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Change in Land use and Growth in the Area of Selected Crops in Bodoland Territorial Area District (BTAD)

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ABSTRACT

Background: To examine the change in land use pattern, growth trends of area of selected crops and crop diversification of BTAD from 2014-15 to 2022-23.

Methods: Data were collected from the Joint Directorate of Economics and Statistics of BTC and Directorate of Economics and Statistics, Assam. The study used percentage, Compound Annual Growth Rate (CAGR), Simpson Diversity Index and tabular.

Result: Non-agricultural land raised by 6.88 per cent, while barren land increased by 1.92 per cent. Permanent pasture declined by 13.23 per cent, but tree crop area grew by 5.96 per cent. Fallow land expanded sharply general fallow by 35.19 per cent and current fallow by 21.25 per cent. The net sown area fell by 4.78 per cent and land sown more than once dropped by 27.01 per cent, leading to an overall 11.97 per cent decline in cropped area. This shows reduced crop intensity and negative growth in multiple cropping. There has been a sharp decline in food crops, with autumn rice (-2.32) and summer rice (-2.32) falling, while winter rice (1.08) grew steadily. Plantation crops such as tea, areca nut and banana raised by 8.2 per cent, 5.66 per cent and 1.85 per cent respectively. Horticulture crops also expanded kharif vegetables by 3.7 per cent, rabi vegetables by 7.6 per cent, onion by 4.1 per cent, garlic by 2.5 per cent and chilli by 2.43 per cent. The Simpson Diversity Index fell from 0.57 in 2014-15 to 0.32 in 2022-23, showing a sharp decline in diversity. Thus, there has been growth in all the selected crops except summer rice and autumn rice. But the growth in all the selected crops was not support the result of crop diversification.

Key words: Crop diversification, Growth of area, Land use pattern, Selected crops.

INTRODUCTION

One of the most crucial components of production is land, which is the earth's solid surface. Humans use it for a variety of things, including infrastructure, industry, housing, recreation and agriculture. Using land for agriculture is especially important because it produces food and provides raw materials like cotton and sugarcane for industries. Farming boosts the nation's economy, generates jobs and aids in the development of rural communities. However, since land is a scarce factor of production, single cultivation on a small amount of land cannot satisfy the expanding demands of the population. Therefore, enhancing land productivity and boosting economic benefits depend heavily on land-use patterns and management techniques. Crop diversification is the key to increasing agricultural productivity and people's economic well-being. Crop diversification improves food security and allows farmers to produce marketable surpluses, helping them earn higher incomes to meet household needs (Khanam *et al*., 2018). According to Basantaray *et al*. (2024), farm income is strongly and favorably impacted by crop diversification. The most significant land-use category from an agricultural standpoint is land that can be cultivated. Therefore, the purpose of this study is to investigate the land-use pattern and crop diversity in BTAD.

MATERIALS AND METHODS

The present study is based on secondary data, subject to availability. Data were collected from the Joint Director of Statistical Handbook of BTC (Bodoland Territorial Council), the Statistical Handbook of Assam, relevant journals and websites. Various crops were selected to examine the land use pattern and changes in the cropping pattern of BTAD between 2014-15 and 2022-23. Autumn rice, winter rice and summer rice were selected as food crops; tea, areca nut and banana as plantation crops and kharif vegetables, rabi vegetables, onion, garlic and chilli as horticultural crops and mostly use crops. The area under these selected crops was taken as the variable factor.

Selection of study area

The study has been conducted in BTAD which was formed on 10th February 2003 which consists four districts namely, Kokrajhar, Chirang, Baksa and Udalguri. The autonomous council was carved out of the seven existing district, Kokrajhar, Berpeta, Kamrup, Darrang, Sonitpur, Bongaigaon and Nalbari. Total geographical area of BTC was 8970

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squares kilometers. The economy of BTC largely depends on agricultural sectors, other allied activities and small scale industries like household industries, fisheries, livestock, *etc*. About more than 73.17 per cent population of BTAD depends on agriculture for their livelihood. As majority of population depends on agriculture for their livelihood, better utilization of land improve the economic condition of population of BTAD. The study shows the land utilization of BTAD.

Periods of study

The period of study was considered as per the availability of data. The land use pattern and crop diversification in BTAD were estimated for the period from 2014-15 to 2022-23.

Methodology

To analyze use of land, growth trends of area of various crops and Crop diversification of BTAD from 2014-15 to 2022-23, Percentage method, Compound Annual Growth Rate, Simpson Diversity Index methods have been used.

1. The percentage method has been used to measure changes in the classification of land area, which helps to determine the growth rate of different types of land use.
2. Compound annual growth rate (CAGR).

CAGR provides a simplified measure of the average annual growth of an investment, business, production or any other variable over a specified period, assuming consistent growth each year. It is a valuable tool for investors, entrepreneurs and producers to assess the potential returns or performance trends by indicating the average annual rate of increase or decrease. In this study, CAGR was employed to analyze the percentage change both growth and decline across the selected parameter namely, area of selected crops over the study period The following is the formula of CAGR -

$$CAGR\ (t_0,t_n) = V(t_n) / V(t_0)\ \frac{1}{t_n - t_0} - 1 \times 100$$

Where

$V(t_0)$ = Beginning value of growth of area of selected crops (*i.e.* 2014-15).

$V(t_n)$ = Final value of growth of area of selected crops (*i.e.* 2022-23).

$t_n - t_0$ = Number of years.

Simpson diversity index

In the given study, Simpson Diversity Index was used to measure the extent of diversity and was calculated as follows:

$$DI = 1 - \Sigma P^2_i$$

Where

P= Proportionate area of the i^{th} crop in the gross cropped area.

I = 1,2,3, ……, n is the number of crops

The index ranges between 0 to 1. If there is specialization then the index moves towards zero. In other words for $\Sigma P^2_i = 1$, there will be complete specialization.

RESULTS AND DISCUSSION

Land use pattern of BTAD of 2014-15 and 2022-23

Land is the most important input for agricultural production and its supply is inelastic. Growing population density cause a steady increase in the amount of land used for both agricultural and non-agricultural purposes. As a result, there is currently very little space for expanding the net area under cultivation. Therefore, the main strategy for attaining greater agricultural growth must be more intensive use of the land area under cultivation. The land use pattern of BTAD across different land categories is shown in Table 1.

Between 2014-15 and 2022-23, the land use pattern shows a clear transformation, reflecting both development pressures and challenges in agriculture. The area under non-agricultural use increased by 6.88 per cent, indicating conversion of farmland for urban growth and infrastructure, while barren and uncultivable land rose slightly by 1.92 per cent. Permanent pasture and grazing land declined sharply by 13.23 per cent, reducing the traditional base for livestock rearing. In contrast, land under miscellaneous tree crops grew by 5.96 per cent, showing a shift towards plantation-based use, while cultivable waste decreased marginally by 3.25 per cent. Fallow lands expanded significantly, with general fallow rising by 35.19 per cent and current fallow by 21.25 per cent. The net area sown declined by -4.78 per cent and the area sown more than once fell steeply by -27.01 per cent, leading to an overall reduction of -11.97 per cent in total cropped area. This indicates declining crop intensity and shrinking agricultural activity. The findings of the study reveal that there has been negative growth rate in area sown more than once has negative growth rate which may be because of inadequate rainfall during off-monsoon season and scarcity of labour. The finding of the study was similar to the findings of Sreya and Vedhyavathi (2018). They found that Kerala's land is gradually moving from agriculture to non-agricultural activities and tree-crop plantations, while more land is becoming fallow or barren. Erratic rainfall and scarcity of labour affect the net sown area for which area under current fallow has increased. To increase the production and enhance farmer's income, it is necessary to discourage the rising tendency in current fallows or to bring current fallows under cultivation Ahmad *et al*. (2018).

Growth trends in area of selected crops in BTAD from 2014-15 to 2022-23

Table 2 shows that there has been a sharp decline in the area or share under food crops. Within this group, autumn rice (-2.32) and summer rice (-2.32) shows a decline, while winter rice (1.08) has grown. Winter rice is the most important food crop in the BTAD. Over the study periods, the area of winter rice showed consistent growth. The decline in rice, especially autumn rice and summer rice, may be due to inadequate rainfall and also inadequate irrigation facility. Gadad *et al*. (2017) found that except winter rice, summer rice and autumn rice require irrigation facilities

Table 1: Land use pattern of BTAD of 2014-15 and 2022-23.

Particulars	Land used pattern in 2014-15	Land used pattern in 2022-23	Percentage change in land used
Area under non-agricultural use	206945	222235	6.88
Barren and Uncultivable land	61681	62892	1.92
Permanent pasture and other grazing land	33621	29692	-13.23
Land under misc trees crops	24556	26113	5.96
Cultivate waste	13730	13297	-3.25
Fallow land	4936	7617	35.19
Current fallow	3331	4230	21.25
Net area sown	366427	349707	-4.78
Area sown more than once	212607	167387	-27.01
Total cropped area	579034	517094	-11.97

Source: Statistical handbook of Assam.
Calculate by author.

Table 2: Growth trends in area of selected crops in BTAD from 2014-15 to 2022-23.

Particulars	Food crop			Plantation			Horticulture				
	Autumn rice	Winter rice	Summer rice	Tea	Areca Nut	Banana	Kharif vegetable	Rabi vegetable	Onion	Garlic	Chilli
Cropping Pattern	-19.9	1.08	-2.32	8.28	10.13	1.85	5.94	8.97	3.97	0.35	2.43

Source: Statistical handbook of BTC.
Calculated by Author.

to cultivate. Gyari (2014) found that only farmers with access to natural waterways or who can afford artificial irrigation (bore wells, pump sets) were able to cultivate summer paddy. Talukdar and Beka (2005) found that high cost, low product price, land degradation, high cost of irrigation, prevailing market distortion and lack of short duration photo insensitive varieties have been identified as main constraints for summer rice cultivation in the non-traditional areas.

In plantation crops, tea 8.2, areca nut 5.66 and banana 1.85 showed good growth, benefiting from stable market demand and favourable agro-climatic conditions. Farmers shift from rice cultivation to plantation because rice cultivation requires more labour and low profit. The cultivation of modern cash crops has brought short term economic benefits, Paul (2024).

The annual growth rates of all selected horticulture crops are positive by kharif vegetables 3.7, rabi vegetables 7.6, onion 4.1, garlic 2.5 and chilli 2.43 respectively, this may be because of income earn from horticulture. Joshi *et al*. (2006) state that farmers who cultivate fruits and vegetables earn 40-60 per cent more income than cereal growers in India. Saediman *et al.* (2020) found from their study that the large difference in the net return was one reason for the crop shifting from rice to horticulture production.

Result of using simpson diversity index

Crop diversification indices of BTAD was estimated for the years of 2014-15 and 2022-23 (Table 3). Table 3 shows how the Simpson Diversity Index has changed between

Table 3: Result of using simpson diversity index.

Year	Simpson diversity index
2014-15	0.57
2022-23	0.32

Source: Statistical Handbook of BTC.
Calculated by Author.

2014-15 and 2022-23. In 2014-15, the index stood at 0.57, which reflects a moderate level of diversity. This means that land use or crop cultivation was spread across a wider variety of options, with no single type dominating heavily. By 2022-23, however, the index had fallen to 0.32. De and Bodosa (2014) state that the slow progress of irrigation did not help in crop diversity, particularly in off-monsoon season because crop diversification requires irrigation facility because rainfall is not adequate during off seasons.

CONCLUSION

The result of the study reveals that non-agricultural land use has shown a clear increase, accompanied by a rise in barren and uncultivable areas. At the same time, permanent pastures have declined noticeably, whereas the area under tree crops has grown. Fallow lands have expanded sharply, both in terms of general and current fallow, largely due to the high cost of cultivation, low profitability, soil degradation and limited irrigation facilities. The net sown area has decreased and land sown more than once has fallen substantially, resulting in a significant reduction in the overall cropped area. This point to reduced cropping

intensity and a negative trend in multiple cropping practices. Among food crops, autumn and summer rice have experienced a marked decline, though winter rice continues to expand steadily and remains the most important staple. In contrast, plantation crops such as tea, areca nut and banana and horticultural crops have also gained momentum, with vegetables, spices and other high-value crops showing notable growth. Both plantation and horticulture crops have performed well, reflecting a gradual shift by farmers from labour-intensive rice cultivation to more profitable and less demanding alternatives. This expansion is largely driven by the promise of higher income and better market opportunities. Overall, crop diversity has narrowed significantly over time. Whereas land use was more balanced in the earlier period, it has now become concentrated in fewer crops and categories, as reflected by the decline in the Simpson Diversity Index.

Suggestion

Since the decline in net sown area is linked to inadequate rainfall, labour shortage, soil degradation and poor irrigation access, expanding small-scale irrigation, repairing canals and promoting water-saving technologies would help farmers cultivate land more effectively. According to Brahma (2014), inadequate agricultural credit, inadequate irrigation facilities, fertilizers and slow farm mechanization are responsible for poor performance and development of agriculture in the BTAD. In addition to better extension services and training, government assistance in the form of subsidies for machinery, fertilizer and seeds is crucial to motivating farmers to use more land. Improving market access and ensuring fair price returns would boost farming's profitability, lessen the propensity to leave land uncultivated and eventually increase BTAD's net sown area.

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Author contribution

Conceptualization, methodology, data collection, formal analysis, writing-original draft preparation, writing: Papina Basumatary.

Conflict of interest

The author declares no conflict of interest.

REFERENCES

Ahmad, N., Sinha, D.K. and Singh, K.M. (2018). Changes in land use pattern and factors responsible for variation in current fallow land in Bihar, India. *Indian J.Agric.Res.* **52(3):** 236-242. doi: 10.18805/IJARe.A-4955.

Basantaray, A.K., Acharya, S. and Patra, T. (2024). Crop Diversification and Incomes of Agricultural Households in India: An Empirical Analysis. *Discover Agriculture.* https://doi.org/10.1007/s44279-02-00019-0.

Brahma, S. (2014). Agricultural Sector in BTAD: Challenges and Opportunities. *International Journal of All Research Education and Scientific Methods.* **2(6):** 2455-6211.

De, K.U. and Bodosa, K. (2014). Crop diversification in Assam and use of modern inputs under changing climatic condition. *Journal of Climatology and Weather Forecasting*. **2(2):** 1-14. doi: 10.4172/2332-2594.1000120.

Gadad, S.K., Gogoi, P.K. and Konwar, M.J. (2017). Growth parameters of autumn rice under various irrigation schedules and nutrient management. *Indian Journal of Agricultural Research.* **52(2):** 207-210. doi: 10.18805/IJARe.A-4875.

Gyari, P (2014). Irrigation difference and productivity variations in paddy cultivation: Field evidence from udalguri district of Assam. *Indian Journal of Agricultural Economics*. ResearchGate. https://www.researchgate.net.

Joshi, P.K., Gulati, A., Birthal, P.S. and Tewari, L. (2006). Agricultural diversification in south Asia: Pattern, determinants and policy implications. *Economic and Politically Weekly*. **41(52):** 2457-2463

Khanam, R., Bhaduri, D. and Nayak, A.K. (2018). Crop Diversification: An Important Way-out for Doubling Farmers' Income. *Indian Farming.* **68(01):** 31-32

Paul, R. (2024). Cultural shifts and agricultural transformation in Jamaldaha Mekhliganj of Cooch Behar: The Rajbanshi Perspective. *International Journal of Creative Research Thoughts.* 12(-3).

Saediman, H., Astuti, R.W., Alwi, L.O. and Mboe, I.S. (2020). Comparative profitability of small-scale rice and horticulture farming in south konawe district southeast sulawesi. International Conference on Agriculture, *Environment and Food Security*.

Sreya, B. and Vedhyavathi, A. (2018). Dynamic of land use pattern in Kerala- A temporal analysis. *Madras Agric. J.* **105(1-3):** 91-94. doi: 10.29321/MAJ.2018.000109.

Talukdar, K.C. and Beka, B.C. (2005). Cultivation of summer rice in the flood plains of assam - An assessment of economic potential on marginal and small farms. *Agricultural Economics Research Review.* **18(1).**