



## Landuse Dynamics and Rural Development of Canning-II Block, South 24 Parganas, West Bengal

Amiya Kumar Sarkar

Research scholar, Department of Geography, University of Calcutta

### Article Info

#### Article History

#### Received on:

31 December 2019

#### Accepted in Revised Form on:

14 February, 2020

#### Available Online on and from:

21 March, 2020

#### Keywords

Land use Land cover (LULC)

Land per Capita

Land managers

Rural Development

Village amenities

### Abstract

The present study was carried out in Canning II block, South 24 Parganas district of West Bengal to identify changes in Land use and Land cover pattern between the time period 1986 and 2018. The analysis of LULC of the study area reveals that agricultural land (42.09 sq. km.) has been converted to a settlement area (28.20 sq. km.) and aquaculture land (13.89 sq. km.). Topographical maps were used to prepare the LULC map in the year 1968 and USGS LANDSAT 8 and OLI images are nowadays used to prepare the LULC map. Land use data from the year 1968 to 2018 and the population data from the Census 1971 and 2011 were studied to understand the rural development.

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### Introduction

The terms 'landuse' and 'land cover' are often used interchangeably, but each has its own unique meaning. Land cover-refers to the characteristics and surface cover of the earth's surface, as represented by natural elements like vegetation, water, bare earth, impervious surface and other physical features of the land. Identification of land cover established the baseline information for activities like thematic mapping and change detection analysis. Land use refers to the activity, economic purpose, intended use and / or management strategy placed on the Land Cover types by humans or land managers. According to Meyer W.B., (1995) every parcel of land on the earth's surface is unique in the cover it possesses. Land use and Land Cover are distinct yet closely linked characteristics of the earth's surface. The use to which we put land could be grazing, agriculture, urban/ rural development, logging and mining among many others. While land cover categories could be cropland, forest, wetland, pastures, roads, urban areas among others. A growing population requires space to accommodate it and their functions gave rise to the development of functional zones particularly in

rural settlements.

### The Study Area

Canning II block is situated in the northwestern part of the Canning subdivision and northeastern part of South 24 Parganas (West Bengal), between 22°19'12" N to 22°29'11" N latitude and 88°32'10" E to 88°47' 52" E longitude and encompasses an area of 214.93 sq. km. The block is divided into nine Gram panchayats (athrabanki, deuli-I, deuli-II, kalikatala, motherdighi, narayanpur, sarengabad, tambuldaha-I, tambuldaha-II) and 63 revenue mouzas or villages.

### Objectives

The objectives of the study can be listed as follows:

To study the present pattern of landuse systems of the study area

To analyse the different categories of landuse and their changing pattern over time

To identify the changes in response to population increase and rural development



## Methodology

The study incorporates some primary and secondary data and have been represented by suitable cartographic techniques.

**Data Collection:** The data were collected from different sources, such as the toposheet of the area under study for the preparation of land use map of 1968 and USGS LANDSAT8 & OLI images of the study area for preparation of land use map of 2018. Other secondary data were collected from different Government offices and other organizations. Such data were collected from various sources like demographic data from Census office (Census of India) and land use data from District Statistical Hand Book (Govt. of W.B.), block maps, district maps and subdivision maps from NATMO. Other statistical data were collected from different Government offices of West Bengal.

**Data Analysis:** Data were analyzed by different statistical, cartographic and G.I.S. Techniques.

**Interpretation and Visualization:** After analyzing the data and information, they were represented through different types of thematic and non thematic maps and even block level land use maps.

## Dynamics of Landuse in the Study Area

### Extent of Landuse Categories in 1968

Canning - II block occupies 19.47% of Subdivision (Canning subdivision) area and 2.16% of district (South 24 Parganas) area. The distribution of different land use and land cover categories for the study area is represented here in figure 1 and table 1. The source of the LULC map of 1968 is Survey of India topographical map with scale 1:50,000. When we take the block as a whole into consideration, it is observed that the most extensive land use land cover category of Canning II block as in 1968 was agricultural land, which was covered by an area of 127.06 sq. km. and occupied 59.12% area of the area under study (fig. 1).

The second most extensive land use category was rural settlement, which was covered by an area of 25.71 sq. km. and occupied 11.96% area of total area under study. Other extensive land use land cover categories were mudflat, occupying 22.37 sq. km. (10.41%), bil occupying 16.02 sq. km. (7.45%), river occupying 7.65 sq. km. (3.56%), foot track occupying 0.49 sq. km. (0.22%), a non-metalled road occupying 0.34 sq. km. (0.16%), metalled road occupying 0.04 sq. km. (0.02%), embankment occupying 3.65 sq. km. (1.70%), aquacultural land occupying 5.84 sq. km. (2.72%), sand deposition occupying 3.79 sq. km. (1.76%), creak occupying 0.48 sq. km. and pond occupying 1.49 sq. km. (0.69%) land of the total area understudy in the year 1968.

### Extent of Landuse Categories in 2018

Agricultural land area is again the major extensive Land Use which covers an area of 84.97 sq. km. and occupies 39.53% land of total block area in 2018. The second most extensive land use category is a rural settlement which covers an area of 59.21 sq. km. and occupies 27.55% land of total block area (Canning-II block).

Other land use land cover categories are aquaculture land occupying 58.12 sq. km. (27.04%), a non-metalled road occupying 0.19 sq. km. (0.09%), metal road occupying 0.87 sq. km. (0.40%), embankment occupying 4.32 sq. km. (2.01%), brick kiln occupying 0.24 sq. km. (0.11%), creak occupying 0.29 sq. km. (0.13%), river occupying 5.62 sq. km. (2.61%) and pond occupying 1.1 sq. km. land and 0.51% land of total block area.

### Volume of Landuse Changes and its Impact on Rural Development

There are some positive and negative changes but the brick kiln is the landuse which has newly been adopted in the last two decades, so this type of land is a transfer from agricultural land and there is no total volume of changes for these types of land use.

The major positive changes in landuse / land cover categories are metalled road (2075%), embankment (18%), rural settlement (130%) and aquaculture land (895%). The major negative changes in landuse/ land cover categories are non-metalled road (-44%), agricultural land (-33%), creek (-40%), river (-27%), and pond (-26%). Some categories have changed by -100% and transferred into another kind of landuse, e.g., foot track, sand deposits, mudflat and bil.

### Percentage Changes in Landuse and its Impact on Rural Development

There are some positive and negative percentage changes in the total area in land use 1968-2018 of canning II block and the changes of LULC in respect to these fifty years. The positive changes took place in metalled road (0.38%), embankment (0.31%), brick kiln (0.11%), rural settlements (15.60%) and aquaculture land (24.33%). The negative changes in LULC categories are in foot tracks (-0.23%), non-metalled road (-0.08%), agricultural land (-19.58%), sand deposition (-1.76%), mudflat (-10.41%), bil (-7.45%), creak (-0.09%), river (-0.95%) and pond (-0.18%).

## Population Growth and Rural Development

### (a) Change in Population Density

In the year 1971, the population density was 357 persons per sq. km. of Canning II block and it was 457, 672, 888 persons per sq. km. respectively the years 1981, 1991 and 2001. In the year 2011, it is 1157 persons per sq. km. The percentage of change of population density relative to reference date 1971 in this particular block is 224%.

### (b) Change in Household Density

In the year 1971, the household density of Canning-II Block was 67 households per sq. km. The decadal changes of household density from 1981 to 2011 were 80, 116, 154 and 226 households per sq. km. of Canning- II block under canning subdivision. The volume of changes or percentage of change relative to the reference date 1971 of household density is 237 percentages.

### (c) Change in Main Workers

In the year 1971, the percentage of main workers was 29 of the total population of Canning-II block. In the next census years



1981, 1991, 2001 it was 27, 26 and 23 percent respectively and in the last census, i.e. in 2011, it was 15 percent of the total population. The total volume of changes or percentages of change relative to the reference date (1971) of main workers is -48 percent.

#### **(d) Change in Cultivators**

In the year 1971 percentages of cultivators of Canning-II block was 10 percent and in the year 1981, 1991, 2001 it was 11, 13 and 6 percent. In the year 2011 percentages of cultivators were 3 percent. The total volume of changes or percentages reference to relative date (1971) of cultivators is -70 percent.

#### **(e) Change in Agricultural Labourers**

In the year 1971, percentages of agricultural labourers were 15 percent in Canning-II block. In census years 1981, 1991 and 2001 the percentages of agricultural laborers were 14, 12 and 12 percent respectively. And in the last census year of study i.e. 2011, it was only 7 percent per 100 populations. In this block, the total volume of changes or percentage changes relative to the reference date of agricultural labourers is -53 percent.

#### **Decadal Changes in Land /'00 Persons**

In the year 1971, land per hundred populations was 1.236 sq. km. of Canning-II block and land per capita was 0.012 sq. km. In the census year 1981, it was 0.454 sq kilometer per hundred populations and land per capita was 0.004 sq. km. In the year 1991, it was 0.270 sq. km. per hundred populations and land per capita or land per person was 0.002 sq. Km. In the census year, 2001, land per hundred populations was 0.168 sq. km. per hundred populations and land per person was 0.0016 sq. km. In the 2011 census, it was identified that 0.124 sq. km. land per hundred populations and per person average land was 0.0012 sq. Km. The overall volume of changes of land per hundred population of Canning II block is -89 percent.

#### **Decadal Changes in Literates /'00 Persons**

In the year 1971, it was identified that 13 persons are literate per hundred population of Canning-II block. In the census 1981, it was 19 persons per hundred populations and in the year 1991, it was 23 persons. In the year 2001, it was identified as 39 person literates per hundred populations. In the last Census year of the study 2011, it is identified that 55 person literates per hundred populations. In this block total volume of changes of literates per hundred populations of Canning II block is 323 percent.

#### **Changes in Village Amenities**

##### **(1) Changes in Education Facilities**

In the year 1971, there were 62 primary schools, two middle schools and three secondary schools. And in the year 2011, there were 127 pre-primary schools, 119 primary schools, 28 middle school, 21 secondary schools, 12 senior secondary schools and two colleges (Table No 2).

##### **(2) Changes in Medical Facilities**

In the year 1971, there were no medical facilities in the Canning-II Block. And In the year 2011, there were three public health centers, 35 primary health centers, six maternity and child welfare centers, four dispensaries and six family welfare

centers.

##### **(3) Changes in Power Supply Facilities**

In the year 1971, there was no availability of power supply in Canning-II Block. In the year 2011, there were 61 villages has a power supply for domestic use, two villages have a power supply for agricultural use, 23 villages have a power supply for commercial use and 18 villages have a power supply for all uses.

##### **(4) Changes in Drinking Water facilities**

About 45 tap water or tube well water and 11 tank water was available in the year 1971 and In the year 2011 it was six tap water, one well water, 60 hand pump and 48 bore well or tube well.

##### **(5) Changes in Communication Facilities**

In the year 1971 there were 58 villages was under mud road or Kacha rasta, and 10 villages were under paved road. And In the year 2011, the conditions of this block has been changed, such as four common service center, six villages were Bus Service, 22 auto or modified autos, 39 taxis and vans, 24 tractors, 60 cycle-pulled rickshaws, 9 carts driven by animals and five river ferry service were available in Canning-II block.

##### **(6) Changes in Post & Telegraph Facilities**

In the year 1971 there were nine Post Office and In the year 2011, there were 11 Post Office, 10 Sub Post Office and one post & Telegraph.

##### **(7) Changes in Market or Hat Facilities**

In the year 1971, this block has one regular market and 14 weekly market facilities. And In the year 2011, it was 16 regular markets and 24 weekly markets.

#### **Conclusion**

Land utilization of Canning-II Block is influenced by economic, cultural, political, and historical and land-tenure factors at multiple scales. Land cover, on the other hand, is one of the many biophysical attributes of the land that affect ecosystems function. The region ranges in all forms, shapes, and types of settlements- starting from individual dispersed hamlets, to tightly nucleated clusters, local factors of natural and cultural Landscape affecting the type in each case. The nearest neighbor statistics again underlies the uniformity in the spacing, whereas the village size analysis has helped us to recognize the concentration of settlement. In this regard, the active Delta has exhibited the highest areal concentration. A balanced sex ratio in most of the regions accompanied by an increase in sex ratio in most of the regions indicative of a healthy situation. High growth rates of population area characteristic of this delta, growth rates being higher in the in general. Here the change in density is also more marked thereby creating tremendous pressure on Land. The active delta has to self-reliant because it is farthest away from the metropolitan influence. Hence the development level does not highlight any region in particular. In a short- term perspective, the region has to depend more on the modernization of waterways, although overland market lines links should feed the rivers trade centers. Finally, cottage industries and forest-based industries, tourism industries;



fishery should be more developed in a properly organized fashion to benefit the whole area.

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Table – 1: Different Types of LULC Categories of Canning- II Block since 1968

Types	1968 (Sq. km.)	1968 (%)	2018 (Sq. km.)	2018 (%)
Foot Track	0.49	0.23	-	-
Unmetal Road	0.34	0.16	0.19	0.08
Metal Road	0.04	0.02	0.87	0.40
Embankment	3.65	1.70	4.32	2.01
Brick Kiln	-	-	0.24	0.11
Rural Settlement	25.71	11.96	59.21	27.56
Agricultural Land	127.06	59.12	84.97	39.54
Aquacultural Land	5.84	2.72	58.12	27.05
Sand Deposition	3.79	1.76	-	-
Mud Flat	22.37	10.41	-	-
Bil	16.02	7.45	-	-
Creak	0.48	0.22	0.29	0.13
River	7.65	3.56	5.62	2.61
Pond	1.49	0.69	1.10	0.51
Total Area	214.93	100	214.93	100

Source: Computed by author

Table-2: Changes of Village Amenities of Canning –II Block,1971 - 2011

Village Amenities	1971	2011
Education	P62, M2, S3	PP127, P119, M28, S21, SS12, C2
Medical	-	PHC3, PHS35, MCW6, D4, FWC6
Power Supply	-	ED61, EAG21, EC23, EA18
Drinking Water	TW45,TK11	WW1, HP60, TW6, BW48
Communication	KR58, PT10	CSC4, BS6, AMA22, T&V39, T24, CPR60, CDA9, RFS5
Post & Telegraph	PO9	PO11,SPO10, P&TO1
Market / Haat	RM1, WH14	RM16, WH24

Source: Census of India

PP- Pre Primary School, P- Primary School, M- Middle School, S- Secondary School, SS- senior Secondary School, C- Collage  
 D- Dispensary, PHS- Primary Health Centre, MCW- Maternity and Child Welfare Centre, TBC- T.B. Clinic, FWC- Family Welfare Centre.  
 ED- Power Supply for Domestic use, EAG- Power Supply for Agricultural use, EC- Power Supply for Commercial use, EA- Power Supply for all uses.  
 TW- Tap Water/ Tube well Water, TK- Tank Water, WW- Well Water, HP- Hand Pump.  
 KR- Kacha road/ Mud road, PR- Paved Road, PT- Post, Telegraph and Telephone, BS- Bus Service(public or private),  
 AMA- Auto/ Modified Autos, T&V- Taxis and Vans, CPR- Cycle- Pulled rickshaws( Manual &Machine driven), CDA- Cart driven by animals, RFS- River ferry Service.  
 PO- Post Office, SPO- Sub Post Office, P&TO- Post and Telegraph  
 RM- Regular Market, WH- Weekly Market.

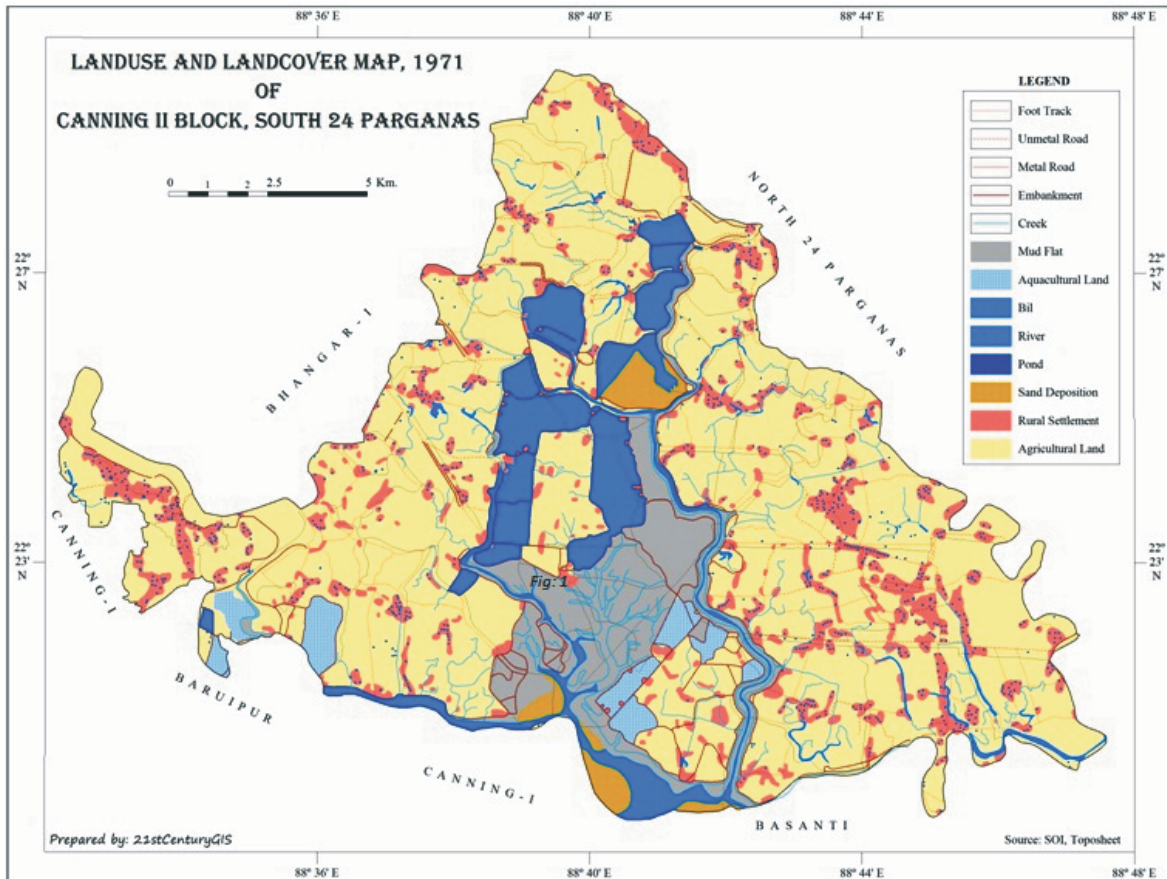


Fig.1

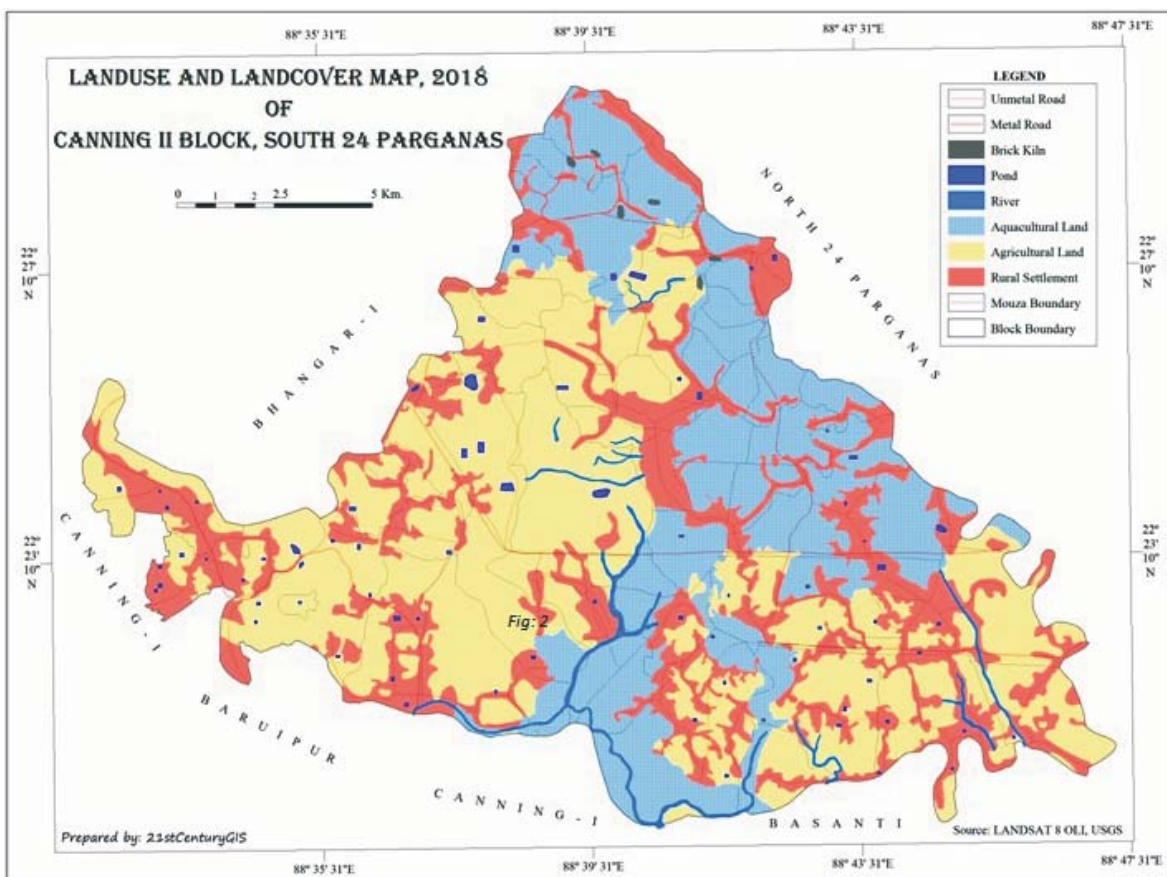


Fig.2

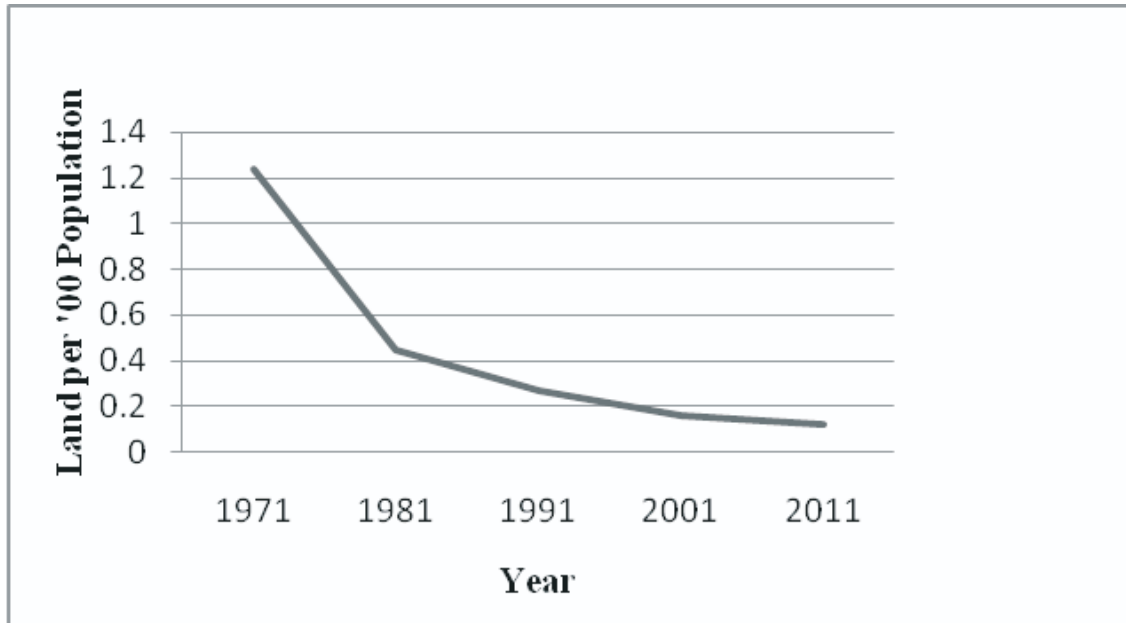


Fig.3: Land per Hundred Populations in sq. km. of Canning -II Block, South 24 Parganas

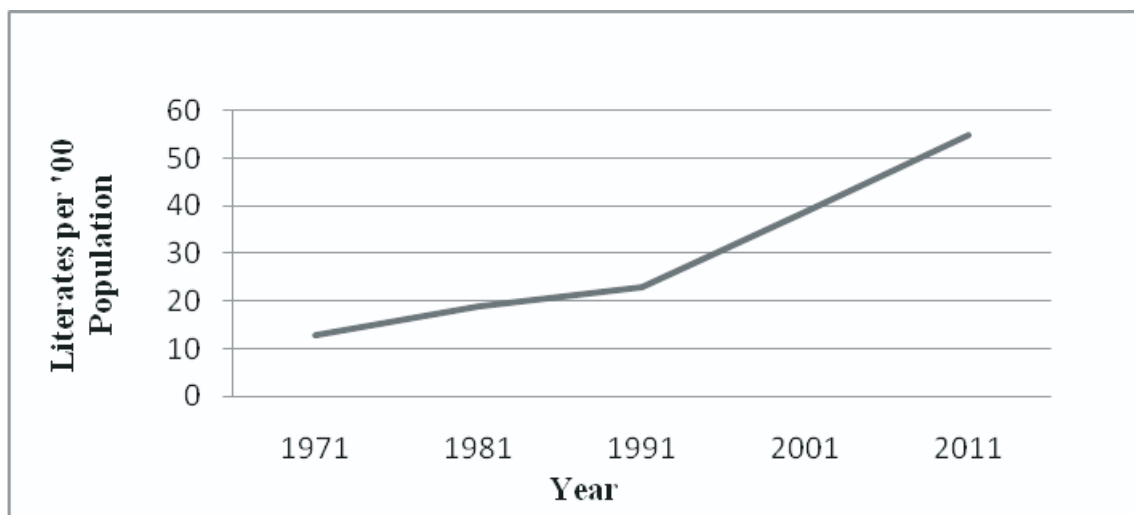


Fig.4: Literates per Hundred Populations of Canning-II Block, South 24 Parganas



Amiya Kumar Sarkar  
Research Scholar: Department of Geography  
University of Calcutta  
Email: amiyasarkar.geo@gmail.com