	50 Ha.	50 Ha.	15 Ha.	
g	Lentil	150 Ha.	25 Ha.	15 Ha.	
h	Pea	20 Ha.	15 Ha.	10 Ha.	
i	Black Gram	25 Ha.	50 Ha.	2 Ha.	
j	Rabi Vegetables	15 Ha.	20 Ha.	5 Ha.	
k	Kharif Vegetables	10 Ha.	10 Ha.	5 Ha.	
3	Natural Calamities & Other Factor Affecting the Crop	Flood, Drought like situation and wild animal is the main factors in the villages, which affects the crop.			
4	Assessment of loss due to different factors over the years	About 30% area of crop area are distributed to the farmers in different Govt. schemes through F.M.C.			
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Seeds, pesticides and fertilizers are distributed to the farmers in different Govt. schemes through F.M.C.			
6	Nos. of actual farmers engaged	550 nos.	301 nos.	60 nos.	
7	Shifting of occupation from agriculture to others over the years	0% (nil)	0% (nil)	0% (nil)	
8	Role of VLEW and other agencies involved	Role of VLEW in every village is satisfactory.			



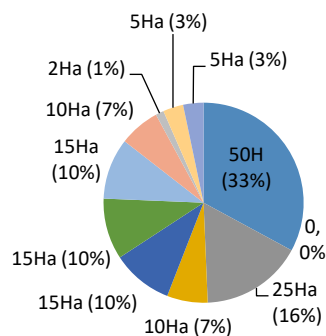
Bohikhowa

- Sali Paddy
- Boro Paddy
- Early Ahu Paddy
- Regular Ahu Paddy
- Mustard
- Potato
- Lentil
- Pea
- Black Gram
- Rabi Vegetables
- Kharif Vegetables



Polashguri

- Sali Paddy
- Boro Paddy
- Early Ahu Paddy
- Regular Ahu Paddy
- Mustard
- Potato
- Lentil
- Pea
- Black Gram
- Rabi Vegetables
- Kharif Vegetables



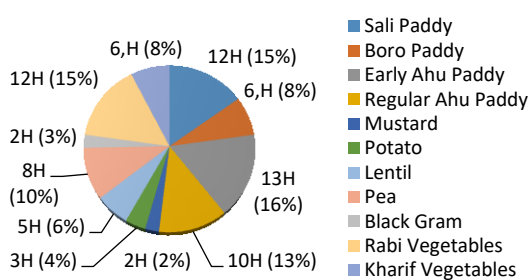
Na ali

- Sali Paddy
- Boro Paddy
- Early Ahu Paddy
- Regular Ahu Paddy
- Mustard
- Potato
- Lentil
- Pea
- Black Gram
- Rabi Vegetables
- Kharif Vegetables

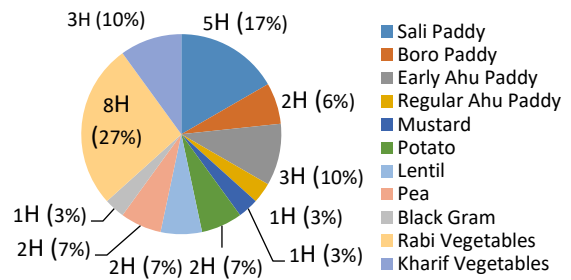
Table 9

Sl No.	Basic Informations	Villages under Dhanshirimukh G.P.			
		4 No. Daw gaon	3 No. Daw gaon	5 No. Daw gaon	Kumaroniati gaon
1	Crop Practices	60 Ha	62 Ha	35 Ha	180 Ha
2	Different Crop Area:-				
a	Sali Paddy	12 H	5 H	10 H	20 H
b	Boro Paddy	6 H	2 H	1 H	12 H
c	Early Ahu Paddy	13 H	3 H	3 H	15 H
d	Regular Ahu Paddy	10 H	1 H	2 H	10 H
e	Mustard	2 H	1 H	-	15 H
f	Potato	3 H	2 H	3 H	10 H
g	Lentil	5 H	2 H	-	3 H
h	Pea	8 H	2 H	1 H	10 H
i	Black Gram	2 H	1 H	-	6 H
j	Rabi Vegetables	12 H	8 H	3 H	13 H
k	Kharif Vegetables	6 H	3 H	1 H	11 H
3	Natural Calamities & Other Factor Affecting the Crop	Flood, Drought	Flood, Drought	Flood, Drought	Flood, Drought
4	Assessment of loss due to different factors over the years	20%	20%	10%	23%
5	Mitigating measures including distribution of seeds, Pesticides, and fertilizers etc.	Through the Gut/ PPS/ Personally	Through the Gut/ PPS/ Personally	Through the Gut/ PPS/ Personally	Through the Gut/ PPS/ Personally
6	Nos. of actual farmers engaged	83%	85%	80%	85%
7	Shifting of occupation from agriculture to others over the years	17%	15%	20%	15%
8	Role of VLEW and other agencies involved	Satisfactory	Satisfactory	Satisfactory	Satisfactory

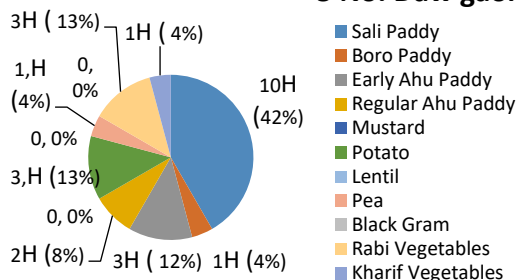
4 No. Daw gaon



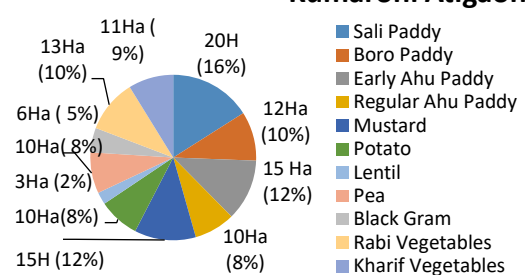
3 No. Daw gaon



5 No. Daw gaon



Kumaroni Atigaon



Role of Big 3 - Nitrogen, Phosphorus and Potassium in crop productivity*:

It's the earth's cultivated cropland that keeps humanity alive and thriving. Plants provide food, fiber, housing and a host of other benefits, and fertilizer plays a key role in this process. As the world population is expected to exceed 9 billion by 2050, fertilizer will be needed more than ever to boost crop production to keep people fed and healthy

All growing plants need 17 essential elements to grow to their full genetic potential. Of these 17, 14 are absorbed by plants through the soil, while the remaining three come from air and water

Generations of soil science have yielded knowledge of how to test nutrient levels in soil, how plants take them up and how best to replace those nutrients after harvest. That's where fertilizer comes in

Nitrogen, phosphorus and potassium, or NPK, are the "Big 3" primary nutrients in commercial fertilizers. Each of these fundamental nutrients plays a key role in plant nutrition

Nitrogen is considered to be the most important nutrient, and plants absorb more nitrogen than any other element. Nitrogen is essential to in making sure plants are healthy as they develop and nutritious to eat after they're harvested. That's because nitrogen is essential in the formation of protein, and protein makes up much of the tissues of most living things. Below is a picture of corn that is nitrogen deficient

The second of the Big 3, phosphorus, is linked to a plant's ability to use and store energy, including the process of photosynthesis. It's also needed to help plants grow and develop normally. Phosphorus in commercial fertilizers comes from phosphate rock. Below is a picture of corn that is phosphorus deficient

Potassium is the third key nutrient of commercial fertilizers. It helps strengthen plants' abilities to resist disease and plays an important role in increasing crop yields and overall quality. Potassium also protects the plant when the weather is cold or dry, strengthening its root system and preventing wilt. Below is a picture of corn that is potassium deficient

**<https://www.tfi.org/voice/fertilizer-101-big-3-nitrogen-phosphorus-and-potassium>*