



## **The Study of Land Use and Cropping Patterns in Undivided Sivasagar District, Assam**

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### **ABSTRACT :**

*Agriculture is one of the most important economic sectors in India. It is still the largest contributor to the GDP and plays a vital role in the socio- economic development in India. Agriculture is the primary sector of our country. It is giving livelihood and employment opportunity for largest rural population of India. Agriculture accounts for 19.9% of India GDP (2019-20). Agriculture land use pattern is mainly depends on the land availability, type of land, soil type, water availability etc. Land use pattern and cropping pattern differ from one region to another region. The present study analyzes the land use pattern and cropping pattern in Sivasagar district (undivided) of Assam. Agriculture is considered the backbone of rural economy of the Sivasagar district and it's played an important role in the socio- economic development of the district. The study based on secondary data. Data were analyzed using statistical method like location coefficient, Simpson diversity index, growth rate etc. The land use pattern of Sivasagar district during 2019-20, indicated that more than 50 percent of total land area covered by total cropped area. Cropping pattern of the district is that food grains occupy more than 90% cropping area. Rice is the staple crop of the study area. The cropping diversity of the Sivasagar District very less because mono- cropping system is practiced in all over the people of the study area. In the Sapekhati revenue circle cropping diversity occurs highest and Nazira revenue circle occur least cropping diversity. The present study observed that still agriculture output is not seen quite satisfied. So, a systematic and scientific research is required to proper utilization of land and agriculture of the district.*

**Keywords:** Cropping diversity index, Cropping patterns, Land use, Location coefficient.

### **I. Introduction:**

Systematic land utilization is essential for proper development of a region. Land use is the utilization of surface land for various purposes at a particular point of time. For example forest land, fallow land, agricultural land. Land use is a dynamic concept. It changes with time and space. Land use pattern showing the distribution of total geographical area of a particular area or region into its various uses. Various factors affect the land use pattern of a region. Such factors are physical, historical, social and economic factors. "In densely populated regions,



land becomes a scarce commodity presenting a complex problem of supply and demand” (Das M M, 2012). Cropping pattern is the central element of land use. Land use pattern of an area has a significant impact on the cropping pattern of that area. In rural areas land is mainly used for agricultural activity. This is called agricultural land use. In those areas, where population increases rapidly in that area, agricultural land has decreased significantly. Cropping pattern means the amount of area under various crops at a particular point of time. It changes over time and place.

The present study is carried out in undivided Sivasagar district, which includes the former Charaideo sub-division presently, Charaideo district. Sivasagar district is one of the agrarian districts of Assam. Agriculture has an appreciable impact on the economy of the Sivasagar district. Land use pattern of the district has very dynamics. Rapidly increasing population and various governmental development projects have a significant impact on the land use pattern of the district. Cropping intensity of the Sivasagar district is much lower than state cropping intensity. In the year 2018-19, cropping intensity in Sivasagar district was 113.80 %, whereas overall Assam’s cropping intensity was 147.03 %. It is observed that still agricultural output is not seen quite satisfactory. A systematic and scientific research is required to proper utilization of land and agriculture of the district.

## **II. Study Area:**

Sivasagar district (undivided) is one of the North-Eastern districts of Assam and located between 94°25' and 95°25' East longitude and 21°45' and 27°15 North latitude. The district is situated 363 km East of Guwahati (The capital of Assam). Sivasagar district falls within upper Brahmaputra valley of agro-climatic zone of Assam. The district is bounded by Brahmaputra River in North, Dibrugarh district in East, Arunachal Pradesh and Nagaland in South, Jorhat district in West. The entire district is divided into three sub-divisions (Sivasagar, Nazira, Charaideo) and seven revenue circles.

### Location Map Of Study Area Under Assam State Boundary

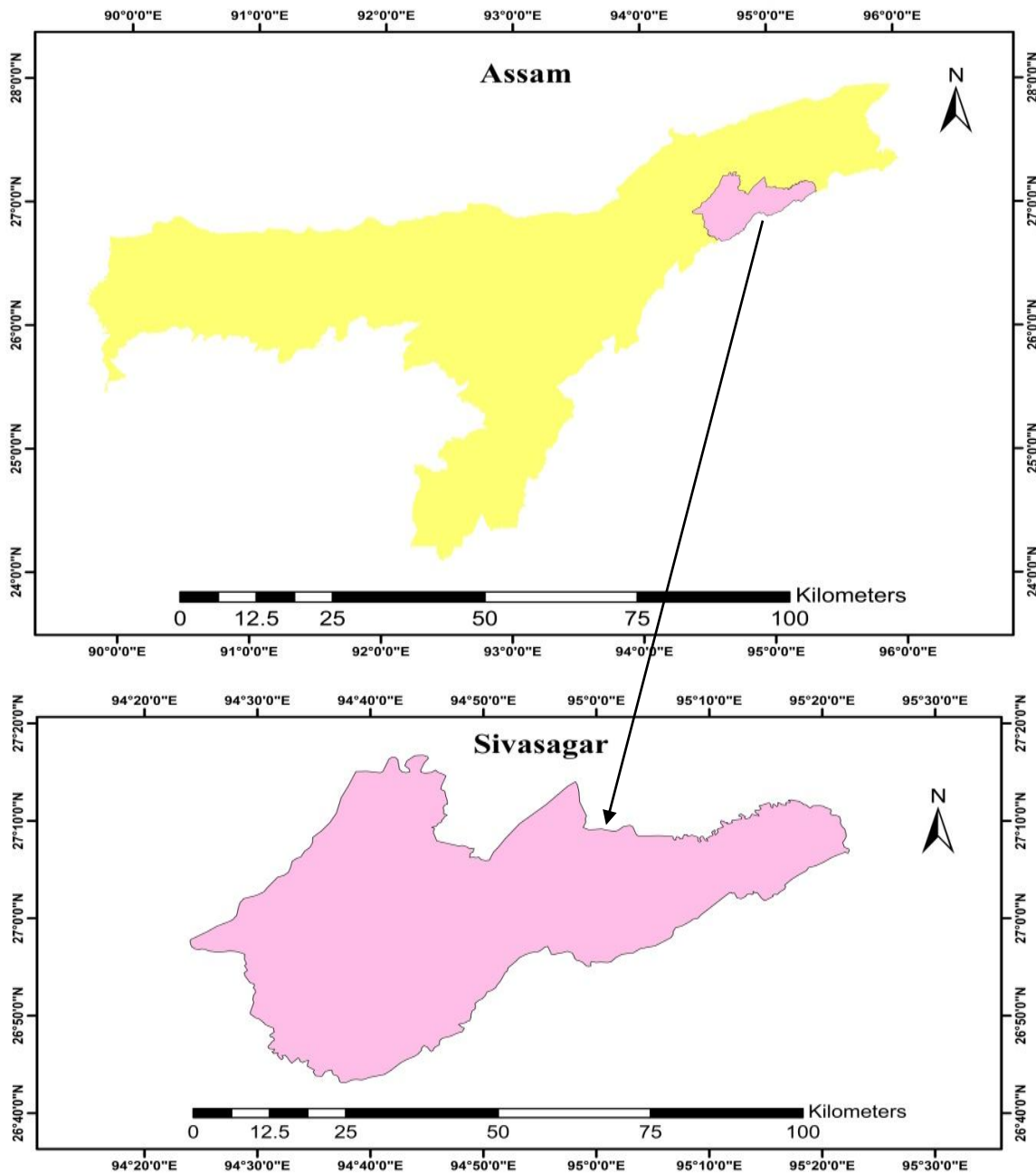


Figure 1: Location map of the study area

### III. Objectives:

The following are the principal objectives of this paper:

- a. To analyze the land use pattern and changes of land use pattern in district.



- b. To analyze the cropping pattern in district.
- c. To find out the crop diversity in district.

#### **IV. Methodology:**

The study is carried out with the help of secondary data. Secondary data are collected from following sources: Statistical handbook of Assam 2011 and 2020; Sivasagar district land use report of 2019-20.

The following methods are used to show analyze:

i. Growth rate:  $(\text{current year} - \text{base year}) / \text{base year} \times 100$ . Growth rate are calculated in Ms Excel.

ii. Location coefficient:  $X / Y$

Where,

X means

Area of crop X in the district

Area of all crops in the district

Y means

Area of crop X in the state

Area of all crops in the state

A higher value for location coefficient for a district indicates the higher concentration of that particular category of land in that district. It is useful to identify the pattern of distribution of the given category of lands across different regions of a state or district (Deka N et al, 2018).

iii. Simpson diversity index: This index is use to measure the cropping diversity in the study area and calculated as follows:

$$DI = 1 - \sum P_i^2$$

Where,

$P_i$  = Proportionate area of the  $i^{\text{th}}$  crop in the Gross cropped area

$i = 1, 2, 3, 4, \dots, n$  is the number of crops

#### **V. Results and Discussion:**

##### **Land use pattern in Sivasagar district:**

“For proper utilization of land resources, a scientific classification of the total land of a country or of a state must be made. The Government of India adopted a classification of land use in



1950 in the line with the recommendation of the Standing Advisory Committee on Statistics, F.A.O. According to this classification, land in Assam is classified under nine categories, viz., i) Forest, ii) Barren and uncultivable lands, iii) Lands put to non-agricultural uses, iv) Cultivable waste lands, v) Permanent pastures and grazing lands, vi) Lands under miscellaneous tree crops and groves, vii) Current fallows, viii) Fallow lands other than current fallows, and ix) Net area sown.” (Das M M, 2012).

Table 1 highlights the land utilization in the Sivasagar district in the year of 2019-20. Total forest area covered 11.42 percent of the total geographical area. This figure is not better than other various other districts of Assam like Kamrup rural, Dhemaji, Tinsukia, Golaghat, Goalpara, Nagaon etc. Area under non agricultural uses covered 13.87 percent of the total geographical area. Barren & uncultivable land, Permanent pastures & other grazing land, Land under miscellaneous tree groves etc., cultivable waste land, fallow land other than current fallow, current fallow covered below six percent of the total geographical area. Total cropped area covered 55.50 percent of the total geographical area. This figure indicates the Sivasagar district is one of the agrarian districts of Assam.

Table 1: Land use pattern in the Sivasagar district, 2019-20

Particulars		Area	Percentage
Total geographical area according to	Professional area	266800	
	Village papers	266800	
Forest		30465	11.42
Not available for cultivation	Area under non agricultural uses	36998	13.87
	Barren & uncultivable land	12454	4.67
Other uncultivated excluding fallow land	Permanent Pastures & other grazing land	14514	5.44
	Land under Miscellaneous tree groves	13523	5.07
	Cultivable waste land	6293	2.36
Fallow land	Fallow land other than current fallow	6294	2.36
	Current fallow	11401	4.27
Net area sown		134858	50.55
Total cropped area		148081	55.50
Area sown more than once		13223	4.96

Table 2 presents the changes of land use pattern in Sivasagar district from 2010-11 to 2019-20. During the period of 2010-11 to 2019-20 forest area remained the same. Area under non-



agricultural uses has decreased. On the other hand, barren & uncultivable land, Permanent pastures & other grazing land has increased. Cultivable waste land, fallow lands have increased significantly. It indicates that such lands (cultivable waste land, fallow land) are future potentiality of uses of non agricultural purposes. It is also pointed out that, if adequate facilities are provided in such lands, it will be suitable for agricultural uses. Net area sown has slightly decreased during the period of 2010-11 to 2019-20. Total cropped area almost remained the same. On the other hand, area sown more than once has increased significantly. It means pressure of population increase on agricultural land or increase the pressure of non agricultural activities on agricultural land. That's why; net sown area more than once has increased during 2010-11 to 2019-20. From the above analysis, it is clear that pressure of non agricultural activity increases on agricultural land.

Table 2: Changes of land use pattern in Sivasagar district

Particulars	2010-11	2019-20	Increase/	Growth rate
Forest	30465	30465	0	0
Area under non	48815	36998	-11817	-24.2
Barren & uncultivable	7336	12454	5118	69.8
Permanent Pastures &	7330	14514	7184	98.0
Land under	20061	13523	-6538	-32.6
Cultivable waste land	1820	6293	4473	245.8
Fallow land other than	2931	6294	3363	114.7
Current fallow	4710	11401	6691	142.1
Net area sown	136822	134858	-1964	-1.4
Total cropped area	146734	148081	1347	0.9
Area sown more than	9912	13223	3311	33.4

Source: Land utilization Statistics, Directorate of Economics and Statistics, Assam

The location coefficient provided the information about dynamics of distribution of different categories of land in Sivasagar district. Table 3 indicates that the highest concentration of land was found in Assam for land under Current fallow (2.87), followed by Permanent & pastures other grazing land (2.47), fallow land other than current fallow (1.87), Land under Miscellaneous tree groves etc. (1.81), Net area sown (1.47), Cultivable waste land



(1.15), Total cropped area (1.10), Area under non-agricultural uses (0.83), Forest (0.48), and Area sown more than once (0.30).

Table 3: Dynamics of distribution of different categories of land in Sivasagar, 2019-20

Particulars	Sivasagar	Assam	Location coefficient
Geographical Area	266800	7843800	
Forest	30465	1852695	0.48
Area under non - agricultural uses	36998	1304952	0.83
Barren & Uncultivable land	12454	1217177	0.30
Permanent & pastures Other grazing land	14514	172718	2.47
Land under Miscellaneous tree groves etc.	13523	219349	1.81
cultivable waste land	6293	160937	1.15
Fallow land other than current fallow	6294	99152	1.87
Current fallow	11401	117353	2.86
Net area sown	134858	2699467	1.47
Total cropped area	148081	3974812	1.10
Area sown more than once	13223	1275345	0.30

Source: Land utilization Statistics, Directorate of Economics and Statistics, Assam

### **Cropping Patterns in Sivasagar District:**

Cropping pattern means proportion of area under different crops at a particular time. Cropping patterns provide a general scenario of agriculture in an area. ‘The cropping pattern of a region has important implications for its agricultural growth in general and livelihood of millions of farmers.’ (Mandal & Bezbaruah, 2013). The chief characteristics of cropping pattern in Sivasagar district is that food grains occupy more than 90 percent cropping area of the selected total cropped area. Among food grains, rice is the principal food grain crop in Sivasagar district. Rice is the staple food of the people of Sivasagar district and Assam. Generally three varieties of rice are grown in Sivasagar district and Assam. They are autumn rice, winter rice, and summer rice. But, except winter rice, very little quantity autumn rice and summer rice are grown in Sivasagar district. Winter rice occupies more than 90 percent of the total rice cultivation area. Maize, wheat, fiber crops are cultivated in very low quantities in the study area. Oilseeds are cultivated in moderate quantities. Cultivation area of some other commercial crops like pulses, sugarcane, potato, onion, ginger, turmeric, black pepper etc are not as much as rice cultivation. It indicates a generally substantive type of agriculture practices



in most of the parts in the study area. Table 4 highlights the details about cropping pattern of some selected crops, changes of cropping pattern and growth rate in the study area.

Table 4: Cropping pattern in Sivasagar district

Name of the crops		2010-11		2019-20		Increase or Decrease in	Growth Rate From 2010-11 to 2019-20
		Area	% to	Area	% to		
Cereals	Autumn	201	0.2	252	0.23	51	25.37
	Winter	94342	95.0	101071	92.59	6729	7.13
	Summer	53	0.1	649	0.59	596	1124.53
	Total Rice	94596	95.24	101972	93.42	7376	7.80
	Maize	72	0.07	47	0.04	-25	-34.72
	Wheat	65	0.07	3	0.003	-62	-95.38
	Other	2	0.002	3	0.003	1	50.00
	Total	94735	95.38	102025	93.47	7290	7.70
Pulses	Gram	3	0.003	0	0	-3	-100.00
	Tur	63	0.06	179	0.16	116	184.13
	Mug	39	0.04	137	0.13	98	251.28
	Masur	22	0.02	196	0.18	174	790.91
	Matikalai	280	0.28	734	0.67	454	162.14
	Peas	212	0.21	965	0.88	753	355.19
	Other	104	0.10	101	0.09	-3	-2.88
	Total	723	0.73	2312	2	1589	219.78
Total Food Grains		95458	96.11	104337	95.58	8879	9.30
Fiber Crops	Jute	38	0.04	17	0.02	-21	-55.26
	Mesta	0	0	4	0.004	4	100.00
	Cotton	4	0.004	0	0	-4	-100.00
	Total	42	0.04	21	0.02	-21	-50.00
Other Principal Crops	Oilseeds	1264	1.27	2016	1.85	752	59.49
	Sugarcane	92	0.09	121	0.11	29	31.52
	Potato	1028	1.03	848	0.78	-180	-17.51
	Onion	60	0.06	80	0.07	20	33.33
	Chilies	142	0.14	224	0.21	82	57.75
	Sweet	99	0.10	80	0.07	-19	-19.19
	Ginger	182	0.18	150	0.14	-32	-17.58
	Turmeric	242	0.24	285	0.26	43	17.77
	Papaya	157	0.16	209	0.19	52	33.12
	Black	55	0.06	98	0.09	43	78.18
	Coconut	503	0.51	688	0.63	185	36.78
	Tobacco	1	0.001	0	0	-1	-100.00
Total cropped area		99325	100	109157	100	9832	9.90

Source: Land use report, Deputy Director of Economics and Statistics, Sivasagar

**Cropping diversity in the study area:**



Table 5 indicates the revenue circle wise cropping diversity in the study area, 2019-20. Overall crop diversity in the district is very less. Crop specialization is more than crop diversity in the study area. Because, mono - cropping is practiced in the study area. In Sapekhathi revenue circle cropping diversity is highest followed by Sivasagar and Demow revenue circle, Mahmora revenue circle, Amguri revenue circle, Sonari revenue circle, and Nazira revenue circle.

Table 5: Revenue circle wise cropping diversity in the study area

Revenue circle	Cropping diversity index
Sivasagar	0.24
Amguri	0.21
Nazira	0.14
Demow	0.24
Mahmora	0.23
Sonari	0.16
Sapekhathi	0.25

Source: Computed by Authors

## VI. Findings:

- The study area is agricultural dominated. More than 50 percent of the total geographical area is occupied by total cropped area. It indicates that the economy of the Sivasagar district is mainly dependent on agriculture.
- The positive growth of cultivable waste land and fallow land has future potential of using various non agricultural purposes like built up area, use of commercial purposes etc. On the other hand, it has scope for cultivation, if adequate facilities are provided in this land.
- Area sown more than once has increased during the study period in Sivasagar district. It indicates that due to mainly pressure of population or pressure of non agricultural works on agricultural land, area sown more than once has increased.
- Further it was observed there has been higher concentration for land under current fallow and permanent pastures & other grazing land in Sivasagar district for the year of 2019-20.
- In the study area, traditional mono cropping method practices widely.



- Food grains are the most prominent crop in the district. Among food grains, winter rice is the principal crop in Sivasagar district. But cultivation of pulses, wheat, and maize are not uniform and cultivated in very low amounts.
- Fiber crops and other some principal crops like onion, potato, sugarcane, oil seeds, sweet potato, black pepper etc are much less popular than food grains cultivation and not uniformly cultivated.
- From the cropping pattern analysis, it is abundantly clear that there is little commercialization of agriculture in Sivasagar district.
- From the crop diversity index, it is clear that crop specialization is high throughout the district. Very little diversity occurs among all revenue circles in Sivasagar district. Highest diversity occurs in Sapekhati revenue circle and least diversity occurs in Nazira revenue circle.

## **VII. Conclusion:**

- Scientific and systematic land use policy should be implemented in the study area. Pressure of population on agricultural land has increased. It further raises food crises in the study area. That's why it needs scientific and systematic land use policy in the study area.
- Some general awareness programmes about cultivation should be regularly conducted to familiarize with scientific agricultural methods and various cropping pattern concepts like mono cropping, double copping, mixed cropping etc.
- Government should focus on mechanization of agriculture in the study area. Use of machines in agriculture is not popular yet in most parts of the district. Without the use of proper scientific machines in agriculture there is no chance for development of agriculture as much as.
- Government should be implementing some systematic projects or schemes that are helpful for commercialization of agriculture in the study area. Still subsistence type agriculture is widely practiced in the study area.
- Some further broad level research is required to more deeply concern the tropic.

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