

Population Growth in Sundarban Region – A Spatio-Temporal Analysis

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Abstract: Sundarban region is the world largest estuarine delta. The reclamation history shows that man had started to settled in this area from 1770 AD in early part of British rule. Till the 1st half of the 20th century the population growth was very low in this region. But after that population has changed dramatically due to partition between India and Bangladesh and also independence movement in Bangladesh. This paper attempts to reveal the growth and spatio-temporal change of human population in the Sundarban. Chronological data has been taken from 1872 to 2011 for the analysis. Census data (2001 and 2011) and different literature have been used as the data base for spatial analysis of population growth in this region. Statistical calculation, graphical presentation and cartographic techniques with GIS software have been used for analysis. The result showing that population has increased 16 times in the last 140 years. There was doubling situation in population growth in 1921 for before independence and 1981 after independence. Population density pattern is low density in coastal area and high density pattern towards interior part from the coastal face. The male female population, rural urban population has also changed both spatially and temporally and these are also increased with time.

Keyword: Estuarine, Reclamation, Cartographic techniques, GIS, Growth rate.

INTRODUCTION

Demography is the study of population change over time and space and it studies the various determinants of population change and the impact of such changes on socio-economic development of region. The study of population gives an idea about the dispersion of population. The density is one of the parameters for measuring population ratio 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 structure, composition and distribution with respect to region and time. The population growth means changes in total population; it may be positive or negative. Population growth is the indicator of economic and social development. The study of measurement of such change, 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. Population distribution and population growth rate have calculated for identifying changes in population characteristics for study region.

Literature Review

Some indian and foreign population geographers have given the tools and techniques to assess the population growth in their books [1- 5]. Indian scholar also attempted to evaluate the population distribution of a particular region with other population characteristics [6-20].

Some researchers also attempt to evaluate the population growth in Sundarban Region. District Human Development Report [21] published the report which emphasised on growth rate and other demographic parameter in South 24 Parganas part. The report compared between South 24 Parganas and North 24 Parganas in distribution of population in Sundarban. District Human Development Report [22] shows the growth of population with other components of population characteristics of blocks which are belongs to Sundarban particularly in North 24 Parganas. The analysis basically based on 2001 census. Centre for Science and Environment [23] in their study entitled “Living with changing climate Impact, vulnerability and adaptation challenges in Indian Sundarban” reported and assessed on block wise population growth (1951 – 2011 projected in Sundarban region. Singh [24] has pointed out that “the population is growing and exerting even greater pressure on fragile and recovering natural systems. As a result of high birth rates and migration inflows, population density is high and

growing,” said the report “Building resilience for sustainable development of the Sunderbans.” Chacraverti [25] has analysed the population growth from 1911 to 2001 with growth rate per annum. Banerjee [26] studied on environment, population and settlement of Sundarban particularly in south 24 Parganas. She analysed growth rate of population in 1981 and 1991 census. She worked on the basis of the blocks of South 24 Parganas under the Sundarban. Das and Bandyopadhyay [27] studied on population growth in 15 selected blocks of Indian Sundarban area. They have measured the growth rate between 1991 and 2001. Sarkar [5] worked on population growth in Indian part of Sundarban. The data have been used from 1872 to 2001. He also analysed the block wise population size of Sundarban from the 1872 to 1991. Rudra and Rudra [28] have tried to analysed the mapping technique of human resources of North 24 Parganas. Sahoo [29], 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 [30], studied on growth of population by decade from 1880 to 1950, in three Sundarbans old districts Khulna and Backarganj, Bangladesh and 24-Parganas (including Calcutta), West Bengal and presented by bar diagram. De [21], calculated the growth-rate of population in the Sundarban during the decade 1951-61 and 1961-71 against the corresponding figures for the district (rural) and the state (rural).

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 Hariabhanga 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 bounded 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 is 2262126 and 2162126. Total rural and urban population is 4172248 and 254011.

Table-1: General information about Sundarban (Study area)

Subject	District		Total
	South 24 Parganas	North 24 Parganas	
CD Blocks	13	6	19
Area	3054.15	1064.36	4118.51
% of Area Covered	64.46	31.81	50.94
Total Population	3309526	1116733	4426259
Male	1692424	571709	2264133
Female	1617102	545024	2162126
Rural	3083950	1088298	4172248
Urban	225576	28435	254011
Sex Ratio	955	953	954

Source: Prepared by Author based on District Census Handbook [31], North and South 24 Parganas.

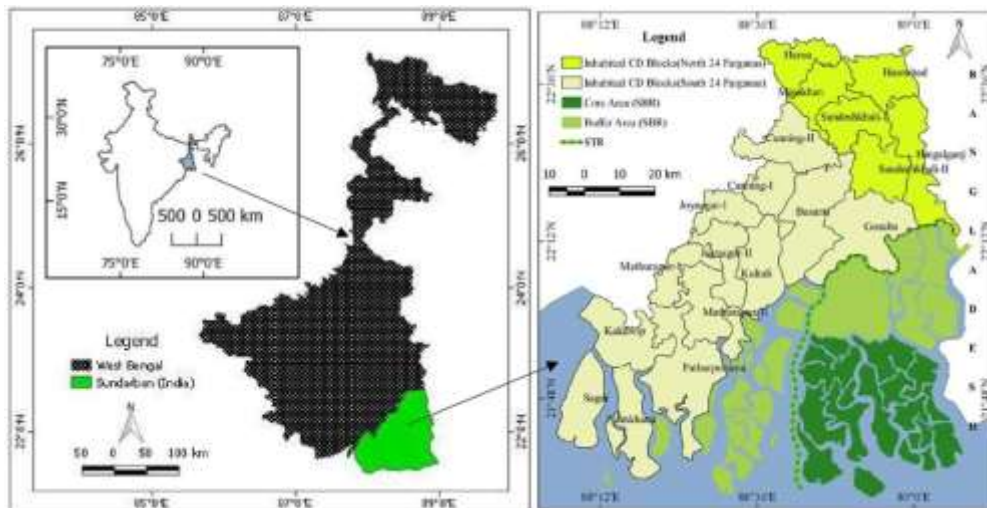


Fig-1: Location Map of the study area

Objectives

- To find out the overall growth of population.
- To measure trend of the population growth in the study area.
- To evaluate the spatio-temporal variation in population growth in Sundarban.

METHODOLOGY

The Study was based on secondary data. It has been carried out from 1872 to 2011 for regional analysis and 2001 to 2011 at CD Block level analysis. Secondary data collected from District census handbook, District statistical handbook, books and literature. The author 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. The collected data for this study have been presented by cartographic techniques using GIS software such as Q-GIS and

statistical analysis. Absolute and relative measures of dispersion have been used for data analysis. Analysed data has been presented by cartographic techniques and statistical graph.

RESULTS AND DISCUSSION

Trend of population growth

The total population in study region in 1872 was 296045 persons and it was increased to 4426259 persons in 2011. Population was increased almost 15 times from 1872 to 2011. Before independence population was very low. But during 1901 to 1951 population was increased almost double. After independent during 1951 to 2001 population increased almost 4 times due to political phenomenon. A mass of population have migrated from Bangladesh to the Sundarban.

Table-2(a): Year wise total population

Year	1872	1881	1891	1901	1911	1921	1931	1941
Total Population	296045	355512	419818	487377	570878	648654	754421	959675

Table-2(b): Year wise total population

Year	1951	1961	1971	1981	1991	2001	2011
Total Population	1159559	1532102	2003097	2455365	3154704	3757356	4426259

Source: Sarkar, 2012 and District Census Handbook, Census of India, 1951 to 2011

From the above table and the following figure it is clear that major population change has been occurred after 1950. In the year of 1971, lot of people came from our neighbour country Bangladesh due to war condition. In spite of these causes there are several factors which have acted important role on growth of population.

Population growth rate in Sundarban was very ups and down. The following table shows that decadal growth rate of first three decades was decreasing way, but after that ever increased and decreased. Maximum decadal growth has been found in the 1951-1961 decade due to both socioeconomic and political dilemma. Recently in the decade of 1981-1991 it was highest and then it is going to decreasing way. In the last census (2011) population growth rate was 15.11.

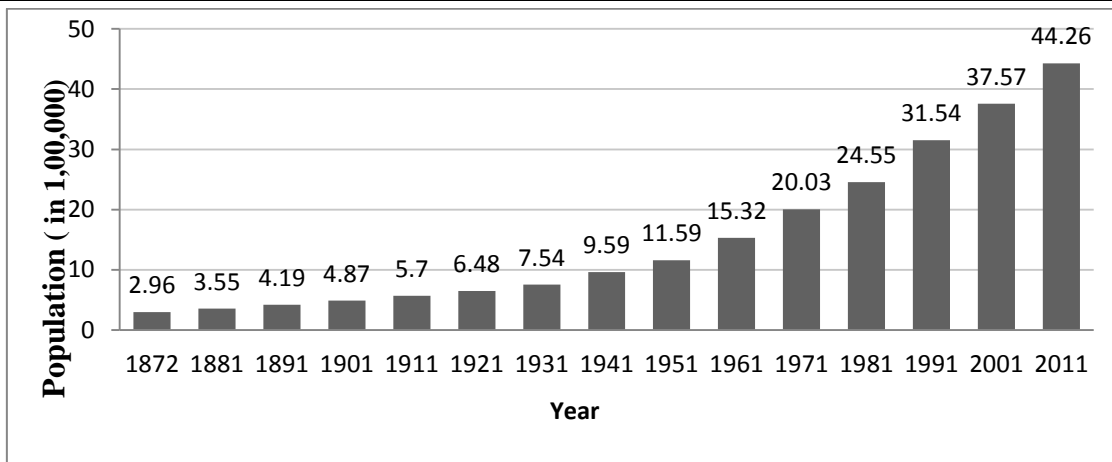


Fig-2: Population Trend [Based on data from Census of India (1951 – 2011) and Sarkar, 2012]

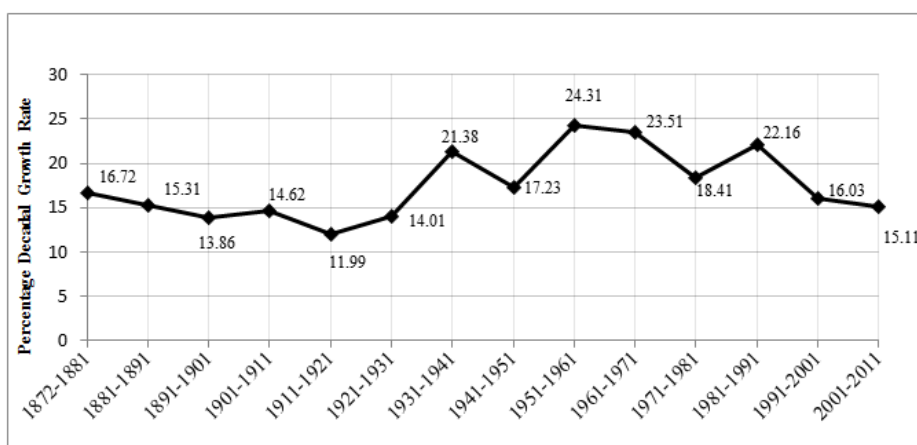


Fig-3: Population Trend [Based on data from Census of India (1951 – 2011) and Sarkar, 2012]

Spatial and Temporal variation in population growth

The highest growth of population was recorded in Canning-II CD block (22.62) in 2001 and it is found that this growth is higher than the Sundarban average in study region. Kakdwip (20.57), Canning-I, Minakhan, Basanti have high growth rate from 1901 to 2001 (Fig.-3.8) accounting more than 18 percent. The low growth below 12 percent was recorded Hingalganj (9.02), Gosaba (10.40) CD blocks and population growth between 12 to 18 percent in rest of the CD blocks in study region. The following map also reveals CD block wise population growth from 2001 to 2011. The high population growth was recorded in Canning-II (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. The low population growth rate was recorded in Gosaba (9.64), Matharapur-II (10.21) and Hingalganj (10.40) CD blocks of Sundarban. In the medium population growth which ranges from 12 to 18 percent was recorded in rest of the CD blocks in study region. it should be point out that Hingalganj recorded lowest population growth in 2001 but population growth rate increased in 2011. Population growth rate increased in 2011 in Sagar, Namkhana, Mathurapur-I, Sandeshkhali-I, Sandeshkhali-II, Kultali CD blocks.

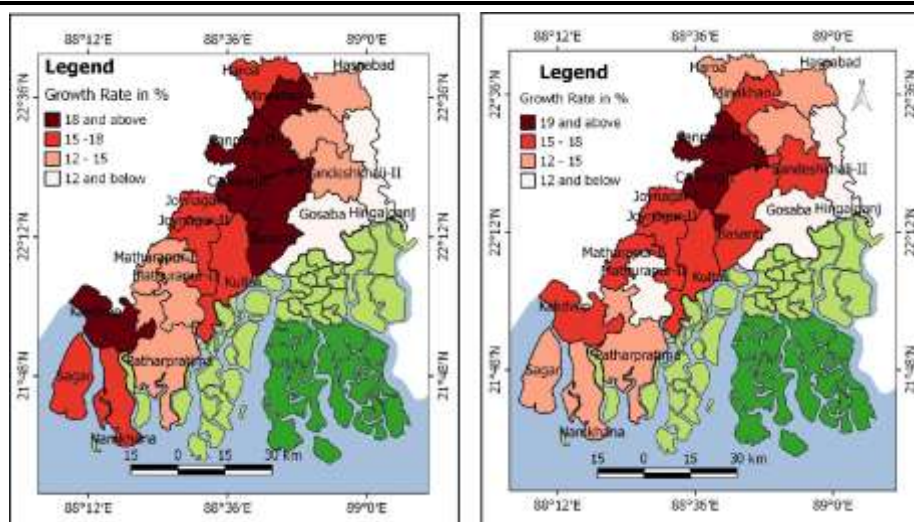


Fig-4: Inter-blocks differences in growth rate of population [Based on data from Census of India, 2001(Left) and 2011 (Right)]

Table-3: Spatio-temporal variation in population growth in Sundarban

CD Blocks	Growth rate 2001	Growth rate 2011	Temporal Variation in growth rate (2001-2011)	Spatial Variation to total growth rate of Sundarban (2001)	Spatial Variation to total growth rate of Sundarban (2011)
Basanti	18.53	17.26	1.27	-2.5	-2.15
Canning-I	19.76	19.72	0.04	-3.73	-4.61
Canning-II	22.62	22.4	0.22	-6.59	-7.29
Gosaba	10.01	9.64	0.37	6.02	5.47
Haroa	17.22	14.87	2.35	-1.19	0.24
Hasnabad	14.87	12.66	2.21	1.16	2.45
Hingalganj	9.02	10.4	-1.38	7.01	4.71
Joynagar-I	15.44	16.74	-1.3	0.59	-1.63
Joynagar-II	15.21	17.06	-1.85	0.82	-1.95
Kakdwip	20.57	15.12	5.45	-4.54	-0.01
Kultali	16.78	17.93	-1.15	-0.75	-2.82
Mathurapur-I	13.82	15.61	-1.79	2.21	-0.5
Mathurapur-II	12.76	10.21	2.55	3.27	4.9
Minakhan	18.7	15.13	3.57	-2.67	-0.02
Namkhana	16.36	12.14	4.22	-0.33	2.97
Patharpratima	14.84	13.09	1.75	1.19	2.02
Sagar	16.94	12.45	4.49	-0.91	2.66
Sandeshkhali-I	14.19	14.59	-0.4	1.84	0.52
Sandeshkhali-II	12.78	15.32	-2.54	3.25	-0.21
Mean	15.81	14.86			
SD	3.43	3.29			
CV	21.70	22.14			

Source: Calculated by the Author (Based on census data 2001 and 2011).

The above table and calculation shows that there are inter block variations in the Sundarban region. in respect to 2001 and 2011 census data, it is observed that temporally maximum positive and negative variation are observed in Sagar and Sandeshkhali-II respectively. On the other hand minimum positive and negative variations are observed in Canning –II and Sandeshkhali-I respectively. Coefficient of variation shows that growth rate of 2011 is more variable and less consistent in comparison with 2001.

There are also variations between CD blocks and total Sundarban region. Positive variation means block level growth rate is less than total regional growth rate and negative growth shows the block level growth rate is more than the regional growth rate in a particular time phrase. Here, in respect to 2001, 9 CD blocks are carrying out negative growth rate and 10 CD blocks are belonging to positive growth rate. In 2011 slight changes have been seen. Population growth rate of Namkhana and Sagar and Haroa which growth rate

were exceeded from regional growth rate in 2001, but the growth rates of these blocks were happened under the regional growth rate. Joynagar I and II, Mathurapur, Sandeshkhali-I had growth rate below the regional growth rate in 2001, but in 2011 the growth rate of these blocks exceeded the regional growth rate.

CONCLUSION

Population growth is an important issue for both physical and socio-economic perspective. If the growth rate exceeds 2% per annum, then the situation is called as population explosion. The Sundarban region has been overtaken this problem recently. But the CD block wise population growth rate is observed in 2011, Canning-II is in the population explosion stage because it exceeds the average annual growth rate. Canning-I is now very near this stage. The above result and discussion shows that there is variability in growth of population in both total region and inter-block area. There is also temporal variability. At last it can be concluded that there is spatio-temporal variability in population growth rate due to physical and socio-cultural constraints.

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