Chapter - 1

Foundation of the Research

1.1 Introduction

At present tourism industry is an important sector and source of top limit revenue for the economic development of the society as well as country. Tourism industry can construct the job opportunity; economic growth and assuaging the poverty in local level and support the increasing demand for other local products (Wall, 1994; Orams, 1995). In the rising countries the tourism diligence specifically the ecotourism has been developed for the progression of the foreign currency and improving the paucity in the society (Boyd and Butler, 1996). Tourism is the interrelationship between social and cultural phenomenon that involves combining the remarkable cultural backgrounds of hosts and guests; supply and demand; tourists and local; tourists and the tourism industry' (Burns, 1999; Cohen, 1996a; Keyser, 2002; Pearce, 1989; Smith, 1989). Ecotourism is a form of tourism motivated mainly by the natural background of an area includes its native customs (Gossling, 1999). The ecotourism practice is the non-consumptive use of natural resources and wildlife that can contributes the visited area through manual labor or financial means aimed at directly assistance the conservation of the place and the monetary well-being of the local residents (Ziffer, 1989). During the late 1980s 'ecotourism' emerged in alliance with tourism industry to sustainable exploitation of natural resources in the tourist destinations (Cater, 1994). In case of tourism evolution ecotourism industry concept is recently appeared as the outpaced of the traditional sand and sun tourism (Swarbrooke, 1999). The term Ecotourism was first introduced by Mexican architect turned environmentalist, Hector Ceballos Lascurain defined the word 'to describe travelling to untouched areas in order to enjoy their natural beauty and culture' (Ceballos-Lascurain, 1987). Today tourism is one of the most imperative leading sectors in the world tourism industry and contributes the high amount of the economic sector for the development of our country. Tourism brings many interconnecting issues mutually such as society; nature and environment mainly put emphasis on to the preserve and sanctuary the environment (Neth, 2008). As the increasing number of tourism growth during the last decades and its effect on environment, so it has lead to a rising anxiety which forced the people to think about more responsible tourism and become known in different names like sustainable tourism, ecotourism, green tourism, adventure tourism and nature based tourism (Butler, 1991). These new forms of alternative tourism are differ from the mass tourism and support the sustainability to encourage the positive impact of tourism development in the different tourism destinations and accept the social and environmental challenges for the better development of the area (Orams, 1996).

In recent times ecotourism has been very much popular and practice in many corner of the world, also it is noticed in many developing countries like India (Richardson, 1993). In this way it is hoped and believed by the concerned people that it might be the best way to practicing ecotourism in the modern age when traditional trend of tourism has been lost its charm and core values. From the ancient time, people are travelling in the different parts of the world for their business and worldwide expedition (Orams, 1995; Wall, 1994). The emergence of the ecotourism development is not only affecting the international tourism for the economic development of the society but also develop the cultural values of the societies and protect and conserve the environment around the world (Boyd et al., 1994). Although the newly formed words is most debatable both in terms of its concepts and practice, but ecotourism is used more widely than other alternative concepts. Ecotourism is materialized around the 1980s and the definitions, concepts and philosophy have been remarkably resilient.

The main characteristics of the ecotourism are nature based, environmental, educative and sustainable. Benefits and the participation of the locals are in the segment of the ecotourism development are also included in almost all definitions. However there was placed a growing phase of alternative forms of tourism during this time on the social, environmental and cultural aspects of tourism and in this way a new vision of future tourism is emerged and planning was beginning to a new form of tourism, during this period. The current position of ecotourism is the concept of the consolidation stage of its product life cycle, especially in Australia and India (Lindberg and McKercher, 1997; Lindberg et al., 1998). In the late 1980s ecotourism was regarded as a small-based niche product which was a specialized form of nature based or adventure tourism (Lindberg and McKercher, 1997; Lindberg et al., 1998). This niche concept changed in the early 1990s, and ecotourism became a popular term, in terms of its definitions, applications, and evaluation stemming from the viewpoint of mass tourism' (Lindberg and McKercher, 1997). His explanation also viewed that the ecotourism in the glow of experiential and educational factors of the sheltered natural areas.

The ecotourism concept depends on three elements such as natural resources, sustainable management and environmental education activities and other minor elements are included such as limited number of tourists or tour operators, protection and increase of the benefits to nature and local people (Buckley, 1994), and these are effect the low impact in

ecotourism development. Ecotourism and sustainability both are closely interrelated to each other; on the other hand ecotourism is one of the significant sectors of sustainable tourism that applies the principle of sustainability to the ecotourism behaviors. In this context ecotourism is to be a tool for sustainable development and applying the holistic approach of tourism environment. As the growing pressures of the visitors could demolish the precious natural resources, so it is important to protect them, though the natural beauty is the main attractions for the tourists of different corner of the country (WTO-UNEP 2002). Hence, it is much more important to preserve and protect the natural property for the future tourists, and alternative tourism practices are incorporated as a substitute of mass tourism in the sheltered and fragile environment of the special tourist destination sites (Budowski, 1976). However, the cultural fascinations are improved the societal facet of the different destination sites of the tourism and it is developed the economic status of the country. Though, socio-cultural, characteristics disquiet 'people' rather than business (Burns, 1999).

Most of the developing countries depend on the tourism industry for the development of economical as well as overall socio-cultural growth of nation. In the modern analytical tools of Geographical Information System (GIS) are newly composed to managing, displaying and analyzing the large volume of data at global and local levels for the tourism planning activities. Geoinformatics is a scientific discipline of information system and it has progressively expressed demands for the fresh skill for planning and management of the tourist activities.

1.2 Justification of the Title

The study area is extended from Saptamukhi river mouth of south western Sundarban to the Jaldha river estuary of Kanthi coastal plain adjacent of Hugli estuarine, the western limit of Sundarban formation. All the tourism destination sites are located at and around Sundarban coast with their sensitive habitats at the shore face of the Bay of Bengal. Physiographically, the Sundarban coast though extended up to the western limit of Hugli estuary, but the coastal sedimentary depositional environment is similar up to Jaldha estuary around Sundarban and part of Kanthi coastal plain. The coastal sand dunes and sandy sea beaches with beach ridge formation are present within the stretch of coastal belt of the studied coastal region. All the dunes and beach ridges belong to Recent Formation and very unstable due to active hydro dynamics processes at the shore face, and along the river mouths or estuaries. The tourism destinations are using the local tourism products, such as wide

sandy sea-beaches, low height sand dunes and beach ridges and mangrove dominated coastal wetlands of the region. The Ecotourism development however may be allowed on the beach dune landscapes and within mangrove wetlands in a sustainable manner, with consideration of environmental zoning and conservation of sensitive habitats with in the area. The present study highlights their potentiality, Beach Quality Index (BQI), Tourism Climate Index (TCI) of the region and Strengths Weaknesses Opportunities and Threats (SWOT) analysis for the development and management proposals for promotion of coastal ecotourism in a restricted manner. The environmental regulations of the coast are also considered for the location of ecotourism infrastructures in the study, for the environment friendly development of ecotourism destinations to support the local participation of the communities and for the benefits of local people. For the above reason the study area is located within the Sundarban and adjacent areas of Hugli estuarine shore line.

1.3 Background of the Study

Ecotourism and sustainable development have become important themes in tourism studies. Tourism is a system that brings together many interrelated issues such as society, nature and environment, however, research in this area is still limited, particularly in less developed countries like India. The rapid growth of tourism during the last four decades has lead to an increasing concern related to its impacts and these forced people to think about more responsible tourism. The alternative tourism differ from the mass tourism in different ways and are labeled using “eco” responsible and sustainable tourism and support sustainable development by maximizing the positive contributions to destination where there is a number of social and environmental challenges are come. For the development of the tourism infrastructure in the sensitive coastal region and maintain the sustainability of the tourism destination sites of ecotourism practice is one of the best alternative tourism that can develop in study area. As remote sensing and GIS technology is now very much active in the field of ecotourism development and its planning and management purpose so, with the help of this geospatial technology ecotourism can develop in the sensitive coastal region.

The consciousness about the environment may emerge among the different people or tourist coming from different parts of the country during their visit to the coastal destinations. The environmental degradation of the visiting destinations is highlighted by the tourists visit as they transmit and convey the information to the other people for specific measurements.

1.4 Research Problem or Research Gap

Ecotourism and sustainable development are related to each other. But sometimes the concept of ecotourism does not meet the expectation. Even if some of the guidelines are being executed, the local communities, stake holders, local culture and the natural environment are still facing many of the negative impacts. As many people turns it into a way of money making, rather than educating tourists towards the environment and negative effect upon the socio-culture activities. So, the current research is conducted to develop the ecotourism in the selected tourism destination sites in the sensitive coastal region of the Bay of Bengal, to identify the coastal resources that attract the tourist, protect the coastal environment by control the tourism activities and maintain the sustainability of coastal ecotourism infrastructures and attempt to modify the mass tourism process into the activities of restricted ecotourism sites. The conservation of the fragile environment may be highlighted or understood by the tourism and recreation processers in the coast. The profit from the tourism recreational activities and also the revenues earned from these activities may be used for the restoration of green and productive environment in this specialized environmental compartment.

Thus it is very much important to develop a proper planning in the region to implement the ecotourism development in a sustainable manner, and the geospatial techniques are helped as a decision supporting tool for identifying problems and preparing a systematic solution.

1.5 Objective of the Study Area

The objective of my study is:

- To identify the area of application for remote sensing and GIS techniques in ecotourism development.
- To find out the Ecotourism potentiality of sensitive coastal destination sites.
- To identify and to measure the Beach Quality (BQI) for each destination sites along the shore face of the study area in support of the tourism product.
- To develop the Tourism Climate Index (TCI) for assessing the favourable period for tourism recreation activities in the coastal destinations.
- To evaluate the SWOT analysis for the tourism destinations along the shore line of sensitive coastal environment.
- To set the frame work of sustainable coastal tourism for the ecotourism destinations.

1.6 Literature Review

The historical records reveal that the visitors from the different countries visit in the different areas to know the unknown world and to explore the resources. In the 20th century, the technological revolution in the transport and communication systems plays an easy role to travel in the remote destinations that leads the movement of the large number of people from one to another destination. With that movement and exploration of the new world, people were take it as a time for expanding their leisure and fatigue which bringing the concept of tourism. The dramatic growth of tourism has created a negative impact on the environment concerning the natural landscape and human being. Therefore, people have compelled to think about the alternative way to maintain the tourism without or minimum degrading the natural environment (Butler, 1991). In that perspective the ecotourism concept has introduced to support the tourists' affection and love with the nature through sustaining the natural environment. However, the term 'ecotourism' have used synonymously i.e. nature travel, nature-oriented tourism, nature tourism, nature based tourism, sustainable tourism, alternative tourism and special interest tourism (Laarman and Durst, 1987; Durst and Ingram, 1988; Wilson and Larmaan, 1988; Valentine, 1992; Hall and Weiler, 1992; Diamantis, 1998; Wight, 1993).

The environmental sustainability of the ecological and cultural elements can be maintained through changing the human activities after implementation of ecotourism (Dowling, 1995a, b; Blamey, 1995a, b; Blamey, 1997; Sano, 1997). Figgis (1994) suggests that ecotourism should be supply driven not a demand driven to the tourists. There have some contradictions about its positive and negative impact on social, economic as well as the environment. There have need to change in activities and behaviour of the tourists to reduce the negative impact of mass tourism on the natural environment (Boyd and Butler, 1993). Therefore, it is essential to step forward towards demonstrate the elements and matter involve by ecotourism concerning the sustainability of the nature and future prospects of the tourism industry by implementation of ecotourism.

In the field of sustainable implementation of ecotourism in any areas there have required rigorous field investigation in different tourists' destinations regarding the perception of the tourists. The perception survey-based results have been analyzed in the different statistical methods and with the help of geospatial technologies (Semeoshenkova et al., 2017). The geographic information system (GIS) helps to convey the strategic management and control of tourists' activities as well as in the decision making process

(Cvetkovic and Jovanovic, 2016). Maguire (1991) suggests that GIS technology emphasis to improve the business operations regarding the demand and service facilities to the tourists. Moreover, Farsari and Prastacos (2002) used different GIS-based models to define the degraded areas for residential and recreational development and also the required areas for conservation the natural landscape in the field of sustaining the ecological setup. It also used to resolve the conflict level among the competitors in the tourism industrial sector (Damjanovic, 2014). Mejia et al., (2000) describes that GIS technology is beneficial in data documentation and planning organization for the prospects of tourism industry. The GIS mapping apps are now implemented to track the best routes for required destination sites also the pressure of traffic and flow control particularly in the tourism destinations (Leipink and Mehta, 2005). GIS also used to measure the degree of sustainable development of the tourism sites. Therefore, it must says that GIS is an important pathways to avail the planning, management and decision making in sustainable tourism development (Forer and Simmons, 2002).

Tourism potentiality is a most important and popular aspect in tourism industrial sector that flourish the tourism infrastructure for the better economic development of an area (Al Mamun and Mitra, 2012). Samanta and Baitalik (2015) adopted the natural component-based weighted overlay analysis method to identify the ecotourism potential zone in four blocks in Bankura district. In this method the compilation was done considering the physical, infrastructural and meteorological components of landuse-landcover, soil, elevation, slope, vegetation, drainage, road network, temperature and rainfall. Oladi and Bozorgnia (2010) identified the ecotourism potentiality of the Naharkhoran area (Goargan, Iran) using geospatial techniques coupled with DEM-based overlay analysis. Moreover, Ruda (2016) adopted the multi-criteria decision making techniques, the Moran's I statistic and Getis-ord-Gi statistic to prepare the dataset of tourism potential, specific environmental value and tourism infrastructure to find out the ecotourism potentiality of the Nizkyjesenik highlands (Moravia, Czech Republic).

In coastal tourism, beach is the main attraction of the tourists. The beach quality analysis is essential aspect for the ecotourism development in the sensitive coastal areas. The integrated beach quality index (BQI) considering the environmental quality (EQ) and human welfare and health (HWH), using the weighted and aggregation method (Semeoshenkova et. al., 2017). The EQ is assessed comprising the parameters of ecological status of water,

cleanliness, state of habitats and trend of coast, whereas, safety, coastal scenery, service and facilities, human health are to be considered (Semeoshenkova et al., 2017).

Local weather and regional climate have also influenced on the ecotourism development as the tourists' activity and behaviour depends on climate. The climatic variable-based tourism climate index (TCI) (Mieczkowski, 1985) is used to find out the favourable tourism area attracted by the tourist. Gandomkar (2011) also analysed the TCI coupled with GIS to finding the potential tourism sites of the Isfahan province (Iran). This method have been widely adopted (Ramazanipour and Behzadmoghaddam, 2013; Scott et al., 2016; Nemeth, 2013; Bakhtiari and Bakhtiari, 2013) in the field of ecotourism analysis. Hasan et al., (2015) compared the TCI and temperature-humidity index (THI) to identify the better determinant among these two as a controlling factor of the tourists flow in a specific site.

SWOT is a simple planning tool to evaluate the strengths, weaknesses, opportunities and threats of the tourism industry and make some strategic planning for development of tourism sector. Hong and Chan (2010) incorporated the socio-economic and environmental factors in the SWOT analysis to understand the internal strengths and weakness, and external opportunities and threats. The SWOT analysis was also carried out in the Anzali wetlands and evaluates the external and internal factors matrix within the SWOT framework to identify the strategies of strengths-opportunities (SO), weaknesses-opportunities (WO), strengths-threats (ST) and weaknesses-threats (WT) (Ganjali, 2014). The SWOT model has also used on the sustainable ecotourism development in the Alamut region (Saeb et al., 2012) and Boujagh national park (Reihanian et al., 2012).

The ecotourism is implied in the understanding and development of the landscape sustainability. The sustainable management refers to the environmental, economic and socio-cultural aspects of tourism development, and established a suitable balance between these three dimensions to assure long term sustainability. Now, the challenge is how it possible to implement the sustainable ecotourism in the place of the mass tourism. Also, need to identify the limits of such a transformation accompanied by the setting a limit of new development and strategic measures within the tourism industry. This should be accompanied the primary goal to determine the characteristics of the consumers searching for sustainable way of tourism and to accumulate the knowledge of consumer's sustainability. Sustainable ecotourism should also maintain a high level of tourists' satisfaction and ensure a meaningful

experience to the tourists, raising their awareness about sustainability issues and promoting sustainable tourism practices amongst them.

1.7 Research Design

Ecotourism is a newly formed alternative tourism in the tourism industry. This study reveals many things interrelated to each other. The ecotourism practices in the coastal region are very difficult due to the fragile environment of the studied coast. So, maintaining the sustainability of the coastal environment, ecotourism is the most applicable and purposeful way for sustainable management of coastal region. A qualitative and quantitative research work is adopted by reviewing some existing literature about the concept of ecotourism and identifies the research problem of the study area for the promotion of the ecotourism infrastructures in a suitable approach. Therefore, tourism questionnaire survey sheet, field data and other necessary primary data are incorporated to execute a scientific methodological framework of each destination for the development of ecotourism in a sustainable manner in the study area.

1.8 Materials and Methods

The present study assimilates the Survey of India (SOI) Toposheets, Kolkata with a scale of 1:50,000 and 1:25,000; Landsat-8 satellite image; several temporal images of Google Earth; geological map from the Geological Survey of India (GSI), Kolkata; soil map from National Bureau of Soil Survey and Land Use Planning (NBSS & LUP), Kolkata and Digital Elevation Model (DEM) have been used for the physiographic analysis of the region. Census data of (2011), tourism statistic handbook, repetitive respondent survey of the tourists and the hotel survey are conducted for the demographic analysis and construct the frame work(Fig.1.1) of the ecotourism development for each tourism destination sites of the study area. The NOAA (National Oceanic and Atmospheric Administration) climatic data is used to analyze the favourable climatic condition of tourism destination sites for travelling the tourists or visitors. Finally, the methodological framework is prepared through the different thematic layer with the help of geospatial techniques for the ecotourism development of this study area.

The second chapter contains to find out the ecotourism potentiality in the coastal belt with application of geospatial techniques. This study is aimed to perceive a workable methodology and quantify the ecotourism potentiality for achieving an optimized solution in

this study. The analysis is formulated based on 'weighted sum method' (WSM), which is a popular multi criteria decision making tool that incorporates the ranking and scaling techniques for quantifying various attributes of the selected aspects. The techniques are applied for the selection of most potential ecotourism destination sites of the sensitive coastal region in West Bengal and development for the assessment of strength and weakness, service and infrastructure improvement of the study area.

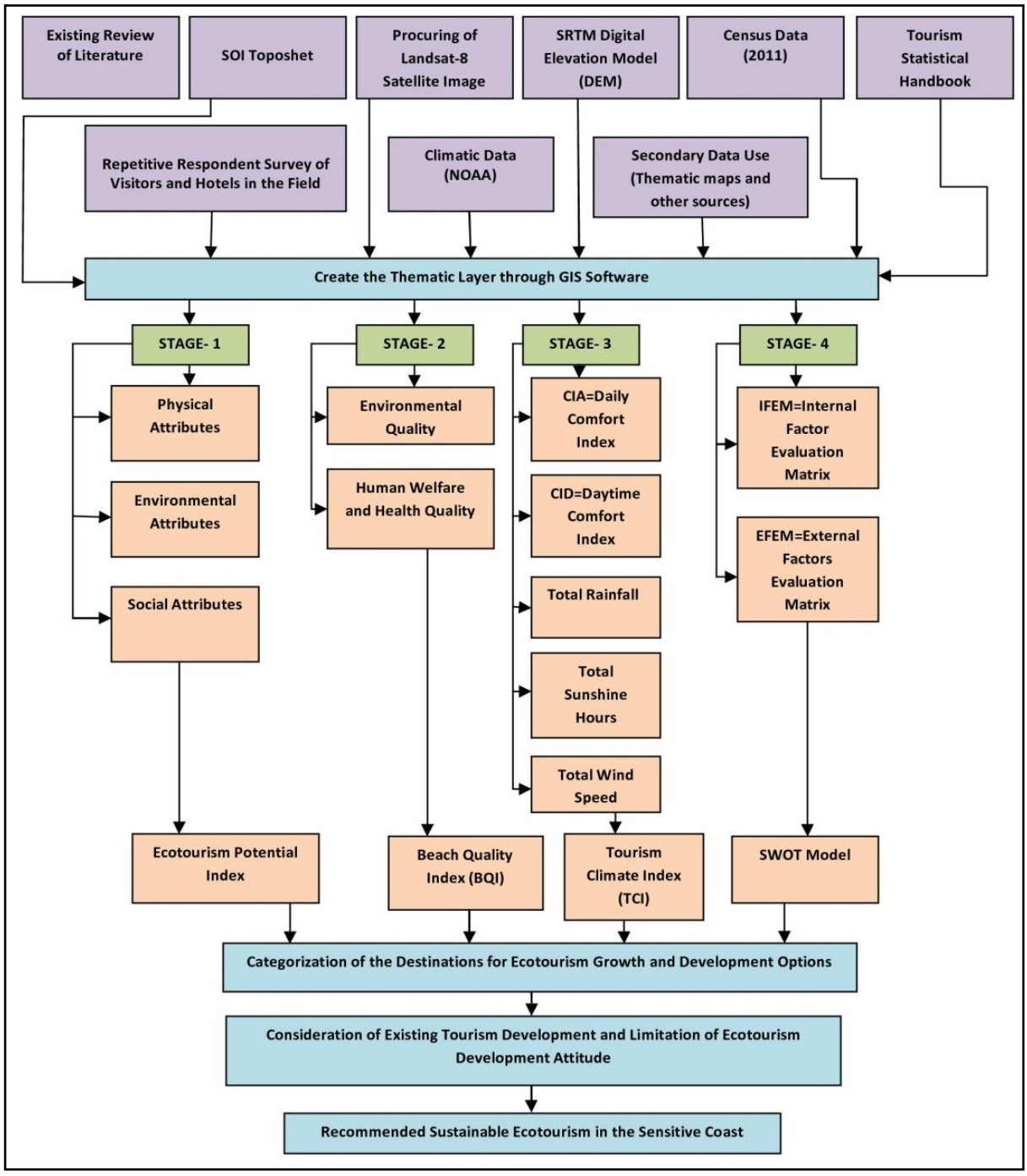

Fig. 1.1: Methodological flow chart showing the framework for ecotourism development in the coastal area.

Multi-criteria decision making is a powerful tool that concerned with structuring and solving option for evaluating numeral alternatives in terms of decision criteria of the attributes based on the linear aggregation method (Al Mamun and Maitra, 2012). Physical, environmental and social aspects are primarily preferred for the assessment of ecotourism potentiality with the help of decision making criteria. Therefore, Ranking of the attributes, intra attribute scaling and computation of aggregate potential techniques are integrated in a multi criteria decision making system to cluster the potential value of each tourism destination sites and investigate the prospective amount among the tourism spots for the assessment of the ecotourism potentiality of the study area.

In third chapter Beach Quality Index (BQI) is estimated for the appraising the quality of beaches in the sensitive coastal region of West Bengal. The BQI is a single summarized composite index (Botero et al., 2013; Williams and Micallef, 2009) formed by eight individual indicators (physical and cultural) which are grouped in two major components such as the Environmental Quality (EQ) and Human Welfare and Health (HWH). The indicators are selected based on their analytical soundness, measurability and relevance to the beach quality issues at the study sites. The indicators, e.g., Ecological status of water (ESW), Cleanliness (CL), State of Habitats (SH), Trend of Coast (TC) are computed under the EQ component and similarly Safety (SFT), Coastal Scenery (CS), Services and Facility (SF), and Human Health (HH) are calculated under the HWH component for the weighting and ranking the indicators (Ariza et al., 2010). Finally, the individual indicators are scaling (1-4) on the basis of their qualitative characteristic of physical and social aspects and to make them normalized and representing the poor, sufficient, good and excellent quality of beaches.

Tourism Climate Index (TCI) is assimilated to assess the tourism climate variability in the fourth chapter (Mieczkowski, 1985). For TCI 35 years (1979 to 2014) climatic data collected from the National Oceanic and Atmospheric Administration (NOAA) and 7 climatic variables, e.g., temperature minimum, maximum, daily relative humidity, minimum daily relative humidity, rainfall, wind speed and sunshine hours are computed in a weighted ranking method to establish the favourable climatic condition of visitors as well as a favourable month for travelling the tourists in their destination sites.

Strengths Weaknesses Opportunities and Threats (SWOT) is a sophisticated tool which involves the systematic assessment of strengths, weakness, opportunity, and threats, these are identified based on the characteristic of the sites and questionnaire surveys of each

ecotourism destination of the study area. The questions are assigned by the level of agreement in the Likert scale in chapter fifth. The SWOT analysis combined with the internal factor evaluation matrix (IFEM) and external factor evaluation matrix (EFEM) to assess the strategic factors of decision making. Primarily, internal factors are grouped as strengths (S) or weaknesses (W) and external factors are grouped as opportunities (O) or threats (T). Accordingly, a list of strengths (Ss), weaknesses (Ws), opportunities (Os) and threats (Ts) has been prepared and tabulate the all factors in IFEM and EFEM for assigning the weight to calculate the final score of SWOT.

1.9 Geographical Settings of the Area

The study area is located at the estuarine mouth of the Hugli and at the northern head of the Bay of Bengal coast within the South 24 Parganas and Purba Medinipur districts of West Bengal (Fig. 1.2). About 220 km coastline is stretching from river Saptamukhi to Jaldah in the entire area (Fig. 1.2). The entire area has extending from 87°30" – 88°22" E and 21°31' – 22°10' N.

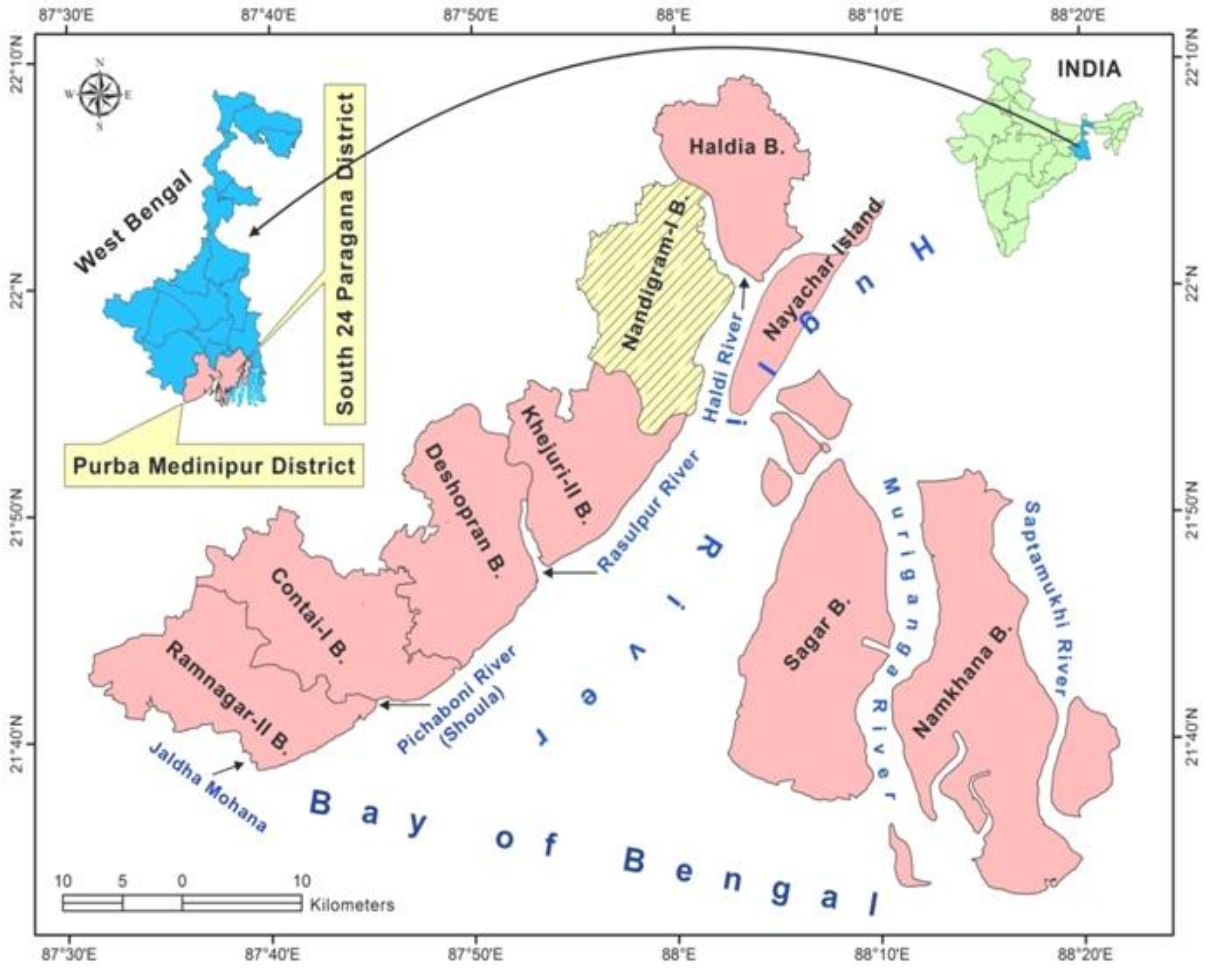

Fig. 1.2: Location map of the study area.

1.9.1 Climate

The study area belongs to the tropical monsoon type of climate with seasonal reversal of wind system. The four main diversified seasons of summer, rainy, a short autumn, and winter are observed in that area. In summer, the coastal region gets the excessive humidity and high temperature. At nights, a southerly cool breeze carries moisture from the Bay of Bengal. Monsoon brings rain to the whole state during June to September. Winter (December – January) is mild over the plains with an average minimum temperature of 15 °C. A cold and dry northern wind blows in the winter, substantially lowering the humidity level. Seasonal monsoon winds and maritime actions in the Bay of Bengal influence the tropical dry and wet climate of the region.

1.9.2 Flora and Fauna

The diversified floral and faunal species are distributed in the coastal belt of the study area. The Medinipur coastal tract encompasses with versatile habitats and niche which accommodate a galaxy of faunal components in the form of pelagic and benthic forms. 57 mangrove species and their associated plants under 32 families are observed in the intertidal, supra-littoral and backshore zones. 28 species of benthic algae under 4 families and 8 phytoplankton species under 3 families are found in the intertidal zone, supra-littoral brackish and sub-tidal open estuarine marine zones (Chakraborty, 2010). Different habitats of contrasting ecological features have been recorded in this area. Dune growing plants such as *Ipomea, Spinifix, Pandanus* are playing a major role to form and stabilized mobile dunes, fore dunes and back dunes. These established species are able to stabilize the shoreline and act as a buffer against coastal erosion (Bhakat, 2001). Considering the overall ecological interest of Sunderban forests, it has been declared as a world heritage site by international union for conservation of nature (IUCN). In this area, 50 species of diatoms, 8 species of diamoflagellates and 1 species of chlorophyceae and cyanophycea, 16 types of zooplankton and about 8 species of algae are present (Chakraborty, 2010). The ecosystem is characterized by a very dynamic environment due to the interacting effect of tide, flooding, salinity and cyclones.

1.9.3 Geomorphology

The study area is characterized by low-lying coastal terraces coupled with extensive fluvio-marine depositional plains, deltaic islands, estuaries, interconnecting tidal creeks, parallel beach ridges with intervening estuaries, mudflats, sandy beaches, dunes and sand ridges. The geomorphic change occurs within the coastal tract is largely influenced by the

tidal and climatic characteristics. The terrestrial depositional plain of the coast is affected by the quaternary fluctuation of sea level at different stages of the development. The coast is almost equally divided into east (Sundarban) and West (Medinipur coastal plain) by the north-south alignment of river Hugli in the south Bengal basin. To the east, the Sundarban is characterized by low-lying swampy terrace with extensive tidal flats (Fig.1.3)and coastal inlets, whereas, the Medinipur coastal plain (west of Hugli river) is a regular coast of three complex chenier systems of sand dunes (Digha, Ramnagar and Contai dunes) and swells. The cuspate form of Subarnarekha delta demarcates as the western limit of the coast of West Bengal.

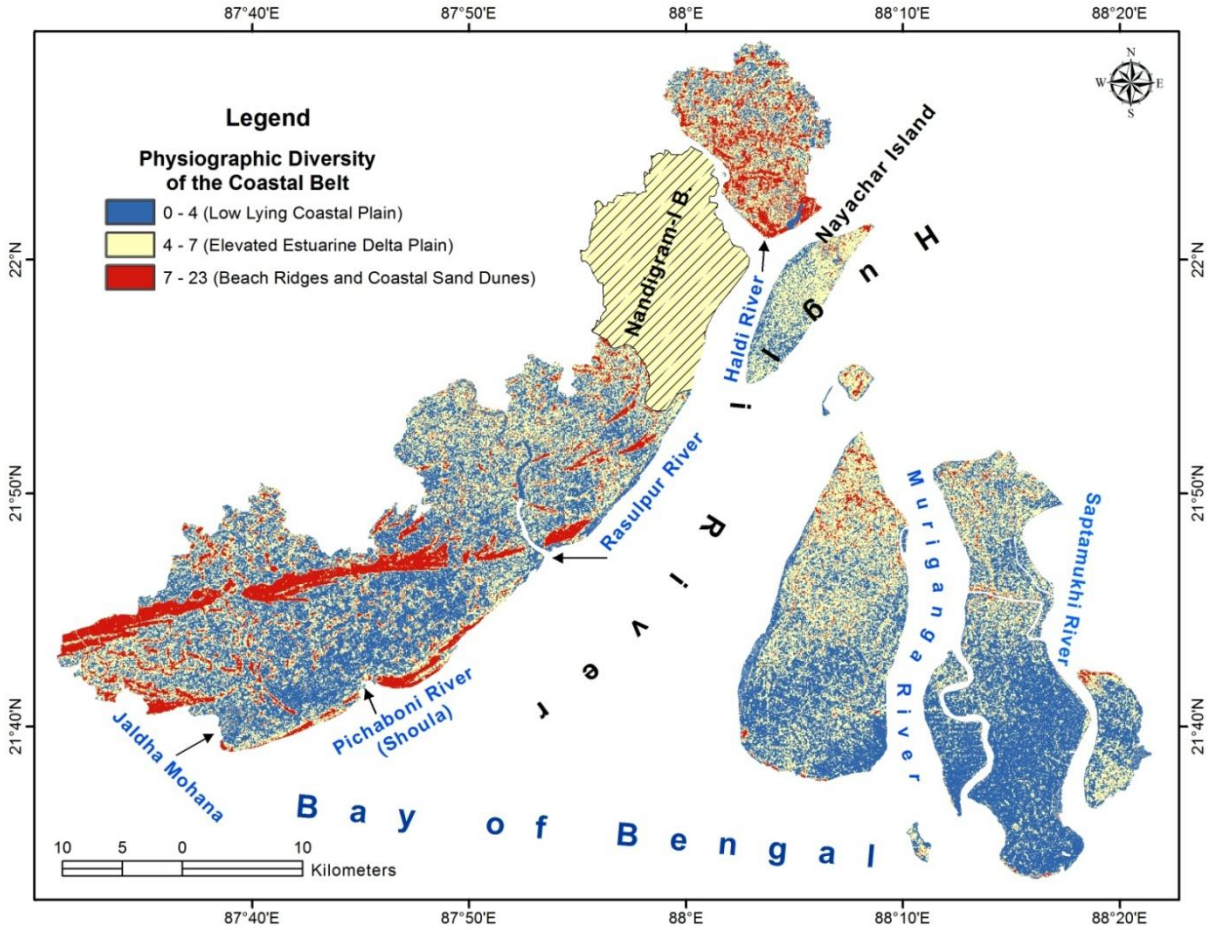

Fig. 1.3: Physiographic diversity of the study area.

Rasulpur river and Digha inlet are the two important tidal inlets in the delta areas (Medinipur coast) of Subarnarekha and Hugli system. The series of beach ridges alternating with bars at the eastern bank of Subarnarekha indicates the successive positions of a receding shoreline. River banks and embankments are protected the low-lying interior coastal land from the saline tide water encroachment. The voluminous sedimentary deposits carried by these rivers and the tidal inlets are forced to be deposited within the jacketed courses, thereby

choking the rivers and gradually raising their riverbeds (Paul, 2002). However, the existing tourist destinations are show in the digital elevation model (Fig.1.4) of the study area.

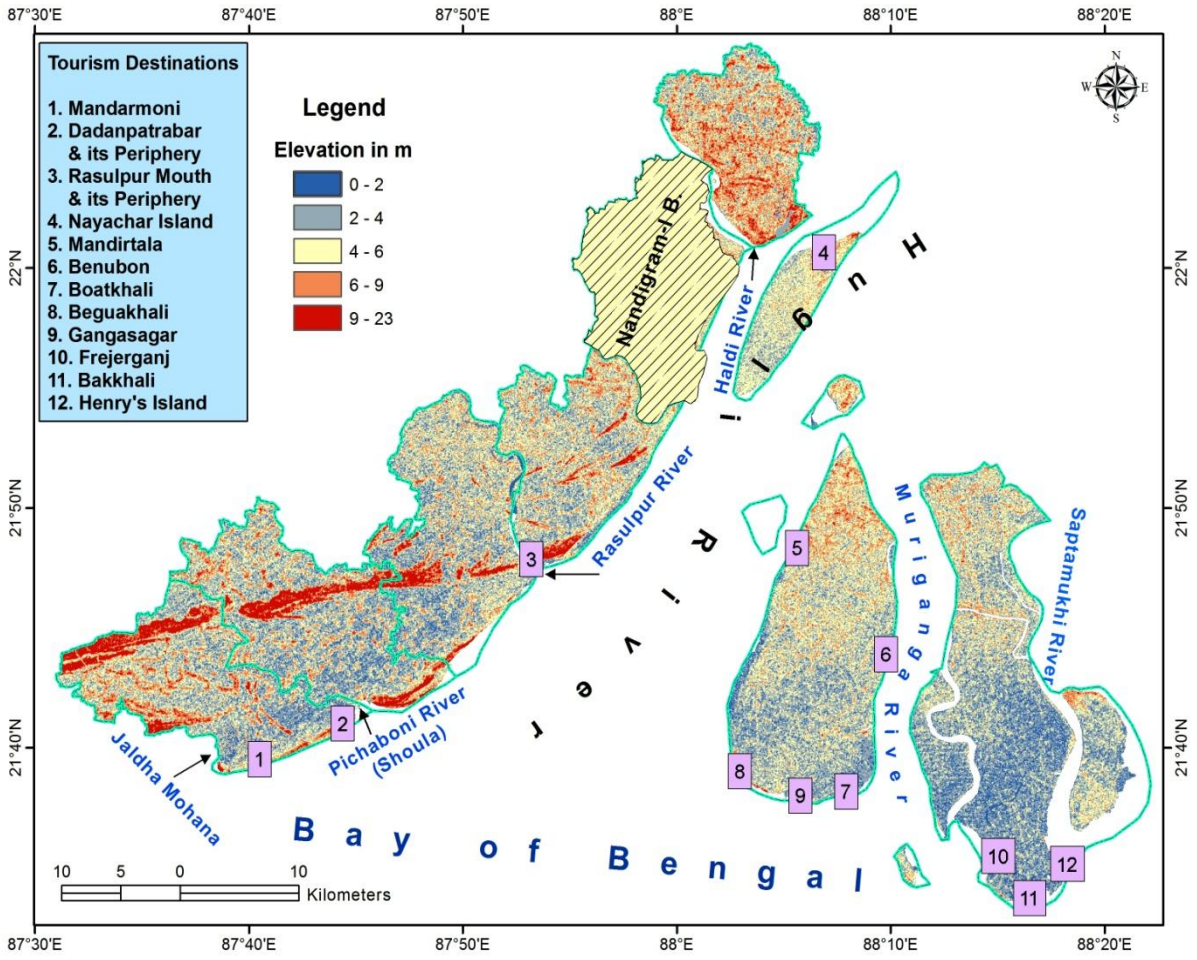

Fig. 1.4: Digital Elevation Model of the study area.

1.9.4 Soil Characteristics

The soil of entire areas is categorized under following ten distinct classes (Fig. 1.5) as per the national bureau of soil survey and land use planning (NBSS & LUP).

W073: Very deep, moderately well drained, sandy soils occurring on gently sloping dunes in coastal plain with sandy surface, severe erosion and salinity.

W074: Very deep, well drained, sandy soils occurring on moderately sloping coastal plain with sandy surface, severe erosion and slight salinity.

W075: Very deep, poorly/ imperfectly drained, fine soils occurring on level to nearly level marshes in coastal plain with clayey surface, and moderate flooding and salinity, associated with very deep, well drained sandy soils.

W076: Very deep, poorly/ imperfectly drained, fine soils occurring on level to nearly level marshes in coastal plain with clayey surface and moderate flooding and salinity, associated with deep, well drained sandy soils.

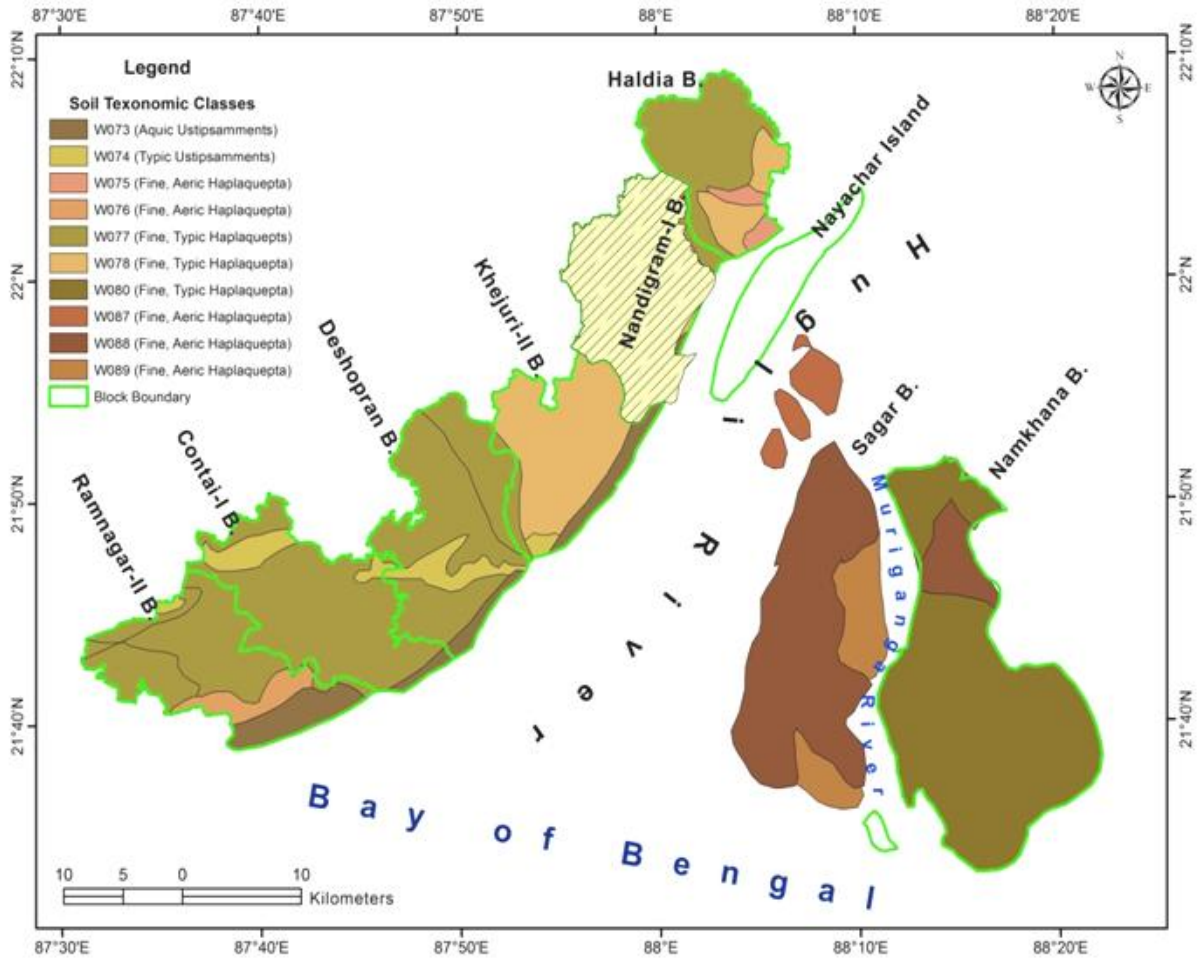

Fig. 1.5: Distribution of the soil taxonomic classes.

W077: Very deep, poorly drained, fine soils occurring on nearly level to gently sloping coastal plain with clayey surface, and moderate flooding and slight to moderate salinity (limited extent), associated with very deep, poorly drained and fine cracking soils.

W078: Very deep, poorly drained, fine cracking soils occurring on nearly level to very gently sloping coastal plain with clayey surface, moderate flooding and moderate salinity (moderate extent), associated with deep, and poorly drained fine soils.

W080: Very deep, fine cracking soils occurring on nearly level to very gently sloping coastal plain with clayey surface, moderate flooding and moderate salinity (limited extent), associated with deep, fine soils.

W087: Very poorly drained, fine cracking soils occurring on level to nearly level low lying alluvial plain with clayey surface, moderate flooding and moderate salinity (moderate extent), associated with very poorly drained, fine soils.

W088: Very deep, very poorly drained, fine cracking soils occurring on level to nearly level low lying alluvial plain with clayey surface, associated with very deep, poorly drained, fine soils.

W089: Very deep, fine cracking soils occurring on level to nearly level low lying alluvial plain with clayey surface, associated with very deep, fine soils.

1.9.5 Land Use/Land Cover (LU/LC)

The coastal tract is mainly characterized by the seven diversified LULC types of water bodies, wetlands, dense vegetation, and settlement with orchards, agricultural land, agricultural fellow land and bare land (Fig. 1.6). The water bodies remain along the tidal channels and low-lying intertidal shorefront areas. The wetlands are observed at the interior low-lying areas which are mainly converted into the fisheries. Along the dune ridges, and margin areas tidal-creek and river are occupying by the dense vegetation. At the different part of the embankment protected low-lying coastal areas and the fringe of dune ridges settlement are established.

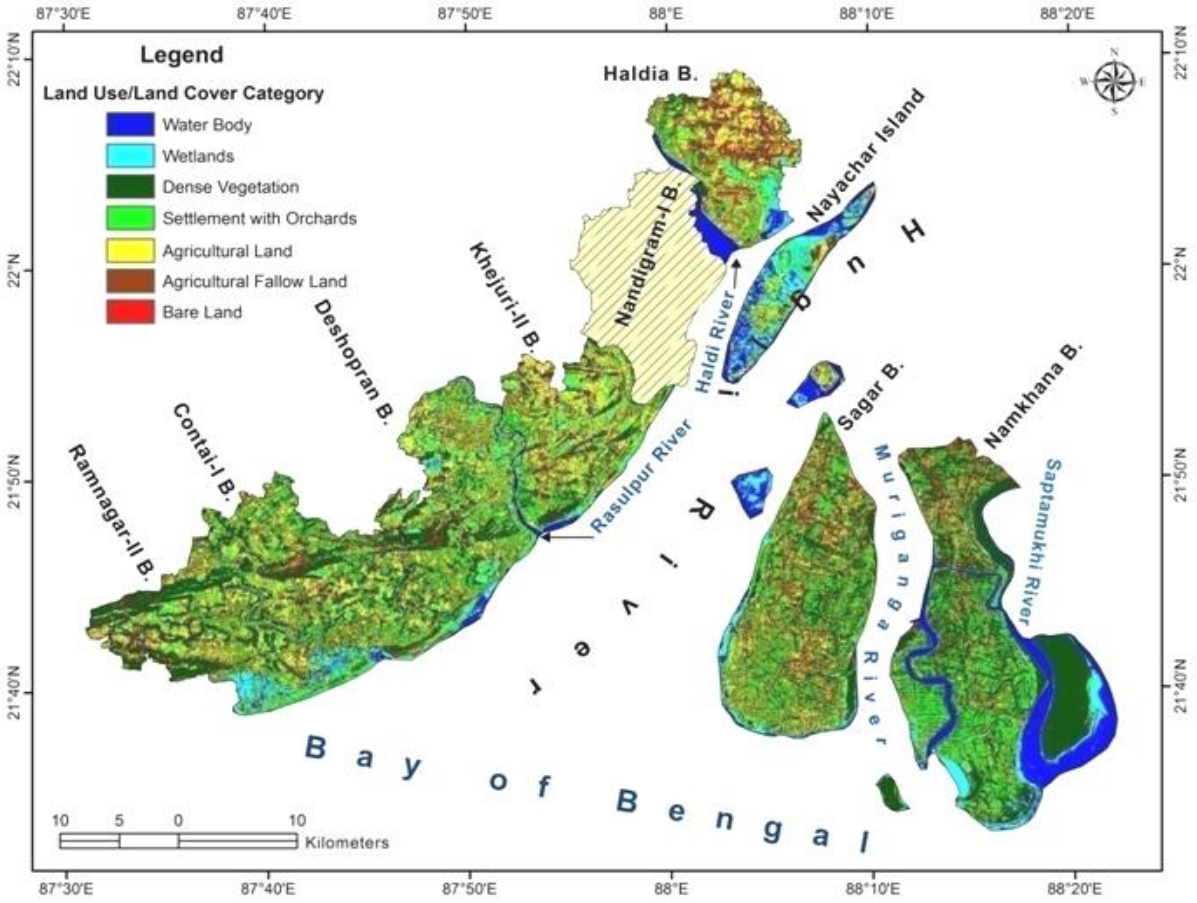

Fig. 1.6: Land use land cover map of the study area.

The low-lying interior areas are seasonally cultivated by the rice paddy, groundnut, and other vegetables. The agricultural fellow and bare land also have observed in the different part of the areas. The data base generated by NDVI (The normalized difference vegetation index) supports the availability of favourable ecological conditions of the tourism

destinations of the study area (Fig.1.7). The vegetation status or the NDVI are (1) wet land vegetations, (2) seasonal grass lands and sparse vegetation, (3) agricultural land, (4) Thickly vegetated area.

1. Mandarmani destination was characterized by littoral forests, wider dune habitats, and mangrove wetlands in the decades of (1970s, 1980s, and 1990s). However, the spread of aquaculture practices and tourism infrastructure over the wetlands and unconsolidated dune sediments have produce the loss of natural habitats and littoral vegetations. The area also needs proper conservation programme to restore the dune vegetations and wetland and vegetations.
2. Dadanpatrabar was cover by dense littoral forests and wider sand dune habitats in the near past (1970-1990s). Currently the spread of fish drying platforms and related infrastructures have occupied the coastal fringes and dune platforms. The area also needs a restoration programme of fringe forests at present.
3. Dakshinpurosuttampur destination is more or less undisturbed and ecologically sensitive in the low lying areas of beach dune complex. The habitats of the region are still well preserved except the agricultural practices in the backshore areas of the coast.
4. Rasulpur destination on the western bank of Hugli river near the confluence of Rasulpur river. Support ideal ecological conditions for littoral forests and mangrove forests. However, the mangrove forests are severely affected at present due to sand movements and storm drifts of sand site sediments.
5. Nayachar Island destination was thickly vegetated by salt marsh and mangrove, in the decades of 1980 and 1990s. However, due to expansion of commercial fish form plots the above vegetation is clear. The Island needs proper conservation plans to restore the indigenous vegetation to maintain the favourable ecological conditions.
6. Mandirtala destination is located along the Hugli river bank of northern Sagar in the estuarine environment. The vegetation of mangrove and salt marshes as well as, the littoral vegetations are highly degraded because of shifting of the river bank and bank protection management.
7. Benubon along the bank of chemaguri-gang and Muri-Ganga River provides ideal area for conservations of mangroves and their natural habitats. However, the rapid rate of expansion of aquaculture ponds has destroyed the fringed forest of mangrove habitats at present.

8. Boatkhali destination is heavily eroded and the dune habitats with standing vegetations were damaged by cyclone induced erosion and by spread of aquaculture ponds. However, the areas of mangroves of this destination are only surviving in the narrow channel fringes of Boatkhali.
9. Beguakhali destination is regularly affected by frequent land fall of cyclonic impact. In Aila cyclone of 2009 the vegetational status of this area is severely affected. The remaining area of mangrove vegetations is affected by sand movements after the occurrences of storm drifts of sediments.
10. Gangasagar was fringed with tidal creeks, mangrove vegetation, sand dune habitats and marshy lands in the previous decades. Mangrove and dune vegetation of the destination site are highly degraded at present for the spread of tourism infrastructure. The seaside vegetation needs conservation.

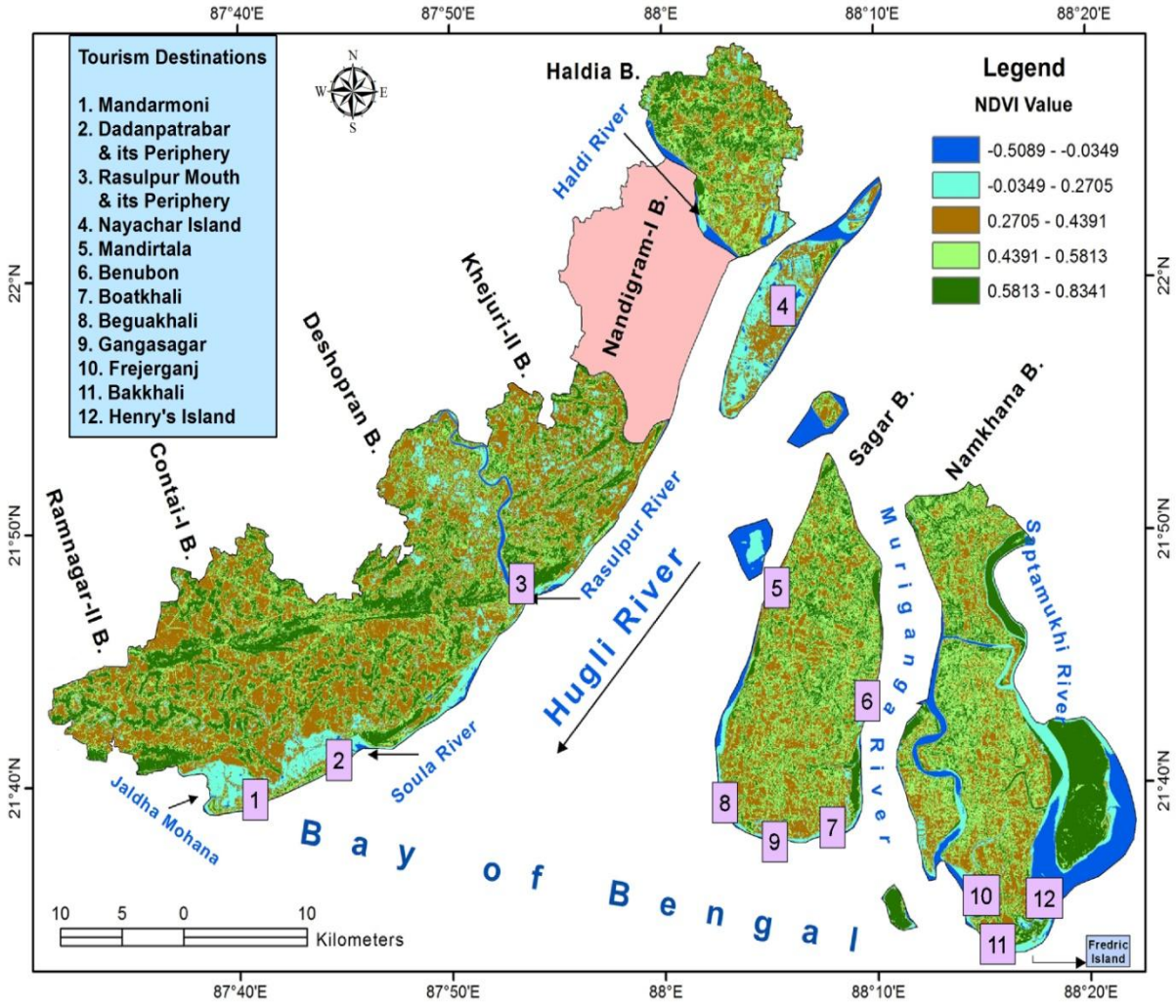

Fig. 1.7: Normalized Difference Vegetation Index (NDVI) of the study area.

11. Frejerganj destination is fringed with vegetations of mixed characters along the shore line and inner parts of the area. Currently the area of destination needs conservations of sand dunes and local plants.
12. Bakkhali destination is fringed with casuarinas trees and backshore mangroves, and other littoral vegetations. The mangroves are highly degraded in this part of coastal destinations.
13. Henry's Island is thickly vegetated with mangroves except the areas under aquaculture ponds and tourism infrastructure.

1.9.6 Demographic Structure of the Area

The total population of selected seven blocks is 1,042,236 as per the 2011 census comprising with male and female population of 535,521 and 5067,715, respectively. The number of household is relatively high in the areas of South 24 Parganas that the Purba Medinipur district (Fig. 1.8).

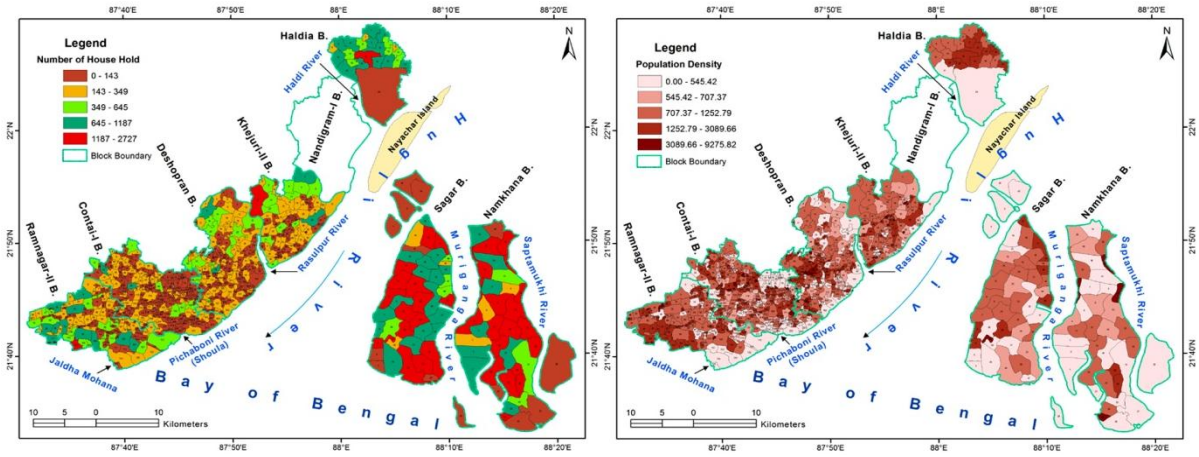

Fig. 1.8: Number of household and population density of the study area.

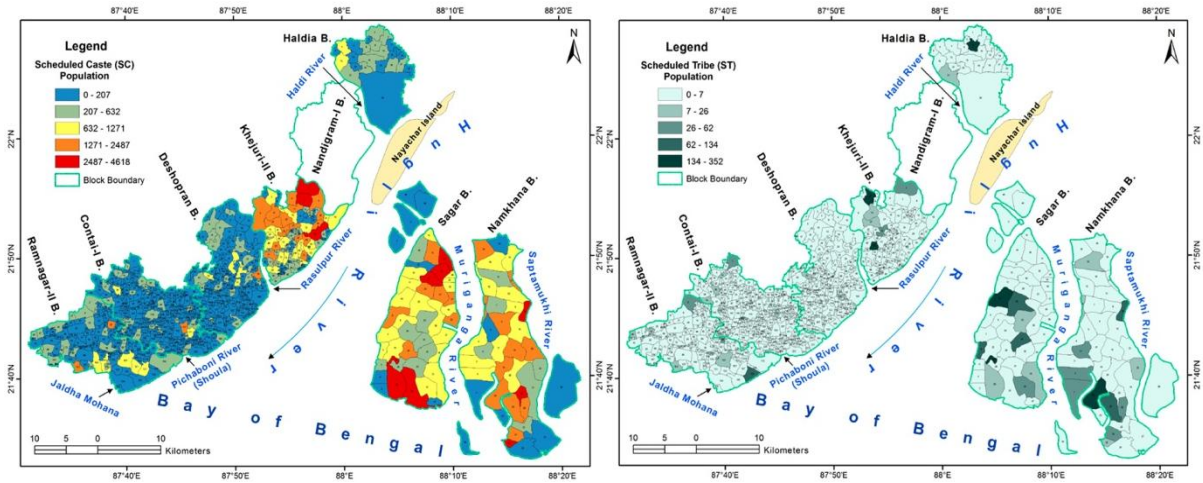

Fig. 1.9: Schedule Caste and Schedule Tribe Population of the study area.

The five class-based population densities shows that at the different part of the Purba Medinipur district the higher density observed in compared to the areas of South 24 Parganas district. Among the total population, the total schedule caste (SC) and schedule tribes (ST) are 228,729 and 3132, respectively whereas, rest are the in unreserved categories. The more number of SC population are remaining in the two blocks (Sagar and Namkhana) of the South 24 Parganas district and one block (Khejuri-II) of Purba Medinipur district in comparison with the other blocks of the area.

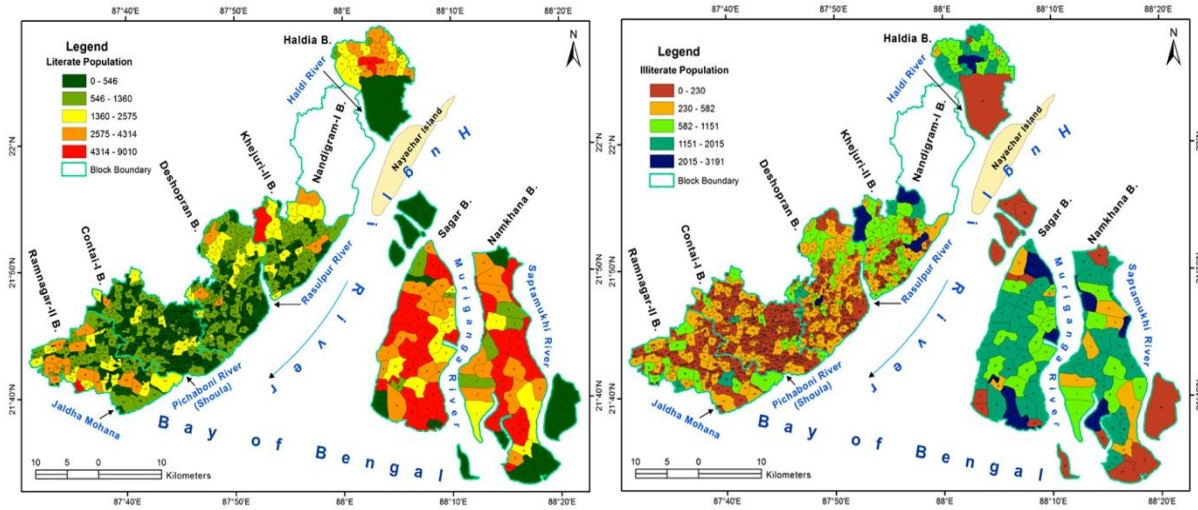

Fig. 1.10: Literate and Illiterate population of the study area.

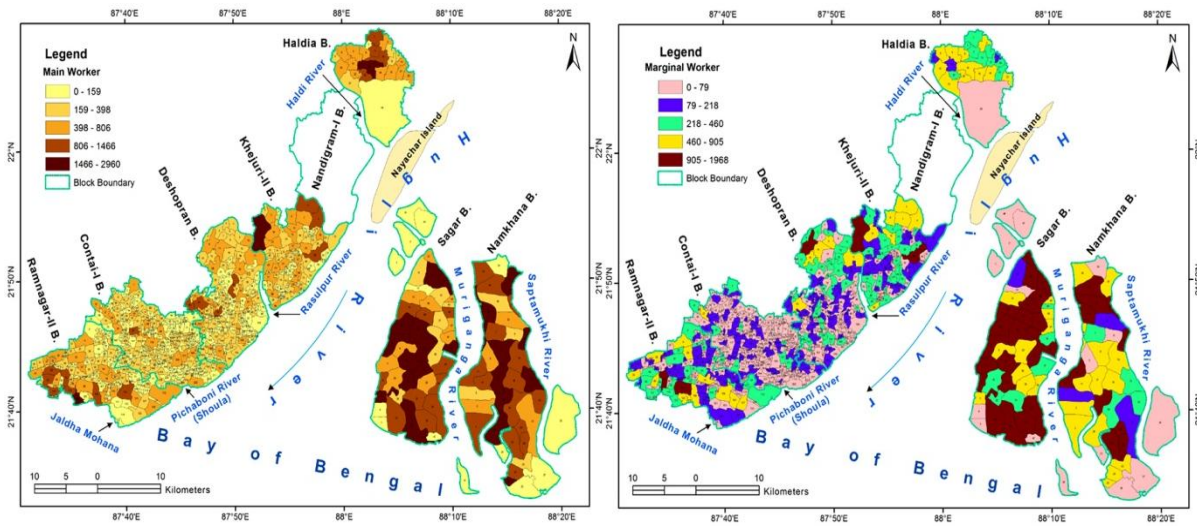

Fig. 1.11: Number of main worker and marginal worker of the study area.

The overall ST population is minimum number in the area and their distribution is shown in the (Fig. 1.9). The number of literate and illiterate (Fig. 1.10) persons both are high in the areas of South 24 Parganas district comparing with the areas of Purba Medinipur district as the number of total population is high in the larger villages. In the entire area the

number of working population is 380,514, and among the total working people, the number of main workers and marginal workers (Fig. 1.11) both are relatively high as observed in case of the literate and illiterate class of population distribution.

1.10 Description about the Ecotourism Destination Sites

There have number of ecotourism destination sites emerged along the sensitive coastal areas. Among those ecotourism destination sites some are important heritage, pilgrimages sites, and other are coastal resorts.

1.10.1 Mandarmani

Mandarmani sector is located between the coastal areas of Tajpur and Junput growing as the second important coastal tourism sector after the Digha in the East Medinipur district (Fig. 1.12). This area is traditionally defined by the estuaries of Dadanpatrabar creek (west and north) and the Pichhabani creek (east and north), and the Bay of Bengal in the south. This sector covers a length of 7 km, extending from 87°38'49" – 87°43'19" E and 21°39'30" – 21°40'15" N in the southern part of East Medinipur district, West Bengal. It is remaining under the Ramnagar police station. There is no direct route to reach at Mandarmani by bus services. Buses are available from Contai-Digha route (SH11) up to Chaulkhola bus stand, and then the trekkers are available for the public transport (Fig. 1.13). The nearest railway station is at Ashapurna Devi, which is 15 km away from Mandarmani. But, the main railway junction Contai (Kanthi) is about 40 km away from the Mandarmani.

Within only 10 years, Mandarmani has claimed a position in the tourist map of coastal resorts of eastern India and the rural based seaboard area of West Bengal. It is highlighted and came under news for its rapid growth and development the past few years. This development indicating that this tourism sector added a new dimension to the economic development of the state as well as the local people. However, this area is rapidly developed without any planning after violation of the coastal regulation zone (CRZ) rules. This may become a hindrance to the tourism industry.

The main attractions of this tourism site are sandy beach, decorated with keya and casuarina trees and sand dunes coupled with the sea waves and the vast sandy expanse near the estuary. At present, Mandarmani has become a luxurious coastal resort where one can spent nights at costly hotels, enjoying the variety of delicious sea fishes and a lonely sea beach with beautiful sunrise and sunset. A new form of entertainment related activity has been introduced at the Mandarmani coast in 2010. Beach buggy includes the joy ride on motor cycles, small cars, speed boats (6 seater and 10 seater), Banana boat, Jetski (Rs.

500/per head), and many other activities into the sea or above the sand dunes. There are 23 vehicles and 14 speed boats engaged in this activity during 2010 – 2011. The Mandarmani tourism destination may become emerges just like the Kovalam and Goa beaches for such type of activities. However, these activities are enhancing the further degradation of the coast and destroying the biodiversity of the coast.

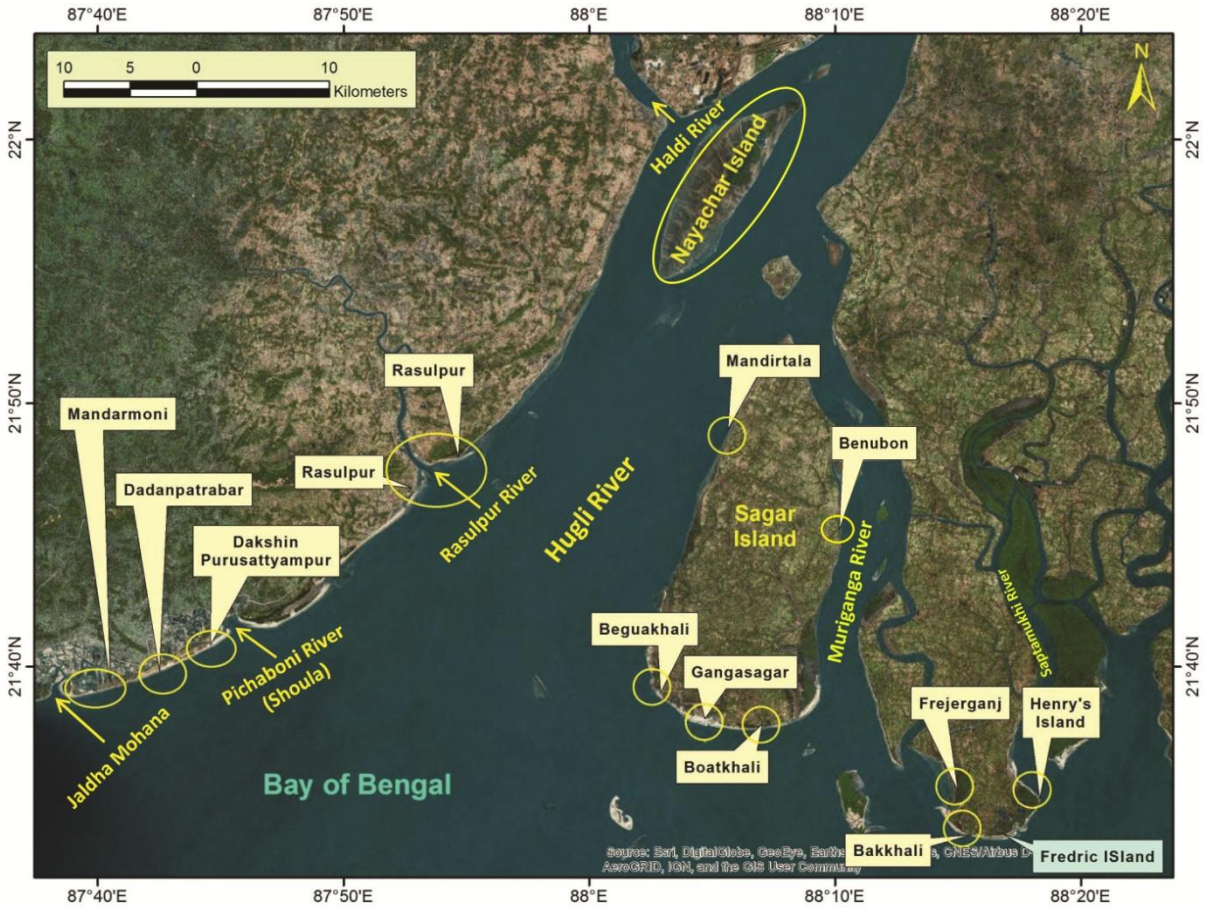

Fig. 1.12: Ecotourism destinations map of the study area.

1.10.2 Dadanpatrabar

Dadanpatrabar is also closely located to the Mandarmani (Fig. 1.12). It is a major fish-landing centre govern by the local fishing community (such community managed fish land centre is called *Khoti*). Fishermen communities have traditionally used a portion of the wonderful beach to dry the fish and due to this reason the environment may be affected. However, the natural beauty of that place attracts the tourists.

1.10.3 Dakshin Purushottampur

Dakshin Purushottampur village is located in Ramnagar II block of Purba Medinipur district in West Bengal, India (Fig. 1.12). The total geographical area of village is 9.93 km^2 with the total population of 2,394 in the 476 household. Basically, it is located at the

Mandarmani sector. It is a newly emerged tourism destination. Commercial development is not improved in compared to the other tourism destination sites of the study area. The main attractions of the place are its natural beauty and pristine sea beach. In the near future it can be a most favourable ecotourism destination for the tourists.

1.10.4 Rasulpur

Rasulpur tourism destination site is located on the both side of the river Rasulpur (Fig. 1.12). It is about 15 km away from the Contai and well connected in terms of communication and accessibility. The main attractions of this area are the river mouth, dunes, mudflats, mangrove and casuarinas trees, tide and famous historical mosque.

1.10.5 Nayachar Island

Nayachar Island is located in the middle of river Hugli and just in the confluence point of river Haldi and Hugli (Fig. 1.12). In the recent past this island was fully covered by natural mangrove and saltmarsh grasses. But now the entire island is converted into fisheries. Being located in the island position the boat is the only mode of communication from the main land. The nature lover may enjoy the loneliness of these island with surrounding natural vegetation, mud bank, tidal flats etc.

1.10.6 Mandirtala

Mandirtala village is located in Sagar block of South 24 Parganas district in West Bengal, India (Fig. 1.12). It is situated 10.9 km away from block headquarter Rudranagar, and 88.8 km away from district headquarter (Alipore). As per 2009, Muriganga-II is the gram panchayat of Mandirtala village. The total geographical area of village is 6.82 km^2. Diamond Harbour is nearest town to Mandirtala (56 km away). The most attractions of the places are the heritage temple.

1.10.7 Benubon

Benuban is the newly emerged attractive tourist destination site in the eastern side of the Sagar Island and in the margin of Muriganga river (Fig. 1.12). The natural mangrove forest, tidal mudflats and boating along the tidal creeks are the attractive and pleasant nature of this site. This place is well connected from the main road by a distance of 4 km.

1.10.8 Boatkhali

The Boatkhali is the seaside degraded landscape at the southeastern part of the island (Fig. 1.12). This place attracts the tourists for is degraded landscape, tidal creeks, and most

important is the famous *Manasa temple*. The mode of transportation is very poor as there have not any concrete road from the main road which is almost 7 km distance.

1.10.9 Beguakhali

The village Beguakhali is located in the southwest corner of Sagar Island (Fig. 1.12). This village has a metallic road running across the island. The most attractions of the place are the lighthouse, mangrove forest, tidal creeks, sandy and partially degraded beach. The concrete road is connected with the main road favored by the tourist to avail this place.

1.10.10 Gangasagar

The name 'Gangasagar' is not new to the Hindus living in India or abroad. This tourism destination sites claims more importance for its religious activities than others. Gangasagar is the significant area among the entire 43 mouza of the Sagar Island, at the northern head of the Bay of Bengal coast and Hugli estuary mouth (Fig. 1.12). It situated at the low-lying coastal area that had been reclaimed from the Sundarban mangrove forests during the early 19th century. The island is bounded by two major rivers, the river Hugli (west) and Muriganga (east), and southern part is exposed to the Bay of Bengal.

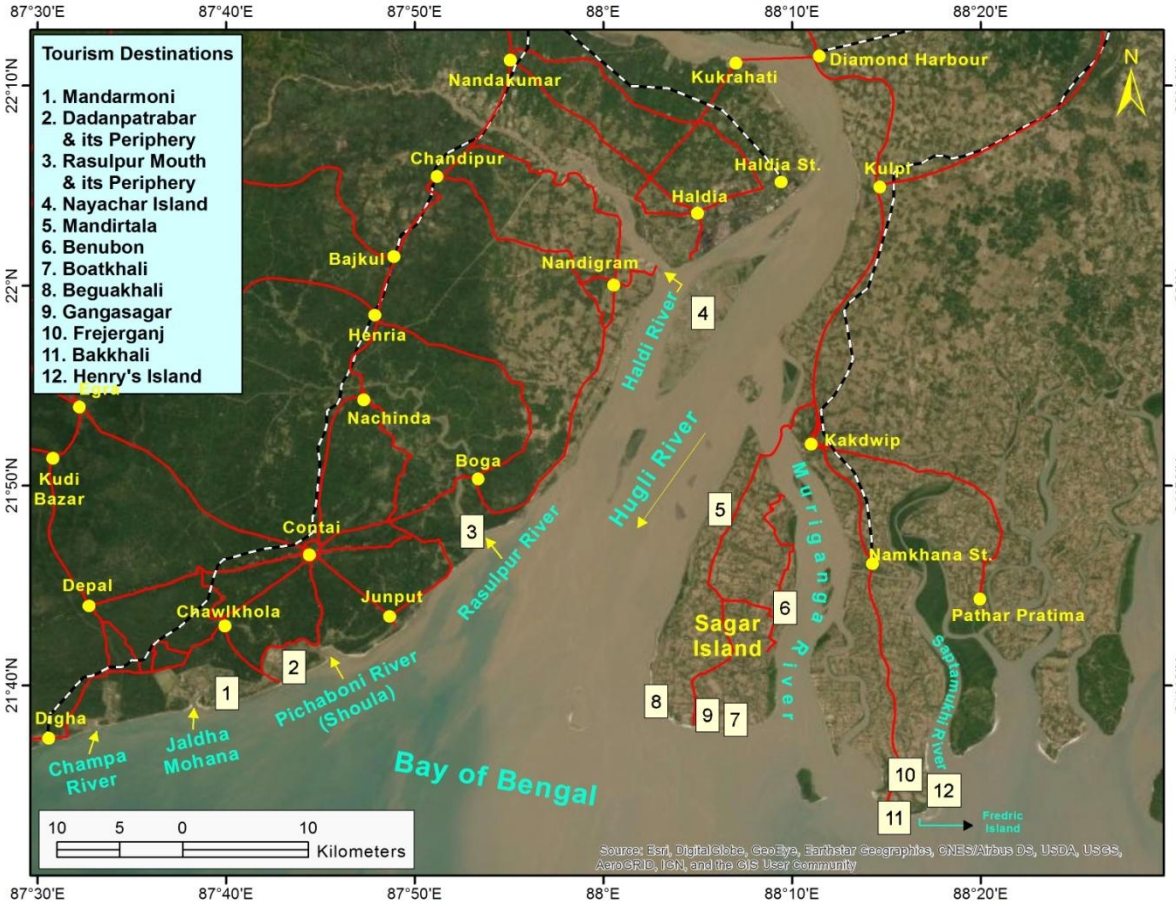

Fig. 1.13: Road network map of the study area.

Anyone can arrive at Gangasagar from Kolkata by road and railway (Fig. 1.13). But there have no direct link for its island location and three steps of break of journey are required to reach Gangasagar following the NH 6 and SH 79 up to Harwood Point near Kakdwip where ferry service is available for crossing the Muriganga river to reach Kachuberiya (the northern tip of the island). From Kachuberiya, bus service is available up to Gangasagar. This tourism site has been popular across ages but its accessibility is not improved significantly. The prime hindrance has been the island location and hindrance of accessibility. Gangasagar has become a religious spot with the association of *Kapil Muni*, a Hindu philosopher and advocate of *Samkha* philosophy who worshiped here as a deity in the *Kapil Muni temple*. It is a customary ritual among the Hindus to take a holy dip in the Ganges on the day of *Makar Sankranti*.

1.10.11 Frejerganj

Frejerganj is situated about 3 km distance from Bakkhali (Fig. 1.12). It is well connected from Bakkhali by bus and cycle van but the best option is to walk along the beach. The beach between Bakkhali and Frejerganj is calm and quiet. There are several fishing villages and the tourists are likely to come across fishermen mending their boats and nets, with their children playing in the beach. The main landmark of the Frejerganj beach is the towering wind mills. Frejerganj is a hub of fishing activities and houses a large harbour. Hundred of fishing boats of all possible shape and size, line up in the harbour. It is a place of fanatic activities with fishes being unloaded and packed with ice. It is an ideal place to enjoy the beach alone, but be prepared for rough ride and wadding through knee deep water.

1.10.12 Bakkhali

Bakkhali is the seaside resort in South 24 Parganas district of West Bengal, India (Fig. 1.12). It is located on one of the many deltaic islands spread across southern Bengal. Most of the islands are the part of the Sundarban, barring a few at the fringes. Some of these are joined together with bridges over narrow creeks. This place comes one of best sea beaches in India. In every year, many tourists are travelling here. In weekend, the tourists' number is increasing. Bakkhali is unique in many ways. The windmills in Frejerganj serve as a power generating location. The rickshaw van is the only form of local transport. Fishing is the primary occupation of the people. Agriculture is almost absent because of the extreme salinity of adjacent sea which inundates the land heavily, affecting the fertility of the land. Jambu-dwip and Lothian are two nearby forested islands.

1.10.13 Henry's Island

Henry's Island is located near Bakkhali in South 24 Parganas, India (Fig. 1.12). It is about 130 km from Kolkata. It has become one of the most popular beaches adjoining the Sundarban. Under the supervision of the Fisheries department of the Government of West Bengal, about 1.00 km^2 area is being used for fishery along with forest conservation. The wide and flat beach adorned with silvery sands is the prime attraction of that place. There is a watch tower which offers a complete panoramic view of the entire island from its top. The island is the nesting ground to millions of red crabs. The nearby attractions of the Henry's Island are Bakkhali, Frejerganj, Jambudwip. Tourists can take a stroll on the beach and enjoy the sunset and watch the fishing boats sailing in far offshore region. It is a nice experience to see them to catch fishes. Tourists can also buy the fresh from them at reasonable prices. Henry's Island has recently earned reputation as a bird watching site. Some of the birds sighted at Henry's Island are Lesser Whistling Ducks, Eurasian Wigeon, Gadwall, Streak-throated Woodpecker, Black-Rumped Flameback, Kingfisher, Common Snipe, Ruddy Turnstone, Red Knot and others are very mesmerized for the tourists.

1.11 Consequences

The sensitive coastal habitats of a few destinations (e.g. Frejerganj, Bakkhali and Gangasagar) are partially affected by tourism infrastructural development. Economically, on the other hand many local people have participated in the tourism process in the destinations by supplying foods, sailing goods, operating tours and travels. Conservation and management policies are adopted by the local administration to restore the habitats. The drinking water supply by extraction of ground water by the emerging number of hotels may invite several problems in the near future.