

How the Indigenous population concentration influenced by forest density: A village level study in Purulia district of West Bengal

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Abstract: This study has been concerned with the relation between the concentration of scheduled tribes population and forest density or areal coverage in Purulia district. Purulia district is located at the western edge of West Bengal where 10.21 per cent population belongs with scheduled tribe population. Tribal people have been preferred forest for everything. The statistical and cartographic method has been applied to examine the relationship between scheduled tribe population and forest concentration in Purulia district. 2459 numbers of villages have been considered to be sample in this study. The study found the relation between scheduled tribe population and forest cover is statistically significant. So, the study concluded that highest forest coverage villages have the higher percentage of scheduled tribe population than scheduled castes as well as others caste population.

Index Terms – Scheduled Tribe, Forest Area, Statistical method, Cartographic Method.

I. INTRODUCTION:

From the very beginning of the human civilization, mainly people used to live in the forest or jungle. Human civilization and habitat pattern changed over time. Some primitive people changed everything with time and adapted new culture, ideas, objects, lifestyle etc. but one group of people they could not change their culture and lifestyle etc. They spend their whole life within nature. They solely depend on nature for shelter, food, cloth and many more and protect the forest in return. These ethnic minor groups of people are known as Tribe. Anthropologist and Sociologist define Tribe in various aspects. W. J. Perry defines tribes as a group which is speaking 'common dialects' and living in a 'common territory' (Pathi, J., 1984). On the other hand, Majumdar added a new criterion that is tribal have 'common social taboos' (Srinivas, M.N., 1977). Bogardus defines tribes in terms of 'ties of blood relationship' and 'common religion' (Sinha, S., 1965). According to Kamaladevi Chattopadhyay, tribes also have 'cultural homogeneity' and 'unifying social organisation' (Bhatia, S.M., 1977). Govt. of India defines tribe based on some criteria that are using 'primitive traits', live at 'geographical isolated region', have 'distinct culture' and 'shy of contact with the community at large' as well as 'economically backward' (<http://vikaspedia.in/social-welfare/scheduled-tribes-welfare/ministry-of-tribal-welfare>).

8.6 per cent of scheduled tribe population occupied 15 per cent of the Geographical area in India (Census of India, 2011). There is a symbiosis relationship between forest and tribes. Tribal livelihood very much control by the forest. Forest resources not only influence their livelihood but also fulfill their day to day demand. Various spiritual, social, cultural and economic activities are directly connected to the forest. In this context the Committee on Forests and Tribal in India (1982) narrate that 'the tribal are forest dwellers as well as for quite a long time they have developed a lifestyle which, from one viewpoint, is woven around forest ecology and forest resources, then again, guarantees that the woodland is secured against the debasement by man and nature' by unique system. The higher tribal populated region has the highest portion of greenery than other regions which indicates the interrelationship between them because of higher dependency. Socially backward minor ethnic group that is tribe are not as such accomplishing with the modern era. Thus they not only prefer to forest for the living but also for the livelihood. On the other hand,

the forest is the common property of tribal people (Prasad, 2011) for this reason; they use it for their necessity and also nurture and protect the forest. There is an opposite approach may be explained briefly the communal right to the forest of tribal. As per the colonial and post-colonial forest law, tribal people are treated as ‘forest destructor and encroacher’. But the policymakers forcefully agreed their rights to the forest for their inseparable relationship by the forest act 2006 (Tripathi, P., 2016).

This study only deals with the relationship between tribe and forest area. Generally, the concentration of tribal population is higher in dense forest area. So this studies going to examine such kind of behaviour and distribution of tribal people in Purulia district. A village level analysis has been presented here to understand such kind of relation.

II. STUDY AREA:

For examine the relation between forest coverage and distribution of tribal population, researchers considered Purulia district as a study area. Purulia district located at the western edge of West Bengal (Fig. 1) where the proportion of scheduled tribe is remarkable as well as forest coverage. Total scheduled tribe population is 540652 persons according to Census of India, 2011 which constituent 10.21 per cent in respect of state total Scheduled tribe population. As per the concentration of scheduled tribe population, it occupies third place in state (Census of India, 2011). The total forest area is near about 876 Sq kms which constituents 14 per cent in respect of district total geographical area. Total 2459 numbers (excluding uninhabited) of villages are considered as a study unit to examine the relationship between concentration of tribes and forest density.

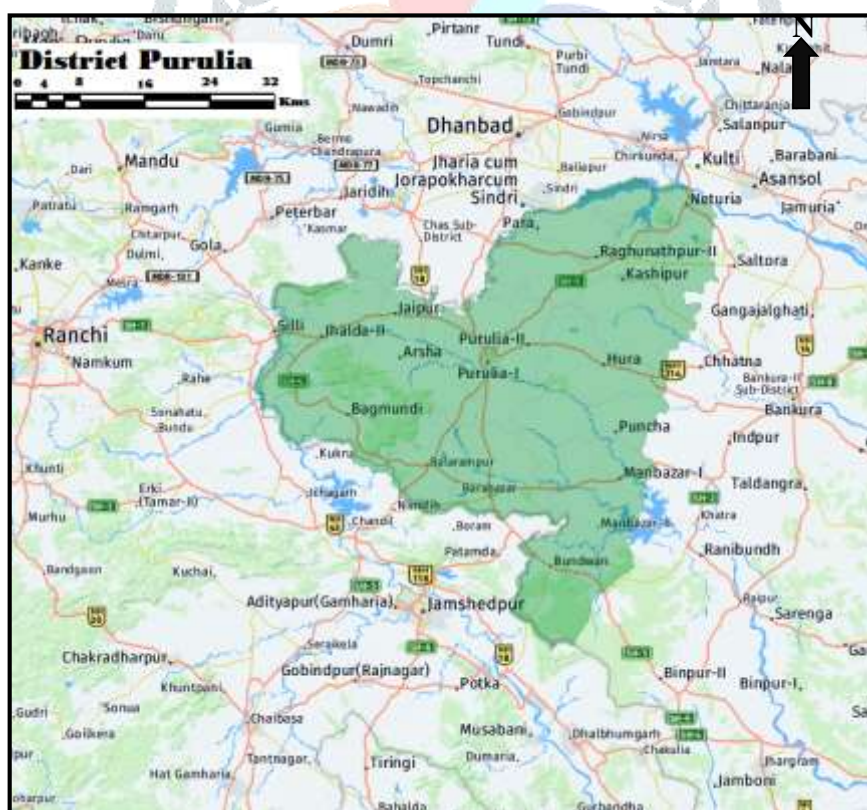


Figure 1: Location of the Study area (Source: Google Map)

III. OBJECTIVES:

Two specific objectives have been drawn for examine the relation between forest coverage and concentration of Scheduled tribe population.

- To represent the distribution of different caste groups in village level
- To analysis the relationship between Scheduled tribe population and forest coverage in Purulia district

IV. DATABASE AND METHODOLOGY:

In this study, data have been extracted from the District census handbook of Purulia, 2011. Two fold methodologies have been applied to establish the study. One is the simple statistical method which is using for calculation of percentage;

$$\text{A. Percentage of Scheduled caste population} = \frac{\text{SC population of village}}{\text{Total population of village}} \times 100$$

$$\text{B. Percentage of Scheduled tribe population} = \frac{\text{ST population of village}}{\text{Total population of village}} \times 100$$

$$\text{C. Percentage of other castes population} = \frac{\text{other castes population of village}}{\text{Total population of village}} \times 100$$

$$\text{D. Percentage of Forest coverage} = \frac{\text{Total forest area}}{\text{Total geographical area}} \times 100$$

And standard regression analysis has been applied to examine the relationship between the concentration and population growth of scheduled caste population and forest coverage. Statistical analysis has been performed in SPSS. Another one is a cartographic method. Mapping has been performed in a GIS environment.

V. CASTE DISTRIBUTION:

In this section, spatial distributions of different caste population have been discussed. Scheduled caste, scheduled tribe and others caste (General and OBC) are considered for discussion in this study.

VI. SCHEDULED CASTE:

The distribution of the SC population is positively skewed in nature over the space. The maximum number of SC population is found in Para village of Para block that is 5194 persons. An average number of SC population is 199 persons in this study area. 1712 numbers of villages have less than average SC population. From figure 2, the study found less than 20 percent SC population concentrated in 1694 number of villages which occupied 67.89 per cent geographical area as well as 64.05 per cent household. Out of 1694 numbers of villages, 740 numbers of villages have no SC population. 376 numbers of villages have 20- 40 per cent SC population while 40-60 per cent population concentrated in 196 numbers of villages. Greater than 80 per cent population occupied 101 numbers of villages which spread over on 1.63 per cent geographical area and also covered 1.45 per cent household. Average density is 1 person per hectares. Only five numbers of villages have more than 25 persons per hectares SC population that is Dayaramdi, Maldi (Para block), Kahalpara (Manbazar-I block), Noagarh (Puncha block) and Kuthibari (Neturia). SC population density is highest in Kuthibari village of Neturia block that is 61 persons per hectares among other villages. There are 269 numbers of villages have more than 50 per cent SC population while 36 numbers of villages hold cent per cent.

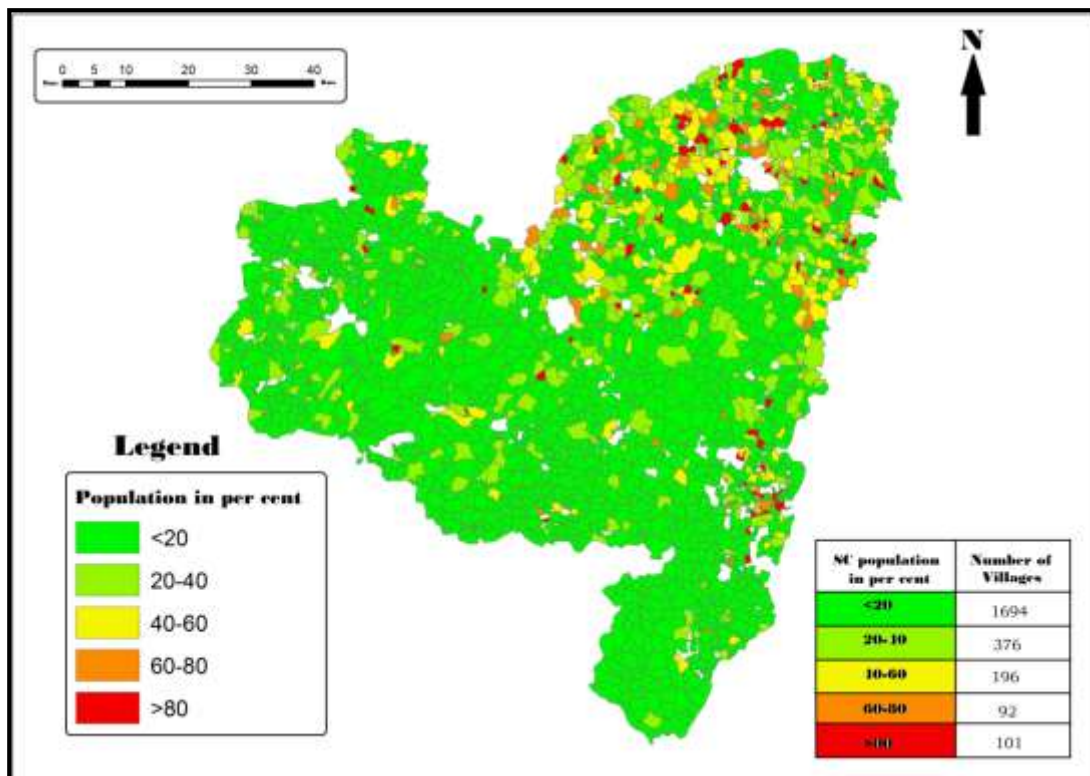


Figure 2: Distribution of Scheduled Caste population in per cent
(Source: Prepared by authors based on Census data, 2011)

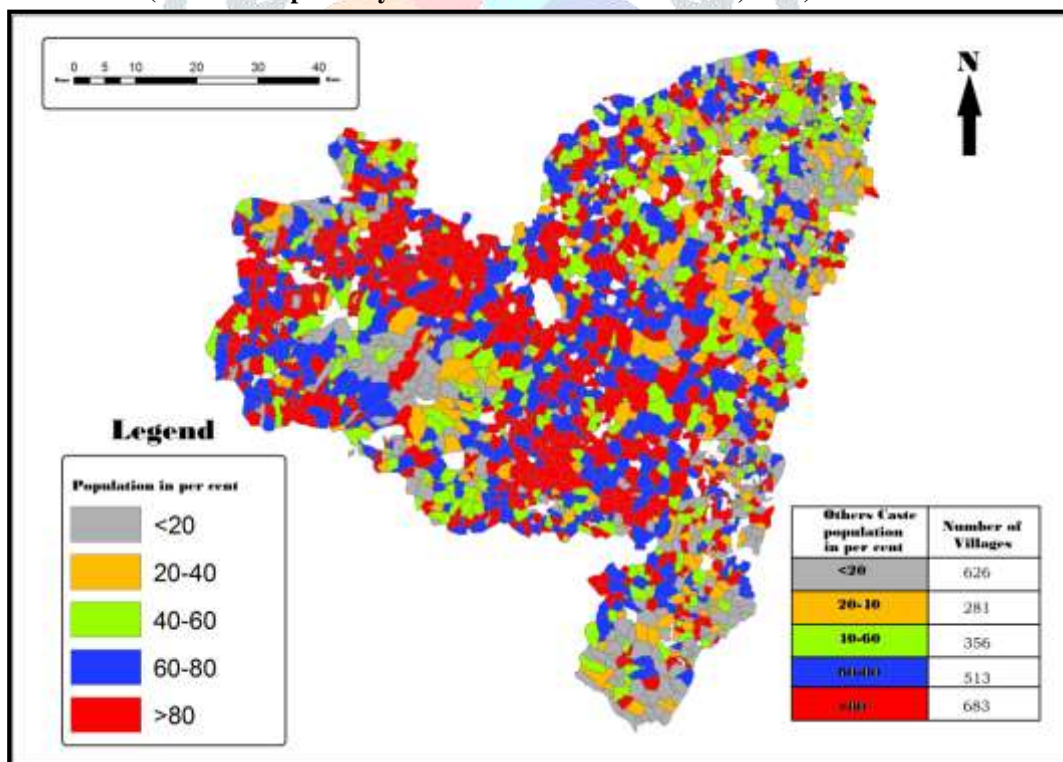


Figure 3: Distribution of Other Castes population in per cent
(Source: Prepared by authors based on Census data, 2011)

VII. SCHEDULED TRIBES:

The distribution of the ST population is more symmetrical than the distribution of SC population over the space. The maximum numbers of ST population are found in Palpal village of Arsha block that is 2813 persons. An average number of ST population is 216 persons in this study area. 1598 numbers of villages have less than average ST population. From figure 4, the study found less than 20 percent ST population concentrated in 1382 number of villages which occupied 51.55 per cent geographical area as well as 65.78 per cent household. Out of 1598 numbers of villages, 552 numbers of villages have no ST population. 336 numbers of villages have 20- 40 per cent ST population while 40-60 per cent population concentrated in 201 numbers of villages. Greater than 80 per cent population occupied 393 numbers of villages which spread over on 13.08 per cent geographical area and also covered 7.09 per cent household. Average density is 1 person per hectares. Only three numbers of villages have more than 10 persons per hectares ST population that is Kuchlipela (Manbazar-II block), Jalahari (Manbazar-I block) and Golapara (Manbazar-II). ST population density is highest in Golapara village of Manbazar-II block that is 20 persons per hectares among other villages. There are 632 numbers of villages have more than 50 per cent ST population while 117 numbers of villages hold cent per cent.

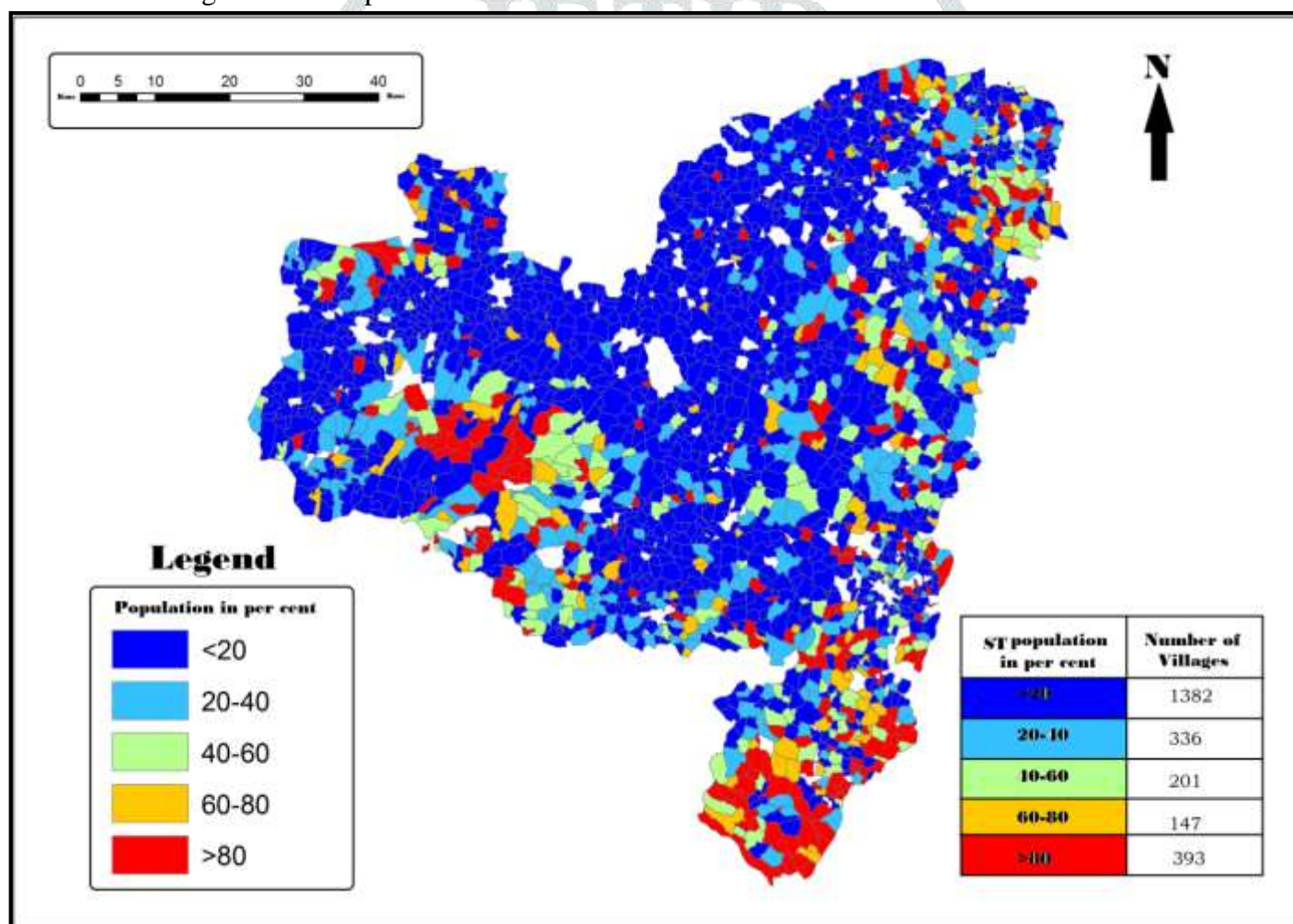


Figure 4: Distribution of Scheduled Tribe population in per cent
(Source: Prepared by authors based on Census data, 2011)

VIII. OTHERS CASTE:

The distribution of others caste population is less symmetrical than ST but more than SC population over the space. Tulin village of Jhalda-I holds the highest numbers of others caste population that is 8806

persons. 1572 numbers of villages are to be found below the average level that is 624 persons. From figure 3, the study found less than 20 per cent others caste covered in 626, 20-40 per cent in 281, 40-60 per cent in 356, 60-80 per cent in 513 and greater than 80 per cent in 683 numbers of villages. The maximum proportion of others caste population covered only 22.75 per cent of the total geographical area and 28.89 per cent of total household. The average density of others caste population is 3 persons per hectares. Only six numbers of villages have more than 30 persons per hectares population that is Kolyagara (Raghunathpur-II block), Maldi (Para block) and Noagarh (Puncha block). Kolyagarah is highly dense village among others that is 73 persons per hectares. There are 1382 numbers of villages have more than 50 per cent SC population while 135 numbers of villages hold cent per cent.

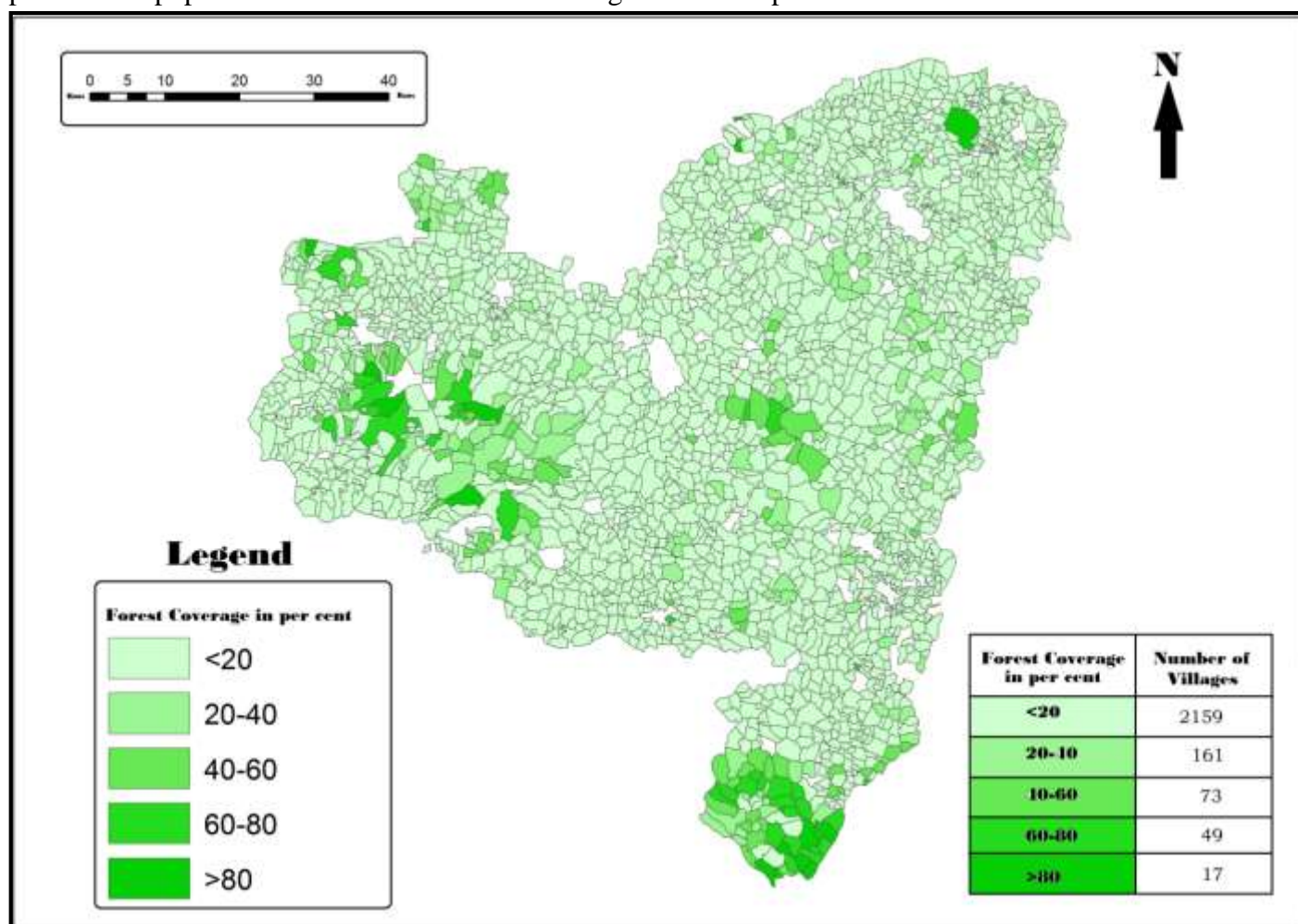


Figure 5: Distribution of Forest Coverage in per cent
(Source: Prepared by authors based on Census data, 2011)

IX. FOREST COVERAGE:

Forest coverage has social, economic and environmental value. There is much settlement have been developed based on forest resources across the world. In this section proportion of forest cover in per cent have been portrayed in village level.

The study found the maximum and minimum forest area is 1403.21 and zero hectares respectively. The highest forest cover is to be found in Gar Panchkot village of Neturia block but as per areal proportion to total geographical area, Chanora village (100 per cent) of Bundwan block has the highest forest area. 1284 numbers of villages have no forest area. Figure 5 showing, 875 numbers of villages have less than 20 per cent forest area while 161 have 20-40 per cent, 73 have 40-60 per cent, 49 have 60-80 per cent and greater

than 80 per cent forest coverage to total geographical area have been found in 17 numbers of villages. In this study, the average forest coverage is 26.01 hectares. 452 numbers of villages have more than the average forest coverage. Only 80 numbers of villages have been occupied more than 50 per cent forest area in this study. An average per capita forest area is 0.07 hectares including villages which have no forest area but it is 0.14 hectares among village having forest area. Premsinghdih village in Raghunathpur-II block has the highest per capita forest area that is 47.79 hectare but the total population is only one person.

X. CASTE POPULATION AND FOREST COVERAGE:

In this section, we mainly present the relation between the distribution of caste population and forest coverage in different villages. The study found 60-80 and greater than 80 per cent forest area occupied only 49 and 17 numbers of villages respectively. Further, we discuss the caste pattern of these villages with details that may make sense.

Table 1: Matrix of ST population and Forest coverage

ST population in per cent	Forest Coverage in per cent				
	>20	20-40	40-60	60-80	>80
>20	1280	69	22	7	4
20-40	296	23	6	8	2
40-60	174	12	13	2	1
60-80	122	9	6	9	1
>80	287	48	26	23	9

Source: Computed by authors based on Census data, 2011

The highest percentage of forest area to total geographical area is to be found in Chanora village of Bundwan block where ST population is 85.31 per cent and other castes population is 14.69 per cent. Second highest forest coverage is found in Satara villages of Bundwan block where also ST population is high among other castes that are 98.80 per cent. The third village in this row is Karru of Bundwan block where ST population is 94.76 per cent. In another case, Pitidiri village also has remarkable forest area where ST has dominated caste among others. But on the other hand, Premsinghdih village of Raghunathpur –II block has 91.55 percentage forest areas where other caste population is maximum that is 100 per cent. Panrri village of Jhalda-I placed in 6th position in terms of percentage of forest area where SC population is 44.17 per cent and ST population is 42.92 per cent. Tarhad village of Jhalda-I has 90.31 per cent forest area where others caste population is maximum than SC and ST. Barakhula village of Bundwan block has 88.61 percentage forest coverage area to total geographical area where the concentration of ST population is maximum. More than 80 per cent area is covered by forest in Gar Panchkot village of Neturia block where 54.28 per cent others caste population is concentrated. Paradih Alias Gurpana village of Bundwan placed in 10th in this row but here also ST population is mainly concentrated. Out of 17 numbers of villages rest of seven numbers of villages where percentage of forest area is more than 80 percent, Chhoto Bakad village holds maximum percentage of others caste population, in Kudna village (Baghmundi block) has also maximum percentage of others caste population, Latajharna (Bundwan) and Gayalikochoa (Arsha) has more

ST population than other two castes categories. Kantagora and Rajauli village of Bundwan block have the higher percentage of ST population.

Out of 17 villages (Fig. 6), nine numbers of villages have the maximum percentage of ST population which indicates 53 percent case is proved that higher coverage forest village is dominating by ST population (Table 1). In case of 66 numbers of villages which have more than 60 percent of forest coverage where 65 percent cases proved also earlier mentioned statement. On the other hand, 87 numbers of villages have more than 50 percentage forest area to total geographical area where 57 numbers of villages that is 65.52 percent have higher ST population than others two castes. This case also supports the earlier statement.

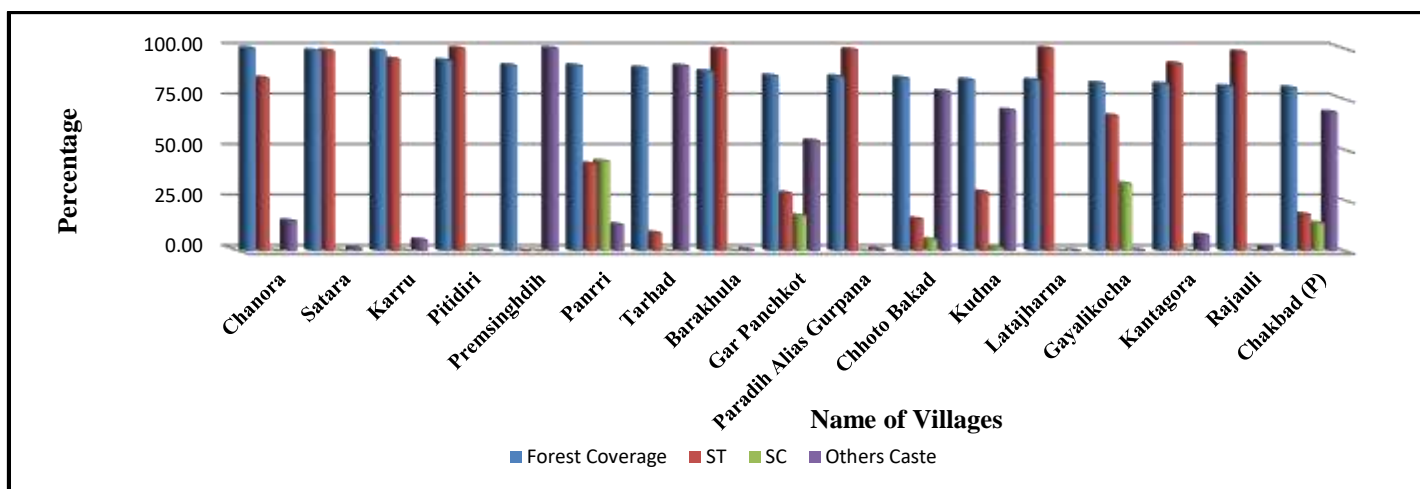


Figure 6: Caste distribution pattern of higher forest coverage (>80 per cent) villages
(Source: Prepared by authors based on Census data, 2011)

Further standard regression analysis has been applied to examine the relationship between concentration of caste population and forest coverage. First analysis is conducted between concentration of SC population and forest coverage which indicates negative relation between them. On the other hand, second analysis presents negative relation between concentration of others caste population and forest coverage. Last one present there is positive relation between concentration of ST population and forest coverage (Table 3). This model is statistically significant in our study (Table 2 & 3). But this model cannot excellently explain the relation between them because both R-squared and Adjusted R-squared value is very low that is 0.068 (Table 1). The three models are

- a. $Y (SC) = 19.809 - 0.152 \text{ forest coverage}$
- b. $Y (\text{Others caste}) = 54.494 - 0.156 \text{ forest coverage}$
- c. $Y (ST) = 25.697 + 0.261 \text{ forest coverage}$

So, the third equation can explain the relationship between concentration of scheduled tribe population and forest coverage but the relation is very low. The model explains that concentration of ST population will be increased by 26 per cent for increasing of one unit of forest coverage.

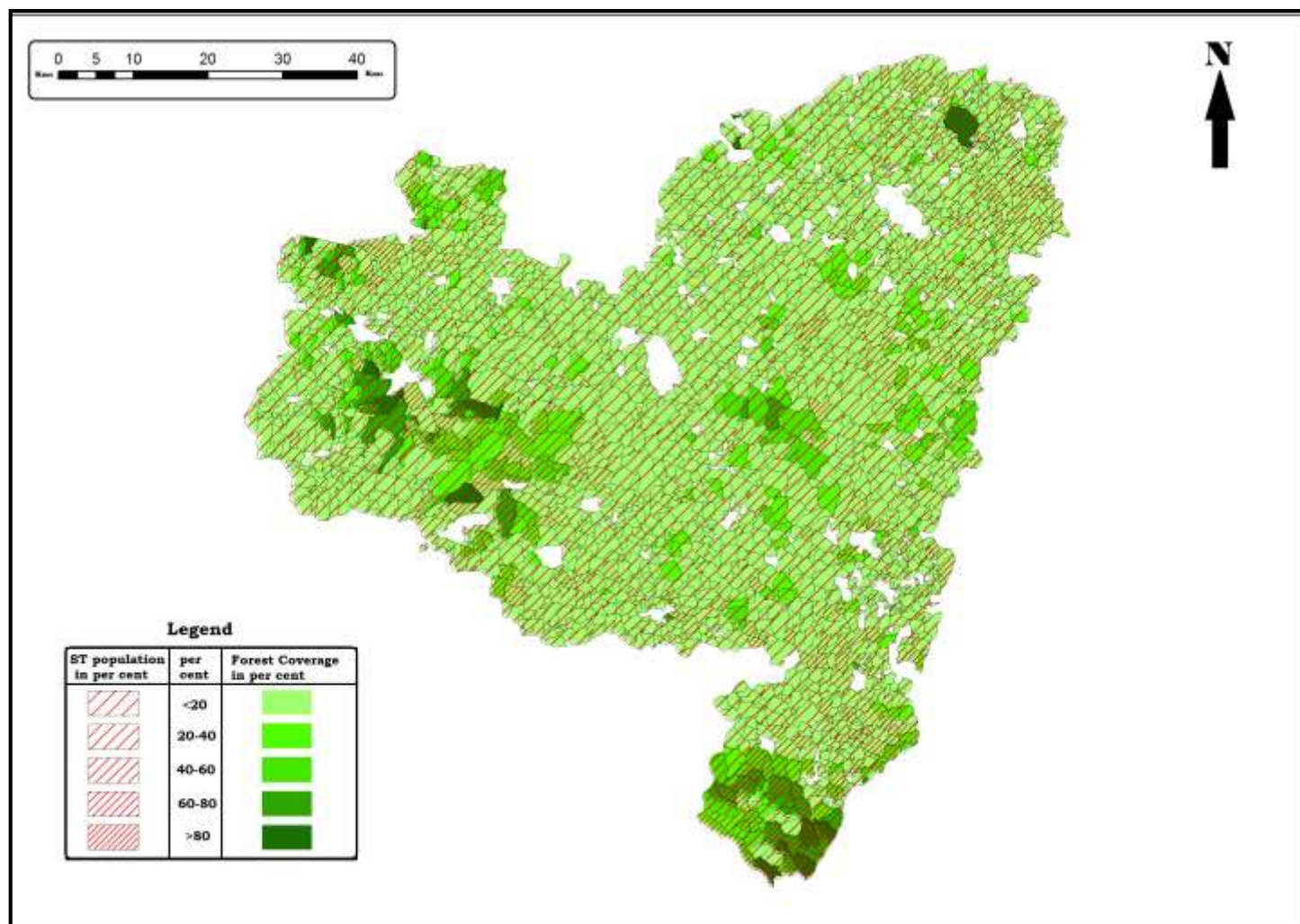


Figure 7: Concentration of ST population and Forest coverage in per cent
(Source: Prepared by authors based on Census data, 2011)

Considering the issue of the low level of significance, the study tries to capture the effect of forest coverage on the rate of change of population in terms of population growth. Because we are interested whether the growth rate of population is more significantly related to forest coverage or not. Further, we run the regression on population growth instead of concentration of population for all three categories separately. The SC population growth is negatively but others caste and ST population growth are positively correlated with forest coverage. The other caste population growth is statistically insignificant while ST population growth is significant in terms of forest coverage (Table 4). Table 5 is showing that there is a statistically significant positive relation between the population growth of ST population during 2001-2011 and forest coverage at 10 per cent significance level. The standard regression models are

- a. Y (SC population growth) = $-0.650 - 0.088$ forest coverage
- b. Y (Others caste population growth) = $-0.883 + 0.053$ forest coverage
- c. Y (ST population growth) = $-0.87 + 0.26$ forest coverage

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.261	0.068	0.068	33.51672	1.749

Source: Computed by authors based on Census data, 2011

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	201016.02	1.00	201016.02	178.94	.000
	Residual	2760121.01	2457.00	1123.37		
	Total	2961137.04	2458.00			

Source: Computed by authors based on Census data, 2011

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	25.697	0.749		34.304	.000		
	Percentage of Forest area to total geographical area	0.581	0.043	0.261	13.377	0.000	1.000	1.000

Source: Computed by authors based on Census data, 2011

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.26	0.07	0.04	0.09	1.62

Source: Computed by authors based on Census data, 2001 and 2011

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-0.87	0.02		-50.88	0.00		
	Percentage of Forest area to total geographical area	0.00	0.00	0.26	1.70	0.10	1.00	1.00

Source: Computed by authors based on Census data, 2001 and 2011

But this model also failed to explain such kind of relation because only 7 per cent variance can be explained by its relationship with forest coverage. The model explains that population growth of ST population will be increased by 26 per cent (approx) for increasing of one unit of forest coverage.

CONCLUSION:

The study found concentration of others caste population is higher than SC and ST population in Purulia district. Concentration of ST population more than 50 percent is to be found in 632 number of villages while 117 numbers of villages have cent per cent. Chanora village of Bundwan block is the fully forested village in Purulia district which is situated at the forest core area with 85.31 per cent ST population. Higher forest coverage area is occupied higher percentage of ST population in maximum case but the relation between them is not as such strong. Relation between population growth of ST population and forest coverage is same in nature. R-squared value of population concentration as well as population growth is 0.068 or 0.07 that means only 7 per cent variance can be explained of concentration and population growth of ST population by its relationship with forest coverage. As it is expected the concentration and population growth of ST population can't explain only by forest coverage. In this study we going to examine the relation between concentration of ST population and forest coverage or higher forest coverage area also enrich in concentration and population growth of ST population that is successfully done by the case study and regression analysis. Along with, this study also opens a new wing for the researcher that the relation between tribe and forest is not clearly explain by the concentration or distribution of tribal population but it is present a crystal clear image while we considered different activities and services which flow continuously in between them.

ACKNOWLEDGEMENT:

The first author is very much grateful to University Grant Commission, MHRD and Govt. of India for providing fellowship for research work. We are also thankful to Dr. Suman Paul, Associate Professor and HOD, Department of Geography and Dr. Subhasis Bhattacharya, Associate Professor and HOD, Department of Economics, Sidho Kanho Birsha University, Purulia, W.B. for providing valuable insight for preparation of this article.

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