

**2.1 Introduction**

From the geographical point of view, Purba Medinipur district has an important location, because it is formed of fertile soil of the lower Gangetic plain on one side and another side it is situated on coastal plain of Bay of Bengal. So, there are many rivers and its tributaries developed in this area and which made this region rich in agriculture. Not only is that, here the climate is favourable for agriculture in different season. Sufficient rainfall, temperature and humidity have made agriculture in the region more productive. Apart from sufficient skilled labour, communication and advanced technology has helped to improve the agriculture in the region. The area of Purba Medinipur district is 4713.00 sq km.

**2.2 Geographical location of the study area**

The district Purba Medinipur is located in the West Bengal state, India. The district extends from 21° 36' 38.08" N to 22° 30' 41.87" N latitude and 87° 25' 23.77" E to 88° 11' 41.21" E longitude (Fig. 2.1). The district was formed on 1<sup>st</sup> January, 2002 after the division of former Medinipur. The district Paschim Medinipur is located on the northern and western border of the study area. On the south-west border, state of Odisha is located and the Bay of Bengal is situated to the south of the district. The river Hooghly and the district South 24 Parganas is situated to the east and Howrah district to the north-east. The district Purba Medinipur is agriculturally more significant due to its appropriate physical and cultural environment. There are so many varieties of crop cultivation in different season. Suitable land, fertile soil, availability of water, appropriate weather and sufficient labour has made this region rich in agriculture. Fish farming, social and agro forestry has also been the important in this region.

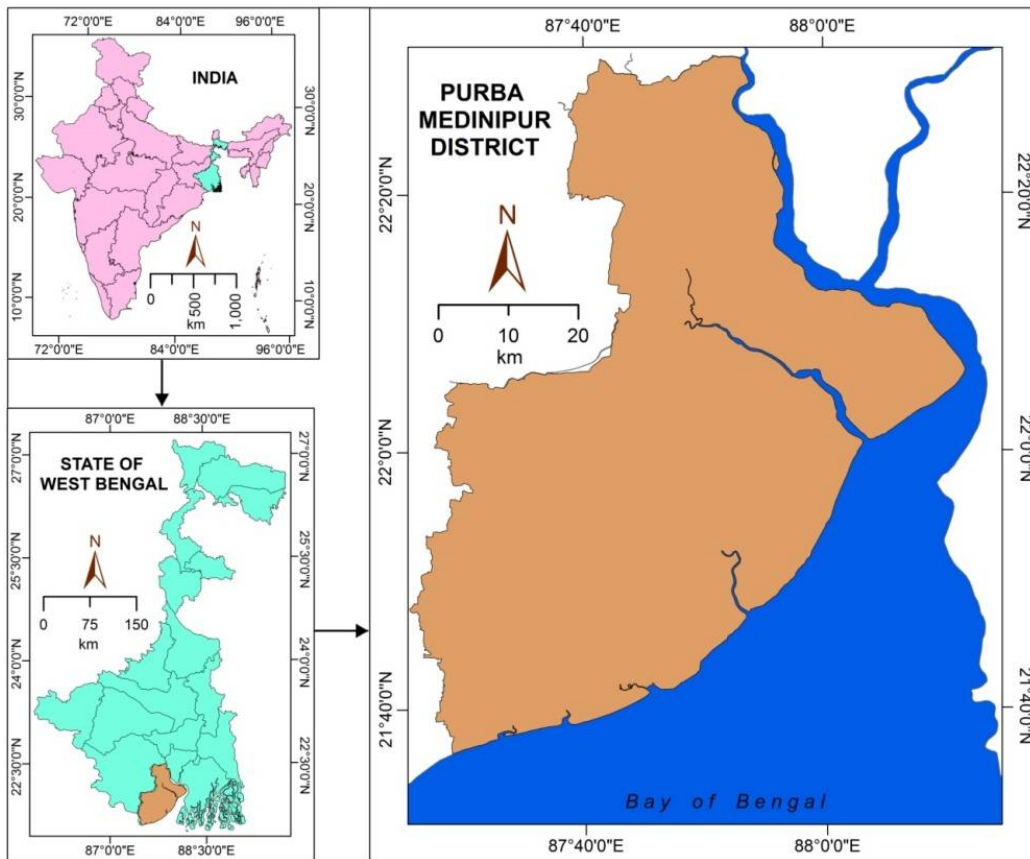


Fig. 2.1 Location map of the study area.

### 2.3 Administrative setup

Purba Medinipur also known as East Medinipur district is an administrative unit of West Bengal state, India. It is the southern part of Medinipur division which is an administrative division of West Bengal. The district consists of 25 community development blocks (Fig. 2.2) with 4 subdivisions and 21 police stations. The number of villages belonged to the district is 2994 and 5 municipalities (Fig. 2.3). There are 2928 inhabited and 66 uninhabited village in the district. The total number of census town is 20 as per 2011 census. Panskura is the largest block of the district and Sutahata is smallest with an area of  $247.74^2$  km and  $78.39^2$  km respectively and the largest village is Dubda of Egra-II block and the smallest is Rautarpur of Ramnagar-II block with an area of  $18.94^2$  km and  $14845.00^2$  m respectively. Tamluk is the districts headquarter located at Tamluk block. The table 2.1 shows the number of different administrative units of Purba Medinipur district at a glance.

There are several types of local bodies through which the different planning, management etc. is implemented. As such, the urban local bodies are Municipalities and municipal councils, notified board and rural area is conducted by BDO (Block Development Office), Gram Panchayat, Panchayat Samiti and Zila Parishad etc. In the district, civil administration is consisted of District Magistrate and he is the principal executive including 4 sub-divisional officers and 25 Block Development Officers. At present Haldia Development Authority (HDA) plays an important role in various development programme in 12 blocks of the district such as Kolaghat, Panskura, Sahid Matangini, Tamluk, Moyna, Nandakumar, Mahisadal, Chandipur, Haldia, Sutahata, Nandigram-I & II. HDA is a statutory body formed under the West Bengal Town and Country Planning and Development Act.

Table 2.1 Different administrative units of Purba Medinipur district.

Sub-division	Police Station	Community development block	Municipality	Total villages	Inhabited villages	Uninhabited villages	Census Towns
Tamluk	6	Tamluk	1	99	99	-	2
		Sahid Matangini	-	86	81	5	2
		Kolaghat	-	109	106	3	4
		Panskura-I	1	229	224	5	-
		Moyna	-	85	85	-	1
		Nandakumar	-	101	100	1	-
		Chandipur	-	112	111	1	2
Haldia	6	Mahisadal	-	75	73	2	1
		Nandigram-I	-	98	98	-	1
		Nandigram-II	-	40	40	-	1
		Sutahata	-	80	78	2	1
		Haldia	1	24	24	-	-
Egra	3	Potashpur-I	-	138	136	3	1
		Potashpur-II	-	151	144	7	-
		Bhagawanpur-I	-	165	164	1	2
		Egra-I	1	133	123	10	-
		Egra-II	-	117	115	2	-
Contai	6	Khejuri-I	-	42	42	-	-
		Khejuri-II	-	99	97	2	-
		Bhagawanpur-II	-	167	167	1	-
		Ramnagar-I	-	149	137	12	1
		Ramnagar-II	-	136	134	3	-
		Contai-I	1	225	221	4	-
		Deshapran	-	168	166	2	1
Contai-III	-	166	166	-	-		
<b>Total</b>	<b>21</b>	<b>25</b>	<b>5</b>	<b>2994</b>	<b>2928</b>	<b>66</b>	<b>20</b>

Source: District Census Handbook, 2011

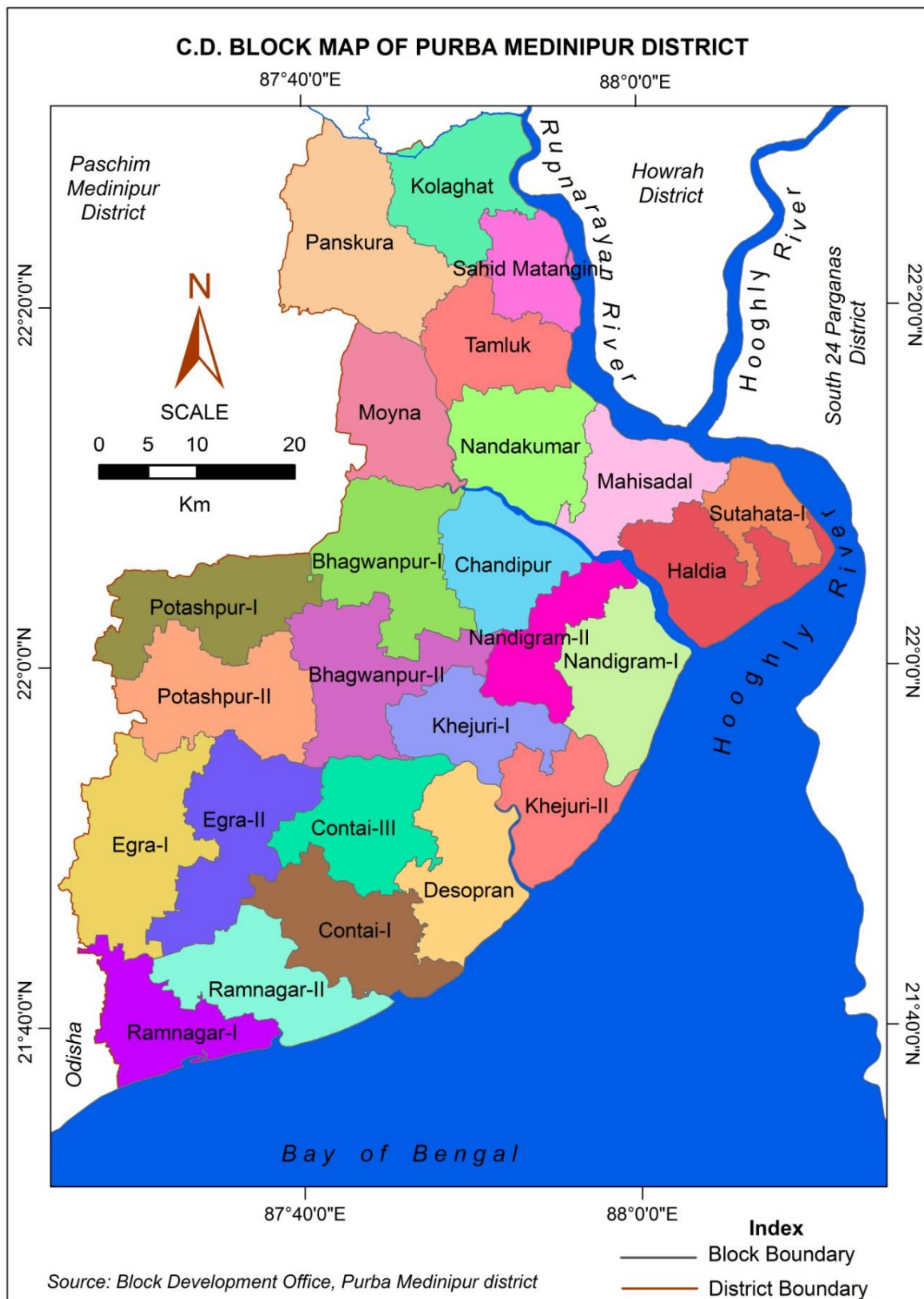


Fig. 2.2 Block map of Purba Medinipur district.

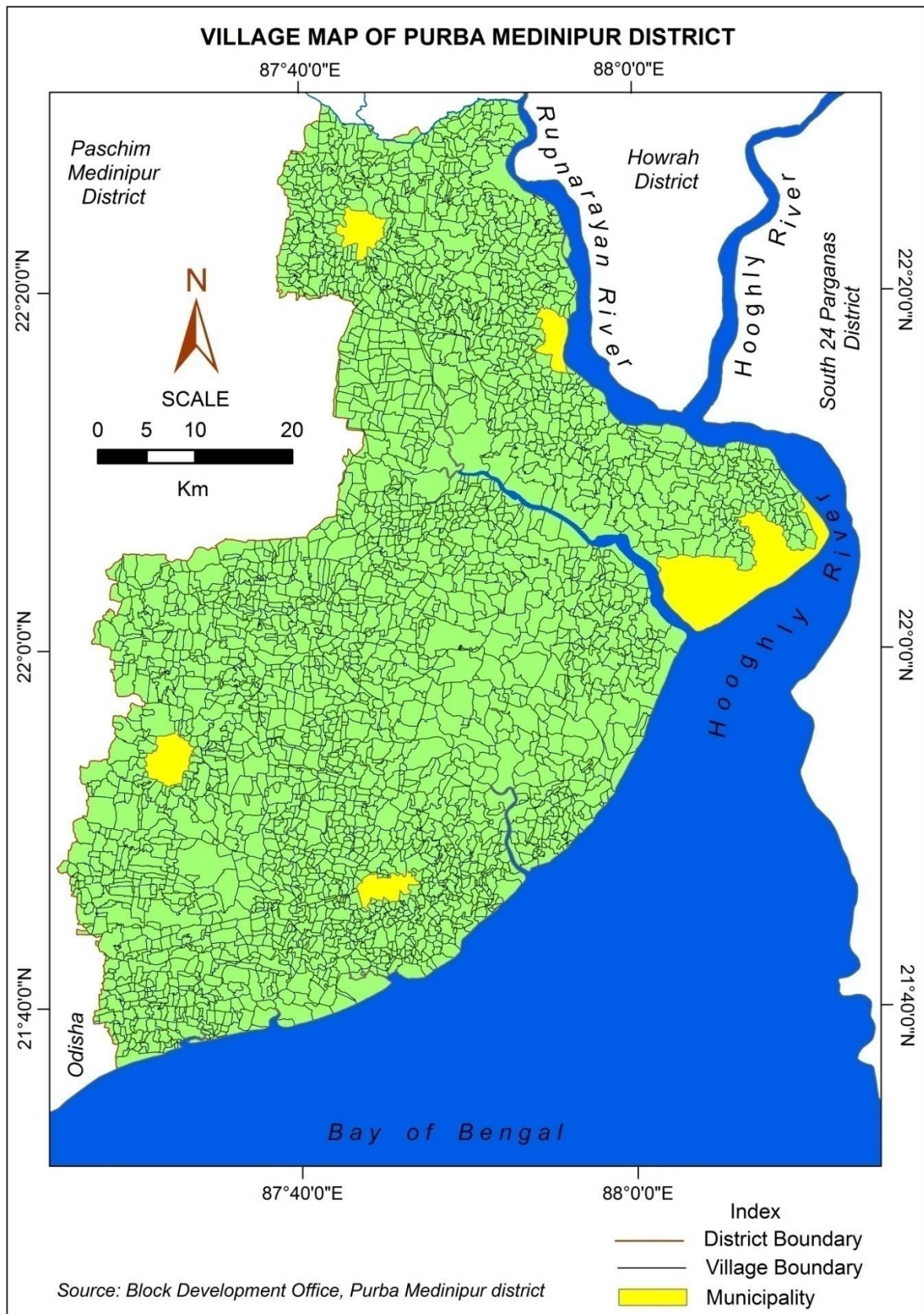


Fig. 2.3 Village and municipality map of Purba Medinipur district.

## **2.4 Physical set up**

### **2.4.1 Geology**

The map (Fig. 2.4), prepared by NATMO (National Atlas & Thematic Mapping Organization) shows that the geological formation of Purba Medinipur district is consists of unconsolidated sedimentary rocks. Geologically, this area is newly origin (Mondal, 2012). In the Quaternary period, this region was formed by depositing sediment on basaltic lava (Rajmahal Trap). The deposition of sediment overlying the trap was mainly in the continental environment. After that, the drainage system was the geological agent of transportation and deposition of sediment which originated from Chhotanagpur Plateau (Das et al., 2014). As the district is situated along the coast of the Bay of Bengal, so the deposition of sediment is the fluvio-tidal type. Even, since this region is situated at the mouth of Hooghly river, the deposited sediment is also greater in depth. No minerals of economic importance are available in the district.

### **2.4.2 Topography**

It is understood from the map prepared by the NATMO, the district is nearly flat surface with very slow run-off (Fig. 2.5). The district is situated along the coast of Bay of Bengal, therefore, the elevation of the region is 0 to 10 meters above mean sea level with an average of nearly 5 to 7 meters. The average slope ranges between 0 to 5 degree. Topographically, the district is divided into two parts, one is the vast flat plains in the east, west and north and other is the Contai coastal plain on the south. According to Central Soil Salinity Research Institute (Bandyopadhyay et al., 2003), the blocks of coastal plain are Mahisadal, Sutahata, Haldia, Nandigram I & II, Khejuri I & II, Contai I & II, Deshopran, Ramnagar I & II and part of Tamluk, Egra, Bhagawanpur block. Some dunes are formed in the southern part of coastal plain.

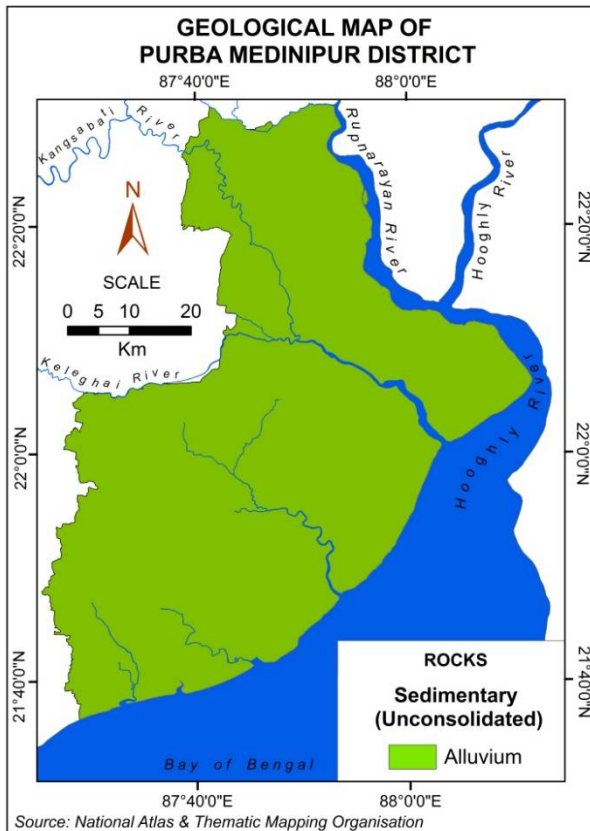


Fig. 2.4 Geological map of Purba Medinipur district.

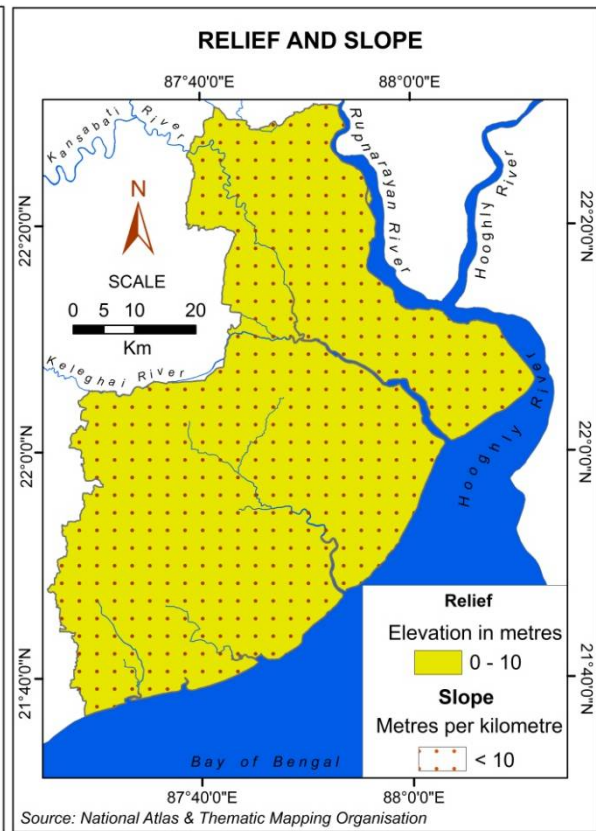


Fig. 2.5 Topography of Purba Medinipur district.

### 2.4.3 Soil

The entire district is composed of deep to very deep alluvial soil. On the basis of composition, the alluvial soil formed in the whole district is falling into three types of soil group, such as Entisols, Aridisols and Alfisols (Fig. 2.6). The vast area of the district is consisted of younger alluvium or entisols. The middle and some western part of the district is consisted by coastal alluvium of antisols. Along the shoreline from Haldi river to Digha district border, a long and narrow strip of saline and saline-alkali soils of aridisol groups is observed. Apart from, the western part and northern part are composed of older alluvium of Alfisols group. This district lies on the flood plains of the Rupnarayan, Hooghly, Kangsabati and Haldi rivers. As a result, large amount of clay particles concentrates on soil texture. Soil texture is medium to fine.

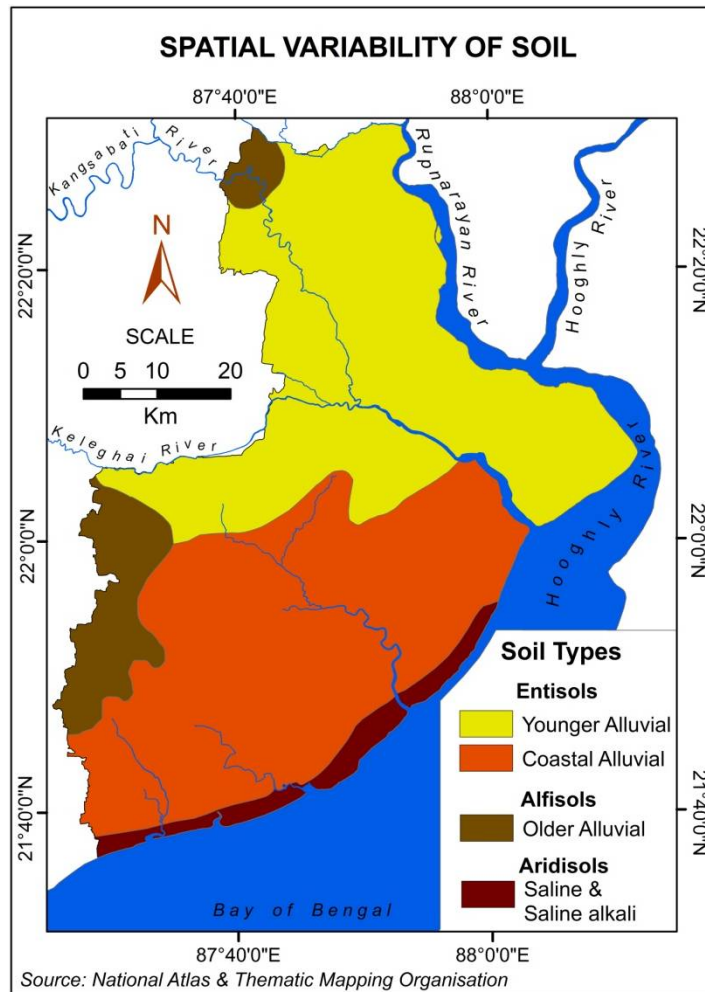


Fig. 2.6 Soil types of Purba Medinipur district.

A soil salinity map (Fig. 2.9) and soil pH map (Fig. 2.10) has been prepared using electro conductivity (EC) and pH value of the soil sample of the district. All the sample have been collected from the field and tested in the laboratory. The map (Fig. 2.7 and 2.8) shows the soil sampling points with measured EC and pH value. The classes and ranges (Table 2.2 and 2.3) of both are adapted from the United States Department of Agriculture (USDA), November, 1955. From the map (Fig. 2.9) it is found that the salinity level is decreasing with the increasing of distance from the sea. According to ranges, the district belongs to first four classes, such as S0, S1, S2 and S3. Most part of the district lies in the classes S0 and S2. The soil along the coast is highly saline. The level of soil pH of the district is slightly acid to moderately alkaline. However, the soil pH of most parts of the district is neutral to slightly alkaline.



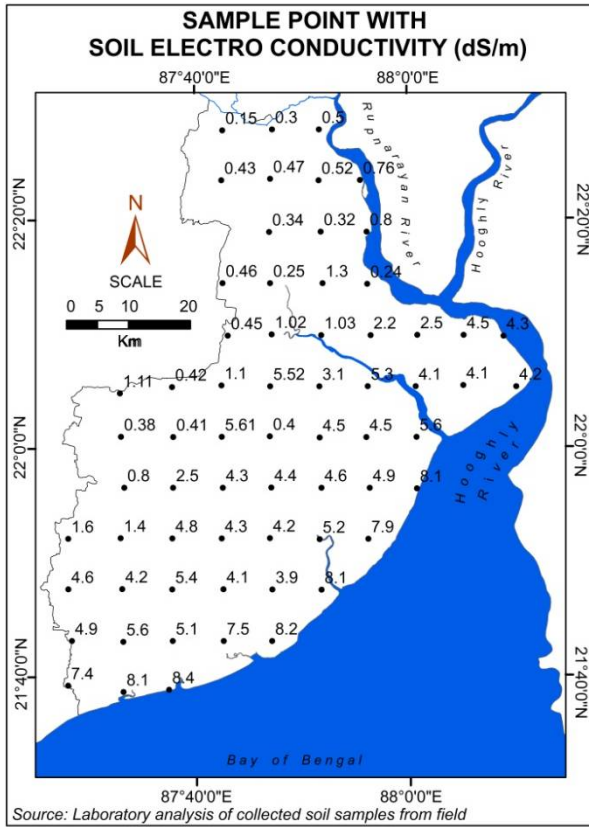


Fig. 2.7 Soil sample point with value of electro conductivity (ECe).

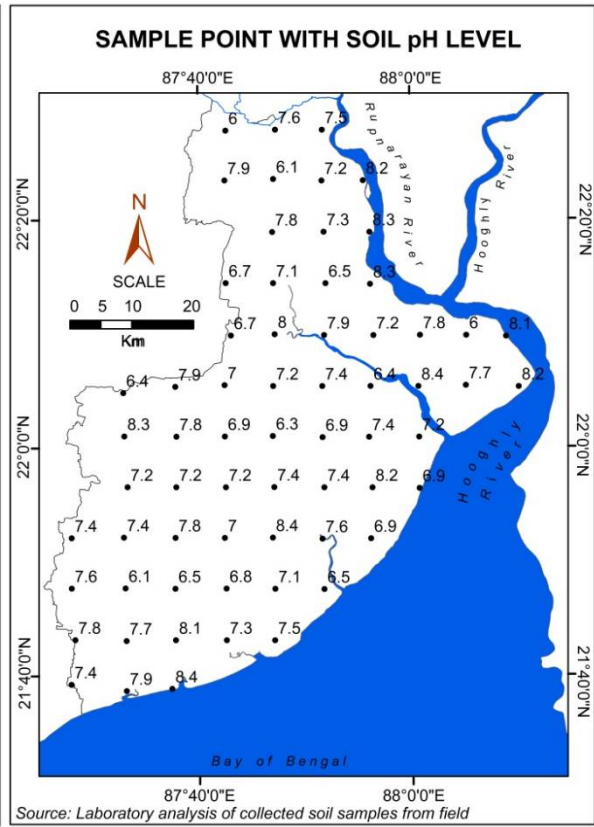


Fig. 2.8 Soil sample point with pH value.

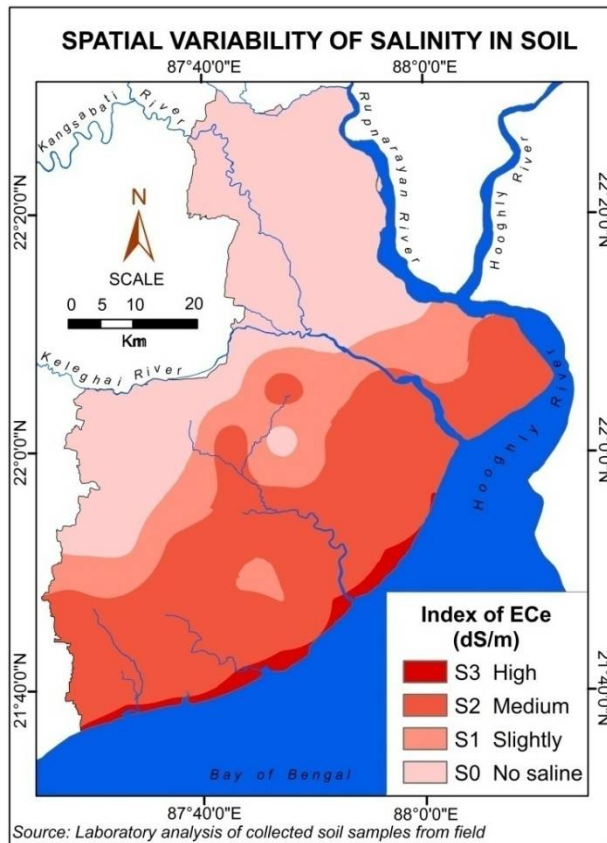


Fig. 2.9 Pattern of soil salinity

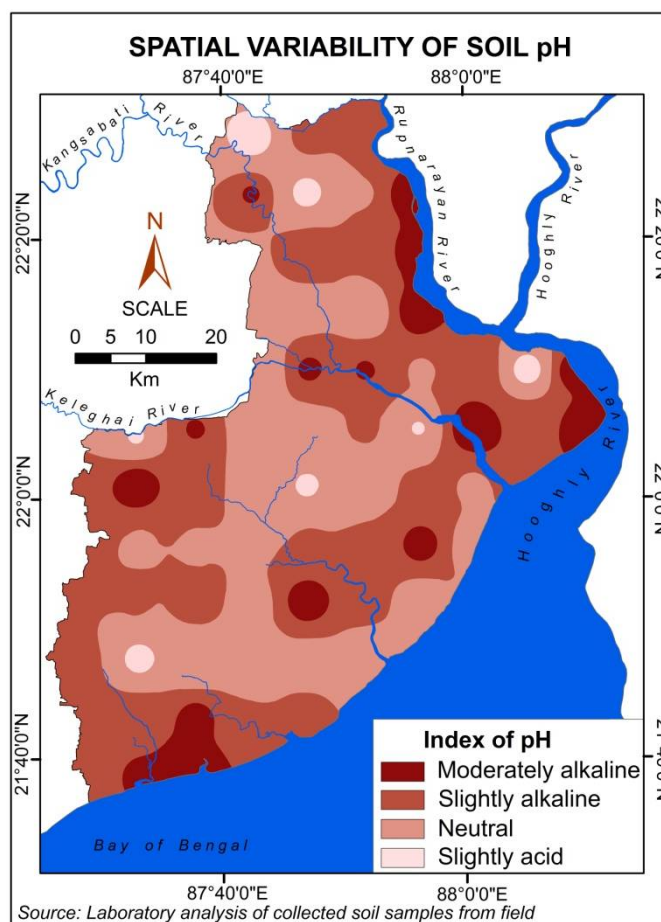


Fig. 2.10 Pattern of soil pH.

Table 2.2 Ranges of soil salinity and classes.

EC (d/S/m)	Soil Salinity Class	Related crop response
Below 2	S0 - No Saline	Salinity effects mostly negligible
2 – 4	S1 - Slightly Saline	Restricted for the more sensitive crops,
4 – 8	S2 - Moderately Saline	Yields of many crops restricted
8 – 16	S3 - High Saline	Only salt-tolerant crops yield satisfactory
Above 16	S4 - Extremely High Saline	Satisfactory yields of few very salt-tolerant crops

*Soil salinity classes and ranges are adapted from United States Department of Agriculture (USDA), November, 1955.*

Table 2.3 Ranges of soil pH and classes.

Soil pH ranges	Soil pH Class
6.1 – 6.5	Slightly acid
6.6 – 7.3	Neutral
7.4 – 7.8	Slightly alkaline
7.9 – 8.4	Moderately alkaline

*Soil pH classes and ranges are adapted from United States Department of Agriculture (USDA), November, 1955.*

#### **2.4.4 Drainage System**

The main river and its tributaries and canal have made a well drainage system of the study area. The rivers flowed in the district are Hooghly, Rupnarayan, Durbachati, Kansabati, Haldi, Keleghai, Chandia, Rasulpur, Pichabani and Champa (Fig. 2.11). Many tributaries and canal are found in the district (Fig. 2.12). The entire river and its tributaries, canal has made a good drainage system of the district which is directly influence the agricultural pattern and the rate of productivity. The map (Fig. 2.13) shows the village wise drainage density of the district (Annexure 1). Drainage density is the channel length per unit area. The class division of drainage density has been determined on the basis of mean and standard deviation of the data set. There are 405 villages where drainage density is above 2 km per km<sup>2</sup> and 810 villages is 0.85 to 2 km per km<sup>2</sup> and the remaining is below 0.85 km per km<sup>2</sup> (Table 2.4)

##### **2.4.4.1 Hooghly river**

Hooghly river is the main river in this region, which is also traditionally called 'Ganga'. The Ganges split into the two rivers near Giria at Murshidabad, one is the 'Padma' which has flowed towards the Bangladesh and other is the 'Bhagirathi-Hooghly' which flows over state of West Bengal and falls into the Bay of Bengal. It is the perennial river and flows along the eastern border of the district and separated from the South 24Pargana district. The major volume of water flowing into this river comes from the middle Ganges through the Farakka Feeder Canal, but the water flow through the natural source of the river at Giria is very low. Besides, the tidal saline water in the Bay of Bengal enters the land surface through this river. This river is navigable and the Haldia port is situated at the mouth of the river.

##### **2.4.4.2 Rupnarayan river**

The river Rupnarayan flows as a combined stream of the Dwarakeswar and Shilabati river, starts from the Ghatal town of Paschim Medinipur district and finally joins the Hooghly river near Geonkhali of Purba Medinipur district. This river flows along the eastern border of

the district and separated from the Howrah district. It is a tidal river and the saline tidal water comes from the Bay of Bengal through the Hooghly river. Therefore, this river dominated by brackish water in the dry season. But in rainy season brackish water is driven out by the influx of fresh water which comes from the upper reaches.

#### **2.4.4.3 Durbachati river**

Durbachati river is tidal in nature and tributary of Rupnarayan river. It is also the connector between Rupnarayan and Kangsabati river. This river has flowed along the northern side of the district and separated from the Paschim Medinipur district.

#### **2.4.4.4 Kangsabati river**

River Kangsabati originated from the Chotanagpur plateau of West Bengal state and flowed over the districts of Purulia, Bankura, Paschim Medinipur and Purba Mednipur in West Bengal. Finally, this river joins with Keleghai river at Tangrakhali and the combined of the two river has flowed as the Haldi river. Kangsabati river is the rain fed river. However, tidal water enters into the river to some extent through the Haldi river. Almost every year, this river is flooded by the rain water from the upper reaches.

#### **2.4.4.5 Haldi river**

River Haldi is originated by the confluence of Keleghai and Kansabati river that flowed over the Purba Medinipur district and then finally connected with the Hooghly river at Haldia town. So, Haldi river is also known the main tributary of river Hooghly. It is 24 kilometers long tidal river. The tidal water comes through the Hooghly river from Bay of Bengal. However, in the rainy season, the water from the upper reaches of Kangsabati and Keleghai river flows through this river and fall into the Bay of Bengal.

#### **2.4.4.6 Keleghai and Chandia river**

The source of Keleghai river is Baminigram near Dudhkundu of Jhargram district of West Bengal that flows over Jhargram, Paschim Medinipur and finally meets with the

Kangsabati river near Tangrakhali of Purba Medinipur district. It is one of the tributaries of Keleghai that flows over the district of Paschim Medinipur and meets with the Keleghai river at Moyna of Purba Medinipur district. It rises from Balichak-Pingla basin of Paschim Medinipur district in West Bengal. This two river is rain fed, but the tidal water enters into the river through the Haldi river.

#### **2.4.4.7 Rasulpur river**

The river Rasulpur is the tributary of the Hooghly river. This river system is almost entirely in Purba Medinipur district. It is the tidal in nature and connects with Hooghly river at Petuaghat of Deshapran block near Bay of Bengal. In the dry season, saline water always flows into this river.

#### **2.4.4.8 Pichaboni river and canal**

Pichaboni rive and canal is the entirely located within the district of Purba Medinipur. It connects to the Bay of Bengal near Haripur of Contai-I block. End part of the river is canal type. It is the tidal river and flowing water is almost saline.

#### **2.4.4.9 Champa river and canal**

It is another tidal river, connect with Bay of Bengal near Digha of Ramnagar-I block. Always flow the saline water. It is almost entirely in the district of Purba Medinipur. End part of the river is canal type.

#### **2.4.4.10 Tributaries and canal**

There are so many tributaries, locally known as ‘Khal’ that connect with different river. It is also connected with the canal and extends within the district. Canals are the man made to distribute of water for agriculture. Tidal water enters the land through the tributaries and also drains the rain water from surrounding. There are numerous tributaries as well as canal in the district like Itaberia Khal, Mugberia Khal, Palabani Khal, Padurbheri Khal, Alipur Khal, Sowadighi Khal, Medinipur canal, Ramnagar canal, Hooghly tidal channel, Orissa coast canal, , Khadalgobra canal, etc.

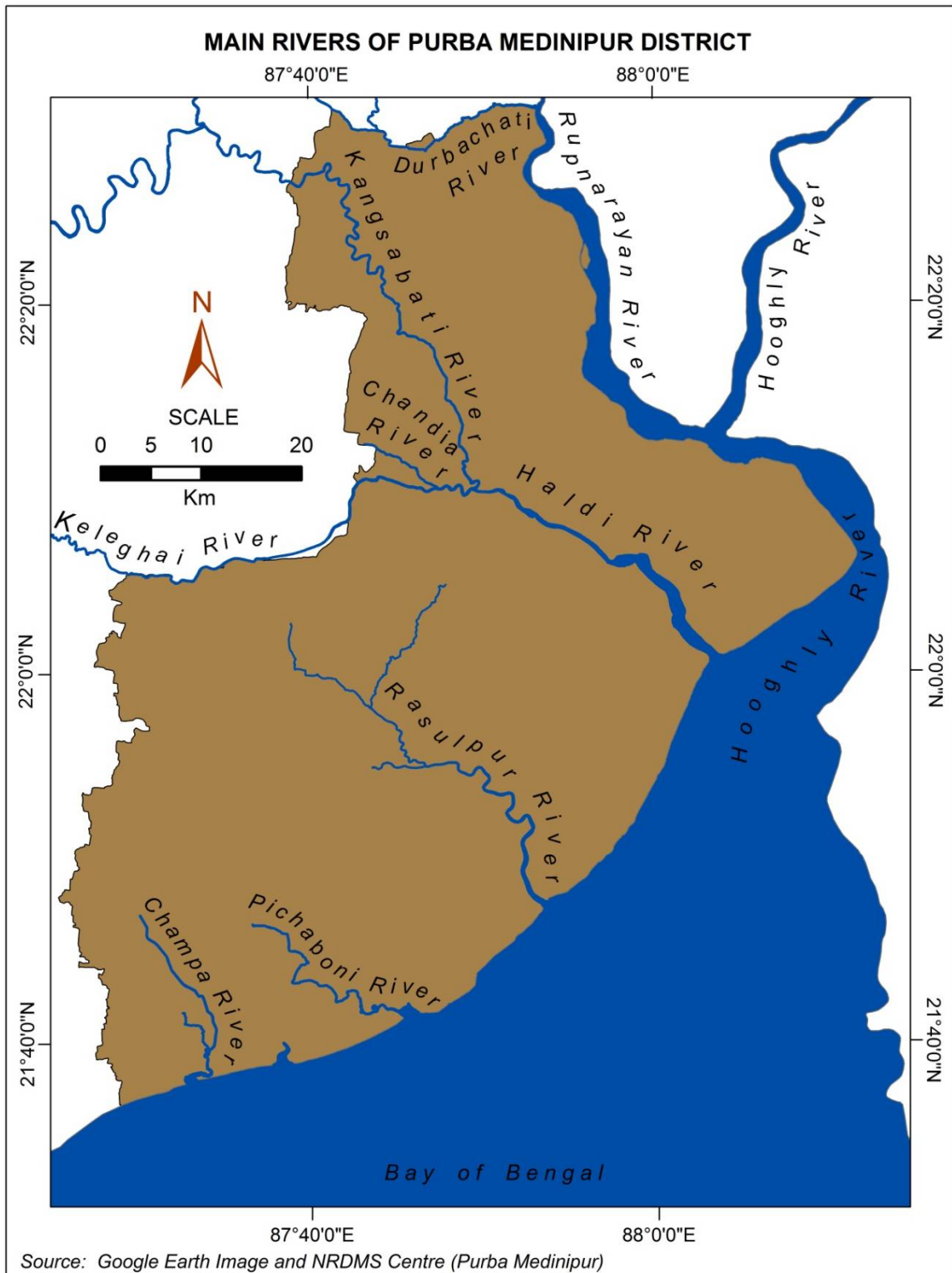


Fig. 2.11 Main river system of Purba Medinipur.

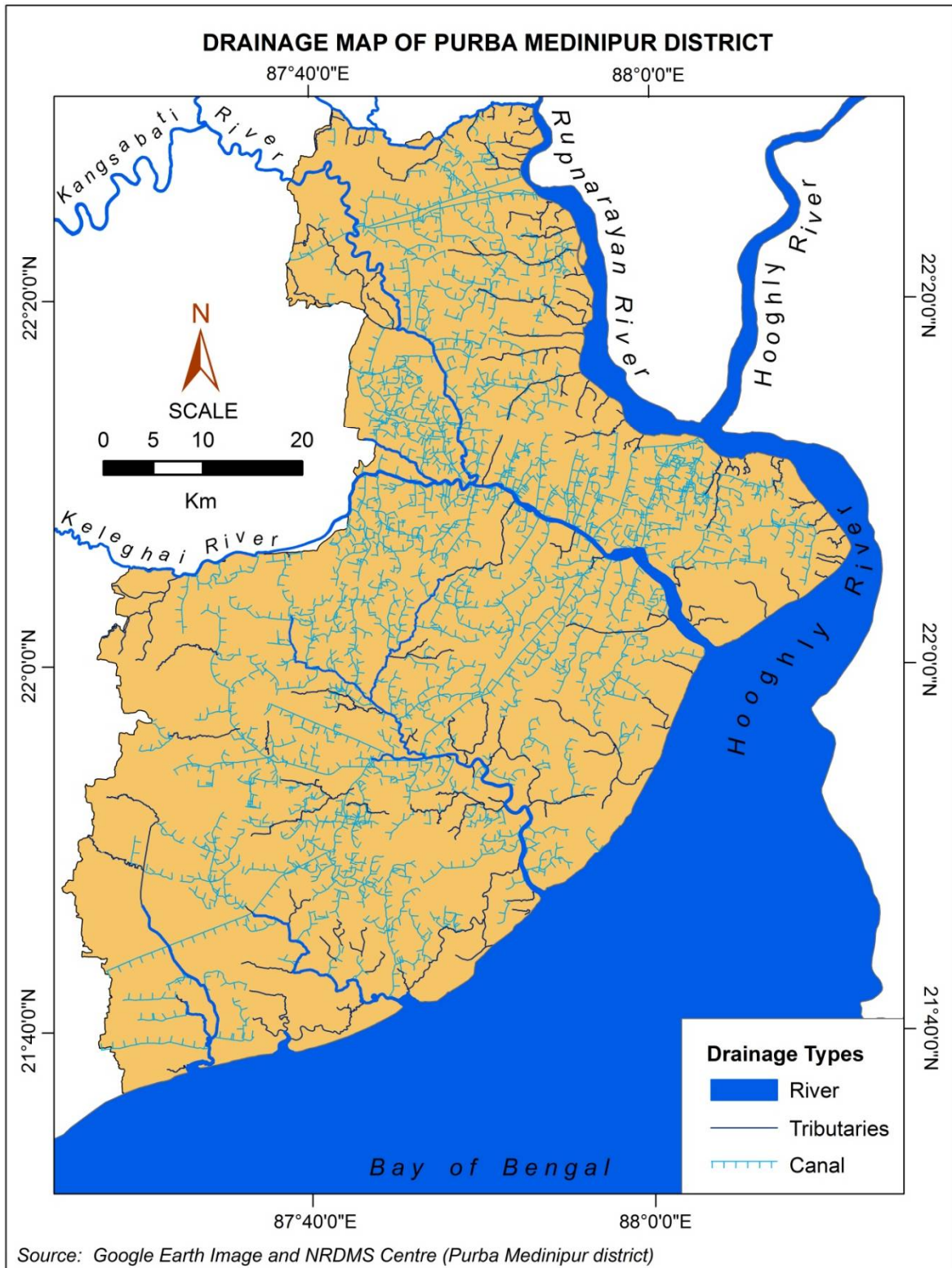


Fig. 2.12 Drainage system of Purba Medinipur district.

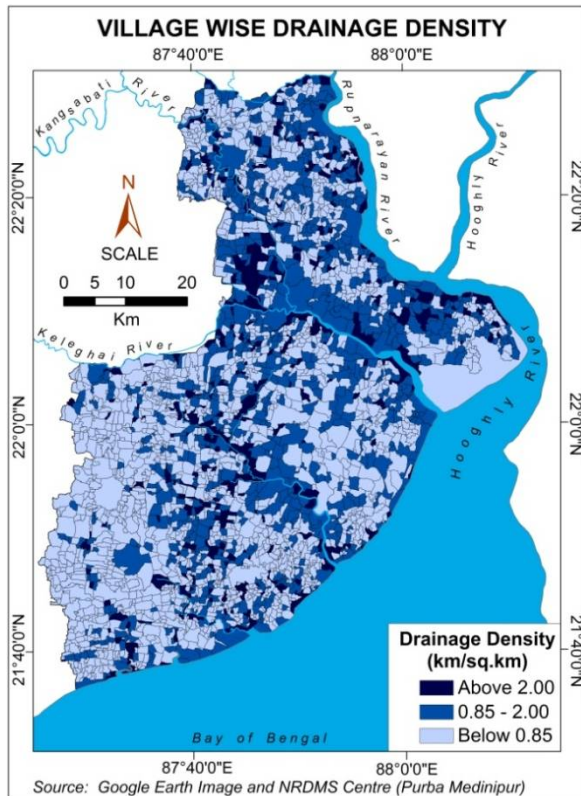


Fig. 2.13 Drainage density.

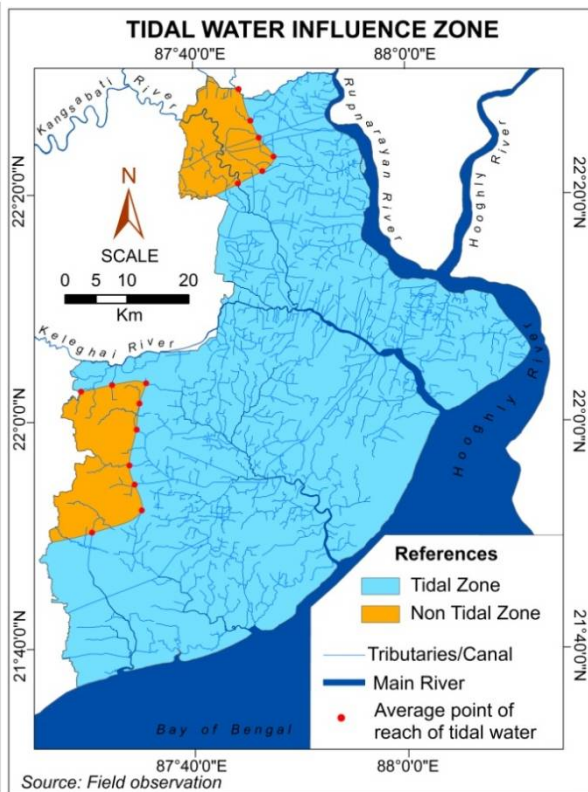


Fig. 2.14 Tidal water influence zone.

Table 2.4 Number of villages in different category of drainage density.

Drainage density (km/sq.km)	Number of village
Above 2.0	405
0.85 – 2.00	810
Below 0.85	1784

#### 2.4.5 Tidal behaviour of river

As, the district is situated along the coast of the Bay of Bengal therefore many rivers and channels flowed over this district and finally it fell in to the sea. Besides, many tributaries and canals are connected by the river to the sea. Therefore, the tidal water flows in all the rivers, tributaries and canals under normal rules of tide. As a result, tidal water enters the far reaches of the land through all these watercourses. The map (Fig. 2.14) shows the tidal water influence area of the district which represents that the tidal water which comes from the sea reaches most parts of the district. Tidal water does not reach only in the small part of north-west and middle-west of the district. Tidal water influenced zone has been determined by collecting data from the field. Average point (red mark on map) of reach of tidal water has been determined by field observation during different season of the study period.



As, the tidal water enters into the ground, the amount of salinity decreases gradually. The map (Fig. 2.16 and 2.17) depicts the different tidal water salinity zone and with drainage system. The water salinity ranges and salinity level (Table 2.5) are adapted published by Victorian Irrigation Research and Advisory Committee (VIRAC), 1980, Quality aspects of water used on farms. The salinity level of tidal water has been determined using electro conductivity (EC) value of the water sample. All the sample (Fig. 2.15) has been collected from the field along the different river from mouth to upper reaches. The water sample is collected during the tide in early winter.

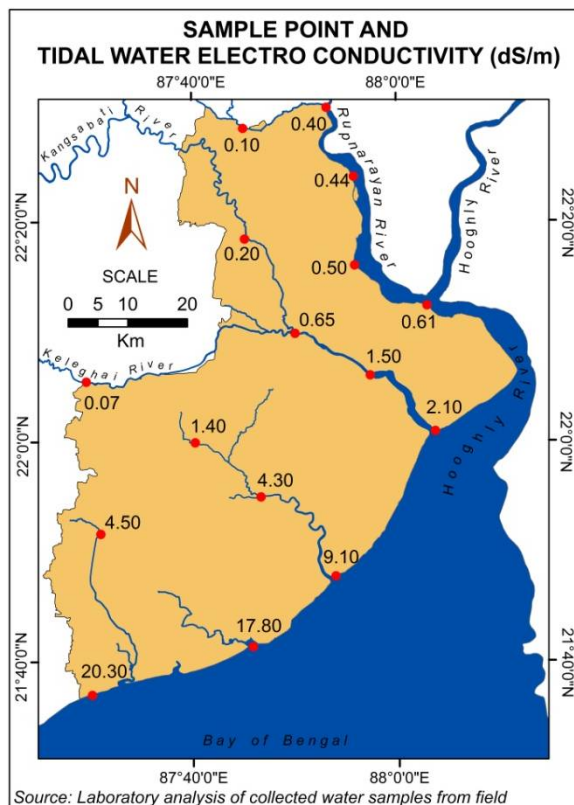


Fig. 2.15 Sample point of tidal water with EC value of Purba Medinipur district.

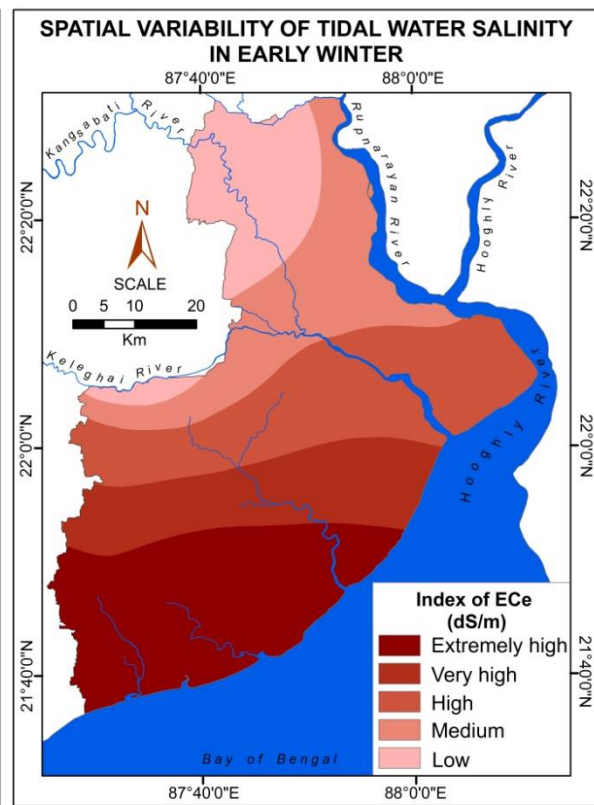


Fig. 2.16 Tidal water salinity influence zone of Purba Medinipur district.

Table 2.5 Ranges and classes of tidal water salinity.

EC (dS/m)	Water Salinity Class
Below 0.3	Low salinity water
0.3 – 0.8	Medium salinity water
0.8 – 2.5	High salinity water
2.5 – 5.8	Very high salinity water
Above 5.8	Extremely high salinity water

*Water salinity classes and ranges are adapted from Victorian Irrigation Research and Advisory Committee, 1980, Quality aspects of farm water supplies.*

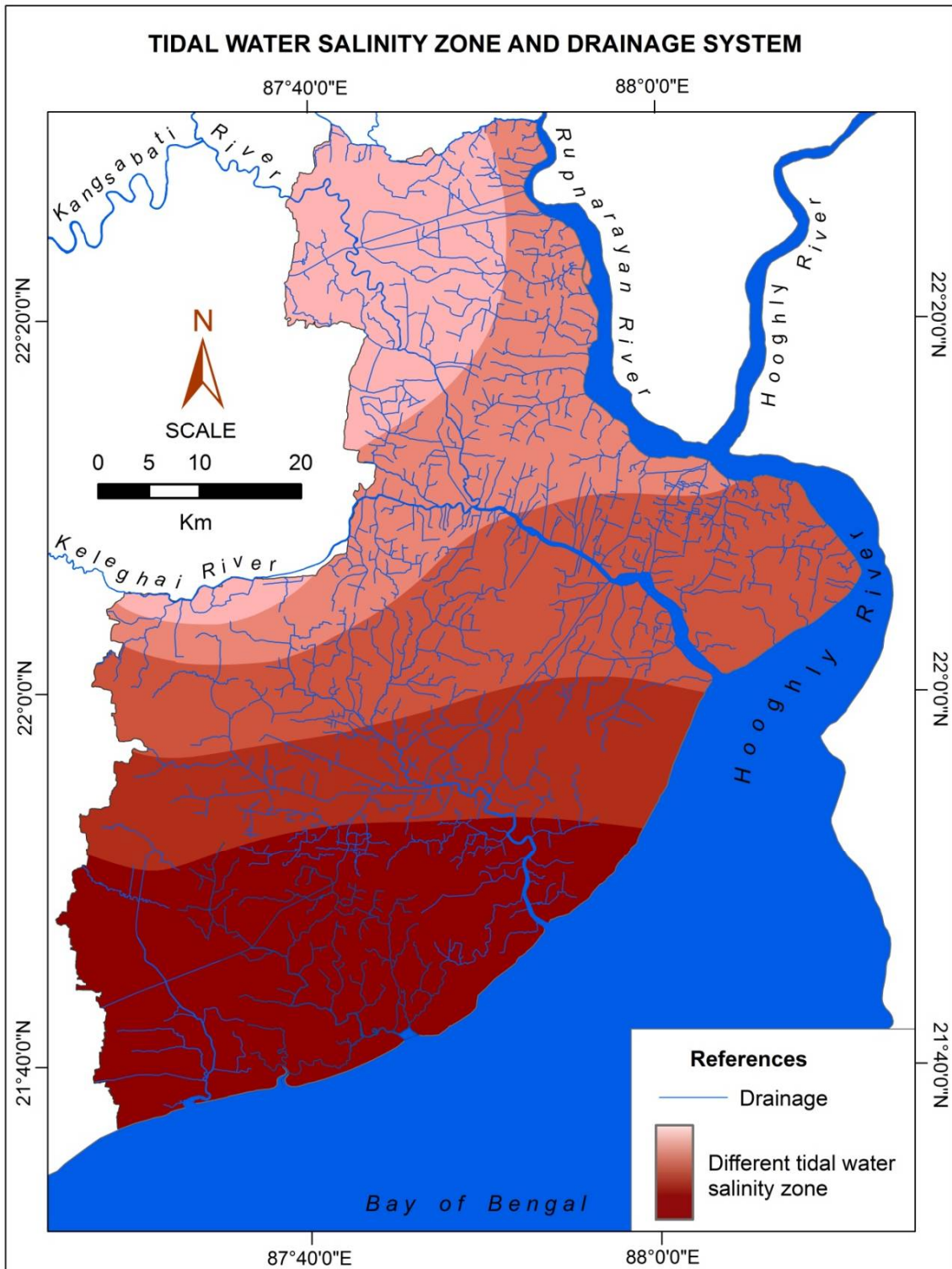


Fig. 2.17 Tidal water salinity influence zone with drainage system of Purba Medinipur district.

## 2.4.6 Climate

The district Purba Medinipur is located in the south-west monsoon climate zone of India. The summer season of the district is very hot and humid in nature and winter is dry and cold. Temperature increases from the month of March to September. In the district, the average annual temperature is about 26.5°C. The maximum temperature reaches up to 39°C and the minimum temperature is 10°C. The coldest month is December and January.

Table 2.6 Twelve years (2003-14) average rainfall and mean maximum and minimum temperature of Purba Medinipur district.

Month	Average Rainfall (mm)	Mean Maximum Temperature (°C)	Mean Minimum Temperature (°C)
January	16.58	25.42	13.83
February	18.83	28.42	16.25
March	26.08	31.83	22.75
April	35.50	33.67	25.67
May	117.75	34.58	26.75
June	262.58	33.67	27.00
July	325.83	32.09	26.45
August	339.08	31.82	26.09
September	323.75	32.18	25.73
October	213.17	32.00	23.58
November	7.83	30.09	18.73
December	7.33	27.18	14.27

Source: Meteorological Department, Alipore, Kolkata.

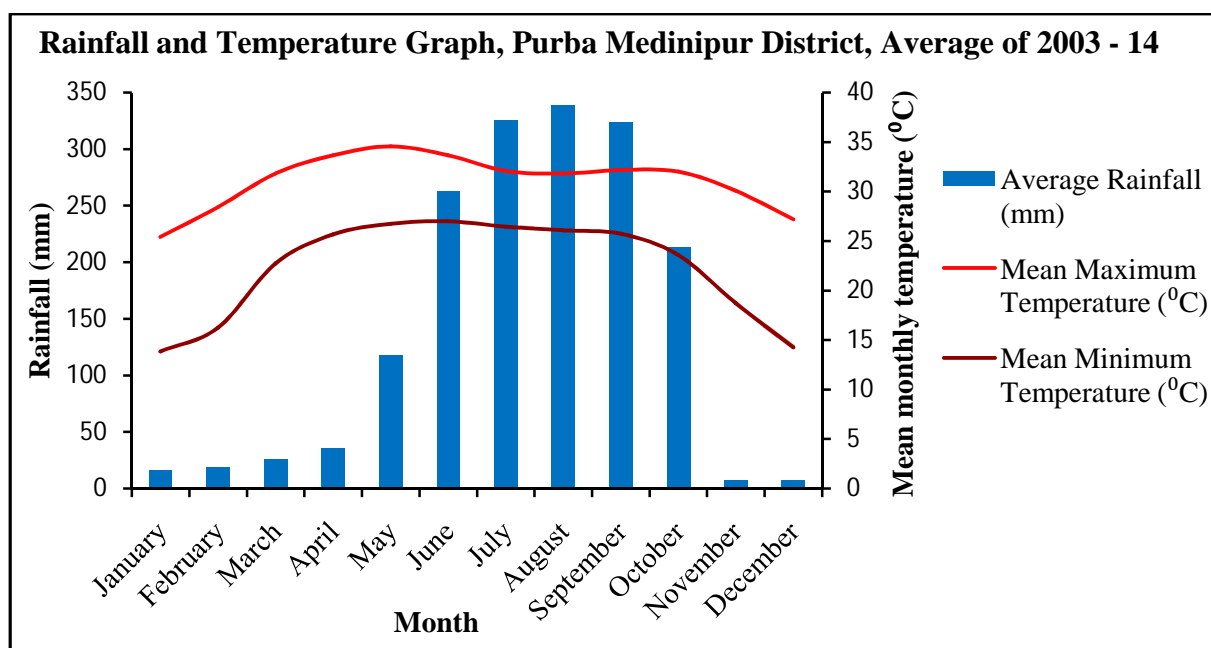


Fig. 2.18 Month wise pattern of temperature and rainfall condition.

Purba Medinipur district receives the maximum rainfall due to the onset of southwest monsoon during the period of June to October. The monsoonal precipitation is occurred with the cyclonic storms. During this season, number of cyclonic storms is originated at Bay of Bengal and enters the land with the huge amount of moisture which causes heavy rainfall. Annual rainfall varies from 1400 to 1600 millimetre. The rainfall has continued to decrease after the withdrawal of south-west monsoon. The district receives very little amount of rainfall in the cold months like November, December and January. An important climatic event in this district during summer season is 'Nor-Wester' which occurs with heavy rainfall and thunderstorm. There are both positive and negative aspects of this storm on agriculture. The table (Table 2.6) and diagram (Fig. 2.18) shows the monthly average rainfall and also maximum and minimum temperature of the district which is calculated using 12 years (2003 to 2014) data of Indian Meteorological Department, Govt. of India.

#### **2.4.7 Natural Vegetation**

The vegetation characteristic of Purba Medinipur district is tropical deciduous comprising of mixed forests. Most of the vegetation is planted either by farmer or by the government or semi-government organisation. Different tree species are planted together in the same places by the farmer, but the government forest department and other organisation plants certain species of trees in specific places in relation to the protection of the environment. The trees planted by farmer are mainly fruits and heavy wooden trees. (details about vegetation are discussed in chapter-3).

#### **2.5 Demography**

According to census 2011, the total population is 50, 95,875 person of the district. In terms of total population, this district is the 20<sup>th</sup> place in India and eighth in West Bengal. The table 2.7 shows that the total male population is 51.60 percent and female is 48.40 percent out of

total population (Fig. 2.19). There are 938 females per 1000 of the males. Total rural population is 88.36 percent and urban population 11.64 percent (Fig. 2.20). Total number of households in the district is 1112041 and the average number of people living in each family is 5. The decadal population growth of the district is 15.29 (2001 to 2011). The literacy rate is 87.0 percent, which placed first in West Bengal. There are major three group of working population according to their activities such as main worker, marginal worker and non worker (Fig. 2.21). Total worker population of the district is 1910320 persons. The map (Fig. 2.25) represents the village wise distribution of worker population and the table 2.10 shows the number of villages in different categories of percentage of worker population of the district. About 22.12 percent of the total population is main worker and 15.37 is marginal worker. The remaining 62.51 percent is non-worker. There are also different types of main and marginal workers, like main cultivator and marginal cultivator, main agricultural and marginal agricultural worker, main household and marginal household, main other and marginal other. The table (Table 2.8) and diagram (Fig. 2.22) shows the different types of worker out of total working population. The map (Fig. 2.26 and 2.27) represents the village wise concentration of total agricultural worker and cultivator and the table 2.11 present the number of villages in various classes of percentage of agricultural worker and cultivator of the district. The population density of the district is 1081 person per sq. km. The villages of north-eastern blocks of the district are more densely populated (Fig. 2.23). Besides, dense settlements have also developed in these villages (Fig. 2.24). The table 2.9 shows the number of villages in different categories of population and settlement density of the district.

Table 2.7 Number of population in different category.

<b>Population</b>	<b>Number</b>	<b>Types of Population</b>	<b>Number</b>	<b>Working status</b>	<b>Number</b>
Male	26,29,834	Rural	45,03,161	Main Workers	11,27,312
Female	24,66,041	Urban	5,92,714	Marginal Workers	7,83,008
				Non-Workers	31,85,555
Total	50,95,875	Total	50,95,875	Total	50,95,875

*Source: District Census Handbook, 2011*

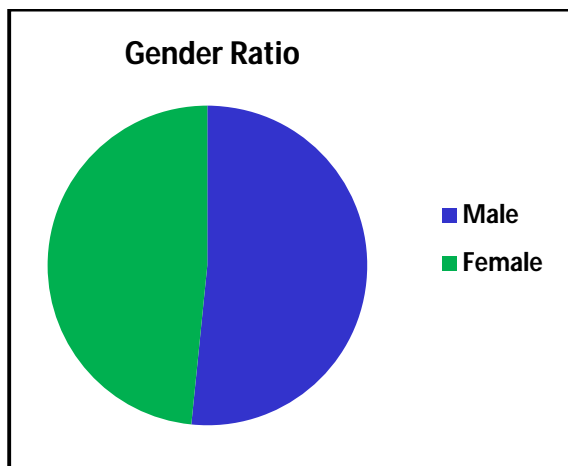


Fig. 2.19 Gender ratio of Purba Medinipur district.

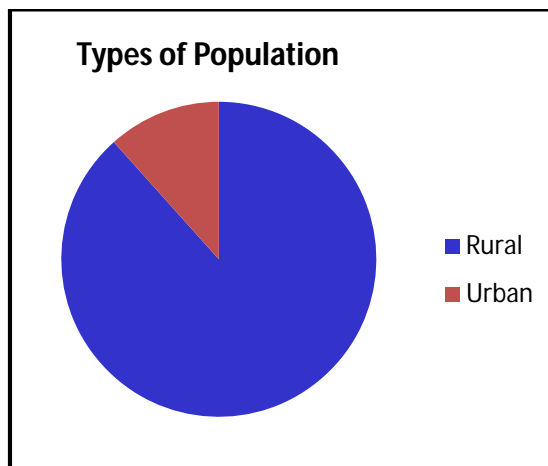


Fig. 2.20 Number of rural and urban population of Purba Medinipur district.

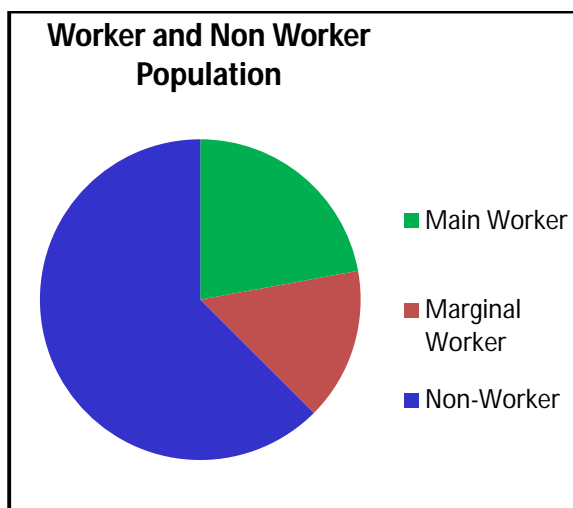


Fig. 2.21 Number of worker and non worker population of Purba Medinipur district.

Table 2.8 Number of different types of worker of Purba Medinipur district.

Worker types	Number
Main Cultivator	242632
Marginal Cultivator	104374
Main Agricultural	277265
Marginal Agricultural	429316
Main Household	56584
Marginal Household	60826
Main Other	528276
Marginal Other	187595

*Source: District Census Handbook, 2011*

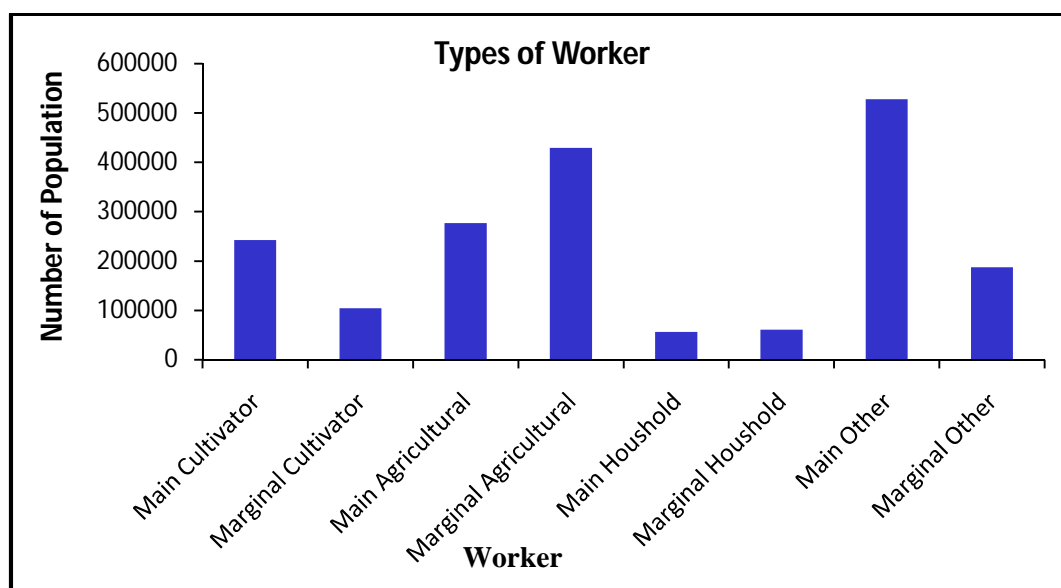


Fig. 2.22 Number of different types of worker population of Purba Medinipur district.

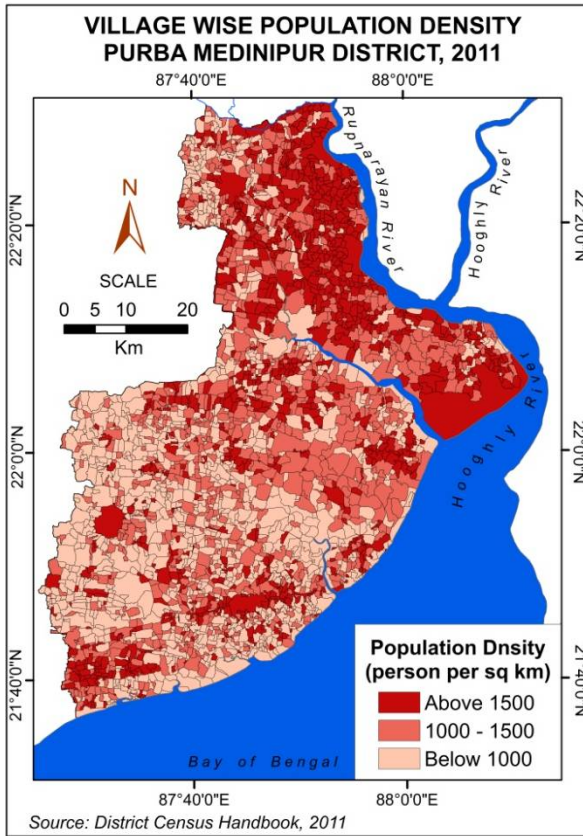


Fig. 2.23 Village wise population density of Purba Medinipur

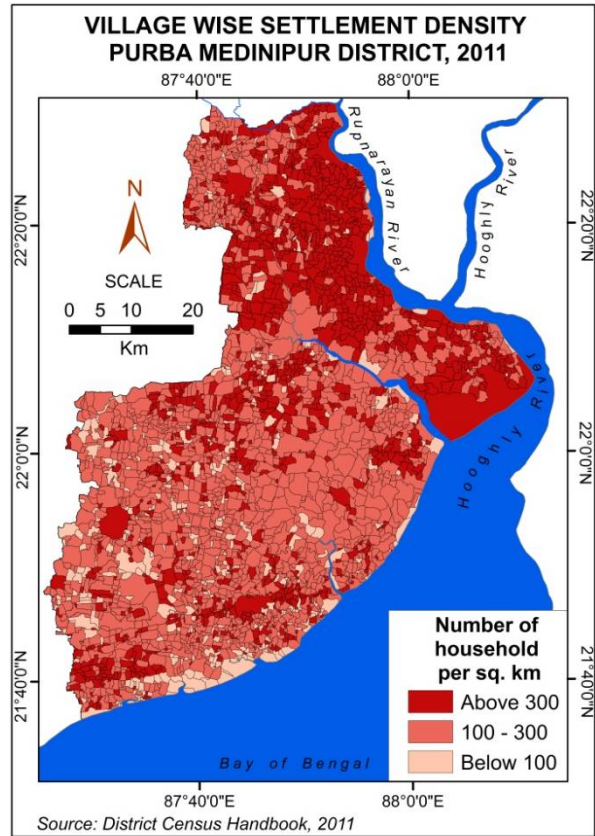


Fig. 2.24 Village wise settlement density of Purba Medinipur

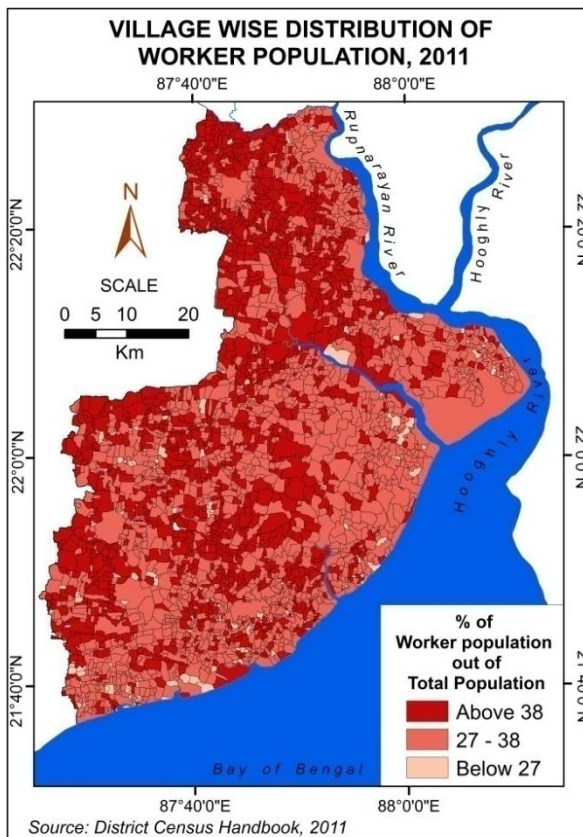


Fig. 2.25 Distribution of worker population

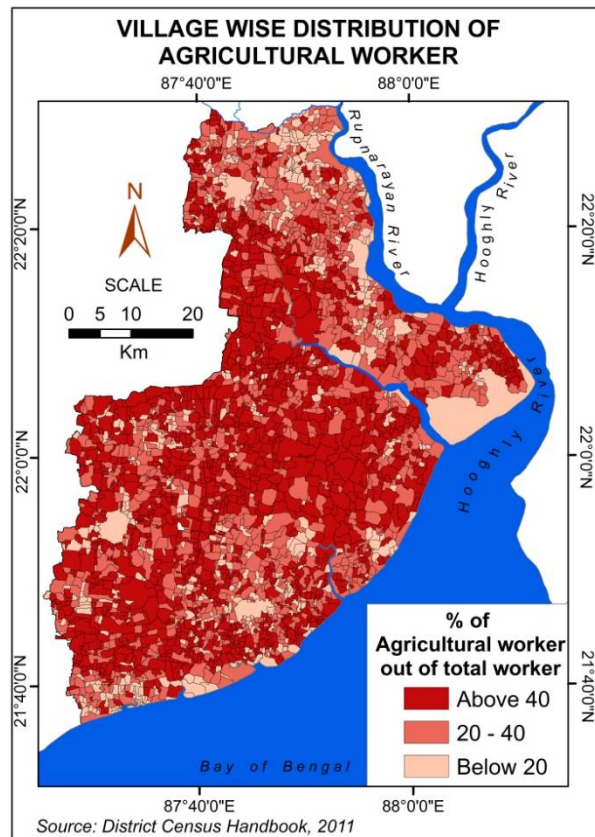


Fig. 2.26 Distribution of agricultural worker

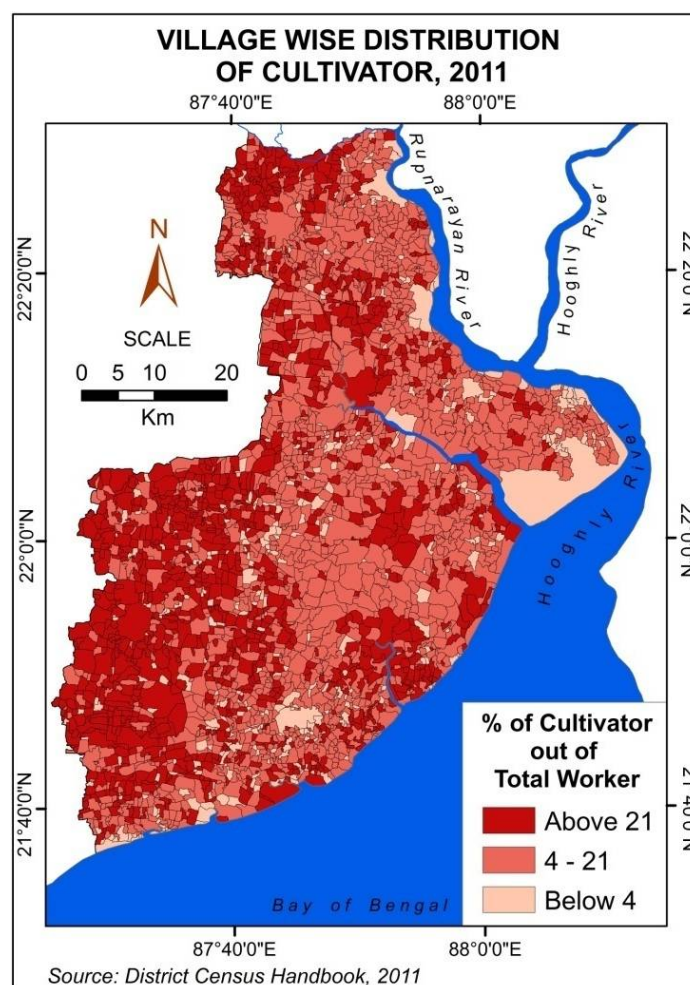


Fig. 2.27 Distribution of cultivator of Purba Medinipur district.

Table 2.9 Number of villages in different classes of population and settlement density.

Population density (person/sq.km)	Number of village	Settlement density (household/sq.km)	Number of village
Above 1500	965	Above 300	1154
1000 – 1500	860	100 – 300	1486
Below 1000	1174	Below 100	359

Table 2.10 Number of villages in different categories of percentage of worker population.

Percentage of worker population	Number of village
Above 38	1241
27 – 38	1616
Below 27	142

Table 2.11 Number of villages in various classes of percentage of agricultural worker and cultivator.

Percentage of agricultural worker out of total worker	Number of village	Percentage of cultivator out of total worker	Number of village
Above 40	1424	Above 21	1130
20 – 40	1007	4 – 21	1490
Below 20	568	Below 4	379



## 2.6 Transport and Communication

Purba Medinipur has good transport system in terms of road connectivity (Fig. 2.29). All the place of the district is well connected by the roads or railways or waterway which helps in the industrial, agricultural and tourism development. The main lifeline of the district is National Highway-6 (NH-6), National Highway-41 (NH-41), National Highway-116B (NH-116B) and South-Eastern railway. The NH-41 is the main link between Kolkata megacity and the Haldia industrial region through NH-6. South-Eastern Railway also connects the different parts of the district with Kolkata as well as other parts of the country. In addition, Digha-Kolkata road (NH-116B) also plays the vital role in the road connection between Kolkata and the southern part, especially coastal part as well as the western part of the district.

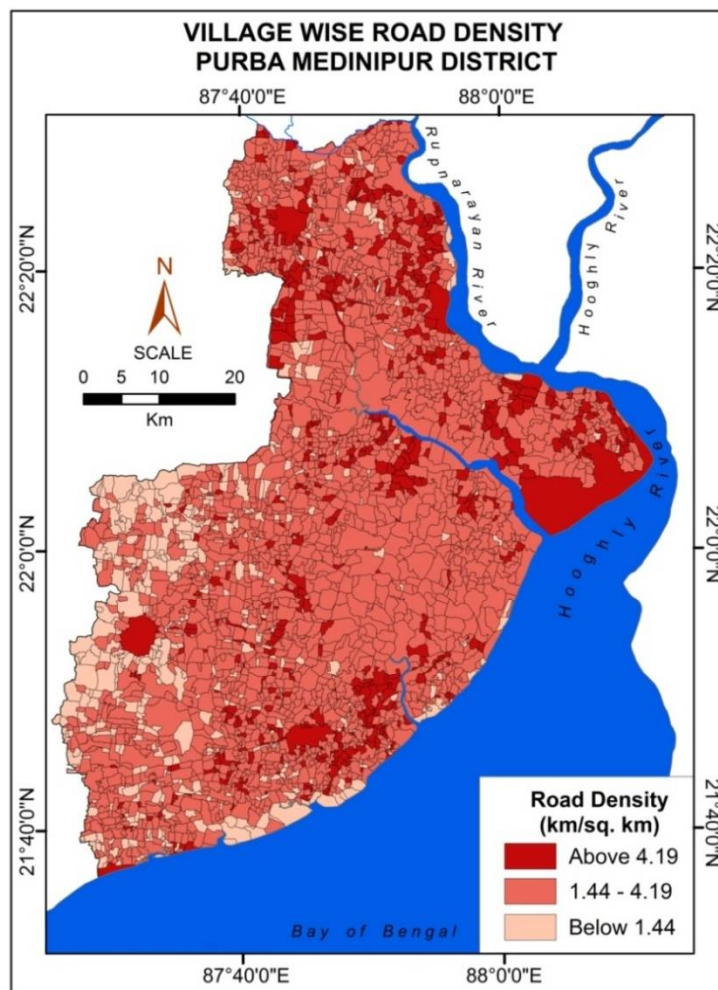


Fig. 2.28 Village wise road density of Purba Medinipur district.

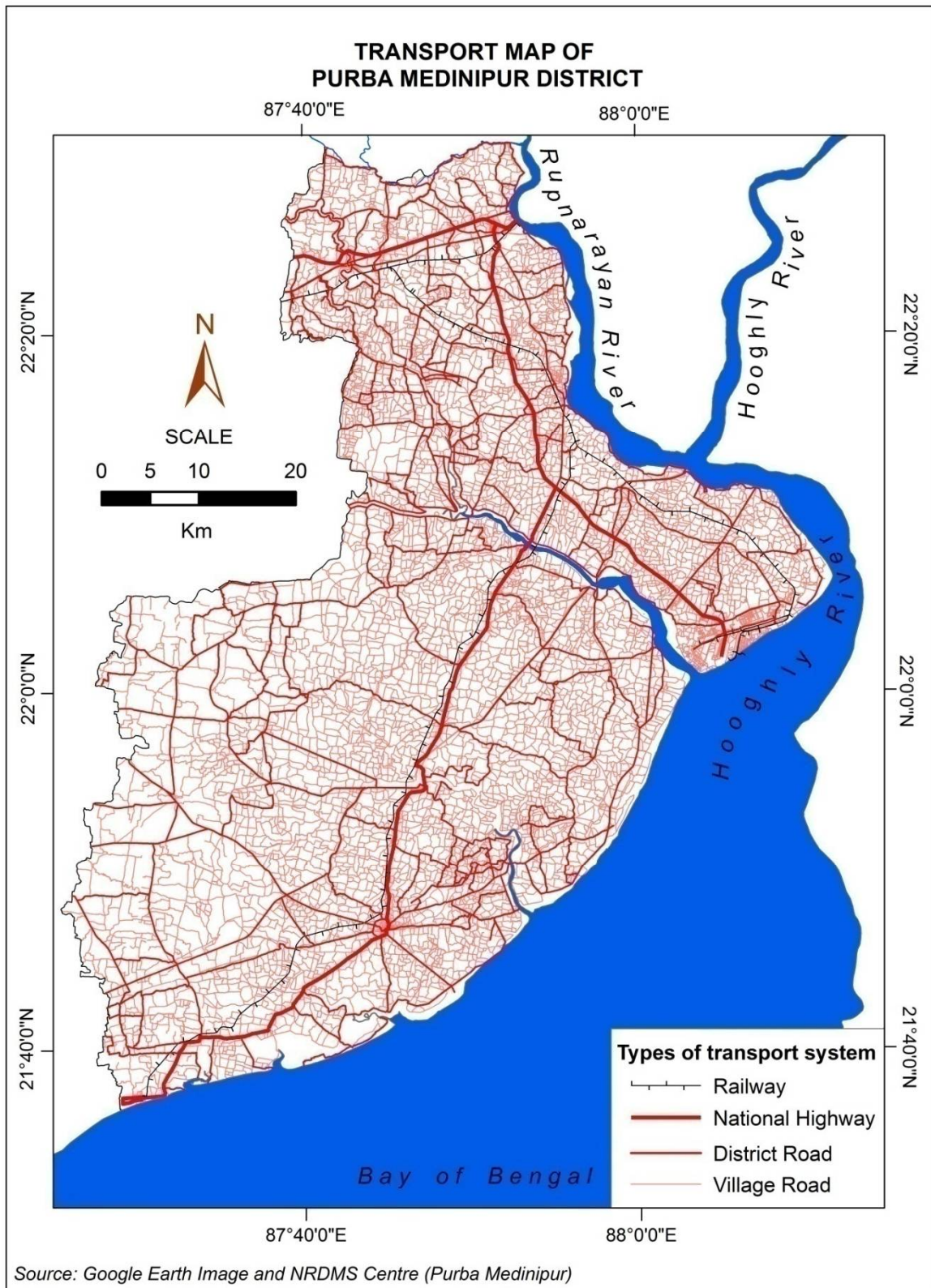


Fig. 2.29 Road map of Purba Medinipur district.

Table 2.12 Number of villages in different classes of road density.

<b>Road density (km/sq.km)</b>	<b>Number of village</b>
Above 4.19	524
1.44 – 4.19	2014
Below 1.44	461

The other district roads are also important to connect with the National Highway. The village road connects the different village with the major road. The district has navigable waterway. The coastal region of the district is also connected to Kolkata by the Hooghly waterway. The Rupnarayan river also plays an important role in waterway. Haldia is the significant river port of eastern part of India. The map (Fig. 2.28) shows the village wise road density of the district (Annexure 2). The road density of 524 villages is above 4.19 km per sq. km and 2014 villages is 1.44 to 4.19 km per sq. km and the rest is below 1.44 km per sq. km (Table 2.12).