

# CHAPTER-VI

## INDENTIFICATION OF MAJOR PROBLEMS OF COOCH BEHAR TOWN

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### **6.1 Introduction:**

Cooch Behar town and its periphery areas have been rapidly growing in the recent years. A change has been significantly noticed in population, socio-cultural landscape, business, transport, residential areas, water supply, drainage and solid waste disposal. The foregoing analysis is one of the main and core chapters, which deals with many aspects of development and find-out major problems of slum dwellers as well as non-slum citizens. The objective of this chapter is to identify the major problems in Cooch Behar town by survey methods (Misra, 1989). From the discussion of previous chapter, it is clear that the growth of urban areas do show evidences of emergences environmental problems and socio-economic disparities. The growth leads to more and more demand for better facilities. The provision of one will lead to the disturbances of the other. More the crowding of provision the environment is burden. The modifications will affect the environment. The use materials will spoil the environment. The major obstacle in controlling pollution has been the traditional use and sovereignty rights, the cost of control being high and the differing perception of pollution by various cultural groups.

Urbanization is a natural consequence of economic change that takes place as country develops, urban areas depending on their size and type, spreading innovations to their hinterlands through various forms of urban rural and regional linkage (Anonymous, 2001). Administration, trade, commerce and several urban amenities are the key urbanization elements, which attract people neighbouring areas in Cooch Behar town. Along with natural increase a large influx of immigrant creates problems to its urban life. Being a planned old town Cooch Behar failed to promote the modern facilities to its residents in an organized manner. Thus like other town Cooch Behar is facing the problem of deficit and uneven distribution of urban amenities. The gaps between

available urban infrastructure and their demand among the people have been increasing continuously in the town, which give birth to several problems (Anonymous, 2007). Some of these problems are very acute and need attention for identification. This chapter deals with some problems, which were identified at the time of field survey (Kothari, 2001).

In the towns the problems are manifold and the solution lies only in the present framework of our urban society, administration and technological knowledge and the availability of resources. The local planning body aims at limited improvement of physical landscape construction of better drain, roads, water towers and safely latrines. It also aims at better utilization of the available human resources along with the housing improvement and creation of jobs and may be attempted on self-help basis to solve the urban problems (Misra, 1989).

## **6.2 Major Problems:**

In the light of discussion on the changing landscape in Cooch Behar town at various stages several environmental issues and problems have come to the limelight.

### **6.2.1 Physical problems:**

Figure 5.1 in the previous chapter (Chapter-V) has given the situation of drainage system in Cooch Behar town. River Torsa is one of the natural drainage channels, which diagonally dissected the town from surrounding rural area and stretch for 5.20 km<sup>2</sup> from North West to South East acts as an important physical barrier. The early builders of the town have found the Torsa levee as relatively safe zone. Most of the European settlements were constructed along this Torsa levee. After independence the town expanded at the north of river Torsa and people like to reside in this part due to availability of urban facilities. But the growth of town was restricted at the south by river Torsa. At the east river Mora Torsa (Dead channel) acts as a physical barrier and creates problem for the connection to the extreme east. There is only one connecting bridge on this river Torsa, which is not sufficient to connect the southern part of the district. Another two bridges at the west connected the town with the outer part of the town. At the west along the river Torsa impressive embankment was constructed to protect the town from flood, which restricted the urban sewer and storm water disposal system and caused problems for the dwellers. The railway track criss-cross the town at the eastern part and restricts the easy movement of the people from the eastern part to

the central business district of the town. There are only two railway gates such as connected the eastern half to the central part in the town. Long queues of vehicles caused traffic jam at the gates.

Here, the study looks at the patterns in temperature over the Cooch Behar town and tries to set up a connection along with urbanization and climate patterns.

### **Trend analysis of temperature in Cooch Behar town**

The affect of urbanization on maximum, minimum and average temperature in Cooch Behar town have been analyzed by the used of non parametric Mann-Kendall and Spearman's rho tests. These methods have been analyzed in following heads.

#### **Mann-Kendall test:**

The Mann-Kendal test has been carried out by some other researchers in their research article, such as; Das & Bhattacharya, 2018; Das et al., 2019). The Mann-Kendall (Mann 1945; Kendall 1975) test statistic ( $S$ ) of the series  $x_1, x_2, x_3 \dots$ , and  $x_n$  are calculated by using the following equation:

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^n \text{sign}(x_j - x_k) \quad (1)$$

Where,  $n$  is the quantity of information points,  $x_j$  and  $x_k$  speaks to the data points of time  $j$  and  $k$

$$\begin{aligned} \text{Sign}(x_j - x_k) &= +1 \text{ if } x_j - x_k > 0 \\ &= 0 \text{ if } x_j - x_k = 0 \\ &= 0 \\ &= -1 \text{ if } x_j - x_k < 0 \end{aligned} \quad (2)$$

The variance of  $S$ ,  $\text{VAR}(S)$  is computed by the following equation:

$$\text{VAR}(S) = \frac{1}{18} \left\{ n(n-1)(2n+5) - \sum_{p=1}^g t_p(t_p-1)(2t_p+5) \right\} \quad (3)$$

Where  $g$  speaks to the quantity of tied gatherings and  $t_p$  indicates the quantity of  $p^{\text{th}}$  gathering's information focuses.

The Statistic ( $S$ ) is unequivocally identified with Kendall's  $\tau$  (tau) as given by:

$$\tau = \frac{S}{D} \quad (4)$$

Where,

$$D = \sqrt{\frac{1}{2}n(n-1) - \frac{1}{2}\sum_{p=1}^g t_p(t_p-1)} \sqrt{\frac{1}{2}n(n-1)}$$

The estimation of (S) and VAR(S) are used to process the standardized test measurement Z as takes after:

$$Z = \begin{cases} \frac{S-1}{\sqrt{VAR(S)}} & , if S > 0 \\ 0 & , if S = 0 \\ \frac{S+1}{\sqrt{VAR(S)}} & , if S < 0 \end{cases} \quad (5)$$

Positive and negative value of Z indicates increasing and decreasing trends. To test null hypothesis ( $H_0$ ), of no trend against the alternative hypothesis ( $H_a$ ), of an upward or descending pattern at the  $\alpha = 0.001, \alpha = 0.05, and \alpha = 0.01$  level of significance,  $H_0$  is rejected if the estimation of Z is more prominent than  $Z_{1-\alpha/2}$ , which is acquired from the Pearson and Hartley's (1966) standard ordinary distribution table.

#### **Spearman's rho test:**

The Spearman's rho ( $\rho$ ) test measurement R and the standardized test statistic  $Z_{SR}$  (Spearman, 1904) are calculated by using the following equation

$$R = 1 - \frac{6\sum D^2}{n^3 - n} \quad (6)$$

$$Z_{SR} = R \sqrt{\frac{n-2}{1-R^2}} \quad (7)$$

Where, R means rank co-efficient of relationship, D is the distinction of rank between combined things in two series, n denotes the data series length. Positive estimation of  $Z_{SR}$  demonstrates increasing trend, while negative estimates of  $Z_{SR}$  shows decreasing trends in the time series. Null hypothesis ( $H_0$ ) is rejected and a significant trend is present in the time series when the value of  $|Z_{SR}|$  is greater than the value of  $t_{(n-2, 1-\frac{\alpha}{2})}$  at 5% significant level (Das and Bhattacharya, 2018).

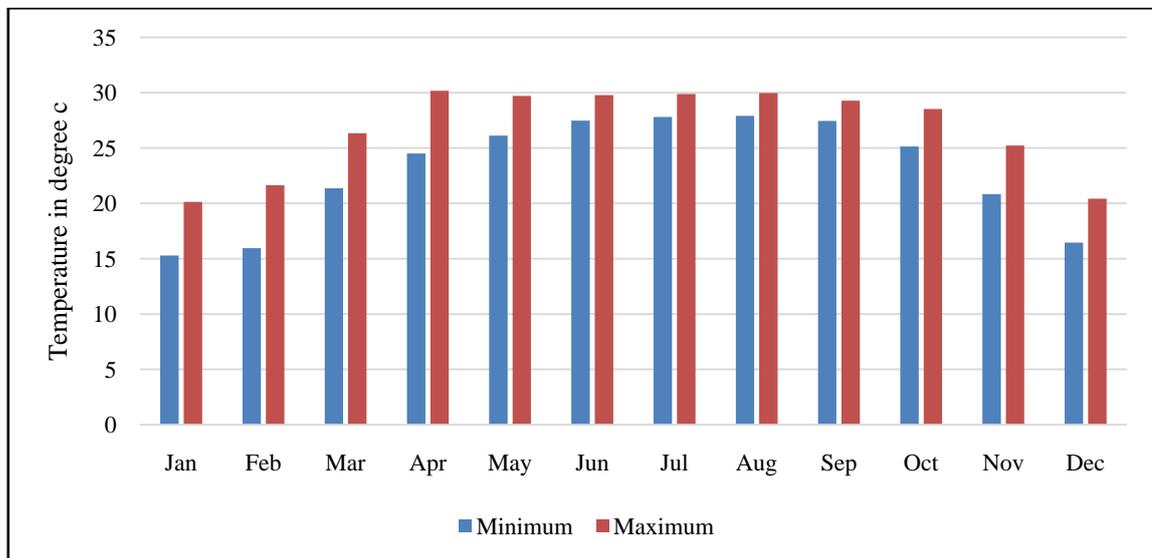
In urban area compared to surrounding area temperature gets increased. This situation is also called as urban heat island, which creates for largely concentration of concrete in build-up area and pavement area (Descola and Palson, 1996). It is realised by long term temperature study in a particular urban study. For this purpose table 6.1 & figure 6.1 to show long term average mean temperature and table 6.2 & figure 6.2 to show long term

average maximum temperature and table 6.3 & figure 6.3 to show long term average minimum temperature has been prepared in Cooch Behar town (1915-2016).

**Table 6.1: Long term Average mean temperature of Cooch Behar town 1915-2016**

Month	Minimum	Maximum	Mean	Std. deviation
Jan	15.287	20.134	17.323	0.832
Feb	15.947	21.633	19.270	0.910
Mar	21.361	26.338	23.823	1.027
Apr	24.498	30.169	26.980	1.076
May	26.121	29.710	27.883	0.809
Jun	27.473	29.773	28.680	0.537
Jul	27.801	29.876	28.839	0.444
Aug	27.904	29.967	28.985	0.402
Sep	27.438	29.275	28.428	0.424
Oct	25.141	28.522	26.636	0.732
Nov	20.830	25.219	22.583	0.817
Dec	16.451	20.424	18.687	0.767

**Sources:** India water portal and agricultural office, Cooch Behar.

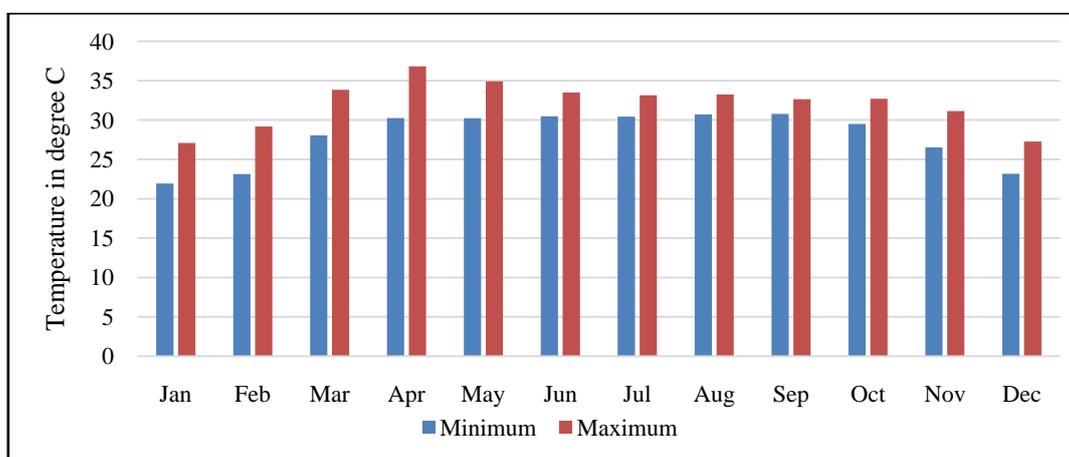


**Figure 6.1: Long term Average mean temperature of Cooch Behar town 1915-2016.**

**Table 6.2: Long term Average maximum temperature of Cooch Behar town 1915-2016**

Month	Minimum	Maximum	Mean	Std. deviation
Jan	21.945	27.079	24.229	0.924
Feb	23.125	29.170	26.405	1.057
Mar	28.065	33.829	31.167	1.168
Apr	30.254	36.813	33.323	1.345
May	30.228	34.904	32.588	0.955
Jun	30.464	33.501	32.285	0.618
Jul	30.424	33.150	31.814	0.533
Aug	30.719	33.252	31.929	0.460
Sep	30.776	32.638	31.674	0.434
Oct	29.507	32.705	30.934	0.750
Nov	26.508	31.144	28.636	0.880
Dec	23.166	27.261	25.337	0.844

**Sources:** India water portal and agricultural office, Cooch Behar.

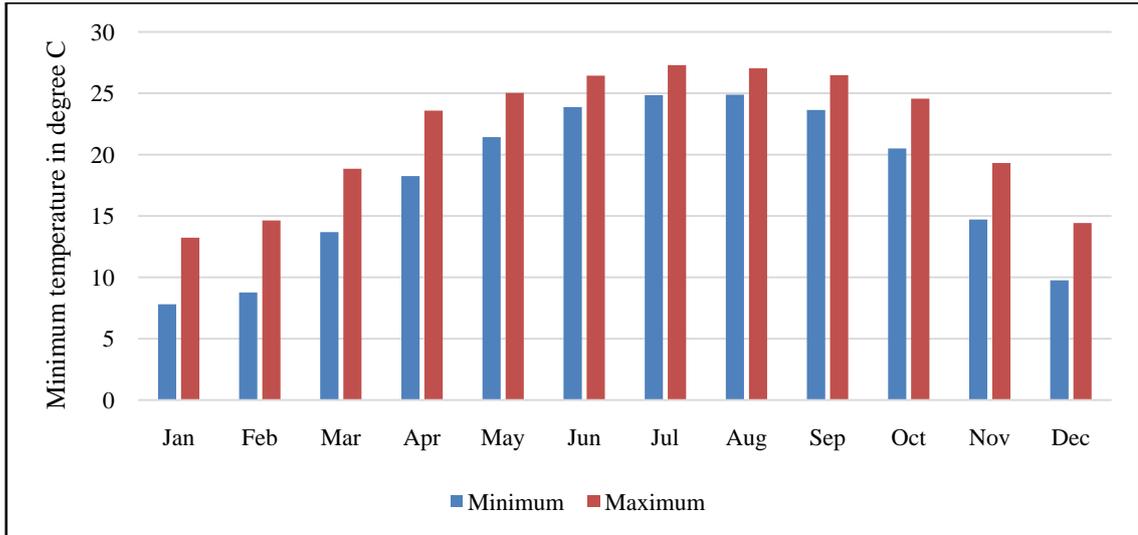


**Figure 6.2: Long term Average maximum temperature of Cooch Behar town 1915-2016.**

**Table 6.3: Long term Average minimum temperature of Cooch Behar town 1915-2016**

Month	Minimum	Maximum	Mean	Std. Deviation
Jan	7.804	13.229	10.439	0.941
Feb	8.772	14.642	12.177	0.979
Mar	13.681	18.848	16.509	1.065
Apr	18.255	23.585	20.674	1.073
May	21.431	25.033	23.214	0.772
Jun	23.866	26.440	25.096	0.540
Jul	24.852	27.296	25.896	0.475
Aug	24.881	27.029	26.069	0.475
Sep	23.642	26.469	25.230	0.512
Oct	20.503	24.556	22.378	0.828
Nov	14.716	19.322	16.559	0.912
Dec	9.751	14.431	12.093	0.883

**Sources:** India water portal and agricultural office, Cooch Behar.



**Figure 6.3: Long term Average minimum temperature of Cooch Behar town 1915-2016**

**Trend of monthly temperature of Cooch Behar town:**

The results of MK and SR test for monthly maximum, minimum and average temperature trend detection revealed both were very much comparative and they were presented in Table 6.4, Mann-Kendall trend statistics showed significant ( $P > 0.01$ ) rising trend in maximum temperature in the month of February ( $Z= 3.21$ ), June ( $Z= 3.13$ ), October ( $Z= 2.96$ ), November ( $Z= 4.60$ ) and December ( $Z= 3.96$ ), whereas at 5% level of significant showed only the month of May ( $Z= 2.17$ ) and August ( $Z= 2.62$ ) and rest of the months had a no trend. So, the enhancement of the maximum temperature was highest in November and lowest in July. Similarly, SR trend results depicted that significant increasing trend in Maximum temperature at 1 % level in the month of April, August, November and December and at 5% level in the month of March and June, whereas, rest of the month remains no trends.

Mann-Kendall trend statistics showed significant ( $P > 0.01$ ) rising trend in minimum temperature in the month of February ( $Z= 4.82$ ), March ( $Z= 3.04$ ), May ( $Z= 2.70$ ), whereas at 5% level of significant showed only the month of January ( $Z= 2.70$ ), April ( $Z= 2.30$ ), June ( $Z= 2.70$ ), October ( $Z= 2.59$ ), December ( $Z= 4.60$ ) and rest of the months had a no trend. So, the enhancement of the minimum temperature was highest in February and lowest in April. Similarly, SR trend results depicted that significant increasing trend in Minimum temperature at 1 % level in the month of January, February, March, November and December and at 5% level in the month of April, August and October, whereas, rest of the month remains no trends. Similarly the average temperature trends also showing same result as maximum and minimum temperature (Table 6.4).

**Table 6.4: Trend of monthly temperature of Cooch Behar town**

Season	Test	Maximum Temp	Minimum Temp	Average Temp
<b>January</b>	Kendall's t	0.12	0.17*	0.15*
	Z	1.93	2.70	2.29
	Z <sub>SR</sub>	0.18	0.26**	0.22*
<b>Feb</b>	Kendall's t	0.21**	0.31**	0.31**
	Z	3.21	4.82	4.85
	Z <sub>SR</sub>	0.30	0.44*	0.44
<b>Mar</b>	Kendall's t	0.11	0.20**	0.15*
	Z	1.68	3.04	2.29
	Z <sub>SR</sub>	0.16*	0.29**	0.21*
<b>Apr</b>	Kendall's t	0.10	0.15*	0.12
	Z	1.59	2.30	1.91
	Z <sub>SR</sub>	0.14**	0.21*	.18**
<b>May</b>	Kendall's t	0.14*	0.17**	.17*
	Z	2.17	2.70	0.27
	Z <sub>SR</sub>	0.20	0.26	0.25
<b>Jun</b>	Kendall's t	0.20**	0.17*	0.19**
	Z	3.13	2.70	2.96
	Z <sub>SR</sub>	0.30*	0.25	0.28*
<b>Jul</b>	Kendall's t	0.02	0.10	0.09
	Z	0.37	1.50	0.48
	Z <sub>SR</sub>	0.04	0.15	0.13
<b>Aug</b>	Kendall's t	0.17*	0.12	.16*
	Z	2.62	1.92	2.46
	Z <sub>SR</sub>	0.25**	0.18*	0.23**
<b>Sep</b>	Kendall's t	0.06	0.05	0.06
	Z	0.87	0.75	0.31
	Z <sub>SR</sub>	0.08	0.06	0.08
<b>Oct</b>	Kendall's t	0.19**	0.17*	0.20**
	Z	2.96	2.59	3.13
	Z <sub>SR</sub>	0.29	0.25*	0.30*
<b>Nov</b>	Kendall's t	0.30**	0.21	0.26
	Z	4.60	3.20	4.13
	Z <sub>SR</sub>	0.42**	0.32**	0.39**
<b>Dec</b>	Kendall's t	0.25**	0.30*	0.30*
	Z	3.96	4.60	1.72
	Z <sub>SR</sub>	0.36**	0.42**	0.44*

Kendall's t – Kendal tau; Z- Man-Kendall's normalized test Statistics; Z<sub>SR</sub>- Spearman's normalized test statistics; \*\*statistically significant trends at the 1% significant level, \*statistically significant trends at the 5% significant level.

**Trend of seasonal temperature in Cooch Behar town:**

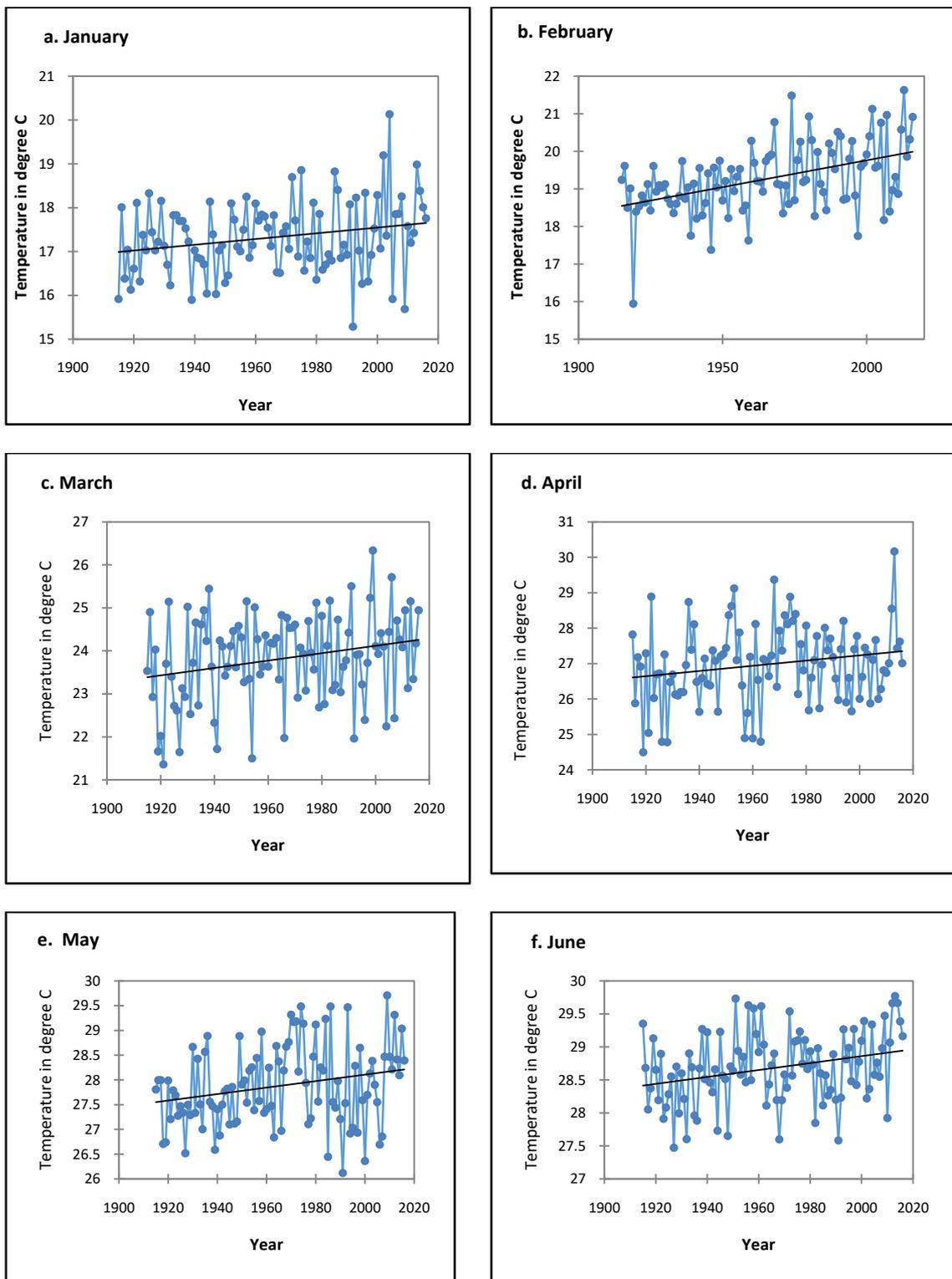
The trend of seasonal temperature change study by Mann-Kendall and Spearman’s rho test reveals the long term (1915-2016) temperature change in significantly in Cooch Behar town. In Cooch Behar town temperature study seasonal wise divided as four season that is pre monsoon, monsoon, post monsoon and winter. Table 6.5 for the study seasonal wise temperature change study by Kendall’s and Spearman’ rho test reveals significant. In every season both test keep significant on average temperature at 1% level. Even in minimum temperature except monsoon season both test keep significant at 1% level. But in case of maximum temperature only pre monsoon season keep significant at 5% level and other three season keep significant at 1% level. The both study shows that in Cooch Behar town with growing urbanization it showing significant in temperature change (Das et al., 2019).

The discussion on temperature trends depicted that there has an increasing trends of temperature in Cooch Behar town. The main causes for temperature increasing is that, in past Cooch Behar in past time was small settlement and tiny place, where, now the settlement increase in huge number. Besides, the vegetable coverage decreases day by day rationally with the increase of urbanization. Not only has that pavement area increase with built up area increased which effect to create a heat island in this region. These causes directly and indirectly increase the temperature of Cooch Behar urban area. Figure 6.4 & 6.5 shows the long term temperature trend of Cooch Behar town, where it reveals that in this town temperature has an increasing trend in winter season months.

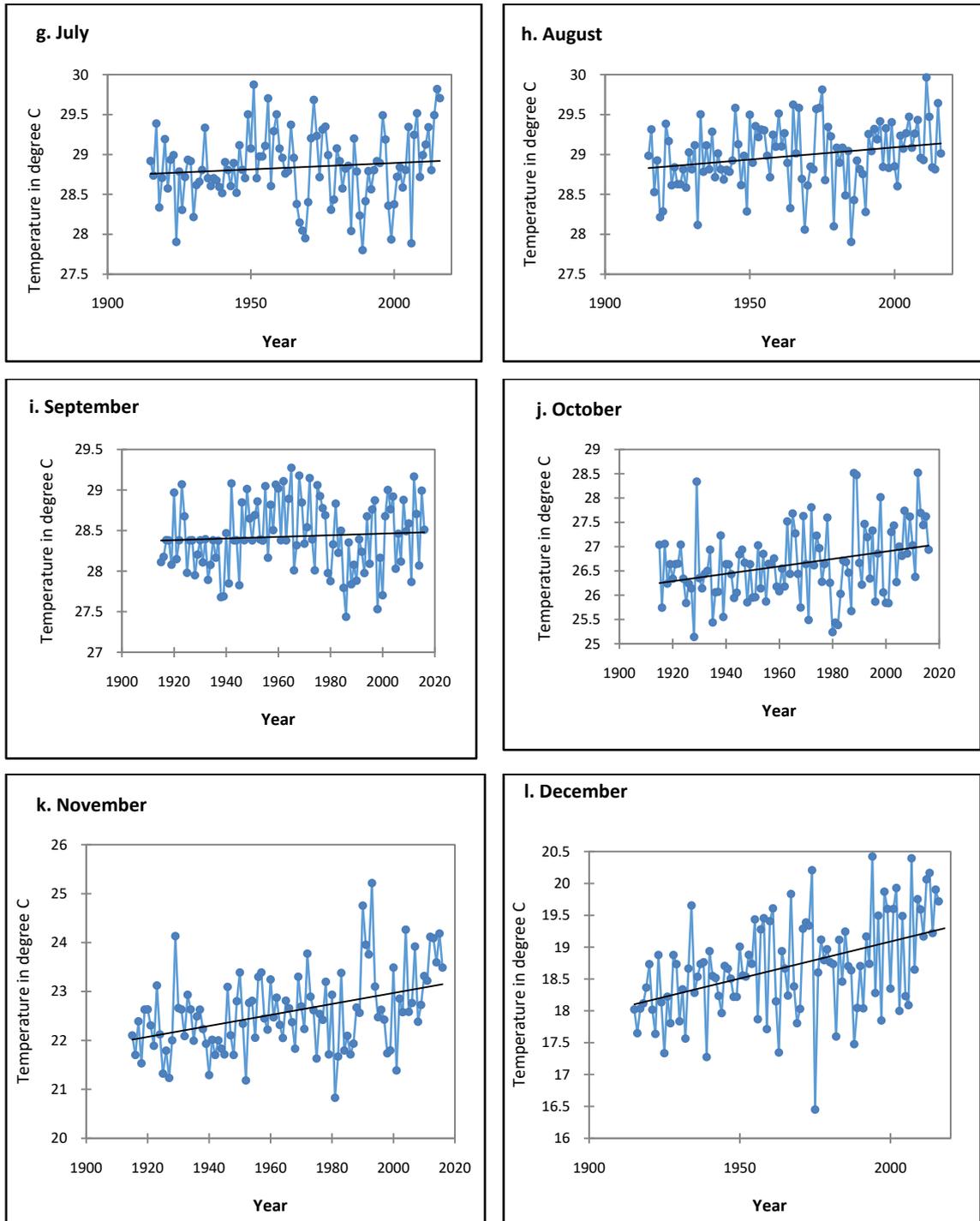
**Table 6.5: Trend of seasonal temperature of Cooch Behar town**

Season	Test	Maximum Temp	Minimum Temp	Average Temp
<b>Pre monsoon</b>	Kendall's t	0.15*	0.23**	0.20**
	Z	2.34	3.63	3.17
	Z <sub>SR</sub>	0.22*	0.34**	.30**
<b>Monsoon</b>	Kendall's t	0.19**	0.16*	0.21**
	Z	2.95	2.43	3.23
	Z <sub>SR</sub>	0.27**	0.23*	0.30**
<b>Post monsoon</b>	Kendall's t	0.32**	0.25**	0.30**
	Z	4.88	3.93	4.74
	Z <sub>SR</sub>	0.46**	0.37**	0.44**
<b>Winter</b>	Kendall's t	0.30**	0.33**	0.38**
	Z	4.62	5.18	5.91
	Z <sub>SR</sub>	0.44**	0.47**	0.53**

Kendall's t – Kendal tau; Z- Man-Kendall’s normalized test Statistics; Z<sub>SR</sub>- Spearman’s normalized test statistics; \*\*statistically significant trends at the 1% significant level, \*statistically significant trends at the 5% significant level.



**Figure 6.4: Trend of long term average temperature of Cooch Behar town a. January b. February c. March d. April e. May f. June**



**Figure 6.5: Trend of long term average temperature of Cooch Behar town g. July h. August i. September j. October k. November l. December.**

### **6.2.2 The changes in the socio-cultural landscape:**

From the discussion carried out in the earlier chapters it is clear that in Cooch Behar there is increase in population growth rate. This is perhaps due to the rapid growth of transport and communication system in and around Cooch Behar town. The areas which are likely to be urbanized in 2021, under standard urban area in Cooch Behar, indicate the likely dependence of the population of these areas in Cooch Behar town to the future. The growth of population too has shown an upward trend. The distribution of population shows the increase of congestion in the central area. The existing infrastructural facilities, though expanded are still not sufficient. Several problems do crop up such as overcrowding of residential houses with less living floor space for families reduction of open space and park land congestion and increase of accident prone areas as a result of growth of traffic etc. the population density in the immediate neighbourhood is also high. The inclusion of neighbourhood areas having high density of population in to the municipal area have only further increased the pressure on land (Robert et al., 2014).

The fast expanding landscape under educational facilities have added greater dimension to the problem. The fast growing residential areas shows a simultaneous increase of schools operated by private agencies without proper and adequate space for students. Even basic amenities are not provided. Some of the schools are located in unhygienic areas and accident prone areas. Higher educational facilities like arts and professional colleges have totally located in the core area of the town. This has resulted in the increase of demand for transport facilities to different areas. Hence the increase in the number of fleets to these places, have increased the flow load and congestion in the municipal area. It is clear that the changes in the educational landscape has its impact on the city, which is reflected on the organizational and reorganization of the educational centres (Spearman, 1904).

The existing space occupied by the recreational and cultural areas in the town is no longer able to meet the demand of increased flow of tourists and visitors to these places. The Cooch Behar palace area to the west has places of historic and scenic beauty but the urban encroachment is up to the river Torsa and hence the preservation of these will be an important problem. The biggest park of the city has been accommodating other urban facilities in the available space. These have reduced the

important park land area and open spaces which is an emerging urban environmental problem. Rajbari Park which once had a number of trees and plants is facing the threat from urban land use. Thus slowly in the process of providing space for increased use this has lost the vegetative cover. The increase of reservoir facility in and near the park has increased the tourist car traffic so much that, the place is not free and peaceful as a park. The cinema theatres are the other recreational centres in the city. The tremendous growth of the residential areas, existing theatres have been remodelled with residential houses. The urban residential environment is totally disturbed due to noise pollution and traffic congestion. For example Sunity Road and Mini bus stand area are the typical examples.

The expansion and increase of population has increased the crowding during festivals. The maintenance of hygiene and provision of accommodation and transport facilities have become the major urban environmental issues. The rapid urban growth has also reduced the open space available for such occasions.

The commercial activities had its main concentration in and around the CBD. As the residential areas got established, the commercial centres started spreading towards these areas. A large variety of commercial activities are in the central area. The streets are narrow and already congested with other activities. The increase of commercial activity has resulted in the crowding of people, traffic, bottleneck, increased accidents and dumping of garbage in carriage line etc. there are other shopping areas in the residential areas of the town. Again the space is crowded with goods and passenger transport with the accumulation of water thrown in the area.

The development of health centres also has shown change in its spatial spread. The old and spacious residential areas which had plenty of open grounds around them have been converted as building site for hospitals and nursing homes. The airy residential area has been crowded with hospital building which has come up haphazardly. The increase of population has given rise to demand for more water supply increase of commercial activities has not only brought congestion, but the container wastes and the wastes from the market create accumulation of the dumps. Those at the market area if not removed quickly, will breed flies and mosquitoes, which will lead to health problems of the area. The man power available is less than the accumulation, hence it does create environmental problem with dumps on the crowded road, which also emits

bad odour. All these insanitary factors lead to health problems (Environmental Report, India, 2009).

On the whole the fast changes in the various social and cultural landscapes due to rapid urban growth have revealed the above cited environmental problems and issues.

### **6.2.3 Traffic congestion:**

There are six types of congested situation for the purpose of economic analysis, though they are encountered in various combinations. These are simple interaction, multiple interaction, bottle neck, trigger neck, network and control, and general density (Vickrey, 2014).

Traffic congestion has become a common problem in every city; Cooch Behar is not an exception. During peak hours (10-11.30 AM) heavy traffic congestion is found at Kacharimore, Harishpal Chowpathi, Station Chowpathi, Bus Stand area, crossing near railway gate and its adjoining areas have been suffering from intense traffic jam, which is found to be beyond control. During the closure of rail gate at the railway ghoomti long queues of vehicles caused traffic jam. The auto has no proper terminus, as a result auto occupies the half of the width of the road caused traffic congestion in that area. Due to the absence of traffic control system at the important junctions such as Khagrabari, Mini bus stand area also caused traffic jam. The increasing number of Toto and two wheelers aggravate traffic congestion in the town.

Because of force and gathering of traffic there is vibrant about in the towns (Central Pollution Control Board, 2010). In a few areas in Cooch Behar, for example, market area, Laldighi and Sagardighi the paths are narrow to the point that the general population living on bring down stories don't get adequate light and air. Because of poor stopping facilities it additionally ends up noticeably hard to drive vehicles on streets as stopped vehicles block the traffic. In Cooch Behar the traffic numbers has developed so much that it has turned out to be hard to try and cross the streets. Along railroad lines and streets houses are being assembled unlimited on infringed areas, for the most part made of tin and without bond, which turn out to be an obstacle in future town development. Plate no. 6.1 showing some scenario of traffic jam problem at six different places for office time in Cooch Behar town.



(a)



(b)



(c)



(d)



(e)



(f)

**Plate 6.1: Some view of traffic congestion in the town: a. Traffic jam near mini bus stand, b. Traffic passing violating traffic rules, c. Lorries creating jam at office time, d. Totos making traffic congestion, e. Huge traffic moving toward town, f. Railway passing and motion less traffic.**

#### **6.2.4 Demographic problems:**

Pressure of population as its capacity acts an obstacle to its proper development of the Cooch Behar town. Growth of population accelerates the development process of the town and side by side it also hindered the growth at living standards of that centre. Thus, the study of population growth has drawn much attention of social scientists not only in India, but also abroad.

The rapid population growth after independence put tremendous pressure on urban fabric in Cooch Behar town. It is argued that the growth of population results in crisis of housing and related basic services in the town and lack of employment opportunities. Very low rate of industrialization in the town results in increase of marginal labours and informal workers, which further reflected in low economic condition of people. Urban poverty has resulted in proliferation of slums in the town. But it is found that, in the last decade the population growth is very low. In 2001 the population growth rate was 7.95 and in 2011 the population growth rate comes to 1.38 percent. There have different problems in the town behind the decrease rate of population growth. Table 3.2 and figure 3.2 in the chapter-III it is found that, the rate of increasing of urban population within the town than census town and fringe extension have been playing a remarkable role for urbanization in Cooch Behar town. It reveals that lack of infrastructural facilities and amenities within the town does not create pull factor to surrounding rural people (Figure 3.4).

#### **6.2.5 Land use problems:**

Land under different uses in Cooch Behar town, which has discussed in previous chapter (Chapter-IV) shows the evaluation and pattern of land use in the light of location and historical background.

It is found that the town is on planned town with densely populated residential areas and with a business centre named Bhabaniganj bazar, higher utilization rate can be achieved by vertical development particularly for residential areas. The commercial areas become more congested and the development takes place in an uneven manner that needs a proper plan for future development (Table 4.4).



**Plate 6.2: Changing land use around Cooch Behar town: a.** Building at fringe area, **b.** Settlement on agricultural land, **c.** Making house by filling down land, **d.** Occupying dumping ground for settlement, **e.** Urbanization by encroachment of agricultural land, **f.** Filling water body for house.

Because of town growth in the external parts of the limit of the town, numerous problems have emerged. Its fundamental reason is that in this town infringed area, tax-exempt land is accessible at a low cost. Plate 6.2 is the present scenario of fringe area of Cooch Behar town for land use changes rapidly. The quick growth of the number of inhabitants in the town has put extraordinary weight on the demand for urban spaces. Because of this demand, goings-on are being made by the local government to consolidate the fringe areas of the town, which is bringing about rushing the development of the developed area of the Cooch Behar town. The municipal organization was firmly affected by the approaches of the legislature and is liable to change its structure with political thought processes of the administration.

#### **6.2.6 Problems related slum:**

Slum and squatters are considered as a problem area for urban development in the third world countries. They are illegally occupied house and creating a nuisance of environmental pollution and degradation of urban living condition. Environmentally, these areas are not fit to stay in our urban society, because squatters provide a million of negligence of social order, economic backwardness, and drugs of leading a life besides politically unconsciousness. Most of the houses have been constructed without obtain legal permit by the municipal authority. Most urban countries of the worlds irrespective of the location and size have incurably developed as slums. Slums emerges with in relatively big urban centres and always tend grow and multiply (Mandal, 2000). The concept of slum as given by R.E. Dickinson can notes as extreme condition of bight in which the housing amenities and access to safe drinking water supply. Mostly the risked of public health problems are corresponding high. Clearance of such squatter settlements or slums and re-housing, the population in more distance areas is problematic. It has recently happened in massive. It has been for there from job opportunities which lies near the city centre (Mandal, 2000).

##### **6.2.6.1 Definition of slums:**

The USA housing Act, 1949, defines a slum as any predominantly residential area where the dwellings, which by any reason of dilapidation, overcrowding, faulty arrangement of design, lack of ventilation, lighter sanitary facilities or any combination of these factors are detrimental to safety, health or morals. This definition has been accepted by the government of India in its slum areas improvement and clearance Act, 1956.

Directory of sociology has defined it as an area of physical and social decadence, on the physical side; the slum is identified by the presence of run down, over aged neglected houses and facilities. On the social side it is identified by poverty and various forms of social disorganization. The existence or absence of a slum is any community- here the poor people and social out caste live. In a large city there may be various types of slums, each of which may be occupied by a different population or social class.

United Nations in its report (Urban Land Policies, 1952), stated that slum meant a building group of buildings or area characterized by overcrowding, deterioration, unsanitary conditions or absence of facilities or amenities which because of these conditions or any of the harmful to health, safety or morals of its inhabitants or the community. The task force on housing and urban development, appointed by the government of India (Vol. IV 1983) have described the slum as follows:

The term slum is generally used in a loose sense designating areas which are seen to be over crowded, dilapidated, faultily laid out and lacking in essential services. To some extent, it is a comparative concept which designates certain areas as slums which are seen as much worse in living conditions than some societal norm for planning as well as for legal purposes, however, which was originally done in India in the central slum areas (improvement and clearance) Act, 1956 which has since then been emulated by II states.

In legal terms, section 3 of the 'Slum Area Act 1956' (Government of India) defines slums as areas where buildings are in any respect unfit for human habitation and are by reason of dilapidation, overcrowding, faulty arrangement of streets, lack of ventilation, light or sanitary, or any combination of these factors, are detrimental to safety, health or morals.

According to Environmental Improvement of Urban Slums (EIUS) programmers, Government of India (1971) adopted the following definition for the slum area.

“A slum area means any areas where such dwelling predominate which by reason of dilapidation, overcrowding faulty arrangement of design of building, narrowness or faulty arrangement of street, lack of ventilation, light or sanitation facilities, inadequacy of open spaces and community facilities or any combination of these factors are detrimental to safety, health or moral”.

According to the Maharashtra slum areas act, 1971 a slum is any area of sub-standard housing. In keeping with this definition many old localities with dilapidated

buildings have been declared as slums. In its census of slum (1976) Bombay Municipal Corporation adopted a narrow definition confining the census to unauthorized hutments or chawl type semi-permanent structures. BMC's coverage is more compatible with the accepted idea of an Indian slum-a congested, insanitary locality consisting of clusters of hutments.

Thus we may conclude that slums are urban areas where the physical and social conditions are poor. Where dwelling have inadequate ventilation, toilet and bathing facilities, no proper streets, lanes and drains and filthy surrounding, dam and improperly planned, deteriorated, overcrowded, insanitary which jeopardize welfare of the people and the areas, which are often occupied by the poor. In other words, slums are residential areas that are physically and socially deteriorated and also economically backward. Suck, in varying combinations, are the major characteristics of urban slums.

#### **6.2.6.2 General nature of slums and squatters settlements:**

Slum is an over on crowd and squalid district of city or a town usually inhabited by the very poor. Slum can be found in most large cities around the world. Slums are usually characterized by high rates of poverty and one breeding centres of many social problems such as crime recreational drugs, alcoholism and unsanitary conditions. The terms are often now used interchangeable slums and the ghettoes originally referred to a neighbourhood based on share ethnicity. In many slums especially in poor countries people live in very narrow alley that do not allow vehicles (like ambulance and fire trucks) to pass. The lack of services such as routine garbage collection along garbage to accumulated in huge quantities. In some slums people collect the city cans for a living later recycling them for the money.

Urban areas as we know are characterized by continuous changes. They should change, because they are dynamic or slow. Whether the change is slow or fast, it is found that some urban areas grow with adequate facilities and some without. In this process of change a few avenges become quite clean and attractive while other dirty, disordered. As opposed to attraction and healthily places, these are some areas or noise, confusion, dirt, ill health, tension and congestion, these areas of confusing and their problems are negative in character such areas of extern negative character are caused slum.

The people inhabiting the slums of several Indian cities are denied even the basic gifts of nature that is air and light. They live in deep, dingy and dilapidated buildings without any sanitation. It is really very important to know their living condition. Slums and squatter are the dirty urban areas where the drains are full of mud and refuse, waste of the houses, full of filth and flies, mosquitoes and insects abound. The roads are either unsealed or full of potholes where even passersby have to wade through muddy water and creating a sense of danger in walking even during daytime what to lack of night. The slums have mostly no road lights, prevalence of service latrines and the road corners are full of heaps of garbage (Mandal, 2000).

#### **6.2.6.3 Causes of formation of slums:**

- a. **Rapid industrialization:** industrial growth and employment opportunities in towns and cities have acted as powerful magnets to attract the rural population. The workers employed in the factories generally make their habitation as near to the place of work. They are low waged persons and cannot afford daily travelling from the distant place in the city. Hence in a short time the buildings occupy the available land or open space without any proper planning. This gives rise to the formation of slums. Finally the industrial town taken together constitutes a slum town.
- b. **Population growth:** there is a lag between the tremendous growth of population and the construction of houses. These shortages manifest themselves in creating slums.
- c. **Lack of zoning:** if zoning regulations are not enforced in the early development of town there are changes for industrial areas very soon there will be overcrowding with the formation of slums.
- d. **Decentralization:** by decentralization, the rich and middle class people move out to the extension areas leaving the poor in the overcrowded part of the town to make it more unsanitary. As a result the slum colonies start mushrooming at a fast rate.
- e. **Lack of education:** if the inhabitants are lacking in education they may not pay attention to improve the living conditions lose civic interest and neighbouring spirit. They are therefore easily attracted by social evils vice and delinquency.
- f. **Poverty:** the main causes for the slum formation can be described in the one word as poverty. The meagre and unsteady income leaves the family with no other choice but to direct all the energies in earning in earning their daily bread

and come minimal clothing. It is difficult for them to pay heavy rent for a decent living. They therefore move in slum areas for nobody with black money builds decent houses for the slum-dwellers.

- g. Repair to maintenance:** there is nothing wrong with old houses if they are looked after from time to time. But Indian repair and maintenance are the foreign words. Hence most of these building remain in a state of decay the formation of slums.
- h. Inadequate power:** lack of adequate power and enforcing the some by the local authority turning nelson's eye for the proper development of the town are also the reasons for the formation of slums if preventive measure are not taken the town will be the slums of tomorrow. Even Chandigarh which is a planned capital is growing beyond the rounds of rigid planning is suburbs and slums.

#### **6.2.6.4 The slum area of Cooch Behar town:**

The basis the slum has been identified by the Cooch Behar town authority: Cooch Behar town declared different parts of it as a slum area on the basis of the following criteria-

- a) A highly populated area characterized by sub started housing squalor often used in the plural
- b) To endure condition or accommodations that is worse.
- c) The town demarcated this slum area on the basis of poverty and inferior living condition.
- d) The most of household are either occupied the vacant land of lived in a that place which distributed by some political party.

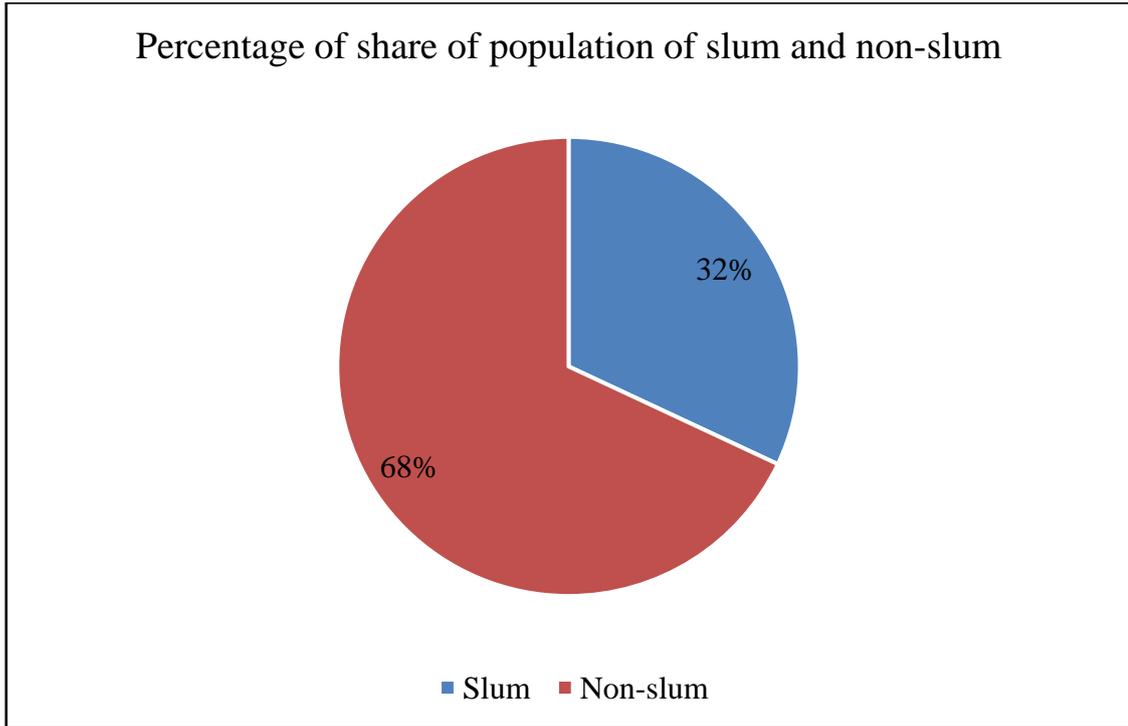
On the basis for this following criteria Cooch Behar town identify 50 slum areas on it. The identification was held in 1985. This identification was a part of "slum clearance act-1985" under central government. Table 6.6 and figure 6.7 showing the location of all slums in Cooch Behar town and gives the details of slum population in the town.

As per 2001 Census, total population of Cooch Behar Town is 76,874, out of which 24,270 people live in slums. From the above it can be observed that due to rapid growth, the percentage of slum population works out to approx. 32% of the total population. This calls for increased demand in basic civic services in slum (Figure 6.6).

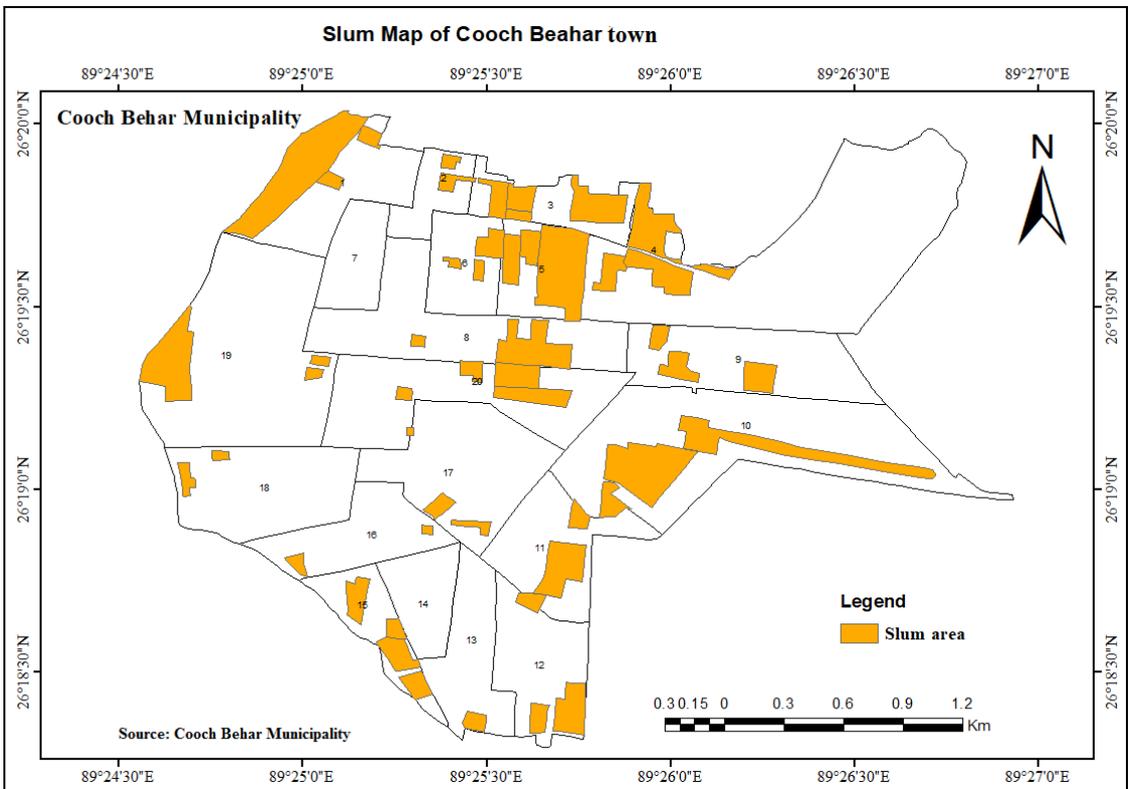
**Table 6.6: List of slum with population in Cooch Behar town**

<b>Ward No.</b>	<b>Name of slum</b>	<b>Population</b>
1	Mantu Das Pally, Rajmata Pally, Shyama Prosad Pally	1860
2	Sibjagya Bye Lane, A.P.C. Roy Road Bye Lane	143
3	Dhakeswari Colony, Kalabagan Netaji Colony, Ashutosh Colony-I, Ashutosh Colony-II.	1445
4	S.N. Road Bye Lane, Kameswari Road Bye Lane	973
5	Salbagan West, Rabi Das Pally, New Dabri, Sukanta Sarani	2923
6	Priyaganj Colony, Dhobi Patty, Badyakar Patty, Silver Jubilee Road Bye Lane	801
7	N.A.	
8	Natun pally, dal patty, kashai patty	2199
9	Poultry farm colony, kharimala khagrabari	1083
10	Malgudam Road, Vivekananda Street Bye Lane, Shib Dighi Bye Lane	1889
11	Gandhi Colony, Panthasala Road Bye Lane	1840
12	B.C. Road Bye Lane, Rabindra Nagar Colony, Golaptala Colony	1213
13	Extrim South Unit	224
14	N.A.	
15	Mistri Para, Matsajibi Basti, Mahamadan Basti, 1957 Colony	1774
16	K.D. Road Bye Lane, Ghosh Para Bye Lane	181
17	PHE Basti, Magazine Road Bye Lane	236
18	Temple Street Bye Lane, Sahitya Sava Bye Lane	326
19	Sushil Das Pally, Lichutala Colony-I, Jhamala Patty, Mustafa Para	2644
20	Lichutala Colony, Upadhaya Para, Khalasi Patty	978

**Source:** Office of the Cooch Behar Municipality, 2012.



**Figure 6.6: Percentage of slum and non-slum population in Cooch Behar town.**



**Figure 6.7: Location of slum in Cooch Behar town.**

**Table 6.7: Socio economic profile of slum people**

<b>Slum name</b>	<b>Ward</b>	<b>Population</b>	<b>BPL</b>	<b>Illiterate Population</b>	<b>No of Drop out children in slum</b>	<b>No. of non-earning Population in slum</b>	<b>No of families having woman earning member in slum</b>	<b>No of slum population remote access to Drinking water source (collection time &gt; 20 min)</b>	<b>Slum population having access road to house as Kutchha road</b>
Mantu Das Pally	1	1582	1322	190	315	205	189	522	300
Rajmata Pally	1	121	90	15	24	15	14	39	22
Shayama Prasad Pally	1	157	101	19	32	18	18	51	29
Shibjogga Road Bye lane	2	79	72	9	16	10	9	26	15
A.P.C Road Bye Lane	2	64	58	8	13	8	7	21	12
Dhakeswari Colony	3	483	441	58	97	62	57	159	91
Kalabagan Netaji Colony	3	218	199	26	43	28	26	71	41
Ashutosh Colony –I	3	488	445	59	97	63	58	161	92
Ashutosh Colony – II	3	256	234	31	51	33	30	84	48
S.N.Road Bye Lane	4	716	653	86	143	93	85	236	136
Kameswari Road Bye lane	4	257	234	31	51	33	30	84	48
Salbagan west	4	713	651	86	143	92	85	235	135
Rabi Das Pally	5	600	547	72	120	78	72	198	114
New Dabri	5	1386	1235	186	276	180	166	457	263
Sukanta Sarani	5	314	286	38	63	40	37	103	59
Priyogonj Colony	6	401	316	48	80	52	48	132	76
Dhobi Patty	6	138	126	17	28	17	16	45	26
Badyakar patty	6	149	136	18	30	19	17	49	28

Silver Jubilee Road Bye lane	6	113	103	14	23	14	13	37	21
Nutun Pally	8	1875	1411	225	375	243	225	618	356
Dal patty	8	125	84	15	25	16	15	41	23
Kashai Patty	9	199	182	24	40	25	23	65	37
Paultry Firm Colony	9	421	384	51	84	54	50	138	79
Kharimala Khagrabari	9	74	68	9	15	9	8	24	14
Malgudam Road	10	654	397	78	130	85	78	215	124
Vivekananda Street Bye Lane	10	642	486	77	128	83	77	211	121
Shib Dighi Bye Lane	10	593	441	71	119	77	71	195	112
Gandhi Colony	11	1945	645	233	388	252	233	641	369
Panthashala Road Bye Lane	11	95	47	11	19	12	11	31	18
B.C.Road Bye Lane	12	157	143	19	31	20	18	51	29
Rabindra Nagar Colony	12	322	294	39	64	41	38	106	61
Golaptala Colony	12	734	670	88	146	95	88	242	139
Extreme South Point	13	224	194	27	45	29	26	73	42
Mistri Para	15	656	499	79	131	85	78	216	124
Matshajibi Basti	15	578	507	69	116	75	69	190	109
Mahamedan Basti	15	359	278	43	72	46	43	118	68
1957 Colony	15	181	125	22	36	23	21	59	34
K.D.Road Bye Lane	16	121	110	15	24	15	14	39	22
Ghosh Para Bye Lane	16	60	55	7	12	7	7	19	11
PHE Basti	17	139	127	17	28	18	16	45	26
Magazine Road Bye Lane	17	97	88	12	19	12	11	32	18
Temple Street bye Lane	18	170	155	20	34	22	20	56	32
Sahitya Sava Bye Lane	18	156	142	19	31	20	18	51	29

Sushil Das Pally	19	1803	845	216	360	234	216	594	342
Lichutala Colony-I	19	708	446	85	141	92	84	233	134
Jhamela Patty	19	59	34	7	12	7	7	19	11
Mustafi Para	19	82	45	10	16	10	9	27	15
Lichutala Basti	20	187	121	22	37	24	22	61	35
Upadhaya Para	20	88	51	11	18	11	10	29	16
Khalashi Patty	20	1003	615	120	201	130	120	330	190
Dabri Mahalla	20	1469	1040	176	294	190	176	484	279
S.J.Road Bye Lane	20	59	44	7	12	7	7	19	11

**Source:** Cooch Behar Municipality.

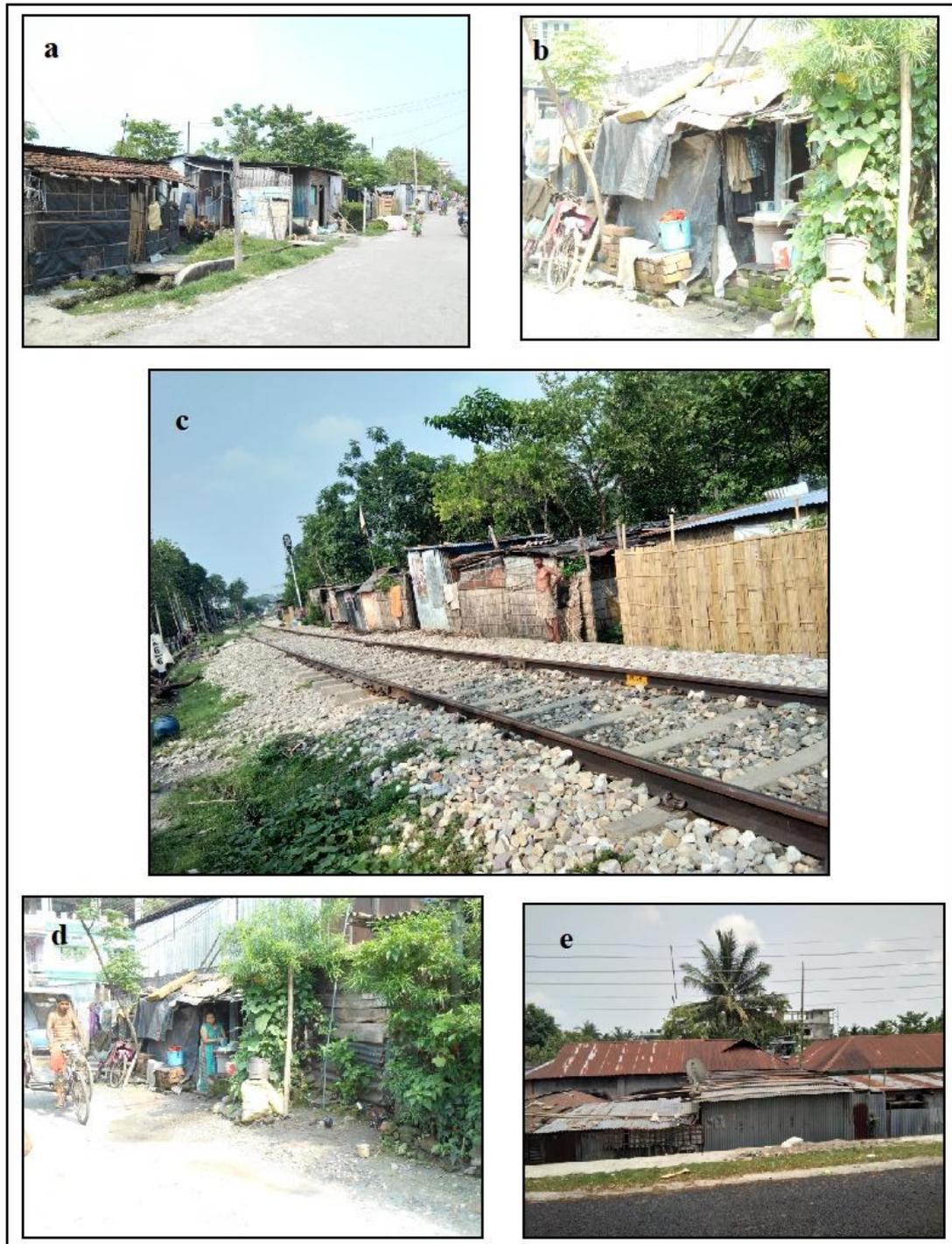
#### **6.2.6.5 Problems of slum dwellers:**

The household survey report and information from town that is showing in table 6.7 giving the socio-economic profile and plate 6.3 showing the situation of the slum dwellers and finds out some problems of slum dwellers which are follows:

**Water Supply:** In most of the slums there is a crisis of the drinking water. Only in few slums piped water is provided presently and rest of them mostly depend on the hand tube well. The technical group of municipality also suggests some changes in the rules so that slum people can have pipeline service at low cost. Presently emphases have been given on the house connectivity in the slums.

**Sanitation:** This is one of the most important services to be provided in the slum. Most of the slum people have dug well of some unsanitary system. This is to be replaced by 2- pit pour flash latrine. There is scope of providing 15 nos. community latrines within the slums, as most of the slum dwellers possess a plot of small land.

**Drainage System:** In most of the slums drainage network is not adequate. These areas are generally low having water-logging problems. For proper drainage system, plinth level of each household is to be raised up to a standard height. Low open area is to be filled and drainage network with in all slums is to be designed. This system is to be connected to the main drain network of the ULB. Thus in most cases drainage system will not be affected without this development.



**Plate 6.3: Some view of slum hoses and their location, a. Slum house besides high road b. Near Bihari patty c. Besides rail line d. Near Kotwali police station e. Beside Torsa river.**

**Road:** Generally, the roads in the slums are kutchra with width varying from 1.2 m to 2.4 m. However, in some slums there are roads having width more 2.4 m connected to road network of the town. Technical studies suggest significant development in road network in all the slums.

**Solid Waste Management:** At present in most of the wards door-to-door collection of the waste through private agencies have been introduced. This is to be extended in slum areas as well.

**Street Lighting:** In the prioritized slums there are about 10-15% houses where no electricity is available. Firstly some arrangement is to be made with WBSEDCL to provide electricity to these households. For street lighting, joint inspection will be required with WBSEDCL and separate plan is to be made for each slum.

**Other Infrastructure:** In majority of the slum there is no common land and private other infrastructure. Only in some slums there is some ‘vested land’ where community hall and community Seva Kendra can be provided.

### 6.3. People’s perception on problems:

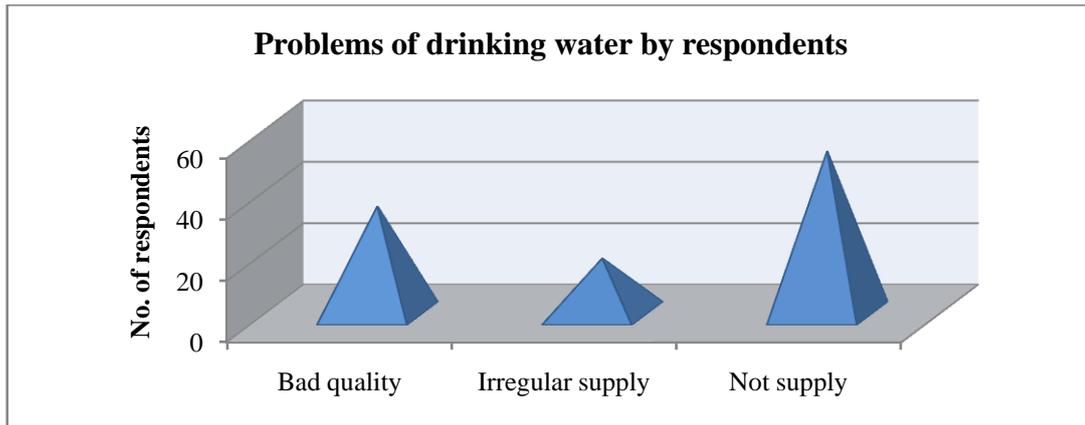
#### 6.3.1 Satisfaction with the existing drinking water supply system:

Table 6.8 and figure 6.8 presents the satisfaction status of the sample residents regarding existing drinking water facilities of Cooch Behar town. Among the respondents 50 percent said that main problem of drinking water is for not supply from the municipal authority. About 33 percent express views about bad quality of drinking water. The reasons behind the lower level of satisfaction are issues like poor quality of water, short time duration of water supply, insufficient water tap, and unavailability of household connection and long distance of water tap from the houses.

**Table 6.8: Problems of drinking water by respondents**

Responses	Frequency	Percent	Cumulative Percent
Bad quality	35	33.02	33.02
Irregular supply	18	16.98	50
Not supply	53	50	100

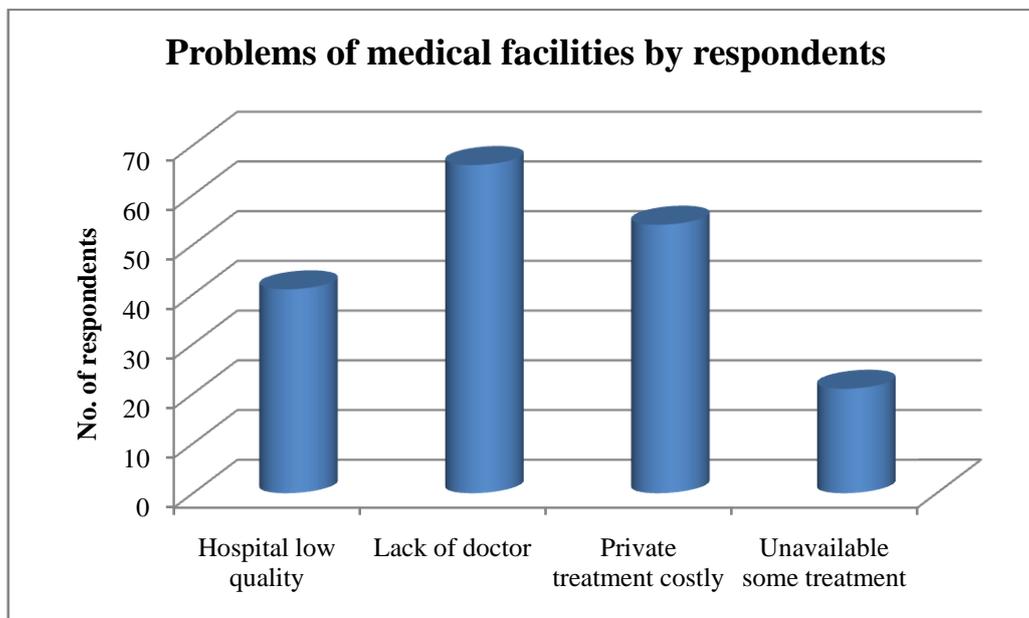
**Source:** Household Survey, 2017.



**Figure 6.8: Problems of drinking water by sample dwellers.**

### 6.3.2 Satisfaction with the existing medical facility of Cooch Behar Town:

Responses obtained from sample household in Cooch Behar town showed in Table 6.9. The majority of the respondent household (60.67%) were satisfied with the medical facilities in Cooch Behar town, while about 39.33 percent household unsatisfied about the existing medical facility of the town. Main reasons for unsatisfied are shortage of doctors in hospital, lack of doctors and medicine for critical disease, high rate of doctors' fees, wrong treatment by nursing homes, unavailable of medicine in fare price shop set by govt. of West Bengal etc.



**Figure 6.9: Problems of medical facilities by sample dwellers.**

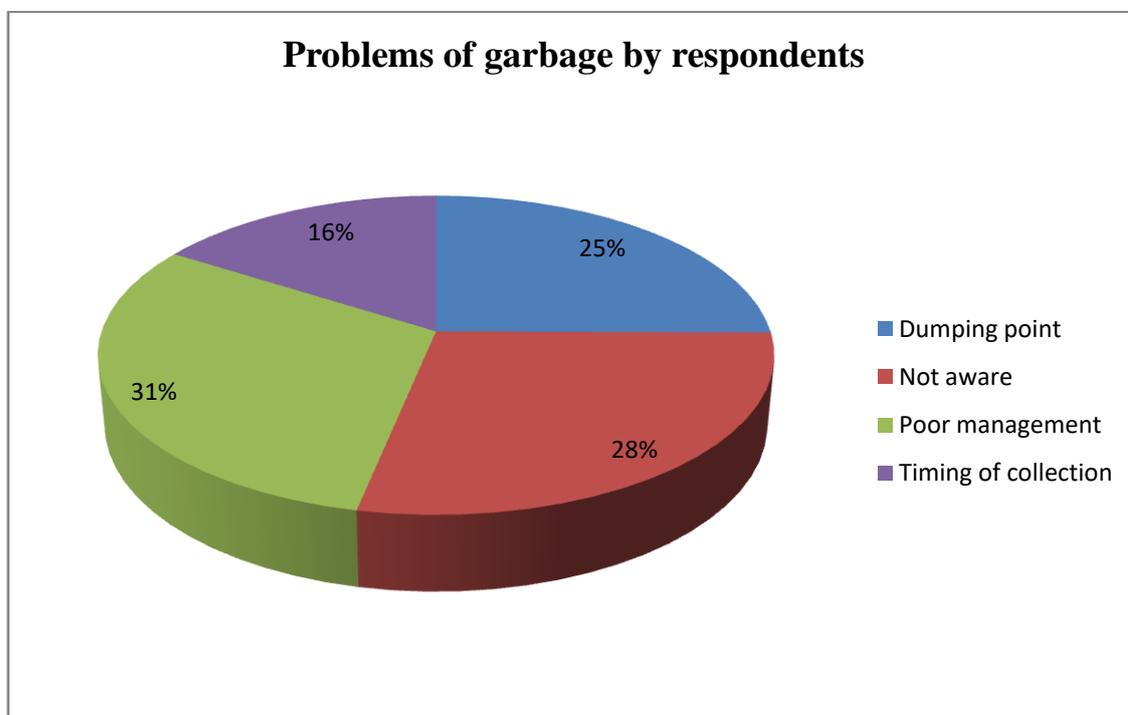
**Table 6.9: Problems of medical facilities by respondents**

Responses	Frequency	Percent	Cumulative Percent
Hospital low quality	41	22.52	22.52
Lack of doctor	66	36.26	58.78
Private treatment costly	54	29.67	88.45
Unavailable some treatment	21	11.53	100.0

**Source:** Household Survey, 2017.

### 6.3.3 Problems with the existing quality of garbage collection system:

Table 6.10 and figure 6.10 reveals the satisfaction status of the residents regarding existing causes of garbage problem. About 53 percent residents are not aware while only 30.73 percent claimed that garbage creates for poor management of present system. The reasons behind the lower level of satisfaction are issues like clearance of dump bins, sweeping of roads, clearance of garbage from open spaces, insufficient community bins and irregularity of door to door collection system.



**Figure 6.10: Problems of garbage by sample dwellers.**

**Table 6.10: Problems of garbage by respondents**

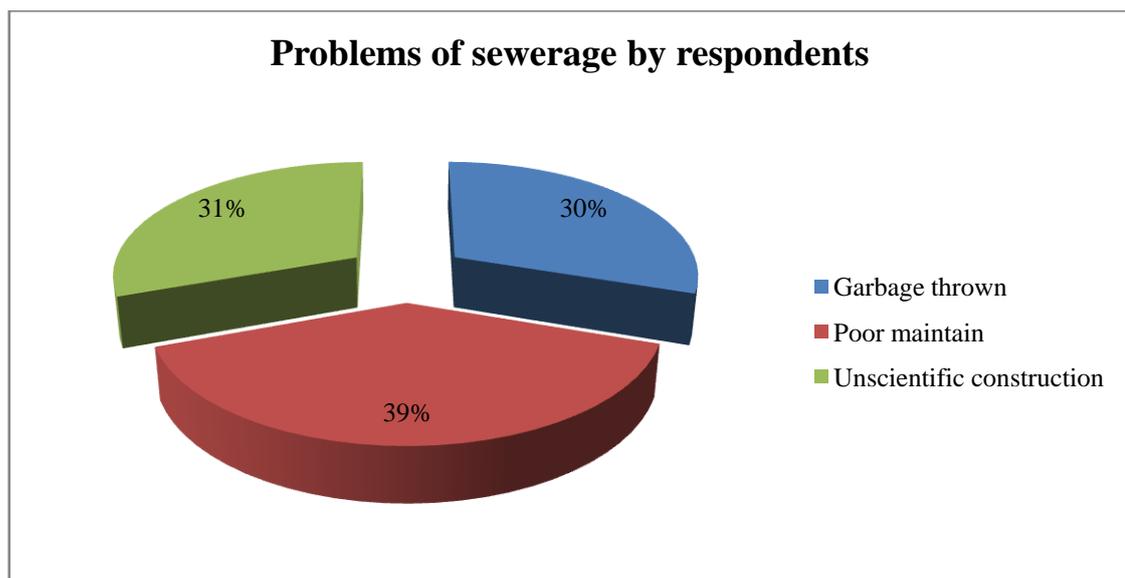
Responses	Frequency	Percent	Cumulative Percent
Dumping point	58	25.10	25.10
Not aware	65	28.13	53.23
Poor management	71	30.73	83.96
Timing of collection	37	16.01	100.0

**Source:** Household Survey, 2017.

### 6.3.4 Problems with the existing sewerage system:

Table 6.11 and figure 6.11 shows the satisfaction status of the residents regarding existing sewerage management system. It can be observed that 39.24 percent of the households are faced sewerage problems for poor maintenance, while about 30% are faced problem for unscientific construction in sewerage system of Cooch Behar town.

The areas that would need to be addressed in the wastewater management are as follows: Sanitation policy should be implemented in full; sensitization of good wastewater management practices should be conducted among both the public and authorities, wastewater collection from households should be regular, and that the authorities should be involved, the wastewater collection system, which includes the gutter and the pipes, need to be improved (Plate 6.4); wastewater must be treated before being drained into the river Torsa and there is a need for an effective disposal system (Plate 6.5).



**Figure 6.11: Problems of sewerage by sample dwellers.**

**Table 6.11: Problems of sewerage by respondents**

Responses	Frequency	Percent	Cumulative Percent
Garbage thrown	80	30.18	30.18
Poor maintain	104	39.24	69.42
Unscientific construction	81	30.56	100.0

Source: Household Survey, 2017.

### 6.3.5 Satisfaction with the existing electricity supply system:

The majority of the households (80.67%) indicated that they faced electricity service related problems which provided by WBSEDCL, while only 19.33 percentage are satisfied with the existing electricity services (Table 6.12).

**Table 6.12: Electricity service related problem of the sample respondents**

Response	Frequency per category	Rel. frequency per category (%)	Lower bound on frequencies (95%)	Upper bound on frequencies (95%)
No	58	19.33	14.86	23.80
Yes	242	80.67	76.20	85.14

Source: Household Survey, 2017.

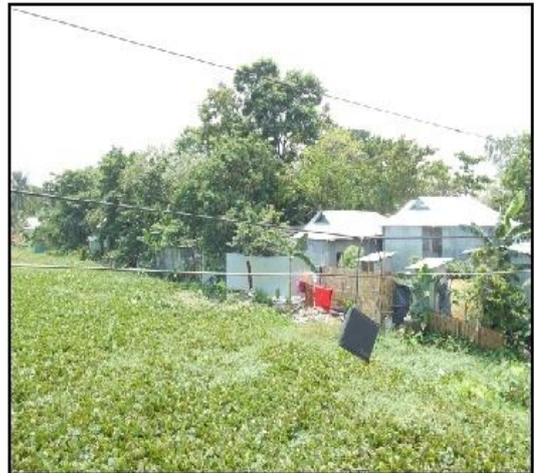
### 6.3.6 Natural calamities faced by the sample respondents:

To make informed decisions about natural hazard risk reduction, it is essential to understand the population's experiences and perceptions of natural hazards. The survey asked respondents for information regarding their personal experiences with natural disasters in Cooch Behar town. The primary objective of these questions was to create a natural hazard profile of respondents to better understand how urban residents perceive natural hazards. To understand the effectiveness of current outreach activities regarding home and family safety, the survey asked respondents about the types of information they receive on how to make their home and family safer. By identifying communication tools that have been effectively used in the past, the town of Cooch Behar can continue to make use of or augment the use of these effective sources.

Plate 6.4 and plate 6.5 showing the bad conditions of environmental situation of Cooch Behar town.



( a )



( b )



( c )



( d )



( e )



( f )

**Plate 6.4: Bad environmental conditions: a.** Eutrophication in a pond **b.** Eutrophication in a drain **c.** water logging **d.** Kutcha drain **e.** road side heap of waste **f.** Drain filled by garbage.



(a)



(b)



(c)



(d)



(e)



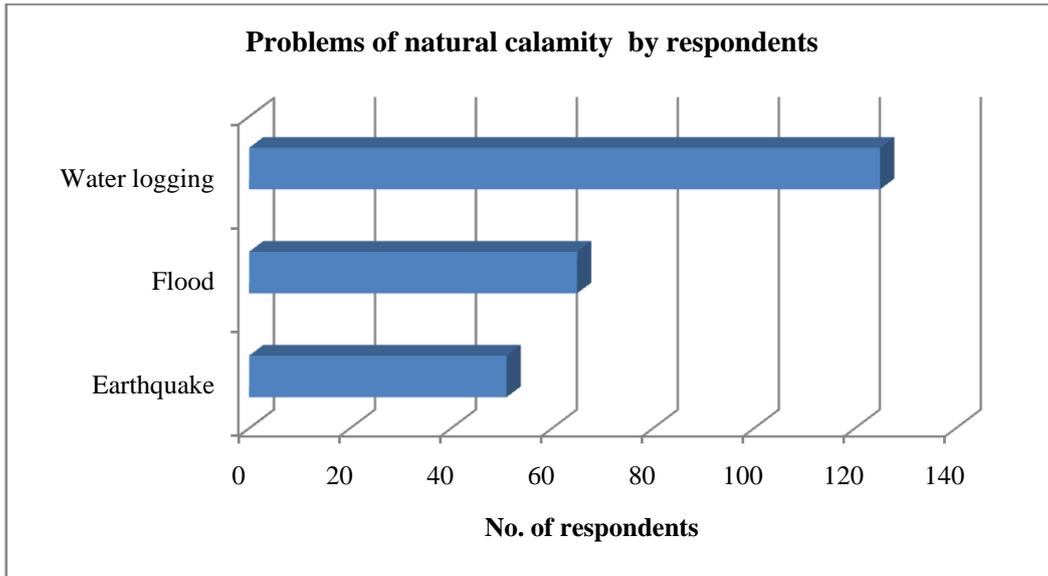
(f)

**Plate 6.5: Poor maintenance of drainage: a. Bad clearing system b. Blockage drain c. Drain covered by grass d. Kutchra drain e. Mud in drain f. Drain filled by plastic.**

**Table 6.13: Problems of natural calamity by respondents**

Responses	Frequency	Percent	Cumulative Percent
Earthquake	51	21.16	21.16
Flood	65	26.97	48.13
Water logging	125	51.86	100.0

**Source:** Household Survey, 2017.



**Figure 6.12: Problems of natural calamity by sample dwellers.**

The survey results indicate that above 50% of the respondents have personally experienced natural hazard within the past few years or since living in Cooch Behar town is the water logging (Table 6.13). They have been experienced a natural hazard; earthquake, windstorm, and flood were the most frequently cited hazards. The figure 6.12 showing that flood is the second important natural calamity of Cooch Behar town.

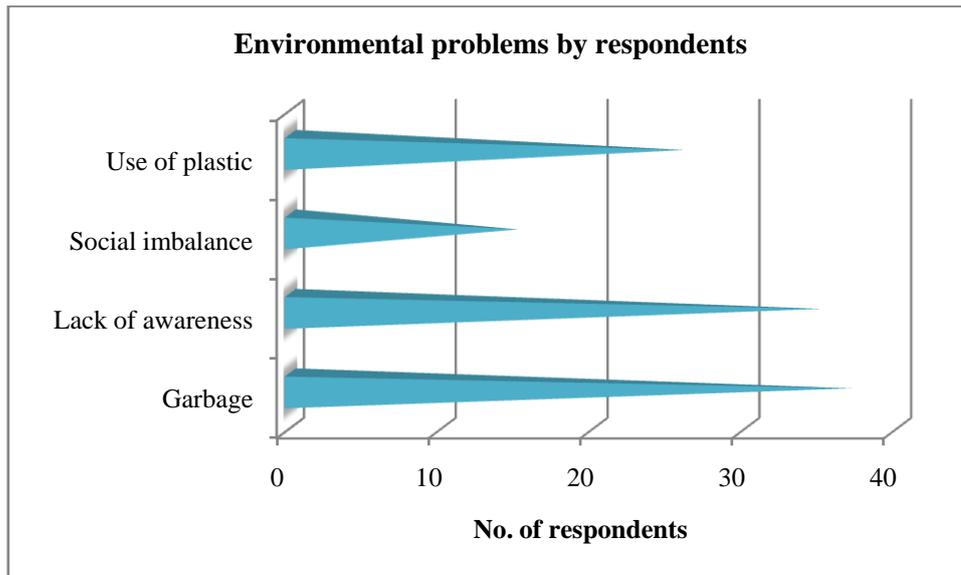
**6.3.7 Respondents awareness to Environmental Problems:**

Table 6.14 and figure 6.13 shows the extent of level of interest of the residents in environmental issues. About 32 percent respondents reported that garbage is the main causes for environmental problems followed by 30.97 percent who reported that lack of awareness create environmental problems. Therefore, it can be said that most of the residents are not concerned about problems caused by improper management of solid waste generated in the town.

**Table 6.14: Environmental problems by respondents**

Responses	Frequency	Percent	Cumulative Percent
Garbage	37	32.74	32.74
Lack of awareness	35	30.97	63.71
Social imbalance	15	13.27	76.98
Use of plastic	26	23	100.0

**Source:** Household Survey, 2017.



**Figure 6.13: Environmental problem by sample dwellers.**

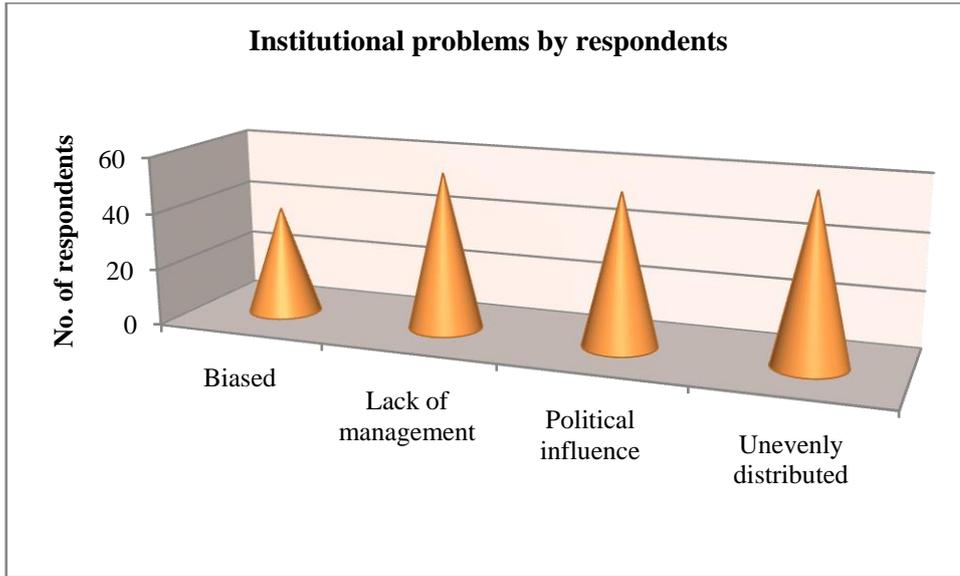
### 6.3.8 Satisfaction with the existing institutional system:

Table 6.15 and figure 6.14 reveals the satisfaction status of the residents regarding existing institution system in Cooch Behar town. About 28.43 percent residents said that institutional problem only for unevenly distribution while 26.96 percent claimed that lack of management; 25.98 percent for political influence, 18.62 percent for biasness.

**Table 6.15: Institutional problems by respondents**

Responses	Frequency	Percent	Cumulative Percent
Biased	38	18.62	18.62
Lack of management	55	26.96	45.58
Political influence	53	25.98	71.56
Unevenly distributed	58	28.43	100.0

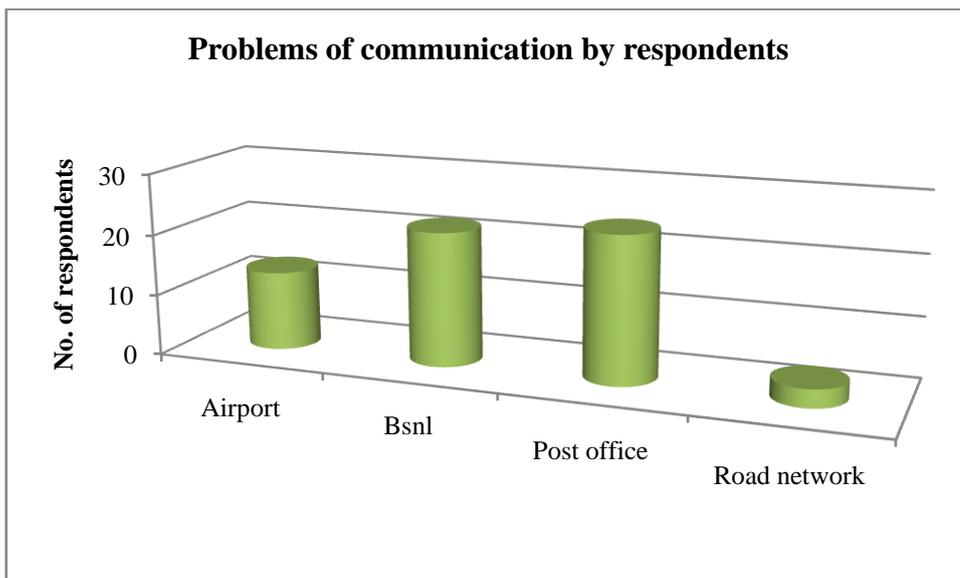
**Source:** Household Survey, 2017.



**Figure 6.14: Problems of institutional by sample dwellers.**

**6.3.9 Problems with the existing communication system:**

The result in Table 6.16 and figure 6.15 shows that in Cooch Behar town 38.70 percent of the respondents are facing problem with post office and 35.48 percent express problem with the connection of BSNL service. Other way stop airport also has creates a communication problem for some respondents and a little respondent view on road network system.



**Figure 6.15: Problems of communication by sample dwellers.**

**Table 6.16: Problems of communication by respondents**

Responses	Frequency	Percent	Cumulative Percent
Airport	13	20.96	20.96
BSNL	22	35.48	56.44
Post office	24	38.70	95.14
Road network	3	4.83	100.0

Source: Household Survey, 2017.

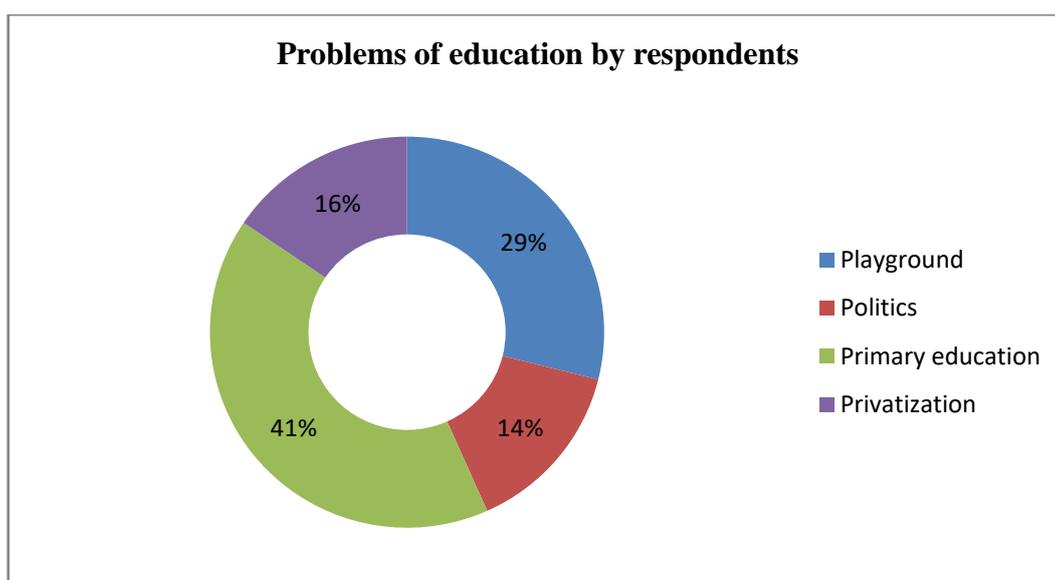
**6.3.10 Satisfaction with the existing educational facility:**

Table 6.17 and figure 6.16 presents the satisfaction status of the sample residents regarding existing problems of educational facilities of Cooch Behar town. About 41 percent residents are not satisfied with primary education while only 14 percent claimed that they are satisfied with the present political system. Besides these, 28.88 percent said about playground unavailable in the educational institutions and 15.55 percent are fear of privatization in educational system.

**Table 6.17: Problems of education by respondents**

Responses	Frequency	Percent	Cumulative Percent
Playground	26	28.88	28.88
Politics	13	14.44	43.32
Primary education	37	41.11	84.43
Privatization	14	15.55	100.0

Source: Household Survey, 2017.



**Figure 6.16: Problems of education by sample dwellers.**

### 6.3.11 Satisfaction with the socio-cultural set-up of Cooch Behar town:

Households were asked to rate their level of satisfaction with the socio-cultural set-up of the town. Their opinions are shown in Table 6.18 and figure 6.17. Most of the respondents (44.06%) are faced socio-cultural problems for lack of open space. Only 35.59 % respondents said they faced some socio-cultural problems for noise pollution. Reasons behind the high level of satisfaction with socio-cultural set Cooch Behar town are sufficient number of cultural bhawan for festivals and cultural programs, different religious programs all over the year with in a peaceful situation.

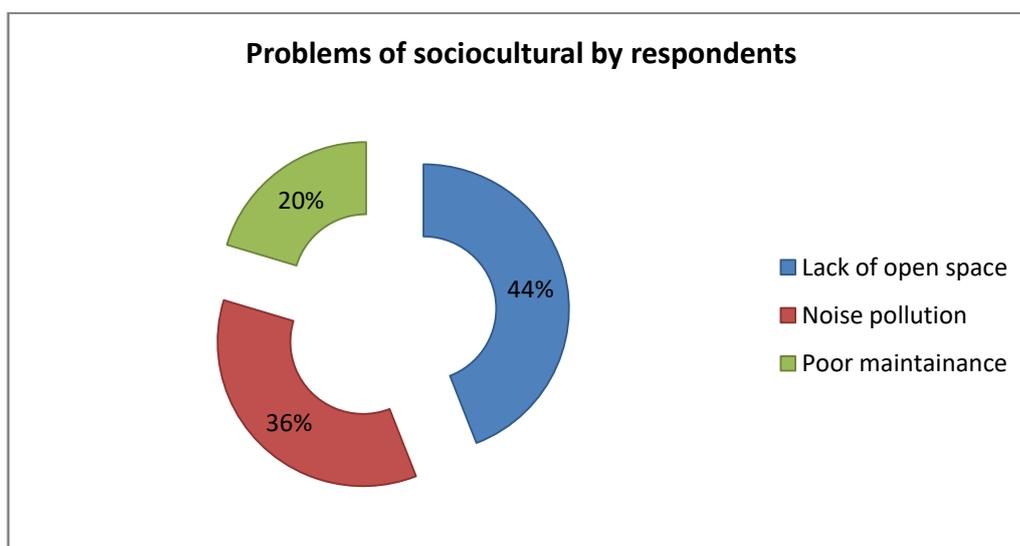


Figure 6.17: Problems of socio-cultural by sample dwellers.

Table 6.18: Problems of socio-cultural by respondents

Responses	Frequency	Percent	Cumulative Percent
Lack of open space	26	44.06	44.06
Noise pollution	21	35.59	79.65
Poor maintenance	12	20.33	100.0

Source: Household Survey, 2017.

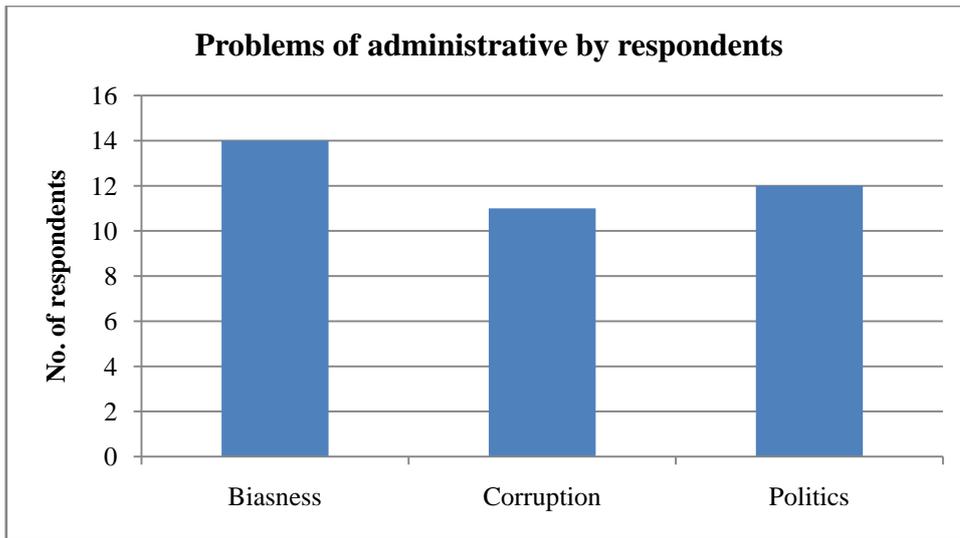
### 6.3.12 Satisfaction with the existing Administrative set-up of Cooch Behar town:

Table 6.19 and figure 6.18 showing the status of the sample residents regarding existing administrative system in Cooch Behar town. About 37.83 percent residents say they faced some administrative problems for biasness while 32.43 percent respondents said that politics is the problem for administrative set up in the town.

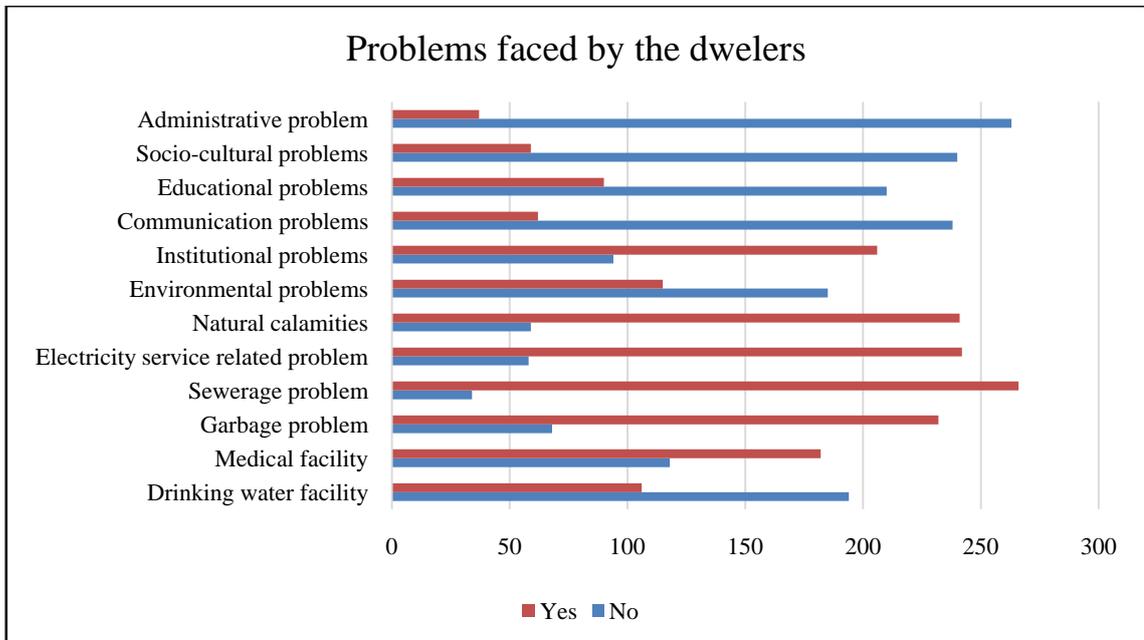
**Table 6.19: Problems of administrative by respondents**

Responses	Frequency	Percent	Cumulative Percent
Biasness	14	37.83	37.83
Corruption	11	29.72	67.55
Politics	12	32.43	100.0

**Source:** Household Survey, 2017.



**Figure 6.18: Problems of administrative by sample dwellers.**



**Figure 6.19: Problems faced by the sample dwellers.**

Figure 6.19 showing the details of different problems of sample dwellers in Cooch Behar town. Where it reveals that besides natural problems there are some manmade problems also in the town.

#### **6.4 People’s perception on solution of waste-management in Cooch Behar town:**

Now a day’s Private Public Partnership (PPP) system is being popular in social service. In this regard Willing To Pay (WTP) model is fruitful in urban service.

##### **6.4.1 Response of sample dweller on Willingness To Pay (WTP):**

The respondents’ willingness to pay for improved management system to deal with solid wastes generated in the town is presented in table 6.20. Survey asked the respondents whether they are willing to pay anything (Financially) or not to get better service (Kumar and Gaikward, 2004). Most of the respondents (77.33 percent) were willing to pay some amount of money while 22.67 percent were not willing to pay anything. Those who were not willing to pay anything gave following reasons that proper waste management is the responsibility of the government and municipal authority, secondly better waste collection and disposal services are of no direct economic benefit, thirdly they prefer disposing their waste either by burning or burying them directly, fourthly some of them were reported that they do not have sufficient income to pay extra money for the waste collection service.

**Table 6.20: Willing To Pay**

<b>Response</b>	<b>No of respondent</b>	<b>Percentage</b>
No	68	22.67
Yes	232	77.33

**Source:** House hold Survey, 2017.

##### **6.4.2 Determinants of Willingness To Pay:**

To study the factors that might have influenced the respondents, willingness to pay for improved waste management system a binary logit model was estimated. Respondents’ WTP was defined in two categories i.e. zero and one, according to the response given by the respondents during the survey. Zero WTP depicted that respondent is not willing to pay while the one was showing that respondent is willing to pay (Ezebilo, 2013). The responses i.e. respondents’ WTP was considered as dependent variable (Table 2.21).

On the other hand the factors which influence people's WTP i.e. independent variable consisted of age, sex, marital status, number of years spent in formal education by the respondent, households' average monthly income. The results of regression after finalizing the variables are presented in Table 6.20.

**Table 6.21: Goodness of fit statistics (Variable WTP)**

<b>Statistic</b>	<b>Independent</b>	<b>Full</b>
Observations	300	300
Sum of weights	300.000	300.000
DF	299	276
-2 Log(Likelihood)	321.130	207.479
R <sup>2</sup> (McFadden)	0.000	0.354
R <sup>2</sup> (Cox and Snell)	0.000	0.315
R <sup>2</sup> (Nagelkerke)	0.000	0.480
AIC	323.130	255.479
SBC	326.834	344.370
Iterations	0	9

The coefficients associated with marital status, education and income have positively effects on WTP. On the other side coefficient associated with sex and age has negatively effect on WTP. Education was found to be positively associated with the willingness to pay for improved solid waste management (Khattak and Amin, 2013). The higher the years of formal education received by the respondents, the higher the probability of the person's willingness to pay for waste management as education positively affects the public attitudes towards health and hygiene. Similar result has been reported in other study by Khattak and Amin (2013). In their study, they found that as individuals receive higher education, they tend to understand the need for waste management better and are more willing to pay for waste management service in Peshawar City.

Income level is always conceived as an important factor that would influence one's WTP (Niringiya, 2010). The residents in Cooch Behar town expressed a positive and significant relationship between households' average monthly income and willingness to pay. The finding on income is corroborated by others like Niringiye (2010) and Field

and Field (2006). They reported that as everyone tries hard to earn their livelihood and to fulfil their household necessities, being at the lower income level household finds it hard to set aside any money for the improvement in the existing solid waste management and could not afford to set extra amounts to preserve the environment.

The results of the study show that sex is also play a considerable role in determining the willingness to pay (Ichoku et al., 2009). Females' residents are more likely to pay for improved solid waste management. This is not surprising because in the study area women are often involved in dealing with household's waste and they should be more affected by ineffective waste management than men (Table 6.22). Therefore women have more incentive to pay for better service. Similar results have been found in other study by Ezebilo (2013) and Ichoku et al., (2007).

**Table 6.22: Determinants of Willing to Pay**

<b>Variable</b>	<b>Co-efficient</b>	<b>Standard error</b>	<b>Wald Chi-Square</b>	<b>Pr &gt; Chi<sup>2</sup></b>	<b>Wald Lower bound (95%)</b>	<b>Wald Upper bound (95%)</b>
Sex	-0.016	0.080	0.038	0.845	-0.141	0.173
Marital status	0.029	0.078	0.136	0.712	-0.124	0.181
Education	0.018	0.084	0.047	0.828	-0.183	0.146
Age	-0.047	0.079	0.352	0.553	-0.201	0.107
Income	0.022	0.077	0.081	0.776	-0.174	0.130

### **6.5 Identification backward ward in Cooch Behar town:**

The inter-wards variations are grouped into four categories of less developed region, moderate developed region, developed region and highly developed region on the basis of natural break (Jenks) method. Development is related with population growth, so population growth with sex ratio map has been prepared (Figure 6.20). To find out the wards of backwardness some demographic and economic indicators have been selected (Table 6.23).

The present analysis is based on both primary and secondary sources of data (Majumder, 1977). The composite index (CI) have been calculated by the following equation-

$$CI = \frac{X_1 * \bar{X}/\sigma + X_2 * \bar{X}/\sigma + X_3 * \bar{X}/\sigma + X_4 * \bar{X}/\sigma + X_5 * \bar{X}/\sigma + \dots \dots \dots X_n}{W_1 + W_2 + W_3 + W_4 + W_5 + \dots \dots \dots W_n}$$

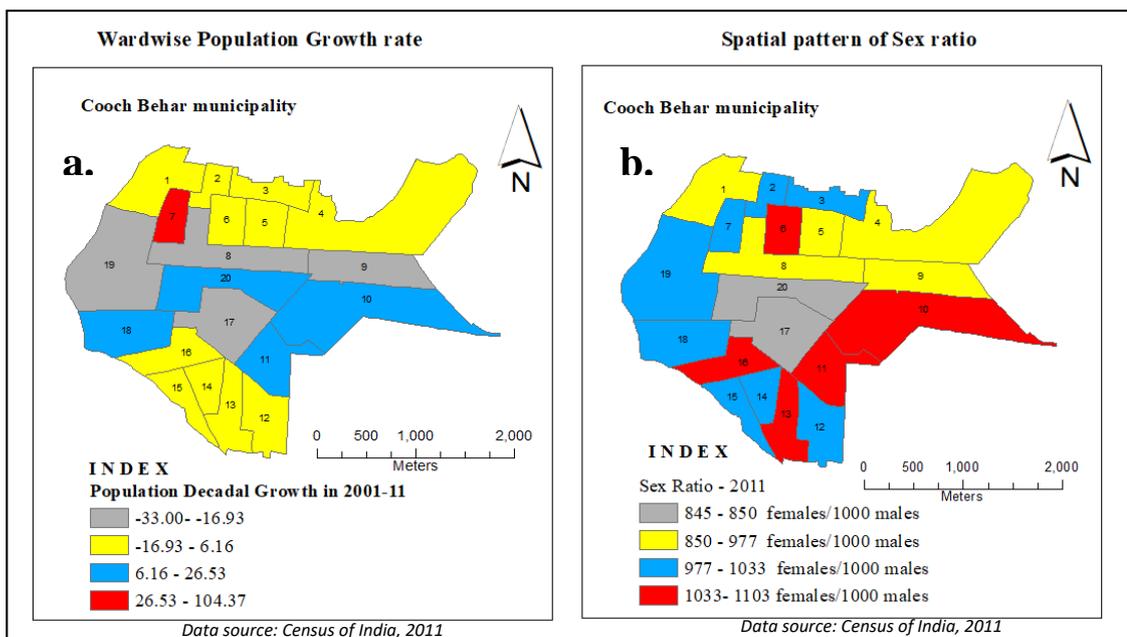
Where,

CI= Composite Index

X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub> ... .. X<sub>n</sub> are the selected indicators

$\bar{X}$ = Mean value of the town

$\sigma$ = Standard deviation of each indicator



**Figure 6.20: a. Ward wise population growth rate b. Spatial pattern of sex ratio in Cooch Behar town.**

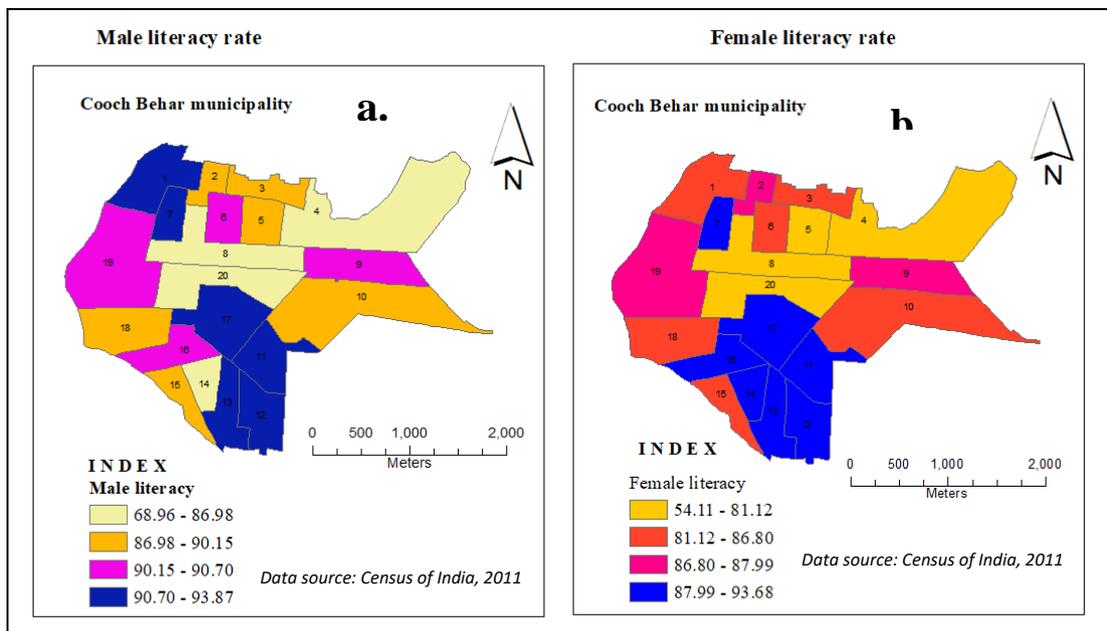
**Table 6.23: List of indicators used in this study**

<b>Variab les</b>	<b>Indicators description</b>	<b>Mea n</b>	<b>SD</b>	<b>Weightage (W)</b>
<b>A</b>	<b>Demographic Indicators</b>			
<b>X1</b>	Population Decadal Growth in 2001-11	4.69	26.78	0.18
<b>X2</b>	S.C Population to Total Population 2011	5.01	2.31	2.17
<b>X3</b>	S.T Population to Total Population 2011	5	5.96	0.84
<b>X4</b>	Sex Ratio – 2011	998.3	70.35	14.19
<b>X5</b>	Density of Population per/Sq Km - 2011	3837. 5	869.6 5	4.41
<b>X6</b>	Literacy rate- 2011	86.79	6.65	13.04
<b>X7</b>	Literacy gap	3.84	4.38	0.88
<b>X8</b>	Male literacy	88.71	5.11	17.35
<b>X9</b>	Female literacy	84.87	8.48	10
<b>B</b>	<b>Economic Indicators</b>			
<b>X10</b>	Secondary activity	12.3 8	6.82	1.82
<b>X11</b>	Tertiary activity	44.93	6.49	6.91
<b>X12</b>	Unemployed	22.61	5.78	3.91
<b>X13</b>	Dependent	19.7 1	4.05	4.86
<b>X14</b>	Number of rooms per household	3.89	0.26	15
<b>X15</b>	Monthly income	25.8 3	7.36	3.51
<b>X16</b>	Monthly expenditure on education per student '000	2.44	0.92	2.65
<b>X17</b>	Land owned per household	2.77	1.07	2.59
<b>X18</b>	Land value Lac per katha	8.98	4.63	1.94

**Distributional pattern of Male literacy rate in Cooch Behar town:**

The male literacy in different wards of Cooch Behar Town ranges from the minimum of 68.96 % in ward number 20 to the maximum of 93.87 % in ward number 12. Taking into account this range of 23.25 % as well as the town average of 12.38 % four classes, namely, very low (68.96 % - 86.98 %), low (86.98 % - 90.15 %), medium (90.15 % - 90.70 %) and high (90.70 % -93.87 %) have been formed. The adjoining choropleth map (Figure 6.10a) has been prepared to show the word wise distributional pattern of work participation rate in secondary activities in Cooch Behar Town.

Form the map (Figure 6.21a) it appears that the wards belong to the medium class are ward numbers 5 in the north, ward number 9 in the east, ward number 16 in the south and ward Numbers 19 in the west of the town respectively. Ward Number 1 and 7 in the north-west and ward numbers 11, 12, 13 and 17 in the south-east represent high male literacy rate. Six wards of low male literacy rate are concentrated in the northern, southern and eastern margin of the town. The very low percentage of male literacy rate are concentrated in the north-eastern part of the town, namely, ward numbers 4, 8, 14, and 20.

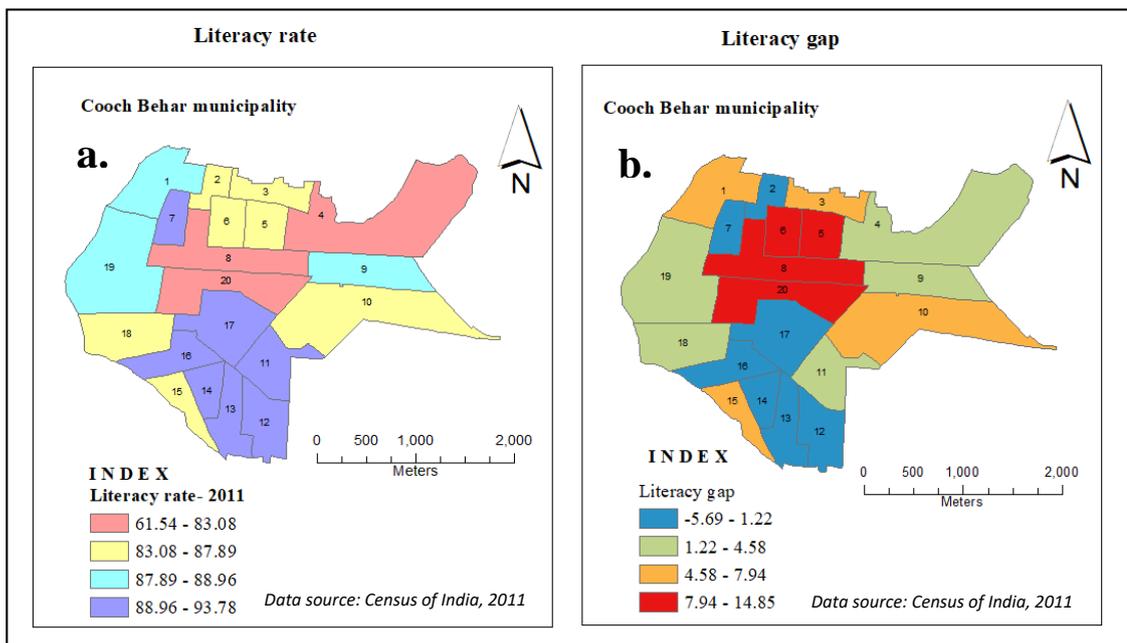


**Figure 6.21: a. Ward wise male literacy rate b. Female literacy rate in Cooch Behar town.**

**Distributional pattern of Female literacy rate in Cooch Behar town:**

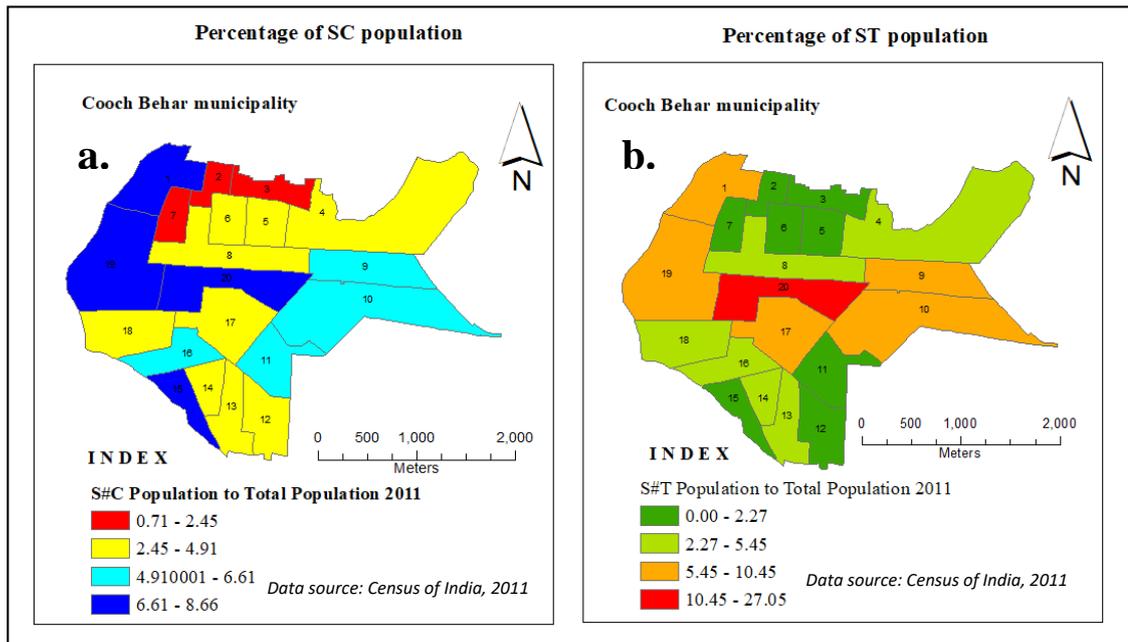
The female literacy rate in different wards in Cooch Behar town ranges from the minimum of 54.11 % in word number 20 to the maximum of 93.68 % in word number 12. Taking into account this range of 39.57 % as well as the town average of 84.87 % four classes, namely, very low (54.11 % - 81.12 %), low (81.12 % - 86.80 %), medium (86.80% - 87.99%) and high (87.99 % - 93.68 %) have been formed. The adjoining choropleth map (Figure 6.21) has been prepared to show the word wise distributional pattern of male literacy and female literacy rate in Cooch Behar town.

From the map (Figure 6.21b) it appears that the wards belong to the medium class are ward numbers 9 of east, ward number 19 in the western and ward Numbers 2 in the north of the town respectively. Ward Number 11, 12, 13, 14, 16 and 17 in the south part and ward numbers 7 in the central represent high female literacy rate. Seven wards of low female literacy rate are concentrated in the margin of the town; the wards are ward number 1, 3, 5, 10, 15, 19 and 16. The very low percentage of female literacy rate are concentrated in the north-eastern and middle part of the town, namely, ward numbers 4, 5, 8, and 20.



**Figure 6.22: a. Ward wise literacy rate b. Literacy gap in Cooch Behar town.**

Figure 6.22 is for ward wise literacy rate and literacy gap in different wards of Cooch Behar town. Besides, Figure 6.23 is for showing ward wise SC and ST population distribution in Cooch Behar town. Both the figures are helpful to identify the backwardness in the town.



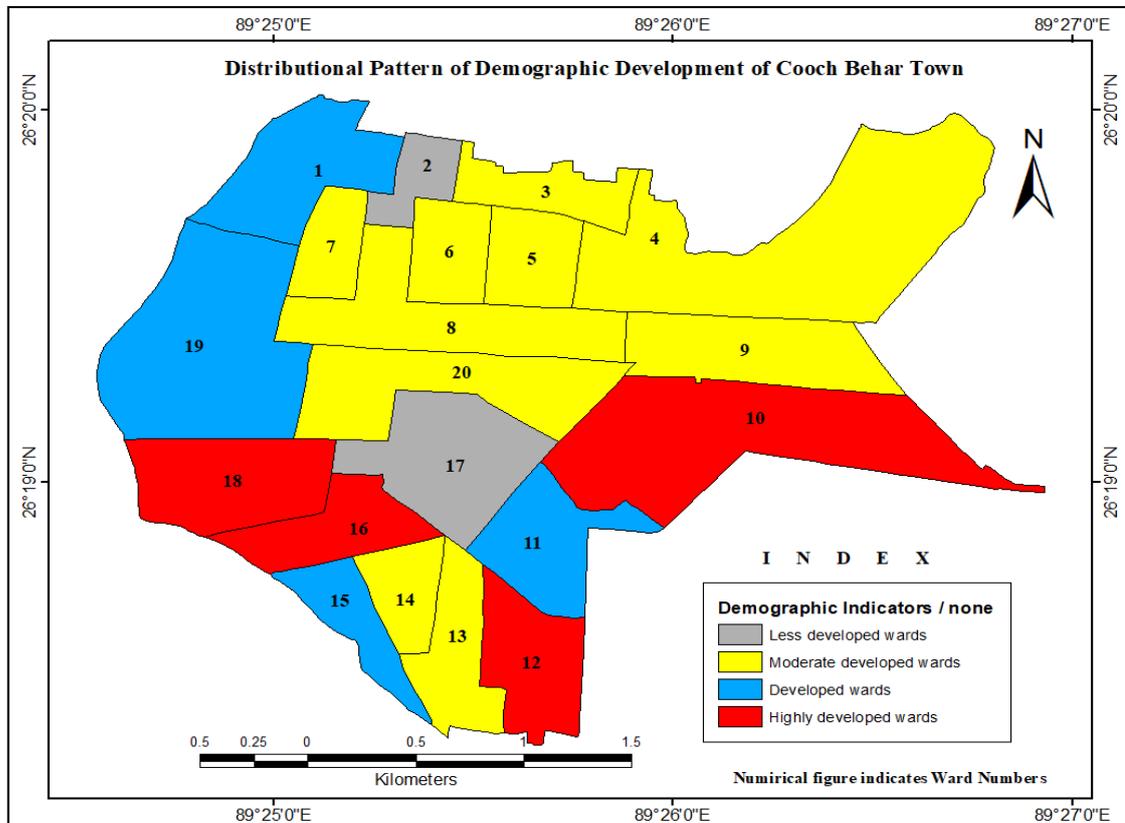
**Figure 6.23: a. Ward wise percentage of SC population b. Percentage of ST population in Cooch Behar town.**

**Demographic development in Cooch Behar town:**

The level of demographic development as delineated by the composite standard score deviates from the bare minimum of (417.32) in Ward number 17 of middle of the town (685.39) in Ward number 18 of Cooch Behar town. Taking into consideration the range of 268.07 four quantitative classes based on natural Jenk method namely Less developed wards (417.32-424.89), Moderate developed wards (424.89-549.02), Developed wards (549.02-600.26), Highly developed wards (600.26-685.39) have been prepared and a choropleth map has been accordingly to describe the spatial pattern of the demographic Development (Figure 6.24).

The adjacent map exhibits that two wards, specifically, Ward numbers 10, 12, 16 and 18 in Cooch Behar town demonstrate high (600.26-685.39) Z score i.e. demographic Development, covering 23.90% area and 23.23% population in Cooch Behar town. Additionally, four wards covering 21.92 % area and 22.77% population of Cooch Behar town have been displayed developed wards (Z-score 549.02-600.26), these are 1, 11, 15, and 19. On the other hand, ten wards namely, Ward numbers 3, 4, 5, 6, 7, 8, 9, 13, 14 and 20 of the northern and southern part of the town display moderate (424.89-549.02) demographic Development. Finally, two wards, that is to say, Ward numbers 2,

and 17 from the eastern margin depict low (417.32-424.89) Z score concurrently, low demographic Development in Cooch Behar town (Table 6.24).



**Figure 6.24: Distribution pattern of demographic development of Cooch Behar town.**

**Table 6.24: Demographic backward wards of Cooch Behar town**

Category	Index	No. of Wards	% of area	% of Population	Name of the wards
Less developed region	417.32-424.89	2	7.49	5.49	2 and 17
Moderate developed region	424.89-549.02	10	46.68	48.52	3,4,5,6,7,8,9,13,14 and 20
Developed region	549.02-600.26	4	21.92	22.77	1,11,15 and 19
Highly developed region	600.26-685.39	4	23.90	23.23	10,12,16 and 18

### **Distributional pattern of work participation rate in secondary activities in Cooch Behar town:**

The Work Participation Rate in secondary Activities in different wards in Cooch Behar town ranges from the minimum of 1.75 % in ward number 8 to the maximum of 25 % in ward number 9. Taking into account this range of 23.25 % as well as the town average of 12.38 % four classes, namely, very low(1.75% - 4.41%),low(4.41% - 9.33%),medium(9.33% - 16.92%) and high (16.92% -25.00%) have been formed. The adjoining choropleth map (Figure 6.25a) has been prepared to show the ward wise distributional pattern of work participation rate in secondary activities in Cooch Behar town.

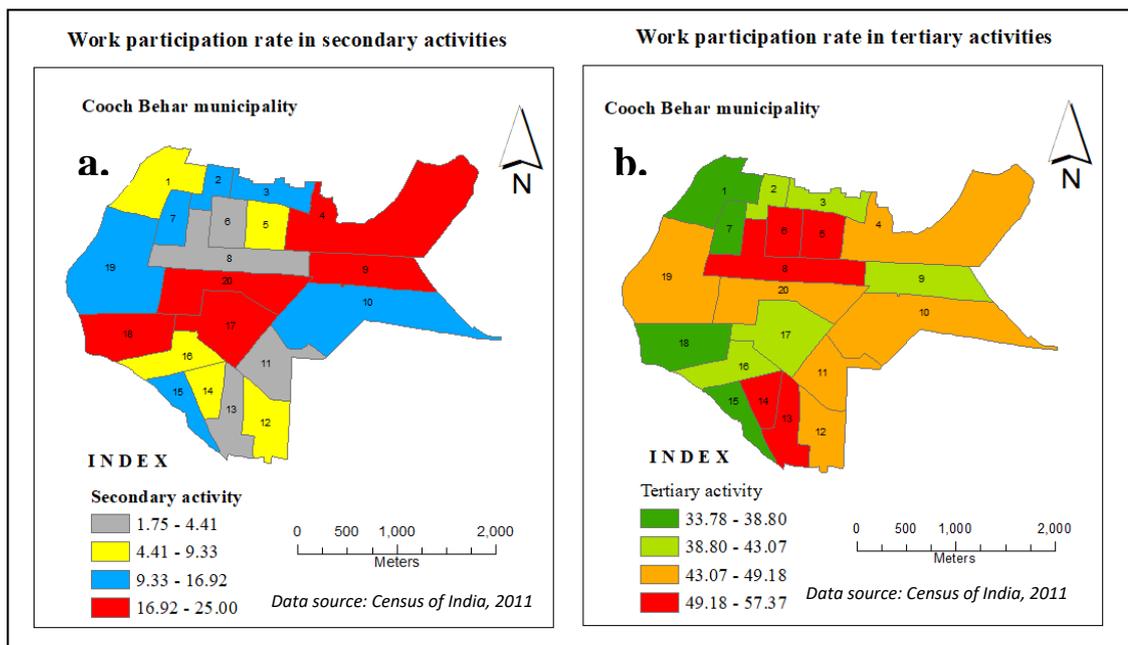
From the map it appears that the wards belong to the medium class are ward numbers 2, 3 and 7 of north and north-west, ward number 10 in the eastern-central and ward Numbers 19 and 15 in the west and south of the town respectively. Ward Number 4 and 9 in the north-east and ward numbers 20 and 17 in the central and 18 in the west represent high work participation rate in secondary activities. Five wards of low work participation rate in secondary activities are concentrated in the northern and southern part of the town, the wards are ward number 1, 5, 12, 14 and 16. The very low percentage of secondary workers are concentrated in the south-eastern part of the town, namely, ward numbers 11 and 13.

### **Distributional pattern of work participation rate in tertiary activities in Cooch Behar town:**

The work participation rate in tertiary activities in different wards in Cooch Behar town ranges from the minimum of 33.78 % in ward number 15 to the maximum of 57.38 % in ward number 5. Taking into account this range of 23.6% as well as the town average of 44.93 % four classes, namely, very low(33.78% - 38.80%),low(38.80% - 43.07%),medium(43.07% - 49.18%) and high (49.18% - 57.37%) have been formed by natural break method. The adjoining choropleth map (Figure 6.25b) has been prepared to show the ward wise distributional pattern of work participation rate in tertiary activities in Cooch Behar town.

From the map it appears that the wards belong to the high class is Ward numbers 2 and 3 in the north, ward number 9 in the eastern-central and ward Numbers 16 and 17 in the central part of the town represent low work participation rate in tertiary activities.

Six wards of medium work participation rate in tertiary activities are concentrated in the north-eastern, central and western part of the town, the wards are ward number 4, 10, 11, 12, 19 and 20. The very low percentage of secondary workers are concentrated in the northern and southern part of the town, namely, ward numbers 1, 2, 3, 7, 9, 15, 16 and 17.



**Figure 6.25: a. Ward wise work participation rate in secondary activities b. work participation rate in tertiary activities in Cooch Behar town.**

### **Distributional pattern of unemployment rate in Cooch Behar town**

The unemployment rate in different wards in Cooch Behar town ranges from the minimum of 12.7 % in Ward Number 20 to the maximum of 32.1 % in ward Number 1. Taking into account this range of 19.4 as well as the town average of 22.61 %, four classes, namely, very low (12.69-16.90), low (16.90-22.80), medium (22.80-28.35), and high (28.35-32.43) have been formed in order that the town average belongs to the medium class.

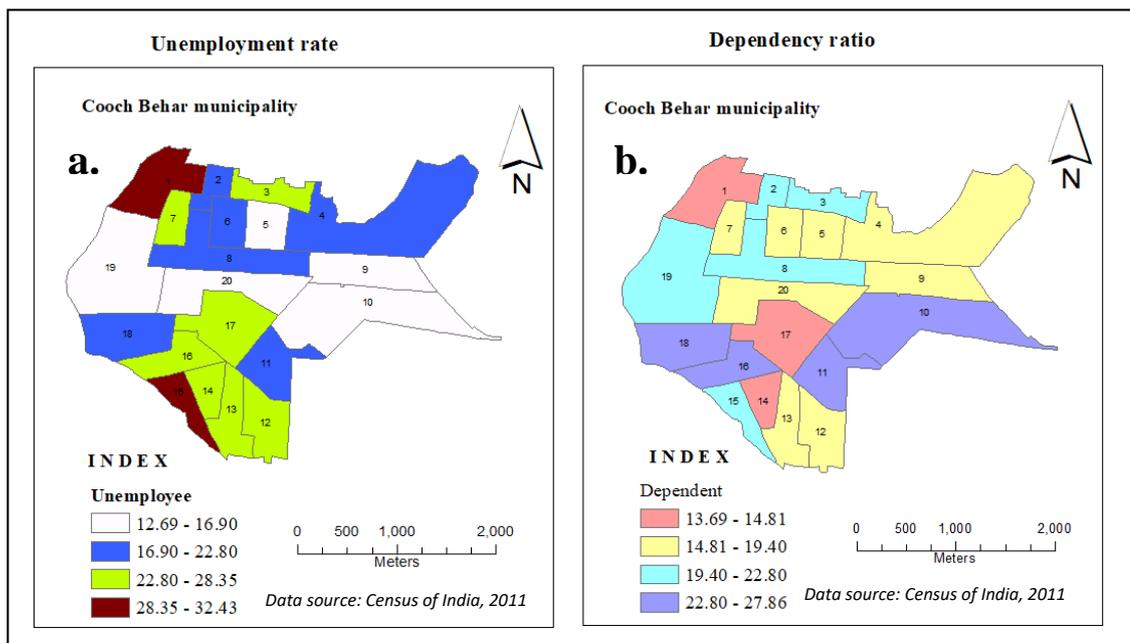
A corresponding choropleth map (Map 6.26a) has been prepared on the basis of above four classes to show the distributional pattern of unemployment rate.

From the map, it appears that there are eleven and nine wards included in the classes above and below the medium class respectively. Two wards, namely, ward numbers 1 and 15 represent high employment rate and seven wards i.e. ward numbers 3, 7, 12, 13, 14, 16 and 17 located in the south belong to medium class.

Six wards, namely, ward numbers 2, 4, 5, 8, 11 and 18 located mainly along the southern boundary of the town show low employment rate. Ward number 9 and 10 in the east, ward number 5 in the north-central part and ward number 19 and 20 in the middle-west show low employment rate.

**Distributional pattern of weighted score of dependency ratio in Cooch Behar town:**

The weighted Score of dependency in different wards in Cooch Behar town ranges from the minimum of 13.7 in Ward number 14 to the maximum of 27.87 in ward Number 11. Taking into account this range of 14.17, as well as the town average of 19.71, four classes, namely, very low (13.69 – 14.81), low (14.81 – 19.40), medium (19.40 – 22.80) and high (22.80 – 27.86) have been formed in order that the town average belongs to the medium class.



**Figure 6.26: a. Ward wise unemployment rate b. Dependency ratio in Cooch Behar town.**

A corresponding choropleth map (Map 6.26b) has been prepared to show the distributional pattern of dependent people on the basis of above classes.

From the map it appears that there is six wards covering the south- east and west of the town reveal high weighted in dependency ration. Ward numbers 2, 3 and 8 along the northern boundary and ward number 19 along the western boundary show medium

dependency ratio. The low weighted score of dependency ratio is strikingly concentrated in the northern half of the town. The ward belonging to this category are Ward Numbers 4, 5, 6, 7, 9, 20 12 and 13, while ward numbers 12 and 13 along the north-eastern boundary belong to the very low dependency ratio.

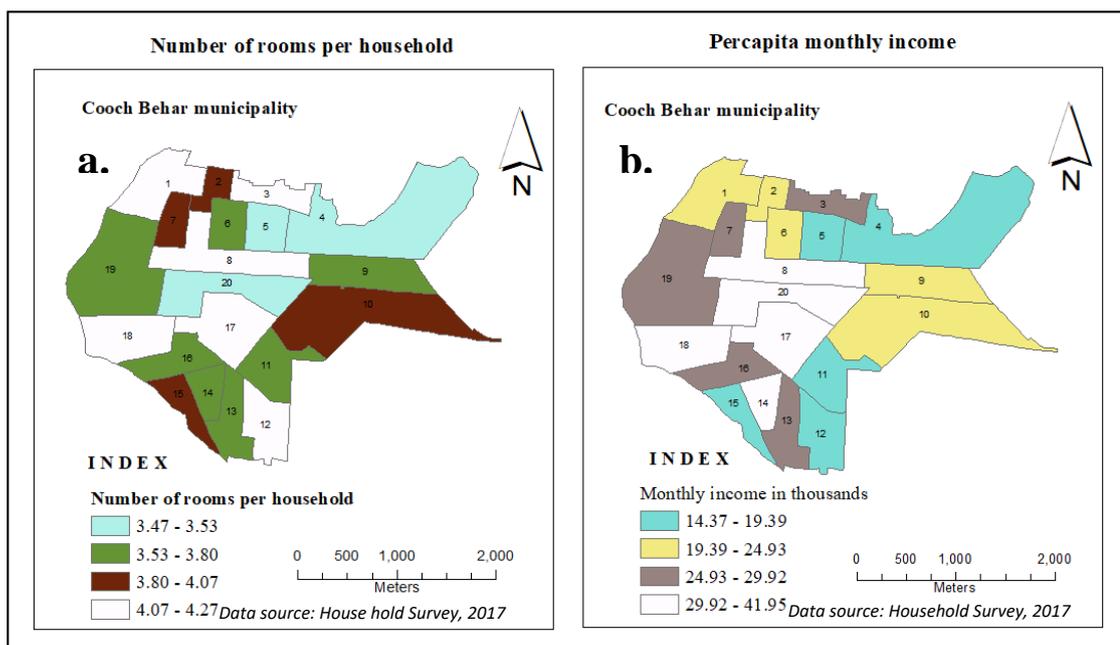
**Distributional pattern of number of rooms per household in Cooch Behar town:**

The number of rooms per household in different wards in Cooch Behar town ranges from the minimum of 3.47 in ward number 20 to the maximum of 4.27, in Ward number 3. Taking into account this ranges of 0.82 as well as the town average of 3.89, four classes, namely, very low (3.47 – 3.53), low (3.53 – 3.80), medium (3.80 -4.07) and high (4.07– 4.27) have been formed in order that the town average belong to the medium class.

A corresponding choropleth map (Figure 6.27a) has been prepared to show the ward wise distribution of Number of rooms per household. From the map it appears that there are only three wards in the high class, namely wards nos. 1, 3, 8, 12, 17 and 18. Two wards i.e. ward numbers 10 and 15 belong to the medium class. It is strikingly noted that the southern part of the town having three wards i.e. ward numbers 11, 13, 14, 16, and 9 in eastern part and 18 in western part shows low average number of rooms per household, whereas three peripheral wards have very low number of rooms per household.

**Distributional pattern of monthly per capita income in Cooch Behar town**

A corresponding choropleth map (Figure 6.27b) has been prepared to show the distributional pattern of monthly per capita income. Five Wards, namely, Ward Numbers 23&24 in the north-west and Ward Numbers 16, 17and 5 in the central parts of the town show very high 'Monthly Per Capita Income'. Five wards, namely, ward numbers 8, 20, 17, 14, and 18 almost surround the central tract of high monthly per capita income. Five wards, namely, ward number 3 in the north, ward number 7 and 19 in the south, ward numbers 13 and 16 in the south belong to the medium class. Low monthly per capita income is observed in five wards, namely, ward numbers 1, 2, 6, 9 and 10 covering north-western, and middle southern parts of the town, respectively. The remaining five wards- ward numbers 4, 5 11, 12 and 15 confined mainly along the peripheral area of the town belong to the low category.

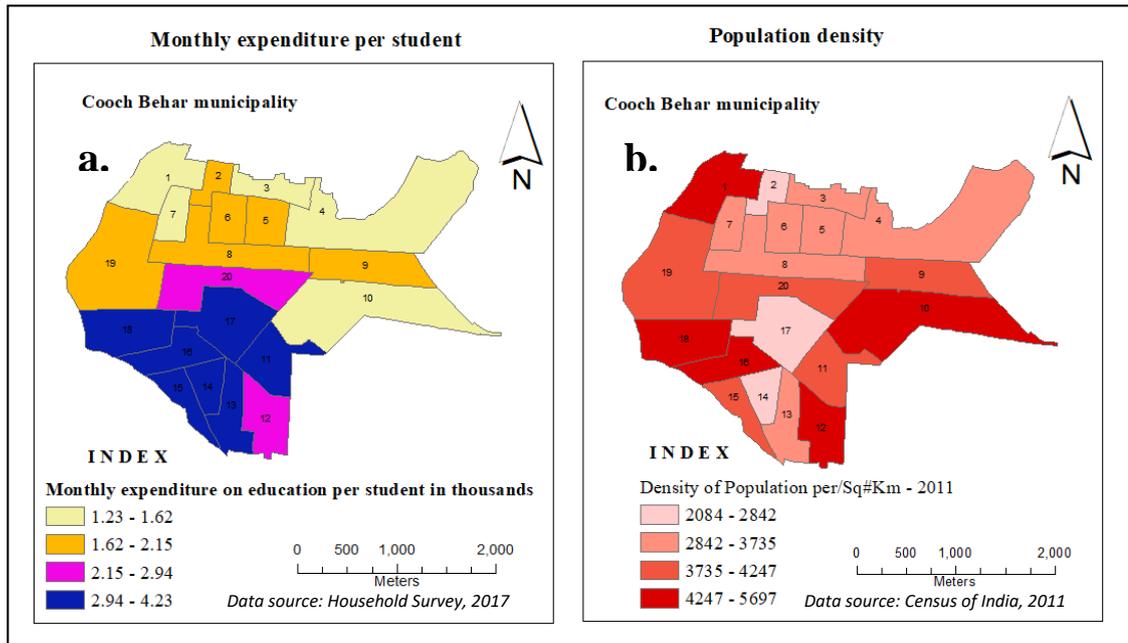


**Figure 6.27: a. No. of room per household b. per capita income in Cooch Behar town.**

**Distributional pattern of monthly expenditure on education per student in Cooch Behar town:**

The monthly expenditure per student in different wards of Cooch Behar town ranges from the minimum of Rs. 1236 in ward number 4 to the maximum of Rs. 4236 in ward number 14. Taking into account this range of Rs.3000 as well as the town average of Rs. 2440, four classes, namely, very low (Rs. 1230- Rs. 1620), Low (Rs. 1620– Rs. 2150) Medium (Rs.2150 –Rs. 2940) and high (Rs. 2940 – Rs.4230) have been formed in order that the Town average belongs to the medium class.

A corresponding choropleth map (Map 6.28) has been prepared on the basis of above five classes to show the distributional pattern of monthly expenditure on education per student. From the map, it appears that there are seven wards having high monthly expenditure per student covering mainly, the southern part of the town. There are two wards namely, ward numbers 12 and 20 in the middle and south-eastern part belongs to medium category. Ward numbers 2, 5, 6, 8, 9 and 19 in the south which record low monthly expenditure per student. Rest five wards belong to boundary of northern part, namely 1, 3, 4, 7 and 10 are belong to very low monthly expenditure.



**Figure 6.28: a. Ward wise monthly expenditure per student b. Population density in Cooch Behar town.**

**Distributional pattern of land owned per household in Cooch Behar town**

The land owned per household at ward wise distribution of Cooch Behar town ranges from the minimum of 1.02 katha at ward Number 8 to the maximum of 4.12 katha at ward number 5. Taking into account this ranges of 3.10 katha as well as the town average of 2.77 katha four classes namely, very low (1.02-1.54), low ( 1.54-2.56), medium (2.56- 3.25) and high (3.25-4.62) have been formed in order that the town average belongs to the medium Class.

A corresponding choropleth map (Map 6.29a) has been prepared on the basis of above classes to show the distributional pattern of ‘Amount of Land Owned per Household’ in Cooch Behar town.

From the map it appears that there is supremacy of ‘Amount of land Owned per Household’ below the town average class respectively. It is strikingly noted here that the sole ward, i.e. Ward Number 10 of the east zone of the town represents very high ‘Amount of land Owned per Household’. Whereas, five wards, namely Ward Numbers 18 of the centre, Ward Number 24 of west, Ward Number 6 and 5 of south-centre and Ward Number 2 of the extreme south reveal high ‘Amount of Land Ownership per Household’.

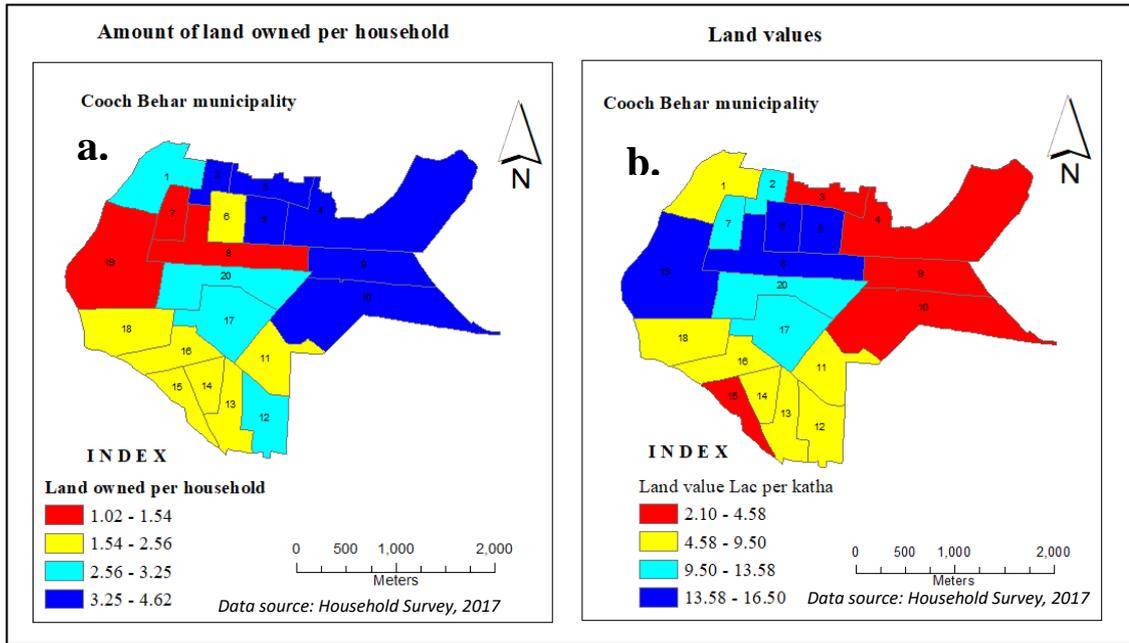
Seven wards belong to each of medium and low class of it. The Medium 'Amount of land Owned per Household' is occurred in a continuous patch from the north-central part to south-central part including six wards, namely, Wards Numbers 20, 19, 16, 17, 7 & 4. The rest one is located in the south-east corner of the town.

The seven wards of low 'Amount of Land Ownership per Household' is observed in two patches. First one is observed in northern part including Ward numbers 23, 22 and 21. The second one is located at eastern boundary including the wards, Ward numbers 14, 11, 12, & 9. On the other hand, very low 'Amount of Land Ownership Per Household' is observed among five wards, among which, Ward Numbers 25 & 3 are located at the Western boundary and the remaining three i.e. Ward Numbers 15, 13 and 8 are located at the eastern zone of the town in disperse pattern.

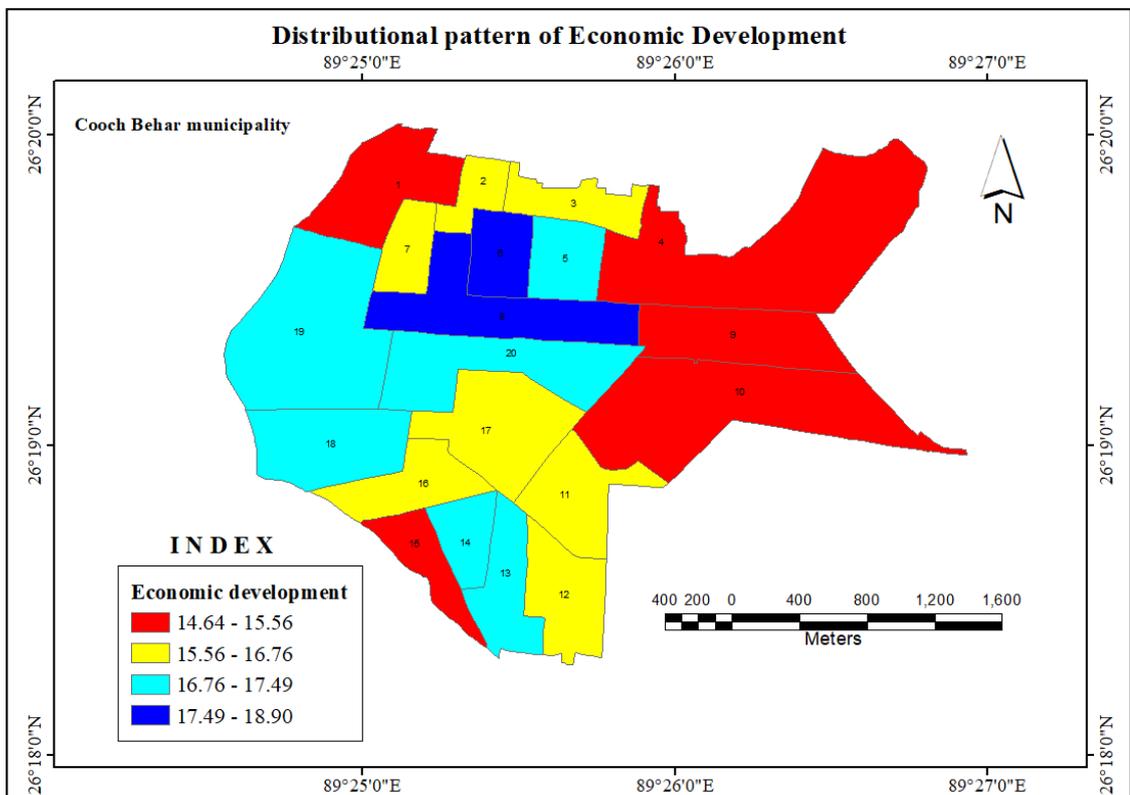
#### **Distributional pattern of land value in Cooch Behar town:**

The ward wise distribution land value in Cooch Behar town ranges from the minimum of Rs. 2.1 lakh per katha in ward number 10 to the maximum of Rs.14.56 lakh per katha at Ward number 5. Taking into account this ranges of Rs.12.46 as well as the town average of Rs.8.98 lakh four classes, namely, very low (Rs.2.10- 4.58 lakh), low (Rs.4.58-9.50 lakh) medium (Rs.9.50-13.58) and high (Rs.13.58-16.50) have been formed in order that the town average belongs to the Medium Class.

A corresponding choropleth map (Map 6.29b) has been prepared on the basis of above classes to show the distributional pattern of land value in Cooch Behar town. From the map it appears that there is supremacy of land value below the town average class respectively. It is strikingly noted here that the sole ward, i.e. Ward Number 10 of the east zone of the Town represents very high land value. Whereas, five wards, namely Ward Numbers 18 of the centre, Ward Number 24 of west, Ward Number 6 and 5 of south-centre and Ward Number 2 of the extreme south reveal high land value. Seven wards belong to the medium and low class of it. The Medium land value is occurred in a continuous patch from the north-central part to south-central part including six wards, namely, Wards Numbers 20, 19, 16, 17, 7 & 4. The rest one is located in the south-east corner of the town.



**Figure 6.29: a. Ward wise amount of land owned per household b. Land value in Cooch Behar town.**



**Figure 6.30: Economic development of Cooch Behar town.**

The seven wards of low land value are observed in two patches. First one is observed in northern part including Ward numbers 23, 22 and 21. The second one is located at eastern boundary including the wards, Ward numbers 14, 11, 12, & 9. On the other hand, very low land value is observed among five wards, among which, Ward Numbers 25 & 3 are located at the Western boundary and the remaining three i.e. Ward Numbers 15, 13 and 8 are located at the eastern zone of the town in disperse pattern.

### **Economic Development in Cooch Behar town**

The level of Economic Development (Figure 6.30) as delineated by the composite standard score deviates from the bare minimum of (14.64) in Ward number 9 of eastern margin to the ceiling (18.90) in Ward number 8 in Cooch Behar town. Taking into consideration the range of 4.26 four quantitative classes based on natural Jenk method namely Less developed wards (14.64-15.56), Moderate developed wards (15.56-16.76), Developed wards (16.76-17.49), Highly developed wards (17.49-18.90) have been prepared and a choropleth map has been accordingly to describe the spatial pattern of the Economic Development (Mitra, 1967).

The adjacent map exhibits that two wards, specifically, Ward numbers 6 and 8 mainly from the centre of town demonstrate high (17.49-18.90) Z score i.e. Economic Development. Additionally, six wards covering 29.97 % area and 31.50 % population of Cooch Behar town have been displayed developed wards (Z-score 16.76-17.49), these are 5, 13, 14, 18, 19 and 20. On the other hand, seven wards namely, Ward numbers 2, 3, 7, 10, 11, 16 and 17 of the northern and southern part of the town display moderate (15.56-16.76) Economic Development. Finally, five marginal wards, that is to say, Ward numbers 4, 9 and 10 form the eastern margin and Ward number 1 from the northern margin and ward number 15 from southern margin depict low (14.64-15.56) Z score concurrently, low Economic Development in Cooch Behar town.

The 'Economic Development' as ascertained by Z-scores taking into account nine selected indicators, of twenty wards of Cooch Behar town ranges from the minimum of - 7.27 in Ward number 25 to the maximum of + 7.17 in Ward number 5. Taking into consideration this range in z-scores all the wards have been grouped into four categories according to the level of 'Economic Development'. The classes of 'Economic Development' and the equivalent numbers of wards included in them are as follows in table 6.25.

**Table 6.25: Economically backward wards of Cooch Behar town**

Category	Index	No. of Wards	% of area	% of Population	Name of the wards
<b>Less developed wards</b>	14.64-15.56	5	37.99	27.39	1,4,9,10 and 15
<b>Moderate developed wards</b>	15.56-16.76	7	30.92	29.20	2,3,7,10, 11,16 and 17
<b>Developed wards</b>	16.76-17.49	6	29.97	31.50	5,13,14,18,19 and 20
<b>Highly developed wards</b>	17.49-18.90	2	8.77	11.85	6 and 8

**Conclusion:**

The study on urbanization in Cooch Behar town indicates the growth of various aspects. The fast growth and change have given rise to many urban-environmental problems. The socio-cultural landscape has shown the increase in the land use progressively. The space is getting filled up by various centres. These have led to crowding, congestion and difficulty in finding more space and facilities. The commercial and residential growth through is along the fringes, the residents of the fringes depend on main market of the town, which giving rise to congestion. There is transport congestion also. The dumping of waste is a hazardous one. The transport routes have been increased rapidly but the road network is almost same. Though, it is a planning city by Koch kingdom and road network devised by grid-iron pattern, still the flow load has increased. Rapid growth of the peripheral area and the centre having major commercial centre, the commuters have increased. This has led to fleet augmentation and noise. The noise level is also above bearable limit. The residential area has grown by filling in all open space horizontally and also vertically. These have given rise to many amenities problems like water supply, waste disposal, sewerage drains.

The findings of the study revealed that as most of the residents in Cooch Behar town are not satisfied with the existing system, they want improvement. Therefore they are willing to pay something to get better facilities to manage their household wastes. But there should be an adjustment of pay structure with economic conditions of the households. It can be said that as education and awareness of Swachh Bharat Abhiyan,

Nirmal Bangla play significant role, government should increase its involvement in education and awareness campaign.

Still Cooch Behar centre continued to be the nucleus for all activities. The aggregation by migration took place by filling in the vacant lands. The inflow of people was from the rural area and from Assam. The main migration was by seeking job. This has given rise to more area being occupied by housing zones. Here the out growth and spatial expansion could be noted. All these have resulted in the spatial expansion of the town.

Lastly in respect of development indicators, it may be concluded that equal number of wards i.e. four wards have highly developed and developed in demographic development in Cooch Behar town. Among the all wards, ten wards have moderately developed region in demographically and rest two wards are in less developed region. Economically two wards are highly developed. Besides these, other six wards recorded developed as 'Economic Development'. Therefore, maximum numbers of wards i.e. seven wards of the Cooch Behar town belong to moderately and five to less class of 'Economic Development' respectively. As a result, there is a prominent disparity in 'Economic Development' in the wards of Cooch Behar town and moreover, the tendency of the maximum number of wards is towards the moderately high level of 'Economic Development'. Government and private sectors should take more initiative to balance the inter-ward regional disparity despite of adverse physical socio-economic and political condition in Cooch Behar town.

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