techniques is very low.As a result livelihood security of the hill dwellers cannot be ensured with subsistence agriculture.

However, apart from low agricultural productivity, the issues relating to poor rural development, low income and wages are still crucial issues of the zone. In spite of undertaking many plans and programs by the government the overall scenario of the socio economic development and livelihood is not yet satisfactory in the three hill district of Assam. To attain sustainable rural development the implementation of a proper development plan meant for the hill dwellers is becoming inevitable in the Hill Zone of Assam. Taking all these facts into consideration the present study has proceed with the following objectives-

Objectives of the study

I. To study the socio-economic characteristics of rural households living in the Hill Zone of Assam.
II. To examine the pattern and extent of livelihood diversification in the Hill Zone of Assam.

II. LITERATURE REVIEW

Agriculture is the prime source of livelihood for most of the low-income countries of the world. Yet, the agriculture sector in these countries cannot guarantee the livelihood security of the rural masses due to the small size of land holdings and scarcity of livelihood assets. In many developing countries acute poverty has long been a common issue. Low levels of income and food insecurity are generally recognized as the main causes of poverty in these countries. Poor levels of monetisation further hinder the process of livelihood diversification as a result rural areas generate low amounts of income (Sharma, 2018).On the other hand, owing to the excessive pressure from the growing population, agriculture is turning into a residual sector even though nearly two-thirds of the population are engaged in agriculture and allied activities. Small and fragmented land holdings, low yield, crop failure, and market failure, are some crucial issues usually faced by the rural households engaging in agricultural activities. In India, the agriculture sector produces only subsistence levels of yields. Diversification is becoming more imperative for rural families to secure their livelihoods (Sharma et.al, 2022).

In addition to these, rural India appears deficient in industrialisation, infrastructural development, skilled labour, and access to crucial resources, making it difficult for rural households to adopt a wide range of livelihood strategies. Low level of incomes and limited job opportunities do not guarantee food security and well-being for rural masses. As a consequence, rural youth are more prone to move to urban areas in search of employment opportunities. Nowadays rural migrants are gradually becoming more inclined towards remittances for income generation (Mamgain, 2004). Khatun et.al (Khatun & Roy, 2016) in their study in West Bengal of India found that the livelihood diversification strategies vary substantially across the region as well as across various livelihood groups. The significance of the nonfarm sector as a source of livelihood is gradually increasing than that of agricultural activity. The extent of livelihood diversification is found to be more in poor households than the resource rich households.

Livelihood diversification strategies are influenced by the factors such as socioeconomic status, location and diversification preference of the member of the household. Most of the studies on livelihood diversification have found that geographically complex factors such as market failures compel rural people to choose alternative livelihood options. Factors that influence a household head's decision to choose different livelihood strategies includes land size, location, family size, level of education and average number working years (Mahama et al., 2017). According to another study, household's dependency ratio, educational attainment level of the household head, the household's connections to cities, credit availability, access to irrigation facilities, etc, are the crucial factors that influence livelihood diversification (Ayanaet, al., 2021).

The livelihood diversification activities in rural areas can be increased by combining both the farm and nonfarm activities. A conducive environment for rural livelihood diversification can be created by imparting vocational training and increasing expenditures on education among the rural masses (Sharma, 2018).Studies have found that hill economies adopt different combination of livelihood strategies to cope up with socio-economic & political changes and its associated risks. Presently the livelihood pattern in the hill areas are shifting from subsistence agriculture to profit oriented commercial activities. Rural livelihood diversification strategies have implication in poverty eradication in the mountain economies for which nonfarm activities are found to be common in most of the rural households (Lama et.al, 2019). The issue of food security should be given top priority to achieve sustainable development in the hill regions. Studies have showed that livelihood diversification is becoming norm in the hill region like Ladakh to overcome the problem of food scarcity. Food systems in the state are changing from being production-oriented to supply-oriented. The rural households are increasingly becoming more dependent on the public distribution system and food markets. Substantial change in the land use pattern in the region is the reason behind the low yield of food crop production. Consequently remittances are emerging as a source of sustainable livelihood (Dame, 2018).The agricultural sector of Assam is subsistence in nature. Monocropping practices and practice of conventional farming methods give only subsistence level of yield (Mandal, 2010).

However, the agricultural yield is low due to low farm expenditure and low interest in farming practice among the rural youths. Crop diversification can be a key strategy to increase profitability in the agriculture sector (Saikia, 2015). A study has shown that households with agriculture as their main source of income have a high degree of livelihood diversification. On the contrary households engaged in nonfarm activities diversify less as because they have a stable source of income (Neog and Buragohain, 2020).Another study conducted on the Bodo community of the Bodoland Territorial Administrative Area (BTAD) of Assam also found that livelihood diversification is moderate for most rural households in the community. Empirical data also showed that the index of livelihood diversification is high among rural households involved in the agricultural sector. Households involved in the non-agricultural sector with high income levels tend to diversify less (Swargiary and Mahanta, 2020).

Furthermore, most of the rural households diversify due to the seasonal nature of agricultural activities. A large share of household income appears to come from nonfarm occupations. In rural areas of southern Assam, diversification of nonfarm activities plays a crucial role along with agricultural activities. The composition of household income is greatly influenced by the level of education of the family members.

Therefore, to empower the rural poor through nonfarm diversification, the spread of education is quite inevitable (Dey et.al, 2013).

Shifting cultivation is the main sources of livelihood of the rural households living in the Hill Zone of Assam. However, Terrace and Wet paddy cultivation are also being practiced in some places of the three hill districts of Assam. Shifting cultivation is locally also known as the Jhum cultivation. Shifting cultivators are known as Jhumia .As per the Population Census of India, 2011 the undivided Karbi Anglong district has about fifty four thousand households that are involved in jhum cultivation. The slash and burning process require in Jhum cultivation have tremendous negative impact on the environment. However, despite of the government's continuous effort to control it the hill dwellers of Assam are still involved in this age old practice. The yield of traditional jhum cultivation is very low. Plantation of commercial crops like rubber, tea and bamboo could be profitable option to generate income and reduce poverty. Despite of the existence of this lucrative opportunity the Jhumias do not want to take the risk of livelihood failure by abandoning their traditional agricultural practice (Bos et.al., 2020).In addition to Jhum cultivation, the rural people of the Hill Zone of Assam also practice animal husbandry. Yet, livestock farming is not commercialized due to high production costs, limited resources, and lack of skills required for farming. Access to credit and adequate skill development training are necessary for the development of livestock farming in the hill districts of Assam (Sharma, 2016).

III. METHODOLOGY

The requisite primary data of the present study were collected during the period of July, 2023 to March, 2024. For the data collection multistage sampling technique is followed to reach at the household level information. The three hill districts of Assam viz., Dima Hasao, Karbi Anglong and West Karbi Anglong were purposively selected at the first stage. At the second stage one subdivision from each district were randomly selected. In the third stage one block was randomly selected from each subdivision. In the fourth stage three villages were selected from each block. Hence, the total number of sample villages is nine. Finally, more than 10 percent sample rural households were randomly selected from each village. The size of the sample was determined by using Taro Yamane's formula (Yamane, 1967).

The Yamane's formula is given by –

$$n = \frac{N}{1+N(e)^2}$$

Here, n = sample size

N = population size

e =level of precision

As per the Taro Yamane formula, at 5% precision level and 95 per cent confidence level the requisite sample size for the present study is 399.128. Approximately it will be 400 rural households. To overcome the sampling errors the present study has increased the sample size to 470.

IV.RESULTS

SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLE HOUSEHOLDS

The socio-economic characteristics of the sample households are depicted in the Table. 1. The total numbers of sample drawn are 100 households from Dima Hasao district, 185 from Karbi Anglong district and 185 from West Karbi Anglong district. In Dima Hasao the percentage of the male population are 49.76 percent, which is lower than the female population 50.24 percent. However, the sample population of Karbi Anglong district consist of 50.97 percent male population and remaining 49.03 percent are female population. Similarly, in the West Karbi Anglong district 55.78 percent are male population and remaining 44.22 percent are female population. The sex ratios of Dima Hasao and Karbi Anglong districts are higher than the state average of Assam i.e., 958 (Population Census of India, 2011). Whereas, the sex ratio of West Karbi Anglong is much lower than the state average. The caste composition of the sample households shows that in Dima Hasao 100 percent of the sample households belong to the Schedule Tribe (ST). Whereas in Karbi Anglong 97.30 percent households belong to Schedule Tribe (ST), 1.60 percent belong to the Other Backward Caste (OBC) and remaining 1.10 percent belong to the general category. In West Karbi Anglong district 98.9 percent of the sample households are Schedule Tribe (ST) population and remaining 1.1 percent of population are Schedule Caste (SC) population. The joint family is the dominant type of family structure in all the three sample districts. In Dima Hasao district 80 percent of the sample households live in joint family and remaining 20 percent households live in nuclear family. The proportion of the sample households of Karbi Anglong district living in joint family is 83.8 percent and remaining 16.2 percent are living in nuclear family. Similarly, in West Karbi Anglong the proportion of family living in joint family is 76.20 percent and nuclear family is 23.80 percent. The average family size of the Dima Hasao, Karbi Anglong and West Karbi Anglong are recorded as 4.12, 4.72 and 5.08 respectively. Again, in the study area the distribution of the sample population by the age group shows that the majority of the sample population is found in the age group of 15 to 64. The proportion of the population of this age group is 72.57 percent in Dima Hasao, 66.90 percent in Karbi Anglong and 63.78 percent in West Karbi Anglong respectively. The proportions of sample population in the age group 0 to 14 are 21.36 percent, 28.75 percent and 33.62 percent in Dima Hasao, Karbi Anglong and West Karbi Anglong respectively. So far as the dependency ratio is concerned it is highest in the West Karbi Anglong i.e., 56.78 percent followed by 49.49 percent and 37.79 percent in Karbi Anglong and Dima Hasao. The dependency ratio the Dima Hasao and Karbi Anglong district is found to be lower than the state average of Assam i.e., 51.6 percent. On the contrary the same is higher than the state average of Assam in case West Karbi Anglong district.

Table .1 : Socio-economic Characteristics of the Sample Households				
Description		**Dima Hasao**	**Karbi Anglong**	**West Karbi Anglong**
Total number of sample households		100	185	185
Number of sample populations	Male	205(49.76)	445(50.97)	516(55.78)
	Female	207(50.24)	428(49.03)	409(44.22)
	Total	412(100)	873(100)	925(100)
Sex ratio		1009.76	961.79	792.64
Distribution of the Sample households by caste	ST	100(100)	180(97.30)	183(98.9)
	SC	0(0.00)	0(0.00)	2(1.1)
	OBC	0(0.00)	3(1.60)	0(0.00)
	General	0(0.0)	2(1.10)	0(0.0)
Distribution of the sample household by type of family	Joint	80(80)	155(83.8)	141(76.20)
	Nuclear	20(20)	30(16.2)	44(23.80)
Average family size		4.12	4.72	5.08
Distribution of the sample population by age groups	0-14	88(21.36)	251(28.75)	311(33.62)
	15-64	299(72.57)	584(66.90)	590(63.78)
	65 +	25(6.07)	38(4.35)	24(2.60)
Dependency ratio		37.79%	49.49%	56.78%
***Source**:* Field survey (Figure in the parenthesis represents percentage)				

LEVEL OF EDUCATION

The distribution of the sample population by the level of education is shown in the Table. 2. The table reveals that in the study area overall 46.9 percent of the population has attained level of education in between primary to high school. Whereas, the same in Dima Hasao, Karbi Anglong and West Karbi Anglong district are 42.5 percent, 44.2 percent and 51.4 percent respectively. Again, the overall 22.7 percent of the sample population has attained education up to below primary level. The same is 28.6 percent in Dima Hasao, 27.5 percent in Karbi Anglong and 15.6 percent in West Karbi Anglong.

Similarly, overall 18.8 percent of the sample population is illiterate and the same is 7.8 percent, 18.3 percent and 24.1 percent respectively in Dima Hasao, Karbi Anglong and West Karbi Anglong district. Overall 11.1 percent of the sample population has attained educational level of HSLC to undergraduate level. In Dima Hasao, Karbi Anglong and West Karbi Anglong the proportion of it is 18.9 percent, 9.9 percent and 8.8 percent. However, overall only 0.5 percent of the sample population only has attained education level up to post graduation and above. In Dima Hasao, Karbi Anglong and West Karbi Anglong these proportions are 2.2 percent, 0.1 percent and 0.5 percent

Table.2 : Distribution of the Sample Population by the Level of Education					
District	**Illiterate**	**Below Primary Level**	**Primary to High School Level**	**HSLC to Undergraduate Level**	**Post Graduate and Above**
Dima Hasao	32 (7.8)	118 (28.6)	175 (42.5)	78 (18.9)	9 (2.2)
Karbi Anglong	160 (18.3)	240 (27.5)	386 (44.2)	86 (9.9)	1 (0.1)
West Karbi Anglong	223 (24.1)	144 (15.6)	475 (51.4)	81 (8.8)	2 (0.2)
Total	415 (18.8)	502 (22.7)	1036 (46.9)	245 (11.1)	12 (0.5)
Source: Field survey (Figure in the parenthesis represents percentage)					

LAND HOLDING PATTERN

In the study area the land ownership of cultivable land is divided into five viz., marginal holding (less than 1 hectare), small holding (1-2 hectares), semi-medium holding (2-4hectares), medium holding (4-10 hectares) and large holding (Above 10 hectares).

The distribution of the sample households on the basis of size of ownership holding of land is shown in Table. 3. The table reveals that in the study area overall 75.96 percent of sample households' cultivable land ownership holding belongs to the marginal category of land holding, followed by 18.30 percent small land holding, 5.32 percent semi-medium land holding, 0.42 percent marginal land holding pattern. However, the overall average size of land ownership holding is 0.79 hectares, which is lower than the state average of Assam i.e., 1.10 hectares (Government of India, 2016). However, no households were found in the large holding category.

Table.3 : Size of the Land Ownership Holding (In hectare)				
Category	**Dima Hasao**	**Karbi Anglong**	**West Karbi Anglong**	**Total**
Less than 1 (Marginal)	86(24.09)	134((37.54)	137(30.38)	357(75.96)
1-2 (Small)	41(47.67)	8(9.30)	37(43.02)	86(18.30)
2-4 (Semi-Medium)	6(24)	13(52)	6(24)	25(5.32)
4-10 (Medium)	0(0.00)	1(50)	1(50)	2(0.42)
Total	100(21.28)	185(39.36)	185(39.36)	470(100)
Average Land Holding	0.70	0.85	0.77	0.79
Source: Field survey (Figure in the parenthesis represents percentage)				

CROPPING PATTERN

The cropping pattern followed by the rural households of the study area is depicted in the Table 4. Rice is found to be the principal crop produced by the rural households of the Dima Hasao district. It is produced in the low lying area as well as through shifting cultivation. Along with rice, ginger, vegetables, maize, cereals, bamboo, agar, coffee, betel nut, betel leaf, pineapple, orange, vegetables, maize, coffee and spices are the crops grown in the high altitude of Dima Hasao district.

In Karbi Anglong district also rice is the major crop grown by the hill dwellers. Other crops like ginger, broom, rubber, bamboo, oilseeds, and vegetables are also being produced in the district. Similarly, in West Karbi Anglong, rice, ginger, broom and bamboo are the crops grown by the households of the surveyed villages. The modes of cultivation are jhum, terrace and settled cultivation.

Table 4: Cropping Pattern in the Study Area	
Name of the District	**Crops Grown**
Dima Hasao	Rice, ginger, vegetables, maize, cereals. bamboo, agar, coffee, betel nut, betel leaf, pineapple, orange , vegetables, maize, ginger, coffee, spices
Karbi Anglong	Rice, ginger, broom, rubber, bamboo, oilseeds, vegetables
West Karbi Anglong	Rice, bamboo, vegetables, bamboo
***Source**:* Field survey	

OCCUPATION WISE PATTERN OF LIVELIHOOD

In the study area the sample households are involved in different types of primary occupations such as agricultural & allied activities, agricultural labour, nonfarm wage earners, government services, private services, trade & commerce and handloom & handicrafts. The distribution of the sample population by the primary occupation is depicted in the Table.

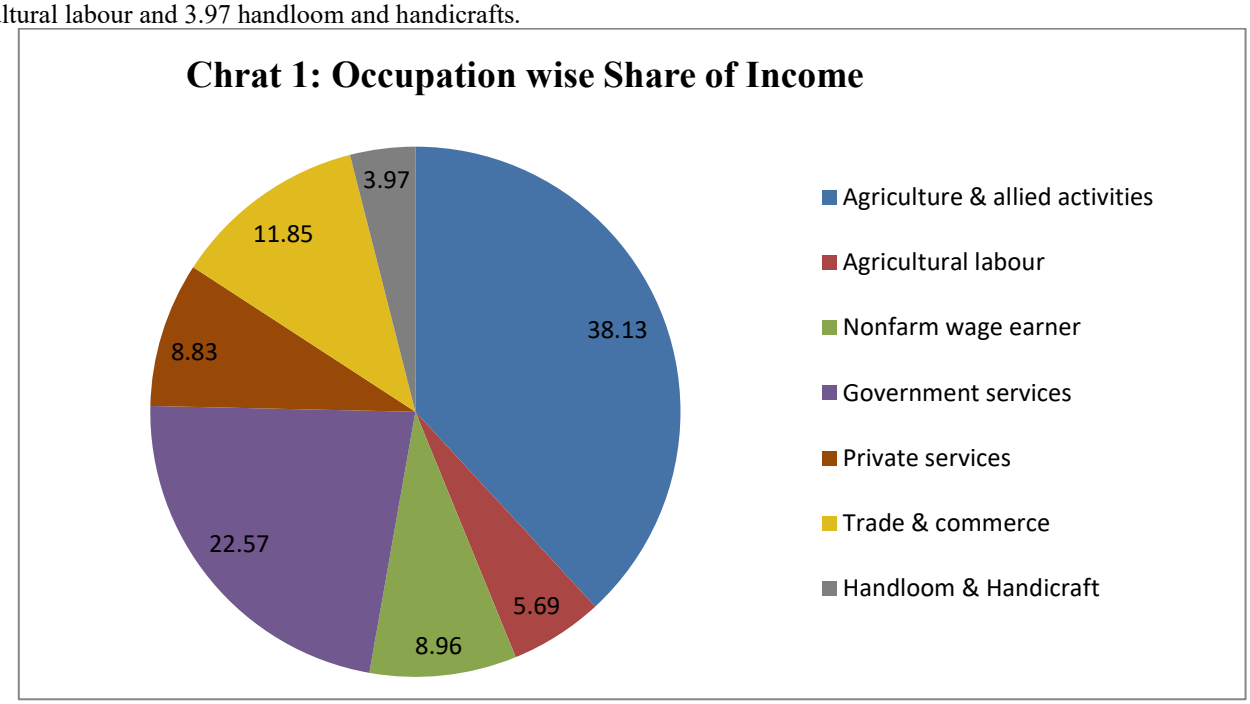
The table reveals that majority of the population is engaged in agricultural & allied activities i.e., 43.4 percent followed by 22.8 percent as nonfarm wage earner, 12.5 percent as agricultural labour, 8.4 percent in trade & commerce, 4.1 percent in government services and 4.1 percent in handloom & handicrafts.

Table. 5 : Distribution of the Sample Population by the Primary Occupation (In Percentage)	
Type of Occupation	**Share of Occupation**
Agriculture & allied activities	367(43.4)
Agricultural labour	106(12.5)
Nonfarm wage earner	193(22.8)
Government services	35(4.1)
Private services	39(4.6)
Trade & commerce	71(8.4)
Handloom & Handicraft	35(4.1)
Overall	846(100)
***Source**:* Field survey (Figure in the parenthesis represents percentage)	

OCCUPATION WISE COMPOSITION OF INCOME SHARE

The occupation wise composition of income share is presented in the chart 1 given below. The pie diagram is reflecting that the agriculture & allied activities is contributing highest income share of 38.13 percent followed by government services, which accounts 22.57 percent. Similarly, the income share of trade & commerce is 11.85 percent followed by 8.96 percent nonfarm

wage earner occupation, 8.83 percent private services, 5.69 agricultural labour and 3.97 handloom and handicrafts.



***Source*:** Field Survey

EXTENT OF LIVELIHOOD DIVERSIFICATION

To measure the extent of livelihood diversification different studies have used Simpson diversity index, Herfindahl index, Herfindahl- Hirchman Diversification Index (HDI), Entropy index, Modified entropy Index, Ogive index etc (Khatun and Roy,2016). For its simplicity and robustness the present study is using Simpson diversity index. The value of the index lies in between 0 and 1. The formula of the Simpson Diversity Index (SDI) is given below.

$$SDI = 1 - \sum_{i=1}^{N} P_i^2$$

P_i^2 is the proportionate share of each livelihood activity to the households overall income. The value of the Simpson Diversity Index lies in between 0 and 1. If the value SDI is 0 then it means complete concentration and if it is 1 then it indicates complete diversification. The other ranges of SDI are low diversification (.01-0.25), medium diversification (0.26-0.50), high diversification (0.51-0.75) and very high diversification (0.76-1.00). Diversity Index (SDI) in the study area is found to be 0.78. It indicates prevalence of very high livelihood diversification in the Hill Zone of Assam.

V. DISCUSSION

The major findings of the present study are-

- Sex Ratio: The study has found that the sex ratio of the Dima Hasao and Karbi Anglong district are higher than the state average of Assam. However, the sex ratio of the West Karbi Anglong district is much lower than the state average.
- Dependency Ratio: It is found that the dependency ratio of West Karbi Anglong it is higher than the state average of Assam.
- Level of Education: Distribution of the sample population by the level of education showed that only less number of population have attained higher level of education. Mass illiteracy is still prevalent in the Hill Zone of Assam.
- Occupation: Occupation wise distribution of the sample households reveals that the highest proportion of the rural households of the study area are involved in agricultural and allied activities. Hill dwellers of Assam are still practicing shifting cultivation, traditionally which is known as Jhum cultivation. The mode of cultivation adopted by them is very primitive and they lack modern method agricultural production.Moreover, hill dwellers are confronting many kind of constrains in agriculture production such as land slide, draught, crop failures, market failures etc.
- The extent of the Livelihood Diversification: The extent of livelihood diversification is found to be very high in the study area. It indicates that households' income is generated from diverse sources of occupation though majority of the population are involved in agricultural & allied activities.

VI. CONCLUSIONS

Based on the key findings of the present study conclusion can be made with the help of the following suggestion for the improvement of the demographic, socio-economic and livelihood scenario in the Hill Zone of Assam.

- The sex ratio of the West Karbi Anglong district is low as compared to the other two hill districts as well as the state average of Assam. Therefore the government and policy makers should take adequate steps in this regard.
- Higher rate of dependency ratio is also seen in the West Karbi Anglong district. It requires better support network to investment in education & skill development and investment in health & wellness programs for the betterment of the dependent population of the district.

- Mass illiteracy is seen in all the three hill district of Assam. The Government and Non Profit Organisations should take adequate steps to address the problem of mass illiteracy by improving access to education, community engagement and providing teachers & resources under the aegis National Education Policy.
- Subsistence agriculture is the main occupation of the majority of the hill dwellers of Assam. To make hill agriculture more productive and resilient strategies for the development of infrastructure, crops & livestock, soil water conservation, capacity building & extension services, market access & value chain, integrated farming along with climate change mitigation plan should be encouraged.
- In the study area the rural households are engaged in diverse range of occupations and the livelihood diversification rate is also very high.
  Despite of this fact the share of income generated from each and every occupation is not equal and satisfactory. For increasing the share of income from all the occupations the policymakers should come out with different plans and programmes incorporating both the farm and nonfarm sources of livelihood.

VII. LIMITATIONS AND FUTURE RESEARCH

The present study is not free from limitations. One of the most important limitations of the study is unavailability of recent factual data relating to income, occupation, ownership of land & livestock holding etc. Specially, there is paucity of particular data relating to the newly formed West Karbi Anglong district. However, another challenge was faced while collecting data from uneducated respondents of the study area. Most of the sample households are living in the remote areas and speak only their mother tongue. Lack of language proficiency among the respondents creates errors that arise from improper responses and partially filled interview schedules. Yet, one more fundamental limitation of the study is the challenge faced in collection of data in the remote areas due to the poor road connectivity.

Despite of all these limitations the present study makes a humble attempt to examine the socio-economic characteristics, pattern & extent of rural livelihood diversification of the Hill Zone of Assam. Though the findings of the present study qualify the general understanding of these dimensions,

it is expected that the socio economic characteristics considered in the study will provide a basis for the future research. Government and policy makers should take initiative for the holistic development of the hill dwellers of Assam. Special focus should be given on the improvement of the traditional agricultural practices, attainment of higher level of education, and improvement of employment & income scenario of the Hill Zone of Assam.

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