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## FROM TRADITIONAL AGRICULTURE TO SMART AGRICULTURE: A REVIEW OF AGRICULTURE SECTOR IN DIMAPUR DISTRICT IN NAGALAND

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### ABSTRACT:

Agriculture has been the backbone of the Indian economy for almost 5 decades and people living in rural areas and hinterland are mainly dependent on agriculture and its allied activities to earn their livelihoods to which north east is no exception. This problem is compounded by seasonal variability in rainfall, shortage of water in rivers, flash floods, lack of traditional knowledge and lack of interest in youth. As technical advancements have failed to make inroads in agriculture sector in Nagaland, this sector is under huge pressure due to increase in population. Out of 40 per cent workers only 7 per cent are cultivators and 2 per cent agriculture labourers. Due to very less productivity in traditional farming many people are diversifying their agriculture towards more income-oriented vegetable cultivation and horticulture. Other than traditional income sources people are diversifying towards livestock, forestry and handicraft for financial security and stability. The present paper examines the impact of agriculture and allied activities on livelihoods of the people and suggests the possible interventions to make the livelihoods more resilient by shifting the people from traditional agriculture to smart agriculture.



**KEYWORDS:** rural economy, crop diversification, livelihoods, agriculture.

### 1. INTRODUCTION

There may be a variety of livelihood activities as categorised by various scholars, for e.g. agricultural intensification or extensification, livelihood diversification and migration by (Scoons, 1998) or the categorisation as natural resource based and non-natural resource based livelihood activities by (Ellis, 2000). Agriculture however, remains the backbone of the rural economy of India. The importance of agriculture can

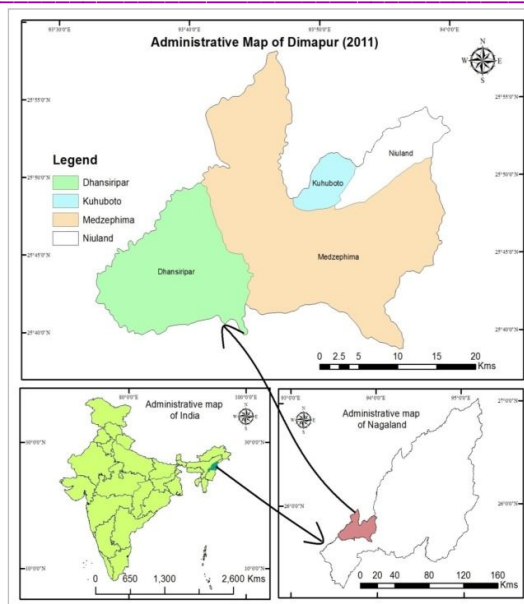
be measured by the fact that whenever agriculture fails it has a huge impact on our economy as most of the people in India are dependent on agriculture and its allied activities. North-east India is no exception to this rule. The northeast India (NEI) is a prominent portion of India, covering a geographic area of 26.2 mha, and home to a population of about 45 million (Ministry of Home Affairs, Government of India). This region is also characterized by large rural population (82%), low population density, large

percentage of indigenous tribal groups (34-91%) and considerably large area under forests (60%) (Ravindranath, et al, 2011). As the population is increasing at a fast pace so the demand for agricultural produce will also increase (Sapkota et al, 2019). To make up with the demand there is a great need to increase the production level. In North-west India the production has increased rapidly after green revolution but the impact of green revolution can't reach to the north east India. Most of the people in this region do

subsistence kind of agriculture, so it is very important to increase the production level by taking initiatives and interventions by the government. The Pre- British hill economy was village based, entirely dependent on the immediate environment such as land, forests, water bodies and animal lives (Sinha, 1993). Agriculture and forest ecosystems which form the main sources of livelihood for the local residents are most sensitive to the impacts of environmental stresses (Reuveny, 2007). In Nagaland most of the area is under rain fed conditions as not much irrigation facilities have been developed. Despite high amount of average rainfall, crops usually fail or give low yields as when there is need of rainfall it does not rain. According to local people, due to change in climate the rainfall season fluctuates and drought like situations are common now- a- days. The continuous depletion of rich ecosystems and loss of traditional agricultural outputs resulting from environmental stressors has a significant impact on the socio-economic wellbeing of the residents, particularly the vulnerable rural poor (Johnson and Hutton, 2012). Due to lack of rainfall the people depend on dry land farming which can provide food only for six months and for other six months they have to depend upon fruits and tubers available in the forest (Basu, 1987). The fertility of the soil can be increased through the use of fertilisers both organic or inorganic which contains balanced amount of potassium, nitrogen and phosphorus and also irrigation that can increase the crop yields and increased concentration of micro nutrients (Food and Agriculture Organisation, 2013). Dimapur district which is constituted of four Rural Development (RD) blocks i.e. Medziphema, Dhansiripar, Kuhubotoo and Niuland.

## 2. MATERIALS AND METHODS

Nagaland is situated in North eastern part of India with Kohima being its capital. Dimapur is the largest town of Nagaland and also the financial capital of Nagaland. The study was conducted in Dimapur district of Nagaland during May and June 2015 with a sample size of 200 households. A large area of Dimapur district is in the plains with an average elevation of 260 metres above the sea level. Dimapur is situated at 25°54'45"N and 93°44'30"E. Dimapur has four Rural Development (RD) blocks namely Medziphema, Dhansiripar, Niuland and Kuhuboto (Figure 1). Eight villages have been selected randomly from four Rural Development blocks, two villages from each block. Both qualitative and quantitative methods have been used for data collection such as semi structured questionnaires, interviews, focus group discussions etc. Personal Interviews and focus group discussions have been used to analyse the changing land use pattern and their dependence on it. Indexing, scoring, ranking and land use resource mapping have been used in the study area. The study tries to analyse the present status of agriculture pattern and forestry and other available options and opportunities for income generation in the region by using both primary as well as secondary data sources.



\*Due to technical difficulties, the boundaries of the RD Blocks could not be shown with accuracy.

Source: Census of India 2001

**Figure 1. Administrative map of Dimapur**

**3. RESULTS AND DISCUSSION**

**Land use pattern in Dimapur district**

The total geographical area of Dimapur district is 92,700 ha. out of which Medziphema holds highest 34,500 ha. The highest cultivated area is under Medziphema block (15,418 ha). whereas lowest in Dhansiripar block with 10,747 ha. under cultivation. The soil found in the district is loamy sand in Medziphema block as it is a relatively mountainous area whereas sandy loam in other three blocks which are plains. Total reserved forest in the district is 15,082 ha. whereas open forest accounts for 6,462 ha and pasture land is 55 ha. Land put to non- agricultural use accounts for 2,457 ha. The district has 249 ha of barren and uncultivable waste land (Table 1). Table 1 also shows that in 2014 out of total geographical area of 92,700 ha., 74.1 percent is cultivable but only 56.6 percent is cultivated and 18 Percent area is left uncultivated. This can be explained due to lack of infrastructure and lack of mechanised farming. In the district, Medziphema block is hilly and doing cultivation in the region is difficult and also lack of availability of High Yielding Variety (HYV) seeds and fertilisers and inaccessibility of some villages to the city and markets make the utilisation of land very low.

**Table 1 Land use pattern of the district (in ha.)**

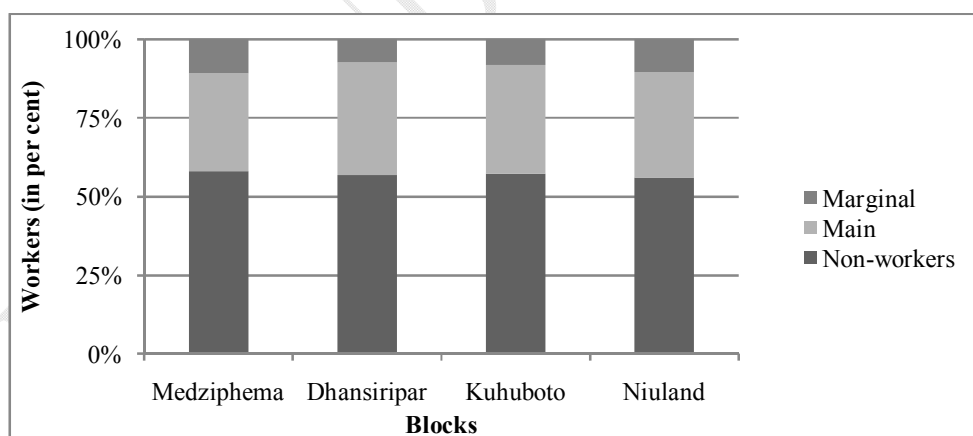
Land use	Dhansiripar	Kuhuboto	Niuland	Medziphema	Total
Geographical area	13,000	14,700	30,500	34,500	92,700
Cultivable area	8,861	9,903	23,624	26,311	68,699
Cultivated area	10,747	11,925	14,332	15,481	52,485
Cultivable waste	425	468	614	593	2,100
Current fallow	1,637	1,872	2,742	2,318	8,569
Forest (reserved )	2,549	3,002	4,423	5,108	15,082

<b>Forest (open )</b>	1,093	1,287	1,893	2,189	6,462
<b>Pasture</b>	11	13	17	14	55
<b>Land put to non agri. use</b>	497	508	560	892	2,457
<b>Land under misc. plantation</b>	740	619	595	721	2,675
<b>Barren and unculturable land (waste land)</b>	67	60	60	62	249

Source: Agricultural Technology Management Agency (ATMA), 2014

As Dimapur is the commercial capital and gateway to Nagaland so many developmental activities are undergoing in the region and land use pattern is changing rapidly. As National highway-39 passes through Medziphema block which connects Dimapur to Kohima, most of the land use changes such as construction of roads, establishment of industries, construction of new buildings etc. are taking place in this block as it is well connected and easily accessible. Most of the rural people are dependent on primary activities. According to Agricultural Technology Management Agency (ATMA) highest number of marginal farmers (< 2 ha) were found in Kuhuboto block which is 56.8 % followed by Medziphema (55.7%), Niuland (48%) and Dhansiripar (46.3%). When it comes to large farmers (> 11 ha) the numbers are high in Kuhuboto (0.9%) followed by Niuland (0.8%), Dhansiripar (0.7%) and Medziphema (0.3%). Most of the people are left with marginal and small land holdings as family size is increasing and land holding is decreasing.

In Dimapur at least 60% population is of non- workers and 40% is of workers and out of 40% working population 23% were main male workers whereas 3% were marginal male workers and female workers constitute 9% main and 5% marginal female workers. When it comes to sector wise categorization, 7% were cultivators, 2% agricultural labourers, 1% work in household industries and 30% other workers (Figure 2).

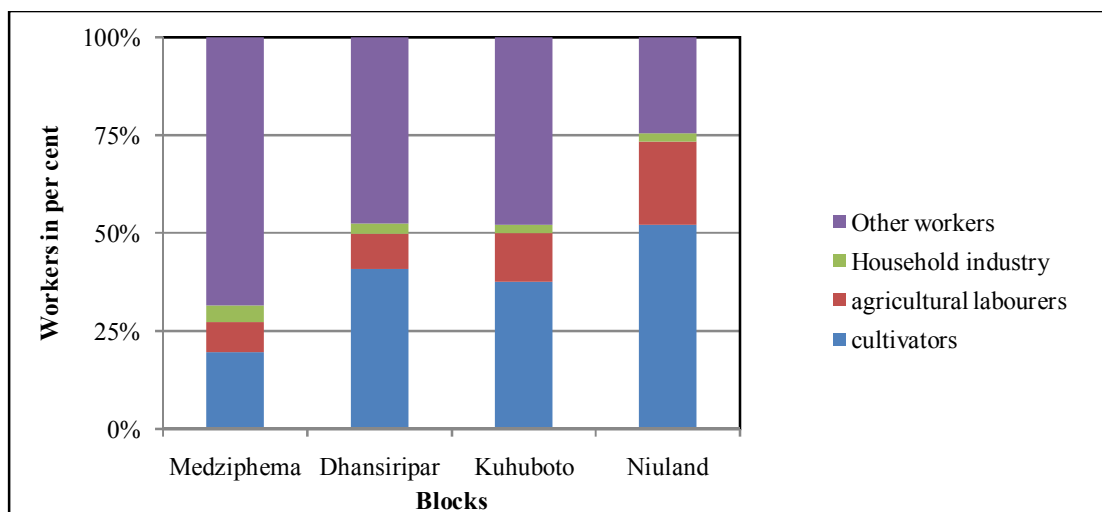


Source: Census of India, 2011

**Figure 2. Composition of the population on the basis of work**

The workforce has further been categorised into the stipulated categories of cultivators, agricultural labourers, household labourers and other workers for the four RD blocks. The number of cultivators is least in Medziphema (19.62 per cent) and is highest in Niuland (52.04 per cent) for the 2011 census. This can be attributed to the fact that the Medziphema block being strategically well located has the advantage of supplying skilled labour to the Dimapur town. This assertion is also supported from the fact that the number of other workers which includes service and other sector jobs

is highest in the Medziphema block (68.57 per cent). Dhansiripar and Kuhuboto also have a fair good percentage of other workers in the workforce 47.67 and 47.98 per cent respectively (Figure 3).



Source: Census of India, 2011

Figure 3. Workforce composition of the RD blocks

**Agricultural Productivity and Diversification- Shift to Smart Agriculture**

Major part of Dimapur district lies in the plain sector except Medziphema block. The plain sector consists of three blocks namely Dhansiripar, Niuland and Kuhuboto having identical topography, rainfall, type of soil, cropping pattern and source of irrigations. Whereas, the Medziphema block is at higher altitude to that of three other blocks. Based on the above factors two different Agro-Ecological Situation (AES) have been identified by the agriculture department in Kohima. AES-I comprising of Dhansiripar, Niuland and Kuhuboto Block, and AES-II covering Medziphema block (Table 2).

Table 2 Agro-Ecological Situation (AES) of Dimapur district

Name of AES	Situation	Crop grown	Cropping pattern
AES-I	High rainfall, lowland area and sandy clay loam	Paddy, Maize	Paddy-Mustard
		Soybean, Mustard	Paddy-Maize
		Linseed, Black gram	Paddy-Linseed
		Cabbage	Maize-Black gram
			Soybean-fallow
AES-II	High rainfall/upland area and loamy sand		Paddy-Cabbage
		Paddy, Maize,	Paddy-fallow
		Soybean,	Maize -fallow
		Ginger, Pineapple	Soybean- fallow
	Ginger -fallow		

Source: Krishi Vigyan Kendra, Dimapur, 2015

Earlier people were mostly engaged in maize cultivation but now the cropping pattern of Dimapur district is changing as the area under cultivation for maize crop has decreased drastically and the cultivation of paddy has increased. The area of soybean and mustard has also decreased whereas the area of Linseed has increased. The area of banana, pineapple and ginger has also increased. Changes in cropping pattern are determined by factors like agro-climatic conditions, technological, infrastructural and institutional environment and profitability signals (Table 3).

**Table 3 Cropping pattern - share of each crop in Gross Cropped Area (2009 and 2012)**

Name of AES	AES I		AESII		Total	
	2009	2012	2009	2012	2009	2012
<b>Paddy</b>	61.72	69.30	20.57	23.10	82.29	92.40
<b>TRC*</b>	232.95	259.80	77.65	86.60	310.60	346.40
<b>Maize</b>	49.50	28.65	16.50	9.55	66.00	38.20
<b>Soybean</b>	14.85	12.41	4.95	4.13	19.80	16.54
<b>Mustard</b>	52.20	30.82	17.40	10.27	69.60	41.09
<b>Linseed</b>	12.75	16.72	4.25	5.57	17.00	22.29
<b>Banana</b>	225.00	236.25	75.00	78.75	300.00	315.00
<b>Pineapple</b>	-	-	18.00	20.00	18.00	20.00
<b>Ginger</b>	75.00	97.50	25.00	32.50	100.00	130.00
<b>Vegetables</b>	375.00	375.00	125.00	125.00	500.00	500.00

\*TRC: Paddy Seed Variety- Gomati (TRC-2005-1)

AES- Agro-Ecological Situation

Source: Agricultural Technology Management Agency (ATMA), 2014

### **Farm mechanization and growth drivers**

Agriculture in the region is mostly dependent on rainfall, so it becomes more difficult for the households to have a healthy harvest when there is no rain at right time adversely affecting the production. In focus group discussions most of the villagers were concerned about irrigation. They were hoping that government should take some initiatives for irrigation. The river and streams that flow in the region become dry or have very less water in may-june leaving the farmers with no option to water their fields and most of the crops gets damaged. Very less households have pump-set facility as most of them cannot afford it. For the development of agriculture in the region, the mechanisation of farms is most important. However, most of the households are poor and cannot afford to buy these machineries. Out of 200 households only 14 % have pump set facility and no one have tractors. Subsidies from the governments to buy machineries can be one major step to increase the farm productivity. This can be supplemented with the provisioning of developing the irrigation systems by constructing the check dams under District Irrigation Plan.

### **Diversification in rural non- farm income**

Other than practicing agriculture, people in Dimapur are involved in horticulture, livestock rearing, fisheries, bee rearing etc. Livestock rearing is an integral part of these households as it provide milk and meat which forms a part of their daily diet. They rear cattle, goats, pigs, hen etc. also. Most of the people also rear fish in their backyard(56.5 percent)and have 1-2 ponds for the same. Those who

don't own any ponds catch fish in rivers and sell them in the market as an additional income source. Due to initiatives taken by horticulture department now people are moving towards horticulture. This can be appreciated by the fact that the production of Pineapple has increased from 1570 mt to 24000 mt in a span of four years from 2006-07 to 2010-11. The establishment of canning and processing plant in Medziphema has provided these households an additional income. Other than fruits, vegetables, mushrooms and spices are also now been grown for additional income.

#### 4. CONCLUSION

For the provincial economy to support over the long haul, the extent of its broadening would require extension to the more extensive components of occupation expansion which can come through both on-ranch pay age by methods for horticulture produce and off-ranch in-come age as pay work or gifted specialists. The extent of expanding genuine pay of ranchers and acquiring continued improvement their prosperity, exclusively through cultivating activities, is truly compelled and the wellsprings of pay and business should be enhanced to limit the hazard. Horticulture and the backwoods biological systems which the majority of the underestimated individuals are subject to for their occupations are exceedingly touchy to the effects of climate change and ecological stressors.

This investigation has likewise featured that the enhancement in agribusiness have financial and natural constraints that should be considered by strategy makers. The diversity of generation, both yield and domesticated animals, and other non-ranch monetary exercises of the general population results into salary streams from differing sources. The differentiated trimming design in an area rises because of assignment of arable land assets for development of number of alternative yields. An augmentation of the expansion to increasingly significant type of ranch division jumper sification is through creature cultivation, poultry and fisheries and its estimation as far as estimation of outputs. The area has an immense potential in the natural cultivating segment and the equivalent can be accomplished by little intercessions like preparing the nearby open and by furnishing them with great assortments of seeds.

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