Mapping the Districts of West Bengal using Geospatial Technology

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Article Info

Abstract

*The Partition of Bengal in 1947 divided the British Indian province of Bengal based on the Radcliffe Line between India and Pakistan. The Hindu dominated West Bengal became a province of India, and the Muslim dominated East Bengal (now Bangladesh) became a province of Pakistan. The Indian state of West Bengal borders with Nepal, Bhutan, Bangladesh and the Indian states of Bihar, Jharkhand, Odissa, Assam and Sikkim. The Himalayas lie in the north and the Bay of Bengal in the south. In between flows the Ganga eastwards and its main distributary, the Bhagirathi flows south to reach the Bay of Bengal. The Siliguri Corridor (or the Chicken Neck of West Bengal) that connects North-East India with the rest of the country lies in the North Bengal region of the state. Geographically, the state of West Bengal is divided into a variety of regions, viz. Darjeeling Himalaya*S*, Terai*,* Dooars, North Bengal plains, Rarh, Western plateau and high lands, coastal plains, Sunderbans and the Ganga Delta. The States Reorganization Act, 1956 was a major reform of the boundaries of India's states and territories, organizing them along linguistic lines. Since then, the district map of West Bengal has changed several times. Larger districts have been divided creating new districts for the purpose of better administration, accessibility and connectivity. The basis of such reforms did not always maintain the historic legacy, geographical perspective and social attributes. The current study actually focuses on the changing 'district map' of West Bengal to highlight the processes of district delineation as decided, notified and executed for better administration and development.*

Introduction

West Bengal, a state of India with capital at Kolkata (Calcutta) is located in the eastern part of the country and bounded to the north by the state of Sikkim and the country of Bhutan, to the northeast by the state of Assam, to the east by the country of Bangladesh, to the south by the Bay of Bengal, to the southwest by the state of Odisha, to the west by the states of Jharkhand and Bihar, and to the northwest by the country of Nepal. With a population of about 91.3 million and a density of 1029/km^2, it is the 7th largest Indian state. The geographical extension of the state lies between are 21° 25' N to 27° 13'N latitudes and 88° 50'E to 89° 50'E longitudes. It has a peculiar configuration with breadth varying between 320 km at one point to hardly 16 km at another. Its roughly 2,200 km

frontier with Bangladesh, neither natural nor well defined, is of strategic importance. With an area of 88,752 km^2, it is the only Indian state that extends from the Himalayas in the north to the Bay of Bengal in the south and has diverse weather conditions, soil categories and forest coverage.

The state may be broadly divided into two natural geographic divisions the Gangetic Plain in the south and the sub-Himalayan and Himalayan area in the north. The Gangetic Plain contains fertile alluvial soil deposited by the Ganges and its tributaries and distributaries. It also contains numerous marshes and shallow waterbodies formed out of palaeochannels. Its sub-divisions are New Alluvium Plains, Sundarban and the Digha Coastal region. The elevation of the plain increases slowly westward in the Rahr and the Western

plateau. The sub-Himalayan tract, known as the Western Duars is a part of the Terai lowland belt between the Himalayas and the plains. Once infested with malaria, the area is now well drained and cultivated. Some of the finest tea plantations of India are situated there. North of the Duars, the Himalayan mountain ranges rise abruptly along the northern boundary of the state in Darjeeling. The state is drained by rivers like Teesta, Torsa, Mahananda, Bhagirathi-Hooghly, Ajay, Mayurakshi, Damodar, Gandeshwari, Shilabati, Rupnarayan and their numerous tributaries. It enjoys a climate transitional between tropical wet-dry in the southern part and humid subtropical in the north. Due to its more longitudinal extension and pronounced variation in altitudes, there is a pronounced seasonal as well as spatial disparity in rainfall. Four well-marked seasons are hot weather season (March May) with dry sultry period and frequent thunderstorms, south west monsoon season (June - September) with frequent wet spells and floods, retreating monsoon season (October November) with autumn cool weather and western disturbances and cold weather season (December February) with dry, cold, foggy morning and clear skies.Forests occupy more than one-tenth of the total land area of the state, and the region as a whole has a rich and varied plant life. In the sub-Himalayan plains the principal forest trees include sal (*Shorea robusta*) and shisham, or Indian rosewood (*Dalbergia sissoo*); the forests are interspersed with reeds and tall grasses. On the Himalayan heights vegetation varies according to the elevation, with coniferous belts occurring at higher levels. The delta of the Hugli constitutes the western end of the dense coastal mangrove forest called the Sundarbans, the UNESCO World Heritage site (1987). It is inhabited by tigers, leopards, elephants, gaurs (wild cattle), and rhinoceroses, as well as a variety of reptiles and birds.

The majority of people live in rural villages. Of those living in urban areas, more than half reside in greater Kolkata. The dominant religious group is the Hindu, followed by the Muslim, Buddhists, Christians, Jains and Sikhs. Bengali is the main language, followed by Hindi, Santali, Urdu, Nepali and Kurukh. English, together with Bengali, is the language of administration while English and Hindi serve as lingua francas at the national level. Agriculture dominates both the landscape and the economy of West Bengal. Rice is the dominant crop, followed by sugarcane, oilseeds, jute, mango, jackfruit, and banana. Wheat and potatoes are produced as winter crops while tea, oranges, apples, pineapples, ginger, and cardamom are cultivated in the northern Himalayan region. The western plateau fringe and the Damodar valley produces the coking coal and a number of metallic minerals. The Hooghly Industrial belt surrounding the Calcutta port was historically famous in jute, chemical, textiles, paper, automobile, ship-building and engineering industries including a number of cottage and small scale industries. Service sector accounts for an increasing proportion of the state's economy. Trade, finance, insurance, and related activities have grown significantly, and tourism has become increasingly important. Also experiencing growth has been the information technology sector. Kolkata is the financial centre for both the state and the eastern India. The state is well developed in transportation, communication, education and health sectors. It is also a culturally rich state since the Bengal renaissance.

Objectives

Maps describe in a visual or graphic format certain key features of the territory being examined. They are important tools and are indispensable to developers and planners and help to understand in a visual way important things about the surface of the Earth. To prepare accurate maps for future planning, application of modern geospatial technology is essential in order to understand the spatial nature of service facility, central place zone, buffer area of Govt. services, etc, maintaining the historic legacy, geographical perspective and social attributes.The aim of this analysis is to show the changing administrative map of West Bengal in the context of district reorganization with the help of modern Geospatial Technology.

Database and Methodology

Secondary data was obtained by reviewing past literatures, various report published by govt. and non-govt. sectors, census of India report etc. Primary data and information were gathered from ground truth verification (GTV) by Global Positioning System (GPS).

Data Particulars	Data Source
Maps	Survey of India Maps NATMO Maps Administrative Map of West Bengal Census of India Maps
Toposheet	SOI Toposheets
DEM	Bhuban Platform (http://bhuvan.nrsc.gov.in/bhuvan_links.php)

The data and information relating to the above have been collected for the period, 1956 2017 and accordingly, a set of maps have been prepared at the outset:

District Map of West Bengal (as on 1956),
District Map of West Bengal(as on 01.03.1986),
District Map of West Bengal (as on 01.04.1992),
District Map of West Bengal (as on 01.01.2002),
District Map of West Bengal (as on 25.06.2014),
District Map of West Bengal (as on 14.02.2017),
District Map of West Bengal (as on 04.04.2017) and
District Map of West Bengal (as on 07.04.2017).

The SOI Toposheets and administrative map have been converted into digital maps by scanning using software in order to provide a common scale to all data, maps and image has to be registered with each other. First, the Survey of India Toposheet has been geo-referenced using ArcGIS10.3.1software. For this, the Universal Traverse Mercator (UTM) has been selected as the projection system. After creating enough links a first order transformation has been used for registration with RMS error of 0.51 which is good for registration. For all kinds of GIS work, ArcGIS 10.3.1 has been used. After georeferencing the SOI toposheet, its softcopy image is opened in ArcGIS for display and finally used as the Base Map for on-screen digitization and accuracy assessment. Depending upon the characteristics of the feature, attributes have been defined such as district boundary, block

boundary etc. have been digitized as polygon. Attribute table has been attached with each of them. Finally we have prepared the year wise administrative maps of West Bengal.

Origin / Early History

The term 'Bengal' has been derived from the name of the ancient kingdom of 'Vanga, or Banga'. References to it is also found in early Sanskrit literature, but its early history is obscure until the 3rd Century BC, when it formed part of the vast empire of the Mauryan King, Ashoka the Great. In the 4th Century CE the region was absorbed into the Gupta empire of Samudra Gupta. Later it came under control of the Pala dynasty. From the beginning of the 13th to the mid-18th Century, when the British gained ascendancy, Bengal was under Muslim ruleat times under governors acknowledging the suzerainty of the Delhi Sultanate but mainly under independent rulers.

The British Period

In 1757, the British forces under Robert Clive defeated the Nawab (ruler) of Bengal, Sirāj al-Dawlah, in the Battle of Plassey. In 1765, the nominal Mughal emperor of northern India, Shah ʿĀlam II, granted to the British East India Company the *dīwānī* of Bengal, Bihar, and Orissa (now Odisha), i.e., the right to collect and administer the revenues of those areas. By the Regulating Act of 1773, Warren Hastings became the 1st British Governor General of Bengal. The British-controlled Government, centred at Calcutta (now Kolkata), was declared to be supreme: essentially, the Governor General of Bengal was the chief executive of British India. Thus, the Bengal Presidency, as the province was then known, had powers of superintendence over the other British Presidencies, those of Madras (now Chennai) and Bombay (now Mumbai).

Britain was not, however, the only European presence in Bengal. The town of Hugli, north of Calcutta, was the location of a Portuguese factory (trading post) until 1632; Hugli-Chinsura (Chunchura), the next town south, was the Dutch post until 1825; the next town, Shrirampur (Serampore), was the Danish post until 1845; and Chandernagore (Chandannagar) remained in French control until 1949. From 1834 Bengal's Governor General bore the title "Governor General of India," but in 1854 the post was relieved of the direct administration of Bengal, which was placed under a Lieutenant Governor. Thenceforward, the government of British India became distinct from that of Bengal.

In 1874 Assam was transferred from the charge of the Lieutenant Governor and placed under a separate Chief Commissioner. In 1905 the British determined that Bengal had become too unwieldy a charge for a single administration, and, in spite of violent Hindu protests, it was partitioned into two provinces, each under its own Lieutenant Governor: one comprised western Bengal, Bihar, and Orissa, while the other included eastern Bengal and Assam. In 1911, because of continued opposition to partition, Bengal was reunited under one Governor, Bihar and Orissa under a Lieutenant Governor, and Assam once more under a Chief Commissioner. At the same time, Delhi became the capital of India in place of Calcutta. Under the Government of India Act (1935), Bengal was constituted an autonomous province in 1937.

The Post-Independence Period

After India gained independence in 1947, the province of Bengal was partitioned along religious lines. The western part remained in India (and was named West Bengal) while the eastern part joined newly formed Pakistan as a province called East Pakistan (later giving rise to Bangladesh in 1971). At the time of its creation in 1947, the state of West Bengal was divided into 14 districts*, as follows:*

Bankura, Birbhum, Burdwan, Calcutta (Kolkata), Darjeeling, Jalpaiguri, Hooghly, Howrah, Malda, Midnapore, Murshidabad, Nadia, West Dinajpur and 24 Parganas.

1) Formation of the district of West Dinajpur

The partition of Bengal left West Bengal with an ill-defined boundary describing a disjointed shape. The district of Dinajpur has been divided into two parts one part named West Dinajpur has been included in the state of West Bengal in India vide Notification No. 66GA dated 17.08.1947 u/s 7(2) of Cr.P.C. 1898 Act V, and the other part remained as Dinajpur in East Pakistan (now Bangladesh).

2) Formation of the district of Nadia

Similarly, the old Nadia district was also divided into two parts, one each falling under India and East Pakistan. A new district, named Nabadweep was formed with as many as 13 Police Stations vide Notification No. 58GA dated 17.08.1947. Subsequently, vide Notification No. 546 GA dated 23.02.1948, the name of the district of 'Nabadweep' was substituted by the name 'Nadia'.

3) Formation of the district of 24 Parganas

In August, 1947, three more Police Stations, viz., Bagdaha, Gopalnagar and Gaighata of the Bongaon Sub-division of Jessore district was added to the 24 Parganas district vide Ciril Radcliff's award dated 12.08.1947.

4) Formation of the district of Cooch Behar

The Princely state of Cooch Behar has been ceded to the Dominion Govt (GoI) vide Cooch Behar Merger Agreement contracted between His Highness, The Maharaja of Cooch Behar and the Governor General of India on 28.08.1949. Later Cooch Behar was declared a district of the state of West Bengal w.e.f. 01.01.1950 vide Notification No. 3509 GA dated 01.01.1950 regarding the Constitution of the Chief Commissioner's Province of Cooch Behar into a district of West Bengal.

5) Merger of Chandernagore

The French conclave, Chandernagore, which was earlier part of the French India, had voted to join India in a plebiscite in 1949. Formally, it joined India in 1952 and finally became a part of the Hooghly district of West Bengal on 2 October 1954 vide Chandernagore (Marger) Act, 1954.

6) Formation of the 'Chicken Neck'

Similarly, under the same provisions (Act), Chopra P.S. of Thakurganj and Chopra in the Kishanganj Sub-division of the Purnea district in the state of Bihar and included in the district of Darjeeling w.e.f. 01.11.1956 vide Notification No. 3895 GA on the even day. Further, Islampur and Goalpokhar P.S. in the Kishanganj Sub-division and Karandighi P.S. in the Katihar Sub-division of the Purnea district in the state of Bihar have also been included in the district of Darjeeling (West Bengal) w.e.f. 01.11.1956 vide Notification No. 3806 and 3861 GA on the even day. Later this area was transferred to West Dinajur and again transferred to Darjeeling district.

Finally, as many as 12 villages of Thakurganj P.S. which lies in the north of Mahananda river were retained in Darjeeling district and the remaining portions comprising Goalpokhar, Chopra, Islampur, and Karandighi P.S. Was transferred to the newly formed Islampur Sub-division of West Dinajpur district.

7) Formation of the district of Puruliya

By Regulation XVIIII of 1805, the British East India Company formed a Jungle Mahals district comprising 23 Parganas and Mahals including the present Purulia. By Regulation XIII of 1833, it was broken up and a new district called Manbhum was constituted with headquarters at Manbazar. The district was very large in size and included parts of Bankura and Bardhaman districts of present West Bengal state and Dhanbad, Dhalbhum and Seraikela-Kharswan districts of present Jharkhand state. In 1838 the district headquarters was transferred from Manbazar to Purulia. Since the formation of the district it was withdrawn from regular administration and placed under an officer called Principal Assistant to the agent to the Governor-General for South-Western Frontier. The title of the officer Principal Agent was later changed to Deputy Commissioner by Act XX of 1854. Finally in 1956 Manbhum district was partitioned between Bihar and West Bengal under the States Reorganization Act and the Bihar and West Bengal (Transfer of Territories) Act 1956 and the present Purulia district was born on 1 November 1956.

Hence, the state of West Bengal comprises 16 districts, viz., ***Darjeeling, Jalpaiguri, Cooch Behar, West Dinajpur, Maldah, Murshidabad, Birbhum, Nadia, Burdwan, Purulia, Bankura, Midnapore, Howrah, Hooghly, 24 Parganas, and Calcutta*** (N = 16).

8) The district composure of the State of West Bengal remained almost same till 1981. Since then the following changes took place :

1. In 1981, spellings of names of 8 districts have been modified as Koch Bihar, Darjiling, Haora, Puruliya, Hugli, Medinipur, Bardhaman, and Maldah. At the same time, sixteen villages of Farakka PS of Murshidabad district has been transferred to Kaliachak PS of Malda vide Notification No.10118 PI/PB/4P-9/81 dated 10.11.1982.

2. Vide GoWB Judicial Department Notification No. 4302-J dated 27.02.1986, the district of 24 Parganas was bifurcated into two: North 24 Parganas (HQ = Barasat) and South 24 Parganas (HQ = Alipore / Baruipur) (N = 17).

3. Vide Notification No. 177 LR/6M - & / 92 dated 28.02.1992, the West Dinajpur district was bifurcated into Uttar Dinajpur (HQ = Raiganj) and Dakshin Dinajpur (HQ = Balurghat) (N = 18).

4. With effect from 01.01.2001, Calcutta has been changed to Kolkata vide Calcutta Gazette Notification No. 376 Home (Cons) dated 27.12.2000.

5. As per the Bengal District Act, 1836 (21) and 1864 (Ben. Act IV) and Sub-section 2 of CrPC, 1973, the Medinipur district was bifurcated into Purba Medinipur (HQ = Tamluk) and Paschim Medinipur (HQ = Medinipur) districts w.e.f. 01.01.2002 (N = 19).

6. As per the Bengal District Act, 1836 (21) and 1864 (Ben. Act IV) and Sub-section 2 of CrPC, 1973, the Jalpaiguri district of West Bengal was bifurcated into Jalpaiguri (HQ = Jalpaiguri) and Alipurduar (HQ = Alipurduar) districts w.e.f. 25.06.2014 (N = 20).

7. As per the Bengal District Act, 1836 (21) and 1864 (Ben. Act IV) and Sub-section 2 of CrPC, 1973, the Darjeeling district was bifurcated into Darjeeling (HQ = Darjeeling) and Kalimpong (HQ = Kalimpong) districts w.e.f. 14.02.2017 vide Notification No. 35-PAR(AR)/O/2R-2/16 dated 07.02.2017 (N = 21).

8. As per the Bengal District Act, 1836 (21) and 1864 (Ben. Act IV) and Sub-section 2 of CrPC, 1973, the Paschim Medinipur district was bifurcated into Paschim Medinipur (HQ = Medinipur) and Jhargram (HQ = Jhargram) districts w.e.f. 07.04.2017 vide Notification No. 79-PAR(AR)/O/2R-1/2011 dated 20.03.2017 (N = 22).

9. As per the Bengal District Act, 1836 (21) and 1864 (Ben. Act IV) and Sub-section 2 of CrPC, 1973, the Bardhaman district was bifurcated into Purba Burdhaman (HQ = Bardhaman) and Paschim Bardhaman (HQ = Asansol) districts w.e.f. 07.04.2017 vide Notification No. 80-PAR(AR)/O/2R-3/12 dated 24.03.2017 (N = 23).

Observations

West Bengal Government has approved proposal for formation of two more districts in the state, viz. Sudarban and Bashirhat from the existing North and South 24 Parganas. With this the total number of districts of Bengal will be 25. The sole aim is to build better connectivity, accessibility, administration and infrastructure base by modifying the shape of a district. Besides, it would create more posts and more jobs in offices. What is important is that while this is done, the factors of local geography should be considered in detail in order to make it more useful to the planners and administrators.

Sources of Information

All information of this article have been compiled from:
1) Govt. Reports (available in the internet)
2) wikipedia.org
3) quora.com
4) banglapedia.org
5) wb.gov.in, and
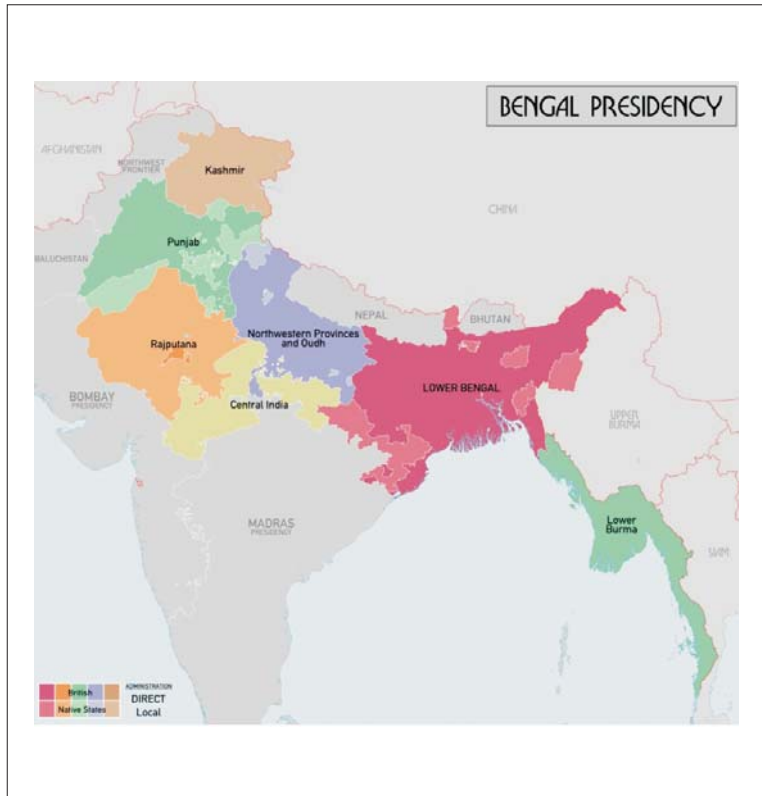6) britannica.com.

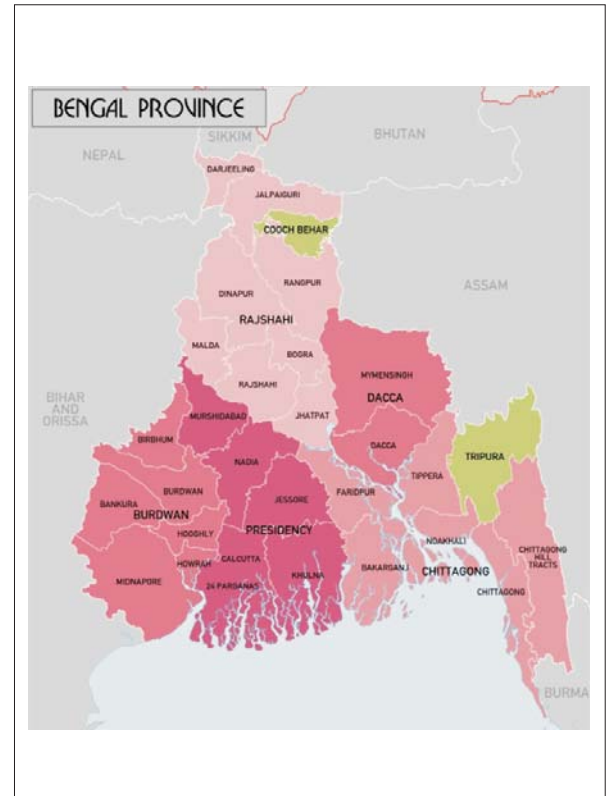Fig. 1: Bengal Presidency

Fig. 2: Bengal Province

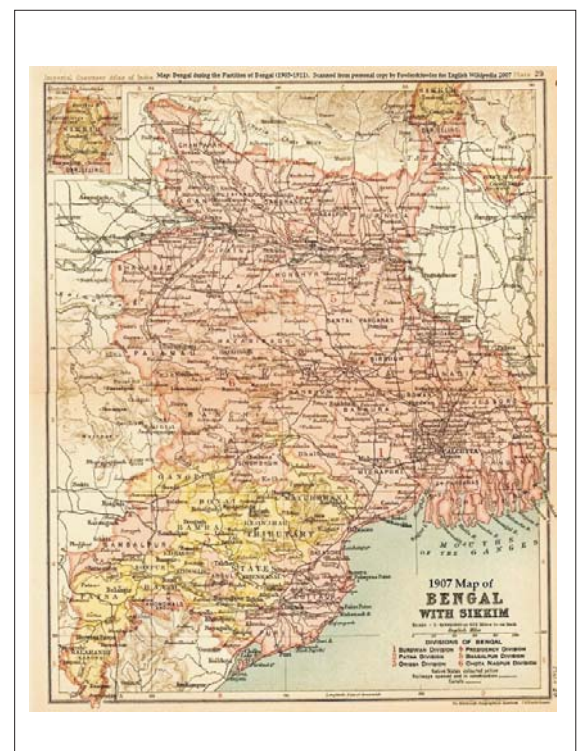Fig. 3: Partition of Bengal, 1905

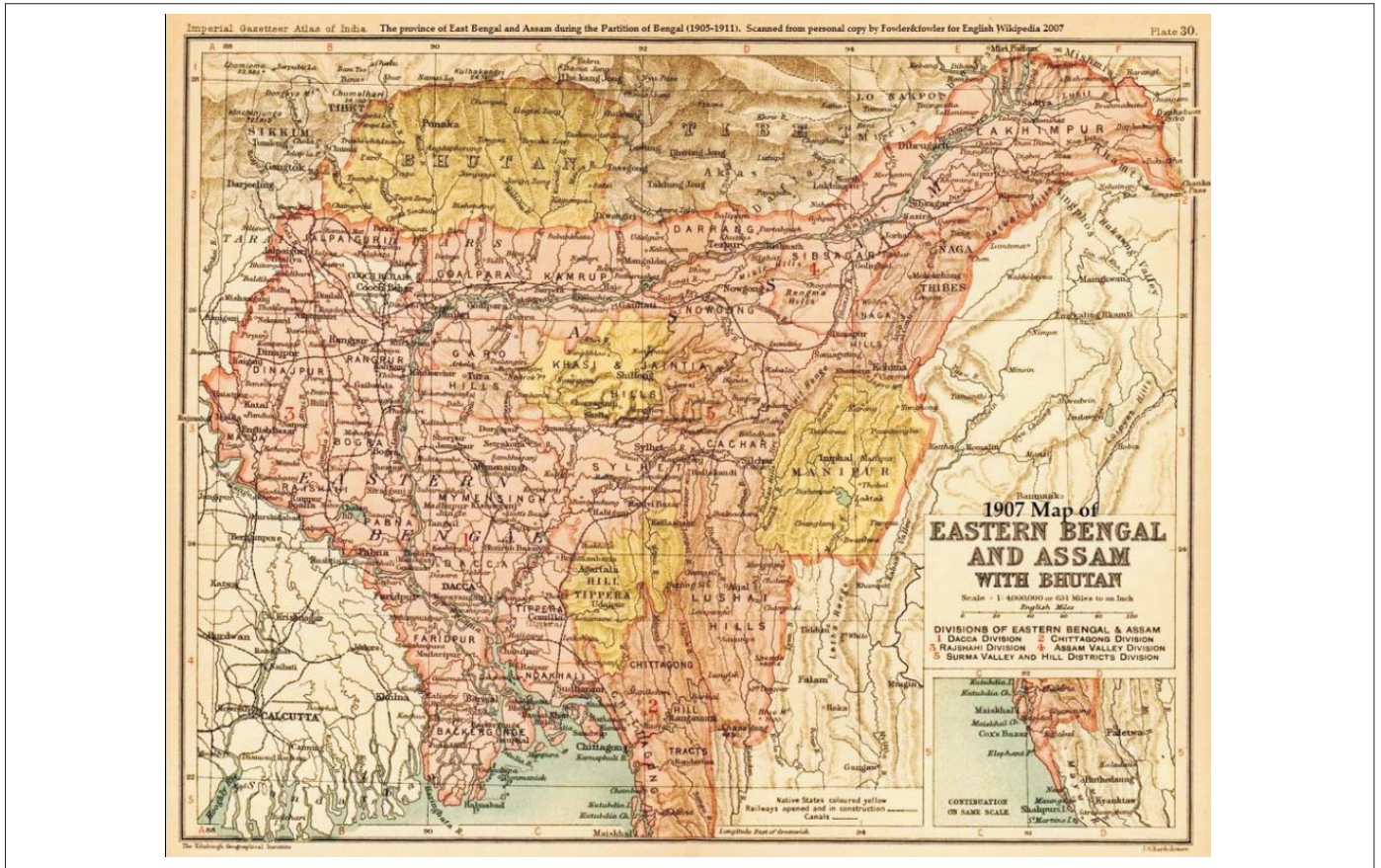Fig. 4: Bengal with Sikkim, 1907

Fig. 5: Eastern Bengal and Assam with Bhutan, 1907
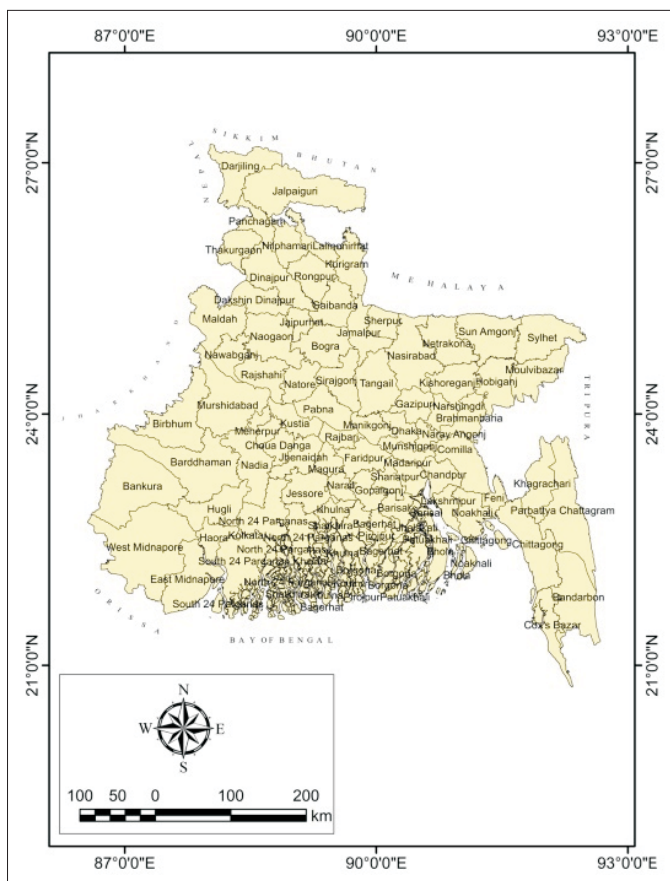

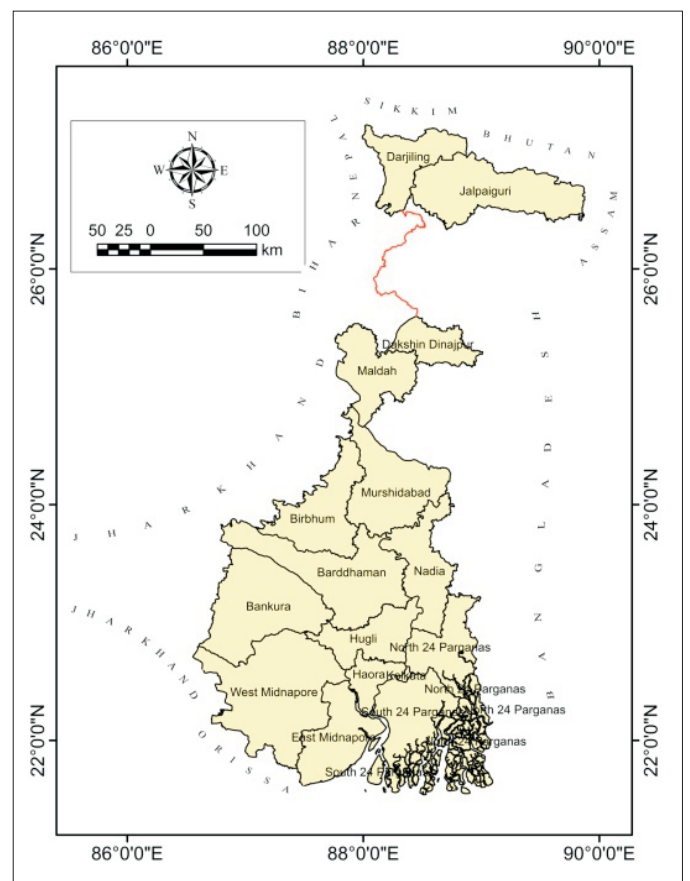Fig. 6: The Undivided Bengal

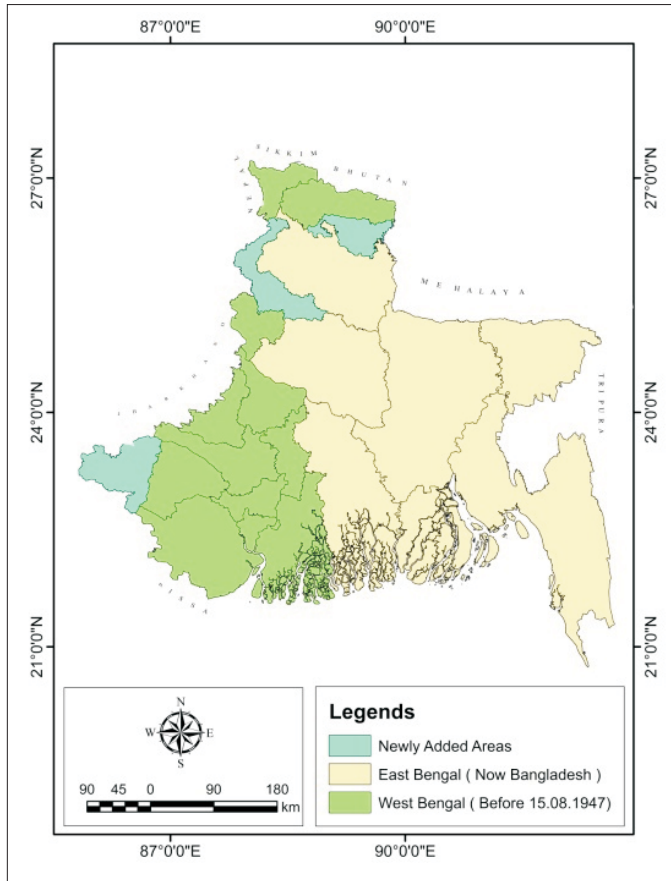Fig. 7: West Bengal as on August 15, 1947

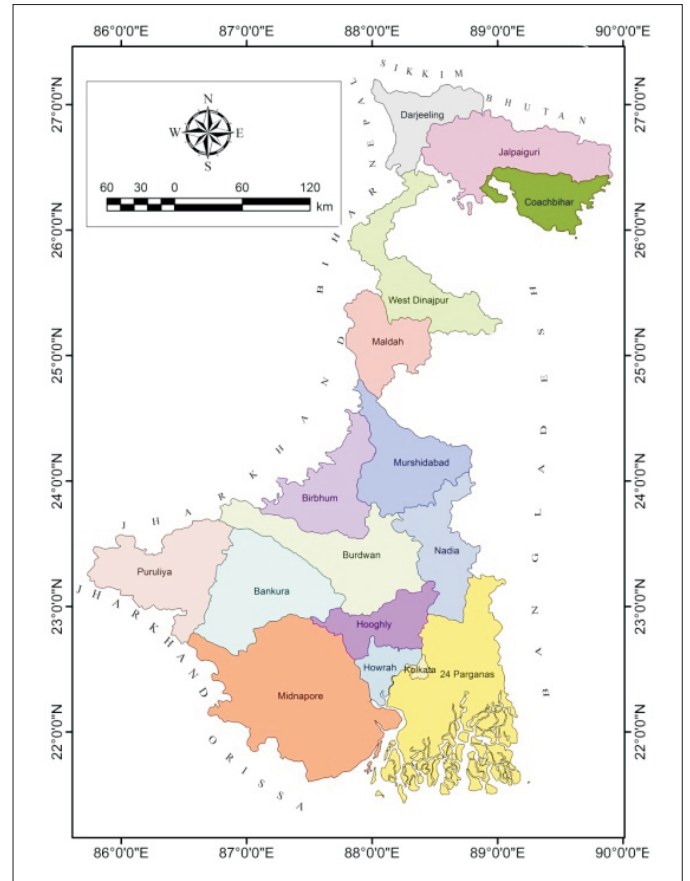Fig. 8: West Bengal after State Reorganization, 1956

Fig. 9: The District Map of West Bengal, 1956
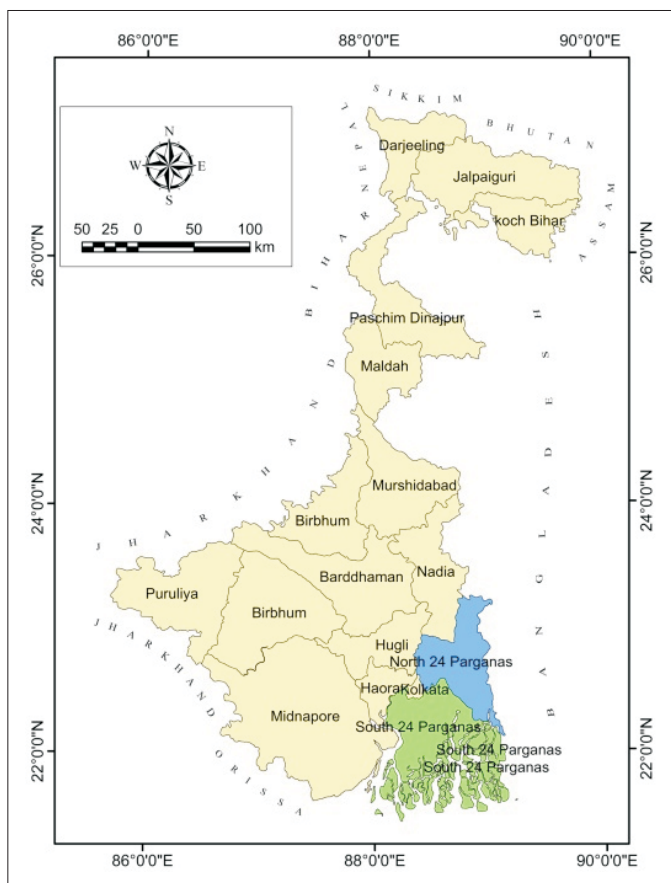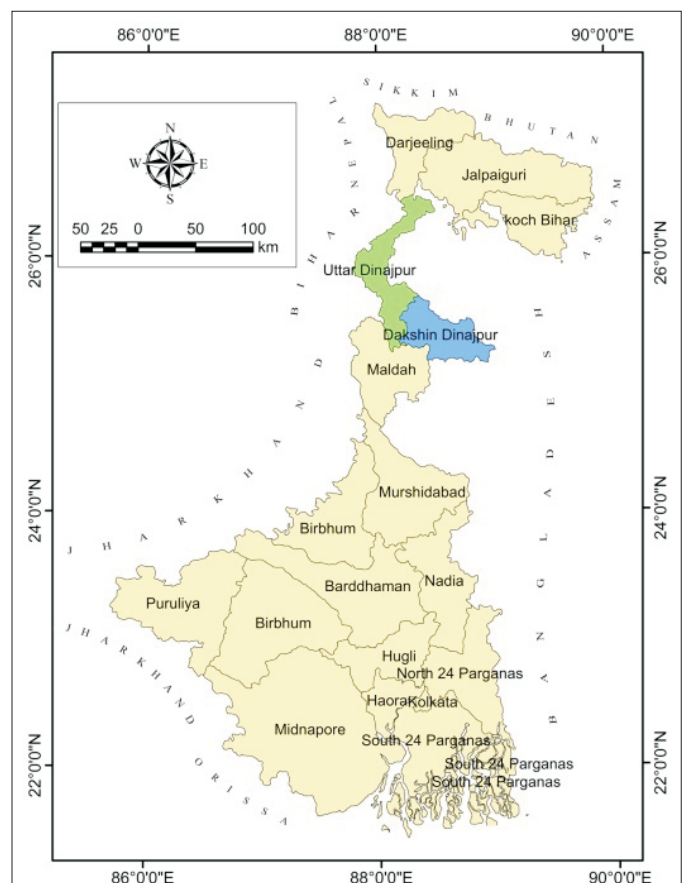

Fig. 10: West Bengal as on February 27, 1986
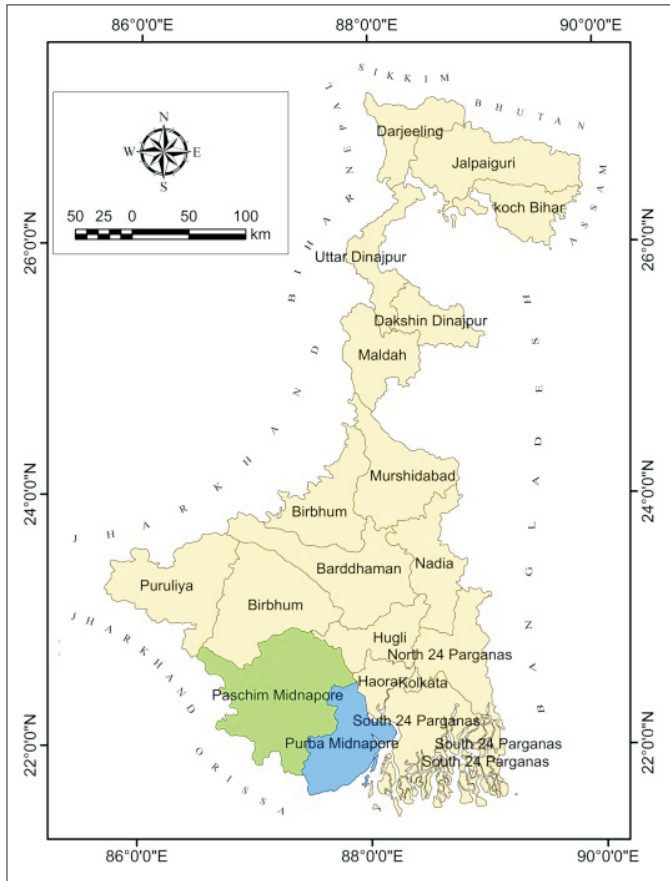

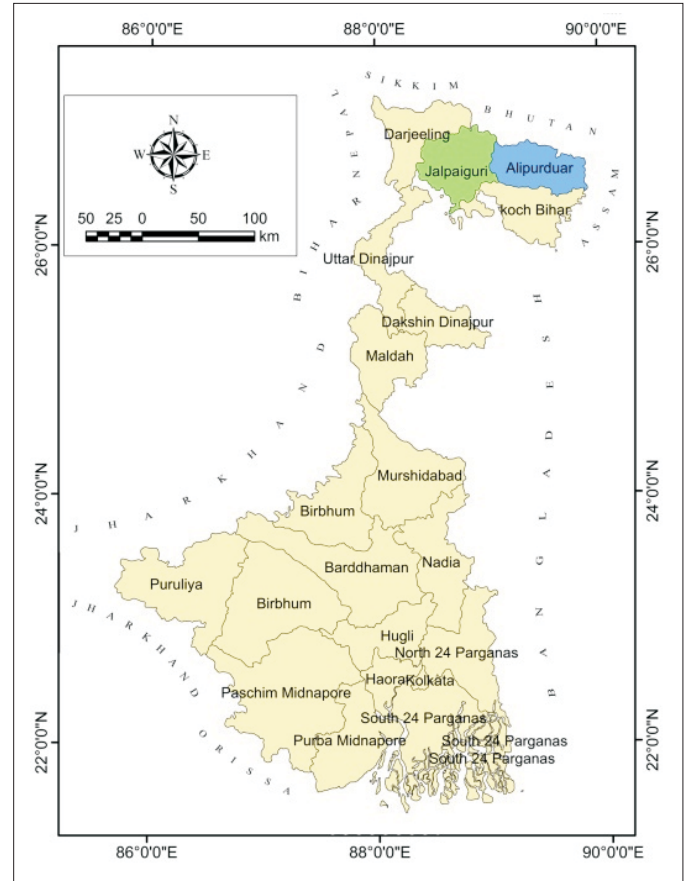Fig. 11: West Bengal as on February 28, 1992

Fig. 12. West Bengal as on January 01, 2002

Fig. 13. West Bengal as on June 25, 2014
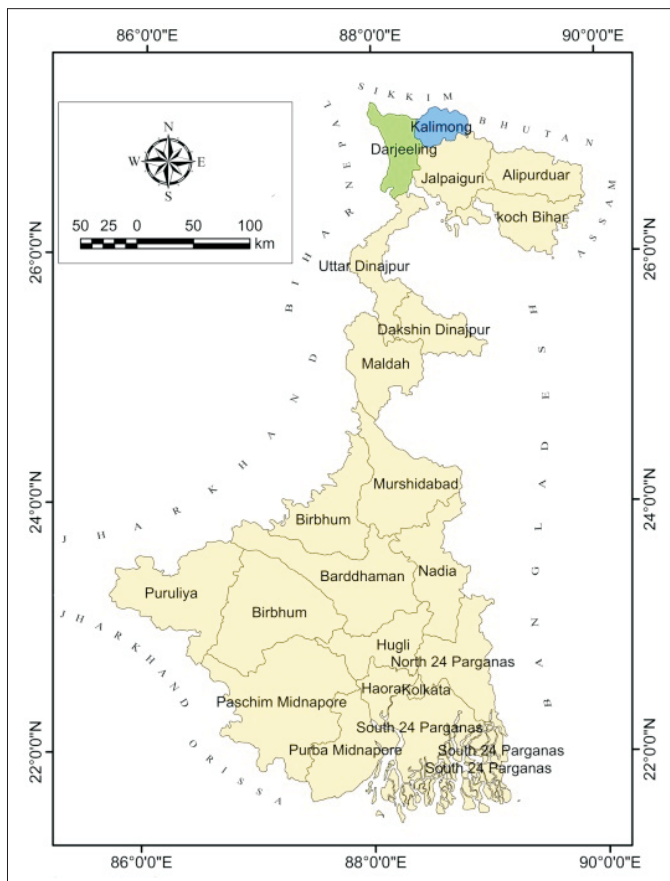
Fig. 14. West Bengal as on February 14, 2017
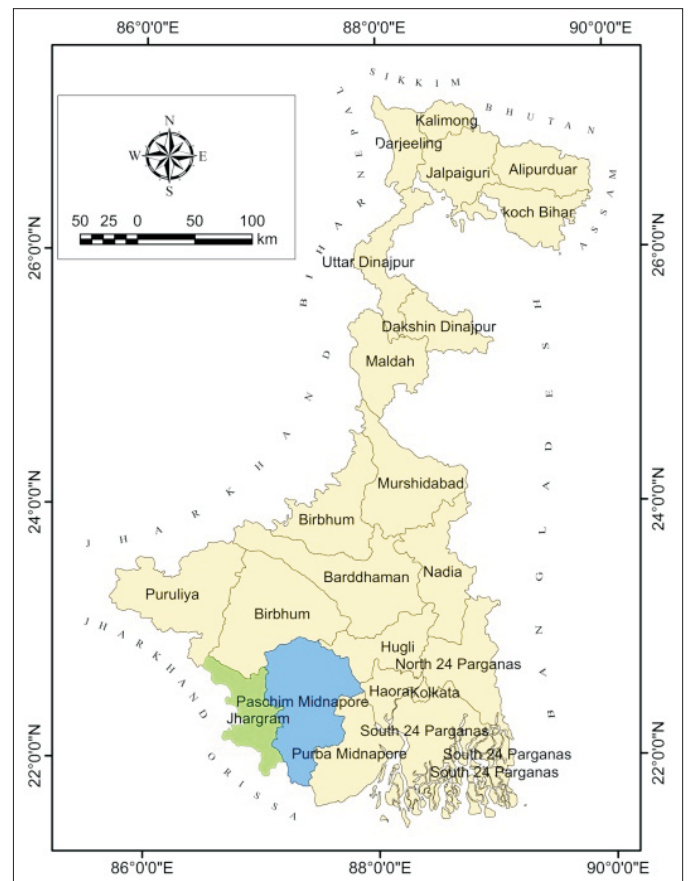
Fig. 15. West Bengal as on April 04, 2017
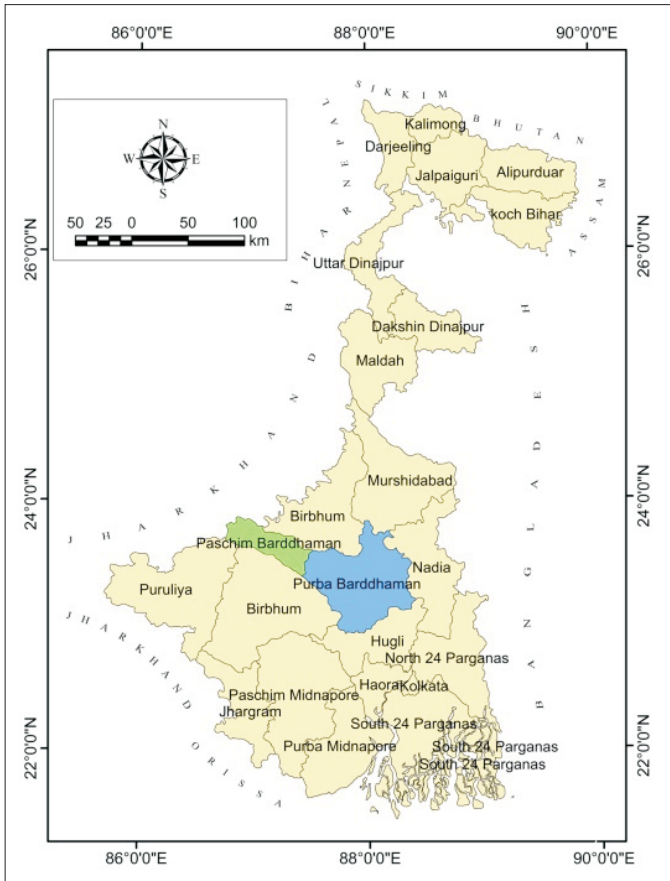
Fig. 16: West Bengal as on April 07, 2017
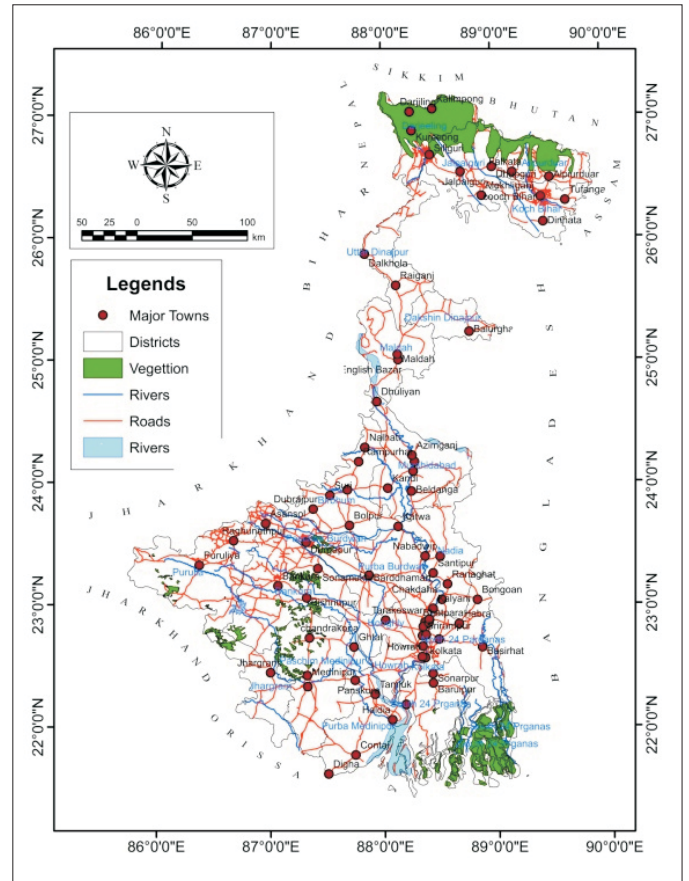
Fig. 17: West Bengal - rivers, forests, roads and towns
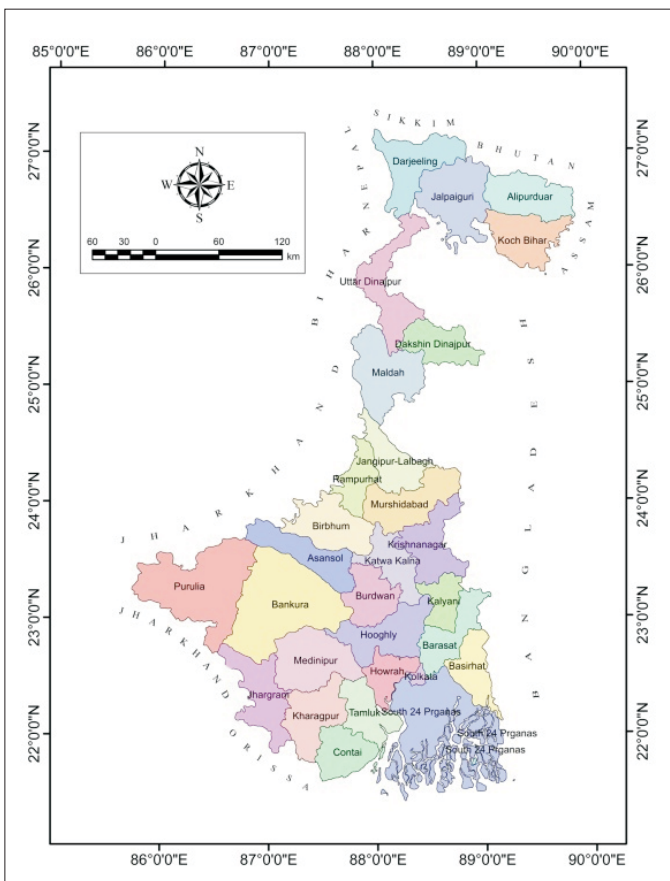
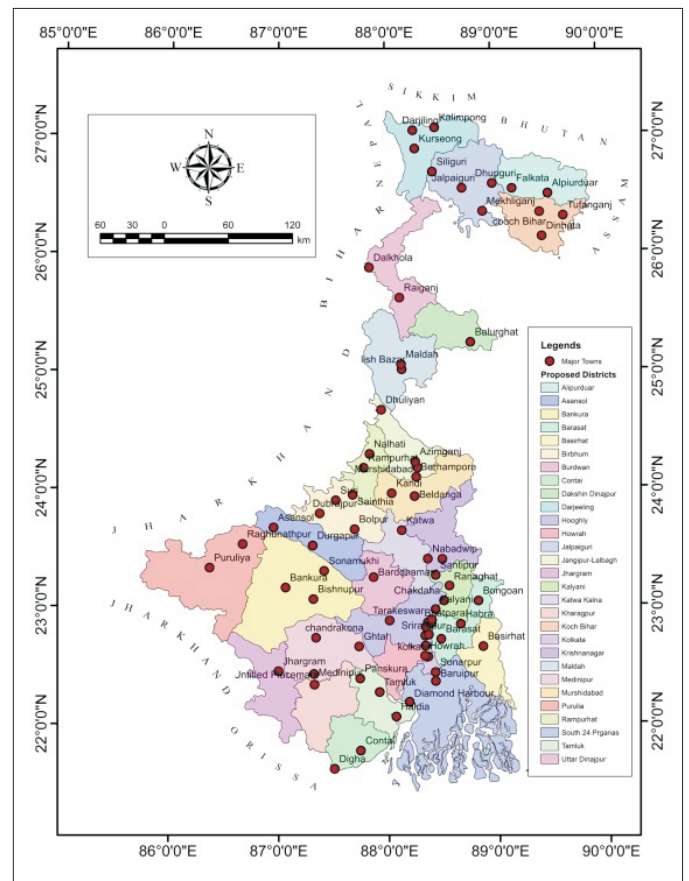Fig. 18: The District Map of West Bengal (after April, 2017)

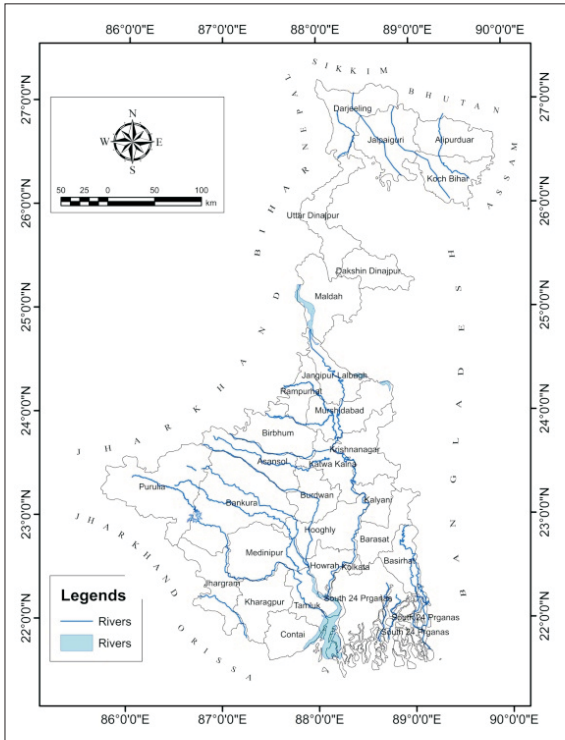Fig. 19: West Bengal Districts with Towns
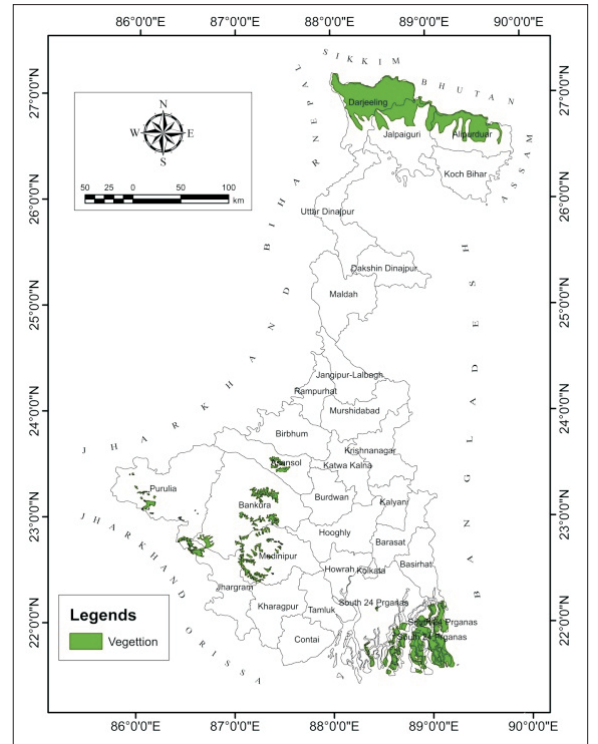
Fig. 20: Drainage Map of West Bengal
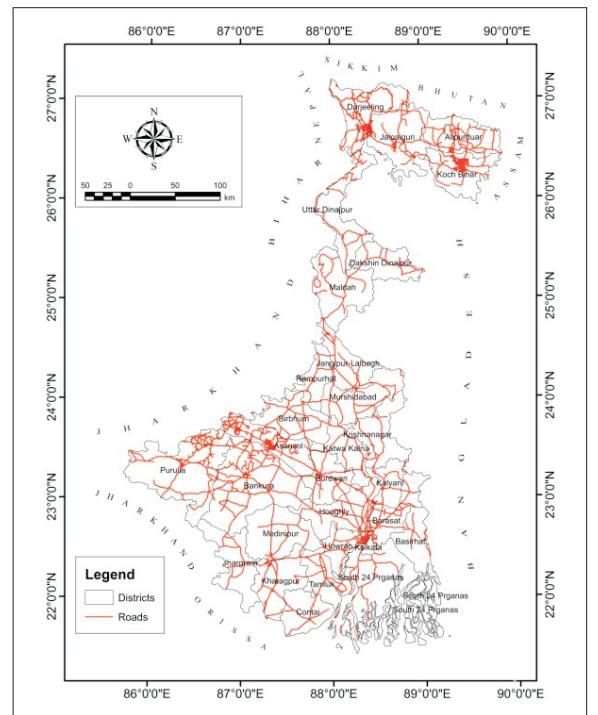

Fig. 21. Forest Map of West Bengal

Fig. 22: Transport Map of West Bengal

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