Population Distribution Pattern in Sundarban Region – A Geographical Analysis
Bablu Samanta
Assistant Professor, Department of Geography
Vidyasagar Teachers Training Institute, Sanjua, South 24 Parganas,
West Bengal – 743377, INDIA

Abstract: Sundarban region is the world largest mangrove located in Ganga – Bramhaputra estuarine delta. The area of this region has been demarcated by the former surveyor duo Dampier and Hodges, who did the work under the British government. The reclamation history shows that man had started to settle in this area from 1770 AD in early part of colonial British rule. The distribution of population in this region has relationship with the natural and socio-economic factors which are unevenly distributed over the surface of the region. The study attempts to show the distribution pattern of population. It also deals with rural urban population distribution, gender wise distribution, caste wise population distribution and population density distribution. This spatial distribution was based on CD block level census data 2001 and 2011. Statistical calculation, graphical presentation and cartographic techniques through GIS software have been used for analysis. The population distribution as both total population and male female population are not uniform. Population density pattern is low density in coastal area and high density pattern towards interior part from the coastal face. The rural and urban population distribution has also changed both spatially and temporally.

Keywords: Estuarine, Dampier and Hodges, Reclamation, Cartographic techniques, GIS, Population density.

I. Introduction
The study of population gives an idea about the dispersion of population. The distribution of population in any area on earth surface is depended on both physical and economic factors. The density is one of the parameters for measuring population distribution of the region. This can be measured by different mathematical formula. The population distribution is studied in terms of population concentration. From this point of view it is interesting to study the population and their changes in study region. The change in population is not only change in its numbers but also its change in distribution with respect to region and time. The study of measurement of population distribution, both temporal and spatial and comparative study gives an idea about changing characteristics of population of study region. In present study population data have gathered from District Census Handbook, South 24 Parganas and North 24 Parganas District for 2001 to 2011 at block level on male, female, rural and urban population. Sundarban is a region where natural constraints are playing role to determine the uneven distribution of population.

II. Literature Review:
There are some research papers which were completed on international context about the geographical analysis of population distribution, population density and migration and other aspects [1] [2] [3]. Some indian and foreign population geographers have given the tools and techniques to assess the population distribution in their books [4] [5] [6] [7].

Indian scholar also attempted to evaluate the population distribution of a particular region with other population characteristics [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23].

District Human Development Report [24] published the report on demography of Sundarban particularly about the part of South 24 Parganas on the basis of 2001 census report. The report emphasized on distribution of population in South 24 Parganas part. Is has also compared the distribution of population in the Sundarban and south side the Sundarban. The report compared between South 24 Parganas and North 24 Parganas in distribution of population in Sundarban. District Human Development Report [25] shows the distribution, density of population with other components of population characteristics of blocks which are belongs to Sundarban. The analysis basically based on 2001 census. Mondal [26] divided Sundarban into two parts and examined the
population distribution. According to 2001 census data North Sundarban has 160000 person and South Sundarban has 215000 person. He also studied on the population density distribution. He delineated mean centre of population on the basis of concentration of population and zone of concentration of population in 2001. Centre for Science and Environment [27] in their study entitled “Living with changing climate Impact, vulnerability and adaptation challenges in Indian Sundarban reported and assessed on block wise population distribution, population density in Sundarban region. Singh [28] has compared the population density between Sundarban and West Bengal. Chakraverti [29] has determined the population distribution of rural and urban population density. He argued that the urban population slightly increased from 2001 to 2011. Banerjee [30] studied on environment, population and settlement of Sundarban particularly in South 24 Parganas. She analysed the spatial distribution and density of population in 1981 and 1991 census. She also emphasised on rural urban population distribution and density in 1981 and 1991. She worked on the basis of the blocks of South 24 Parganas under the Sundarban. She concluded that the percentage of population and density are increasing from coastal area to interior part of Sundarban. Das and Bandyopadhyay [31] studied on population growth, population density and distribution in 15 selected blocks of Indian Sundarban area. The population density was 910 person / sq.km which was greater than the West Bengal average. They compared between south western Sundarban and north eastern on the basis population density. They have presented the cartographic techniques to show the population data on the basis on reclaimed and settled area. Rudra and Rudra [32] have tried to analyze the mapping technique of human resources of North 24 Parganas. Sahoo [33] undertook the study to emphasis the northern part of Sunderbans consisting of six blocks of North 24 Parganas (Haroa, Hasnabad, Hingalganj, Minakhan, Sandeshkhali-I and Sandeshkhali-II). In his research, he prepared a brief demographic profile exclusively for this region. Chattopadhyay [34] measured the urban density of population is 4213 per square mile against a rural density of 1,079 in the region (excluding river and forest areas). Das [35] has considered the Sundarban region including 6 police stations of North 24Parganas and 13 police stations of South 24 Parganas, and compared the total population distribution between two districts on the basis of 1981 and 1991 census data. Sing and Ghosal [37] studied on distribution of rural population density in Sundarban.

III. Study area:

Sundarban is situated in lower part of Gangetic plain in southern part in West Bengal state. It is the world largest mangrove ecosystem. It extends over two districts. The region consists to 13 CD Blocks in South 24 Parganas and 6 CD Blocks in North 24 Parganas. It extends from 21°32'N to 22°20' N latitudes and 88°05'E to 89° 05'E east longitudes. This region is delimited by different geo-ecological features. The study area is bounded to the east by international boundary with Bangladesh though both river and as Hariabhangha and Ichamti River and land, to the south by Bay of Bengal, to the west some part by Hoogly River, rest part of South 24 Parganas and Grater Kolkata urban area, to the north by rest part of North 24 Parganas.

The Indian Sundarban includes the deltaic region of the Hooghly-Matlah estuarine system, and the area bordering the Hooghly, Muriganga, Saptamukhi, Thakuran, Goshaba, Vidya, Matlah, and Hasinbhanga estuaries. In the western part of this section, large areas have been banded for human settlement and cultivation, and very little mangrove forest now remains. The Indian Sunderban lies at the western edge of the ancient delta of the Ganges and suffer from an extreme scarcity of freshwater.

According to census report 2001 and 2011, the region spreads across 4118.51 sq. Km. It covers 64.46% and 31.81% area of South 24 Parganas and North 24 Parganas respectively. The study area covers on 50.94% area of total area of both districts. Total population of this region (2011 census) is 4426259. According to census report, Sundarban got increased 354% in last 50 years. Population growth rate, population density and sex ratio are 15.11%, 1074.72 persons/Km² and 954 female/ 1000 male respectively. Total male and female population are 2262126 and 2162126. Total rural and urban population are 4172248 and 254011.

<table>
<thead>
<tr>
<th>Subject</th>
<th>District</th>
<th>South 24 Parganas</th>
<th>North 24 Parganas</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD Blocks</td>
<td>13</td>
<td>6</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>3084.15</td>
<td>1064.36</td>
<td>4118.51</td>
<td></td>
</tr>
<tr>
<td>% of Area Covered</td>
<td>64.46</td>
<td>31.81</td>
<td>50.94</td>
<td></td>
</tr>
<tr>
<td>Total Population</td>
<td>3309526</td>
<td>1116733</td>
<td>4426259</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1692424</td>
<td>571709</td>
<td>2264133</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1617102</td>
<td>545024</td>
<td>2162126</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>3083950</td>
<td>1088298</td>
<td>4172248</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>225576</td>
<td>28435</td>
<td>254011</td>
<td></td>
</tr>
<tr>
<td>Sex Ratio</td>
<td>955</td>
<td>953</td>
<td>954</td>
<td></td>
</tr>
</tbody>
</table>

Source: District Census Handbook, North and South 24 Parganas, 2011 (Census Report of India)
IV. Objectives:

- To show the spatial and temporal distribution of block wise total population.
- To identify the spatio-temporal distribution of block wise male-female population, rural-urban population and SC ST population.

V. Methodology:
The Study was based on secondary data. It has been carried out from 2001 to 2011 at Block level. Secondary data collected from District census handbook, District statistical handbook. The researcher used descriptive type of research in order to find out more information about this study, and at the same time descriptive research focuses what has happened and what is happening now. In this study the researcher has used both quantitative and qualitative approach. The collected data for this study have been presented by cartographic techniques as choropleth map and comparative bar diagram using GIS software such as Q-GIS 2.14.10.

VI. Population distribution:
Population not only indicates the actual figure of human population, but also it deals with spatial distribution of population in a region. Sundarban region has tremendous versatility in both physical and socio economic environment. So that human population distribution is not homogenous in this area.
A. **Total population distribution:**

The highest number of population was recorded in Patharpratima CD block (288394) in 2001 and it is found that this population in percent to total is 7.67% in the Sundarban region. Minakhan, Hasnabad, Sandeshkhali-I, Sandeshkhali-I and Hingalganj have least number of populations in 2001 accounting less than 180000 people. In 2011, the high total population distribution was recorded in Basanti (22.40 percent) and Canning-I (19.72) due to immigration from surrounding districts for education, job opportunity, business and health and transport and communication facility in the CD block and also urbanization.

![Figure 3: Gender wise population distribution](image)

B. **Male and Female distribution:**

The highest male population recorded in 2001 in Patharpratima and in 2011 in Basanti. On the other hand the highest female population was recorded in 2001 in Patharpratima and 2011 in Basanti. The lowest male population was recorded in Sandeshkhali-II in both 2001 and 2011. The lowest female population was recorded in Sandeshkhali-II in both 2001 and 2011.

C. **Distribution Population Density:**

The population density is the ratio between total land and total population in a region. This density can be expressed into different method. The geographers are generally use arithmetic density which is the total number of people divided by total area of the region (Rubenstein, M. James, 2003). The following figure shows the arithmetic density for Sundarban region for 2001 and 2011. It is observed that the study region shows 1074.72 and 912.31 persons per square kilometre as 2011 and 2001 respectively. There are, however, variations in density at CD block level in study region. The highest density was recorded in Joynagar-I accounting 1672.44 persons per square kilometre followed by Canning-I (1301.90) block lying in north and western part in study region as per 2001 census.

The density between 1200 to 1600 persons per square kilometre was also identified in north and western part in study region. The arithmetic density was found between below 800 persons per square kilometre in coastal area blocks. The lowest density was found 433.42 persons per square kilometre in Namkhana CD block.
The highest density was recorded in Joynagar-I accounting 2008.79 persons per square kilometre followed by Canning-I (1301.90), Haroa, Hasnabad, Minakhan blocks respectively lying in north and western part in study region as per 2011 census. The density between 1200 to 1600 persons per square kilometre was also identified in north and western part in study region. The arithmetic density was found between below 800 persons per square kilometre in coastal area blocks. The lowest density was found 433.42 persons per square kilometre in Namkhana CD block.

D. Rural and Urban population distribution:

The distribution of rural population in Sundarban is highly varied for one place to another. There is also temporal variation of rural population distribution. Concentration of rural population decreases from coastal area to towards interior area.

In 2001 highest rural population is observed in Patharpratima block and lowest rural population is observed in Namkhana, Sandeshkhali I and II, Minakhan, Hingalganj and Hasnabad. All CD blocks except Haroa are belongs to least number of rural population because of rapid urbanization. In South 24 Parganas all 12 CD blocks are observed high to low number distribution of rural population except Namkhana.

In recent census data (2011) revealed that rural population distribution has been changed. Highest population distribution is being seen in Patharpratima, Kakdwip and Basanti. Lowest population distribution is observed in Sandeshkhali I and II, Hingalganj. Thus in the 2001-2011 comparative study shows that actual figure of the rural population has increased. The study reveals another result that rural population has changed both spatially and temporally.

Urban area is located in Stable Delta which covered north western and northern blocks of this area (Banerjee, 1998). The census data showing that only one block of the Sundarban region has urban area in 2001. But in 2011, the census data showing that 9 blocks have urban population. Highest number of urban population found in Canning-I and Joynagar-I block which contain above 35000 urban populations. Rest of the 7 blocks of this region has medium to low urban population. Thus the 2001-2011 comparative study reveals that urban population has increased over the decade.
E. Distribution of Schedule Caste and Schedule Tribe population:

The backward class population distribution is not equal over the all area of the Sundarban region. The following table shows that highest and lowest percentage of SC population observed in Hingalganj and Patharpratima. The highest concentration of SC population is observed in middle and eastern part of the Sundarban region. Northern and Southern parts of Indian Sundarban experienced low SC population concentration. This situation is seen in 2001. The scenario has not been changed so as it was expected in 2011 but the percentage of SC population has been declined. The percentage of SC population has been slightly increased only in Hingalganj. The causes of decreasing of SC population may be like one type of sanskritization, declining population growth rate.
The percentage of Schedule caste population is more than the schedule tribe population in total Sundarban. The CD blocks Hingalganj, Sandeshkhali-I and Sadeshkhali-II which are belongs to North 24 Parganas experienced the high ST population concentration in 2001. A massive change in percentage ST population has been observed in 2011. There is no change in only blocks, Canning –II and Sagar CD blocks. An interesting thing is that percentage of ST maximum decreased happened in 2011Hingalganj which had highest percentage of ST population.

Table 2: Percentage of SC and ST population and their decadal change

<table>
<thead>
<tr>
<th>CD Block Name</th>
<th>SC 2001</th>
<th>ST 2001</th>
<th>SC 2011</th>
<th>ST 2011</th>
<th>Change in SC population</th>
<th>Change in ST population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basanti</td>
<td>38.6</td>
<td>6.3</td>
<td>35.53</td>
<td>5.96</td>
<td>-3.07</td>
<td>-0.34</td>
</tr>
<tr>
<td>Canning-I</td>
<td>50.7</td>
<td>1.3</td>
<td>47.55</td>
<td>5.96</td>
<td>-3.15</td>
<td>4.66</td>
</tr>
<tr>
<td>Canning-II</td>
<td>24.6</td>
<td>5.9</td>
<td>20.93</td>
<td>5.9</td>
<td>-3.67</td>
<td>0</td>
</tr>
<tr>
<td>Gosaba</td>
<td>64.3</td>
<td>9.2</td>
<td>62.69</td>
<td>9.47</td>
<td>-1.61</td>
<td>0.27</td>
</tr>
<tr>
<td>Haroa</td>
<td>24.8</td>
<td>3.4</td>
<td>23.62</td>
<td>5.95</td>
<td>-1.18</td>
<td>2.55</td>
</tr>
<tr>
<td>Hasnabad</td>
<td>25.4</td>
<td>6</td>
<td>25.24</td>
<td>3.69</td>
<td>-0.16</td>
<td>-2.31</td>
</tr>
<tr>
<td>Hingalganj</td>
<td>65</td>
<td>31.5</td>
<td>66.02</td>
<td>7.3</td>
<td>-1.02</td>
<td>2.42</td>
</tr>
<tr>
<td>Joynagar-I</td>
<td>40.9</td>
<td>0.1</td>
<td>39.01</td>
<td>0.03</td>
<td>-1.89</td>
<td>0.07</td>
</tr>
<tr>
<td>Joynagar-II</td>
<td>36.7</td>
<td>0.5</td>
<td>33.94</td>
<td>0.41</td>
<td>-2.76</td>
<td>-0.09</td>
</tr>
<tr>
<td>Kakdwip</td>
<td>35.9</td>
<td>0.8</td>
<td>34.74</td>
<td>0.65</td>
<td>-1.16</td>
<td>-0.15</td>
</tr>
<tr>
<td>Kultali</td>
<td>47.3</td>
<td>2.6</td>
<td>45.49</td>
<td>2.48</td>
<td>-1.81</td>
<td>-0.12</td>
</tr>
<tr>
<td>Mathurapur-I</td>
<td>36.9</td>
<td>0.3</td>
<td>35.18</td>
<td>0.25</td>
<td>-1.72</td>
<td>-0.05</td>
</tr>
<tr>
<td>Mathurapur-II</td>
<td>29.6</td>
<td>1.7</td>
<td>28.23</td>
<td>2.1</td>
<td>-1.37</td>
<td>0.4</td>
</tr>
<tr>
<td>Minakhan</td>
<td>31.3</td>
<td>10.4</td>
<td>30.43</td>
<td>9.32</td>
<td>-0.87</td>
<td>1.08</td>
</tr>
<tr>
<td>Namkhana</td>
<td>26</td>
<td>0.4</td>
<td>25.85</td>
<td>0.41</td>
<td>-0.15</td>
<td>0.01</td>
</tr>
<tr>
<td>Pathratima</td>
<td>23.7</td>
<td>0.9</td>
<td>22.95</td>
<td>0.8</td>
<td>-0.75</td>
<td>-0.1</td>
</tr>
<tr>
<td>Sagar</td>
<td>27.8</td>
<td>0.4</td>
<td>26.53</td>
<td>0.4</td>
<td>-1.27</td>
<td>0</td>
</tr>
<tr>
<td>Sandeshkhali-I</td>
<td>32.2</td>
<td>25.9</td>
<td>30.9</td>
<td>25.95</td>
<td>-1.3</td>
<td>0.05</td>
</tr>
<tr>
<td>Sandeshkhali-II</td>
<td>44.6</td>
<td>22.2</td>
<td>44.91</td>
<td>23.42</td>
<td>0.31</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Source: 2001 data and 2011 data from District Census Handbook of both North and South 24 Parganas, West Bengal.

VII. Conclusion:

The above result and discussion reveals that the distribution of population is not even all over the Indian Sundarban. In respect to total population distribution south eastern and south western part of the Sundarban belong to highest population distribution, where as population density is concerned, north western part of the region experienced the highest population density. Similarly, there is a disparity in male female distribution of the Sundarban. When we talk about rural and urban population distribution, we find out that there is also significant difference. There are also spatio-temporal variations in schedule caste and schedule tribe population distribution. So the population distribution of the Sundarban Region temporally and spatially difference due to both physical and socio economic factor, but this study limited only ten year time span between 2001 and 2011. In future researcher may work on other census year data and find out the detail distribution pattern.

References:


