

CHAPTER - I

CHAPTER I

PHYSICAL LAYOUT OF WEST BENGAL IN RELATION TO TECHNOLOGY
ADOPTION IN AGRICULTURE

Agriculture is a process which is as old as human civilization and yet it is always in the process of transformation. But this dynamism, show a wide range of spatial variations which exist with the variations in science and technology. As technology adoption has to depend primarily on the available resources, such as terrain conditions for cropping pattern, drainage and rainfall for irrigation, soil for crop selection, a comprehensive analysis of these conditions which combinedly form the natural conditions has been essential. West Bengal is not an exception to this fact. Hence, an analysis of the general characteristics of the physical features in relation to agriculture is necessary for proper understanding. The chief elements of the natural conditions considered are : 1) topography 2) drainage 3) climate and 4) soil.

West Bengal is located in the tropical zone and lies between $21^{\circ}38'$ to $27^{\circ}10'$ North latitudes and $85^{\circ}50'$ to $89^{\circ}50'$ East longitudes. The State stretches from the picturesque Himalayas in the north to the Bay of Bengal in the south. It is a land of diversity.

The State has been divided into five physio-climato-edaphic regions where physical conditions together with climate and soil are homogenous in nature. These regions are -

- i) Hill zone
- ii) Terai zone
- iii) Plains of Bengal
- iv) Plateau region
- v) The coastal and deltaic plain.

WEST BENGAL

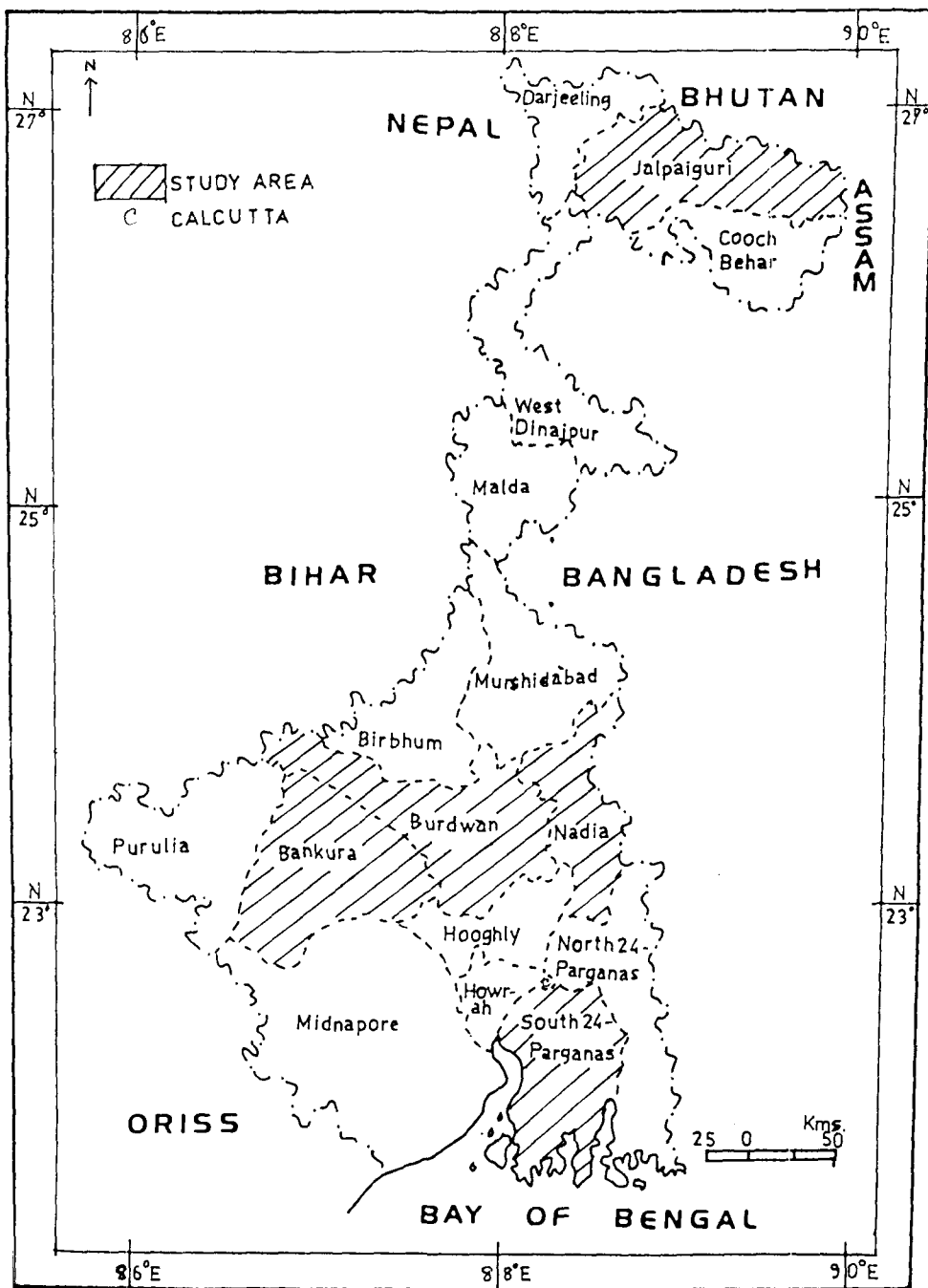


Fig - 1

PHYSIOGRAPHY

- (i) **Hill zone** - Here lies the great Himalayas range, where the landform is extremely uneven with high ridges and deep valleys. Some of these ridges are over 3000 mts. in height. The highest point is Sandakfu (3,630 mts.). The hills and valleys formed in the middle and outer Himalayas in Darjeeling district, constitute this region a tangled mass of hill country. This region having steep slopes, deep gorges cascades and water falls. The region is cut into two positions by the deep gorge of river Tista. The gorge runs north south. To its west are the hills of Darjeeling. The town of Darjeeling sprawls over the northern spur of Tiger hill, the town being mainly built over the western lee-ward side.
- (ii) **Terai Zone** - This region consisting of southern part of the Darjeeling district, the districts of Jalpaiguri, Coochbehar and the northern portions of West Dinajpur district. The region is morphologically less significant. It is neither composed of the alluvium nor the rocks of the hills. It has an average elevation of 250 ft. The tract extending to the east merges into the edge of the Buxa Duars. The Jainti hills form its hilly boundary. The northern piedmont plain and part of the alluvial plain form the terrain pattern of the Duars. The piedmont plain lies at the foothill region of the Himalayas and gradually merges into the rising uplands of Kalimpong and Bhutan. Though formed of alluvium, the Duars is not uniformly level but

PHYSICO-CLIMATO-EDAPHIC REGIONS

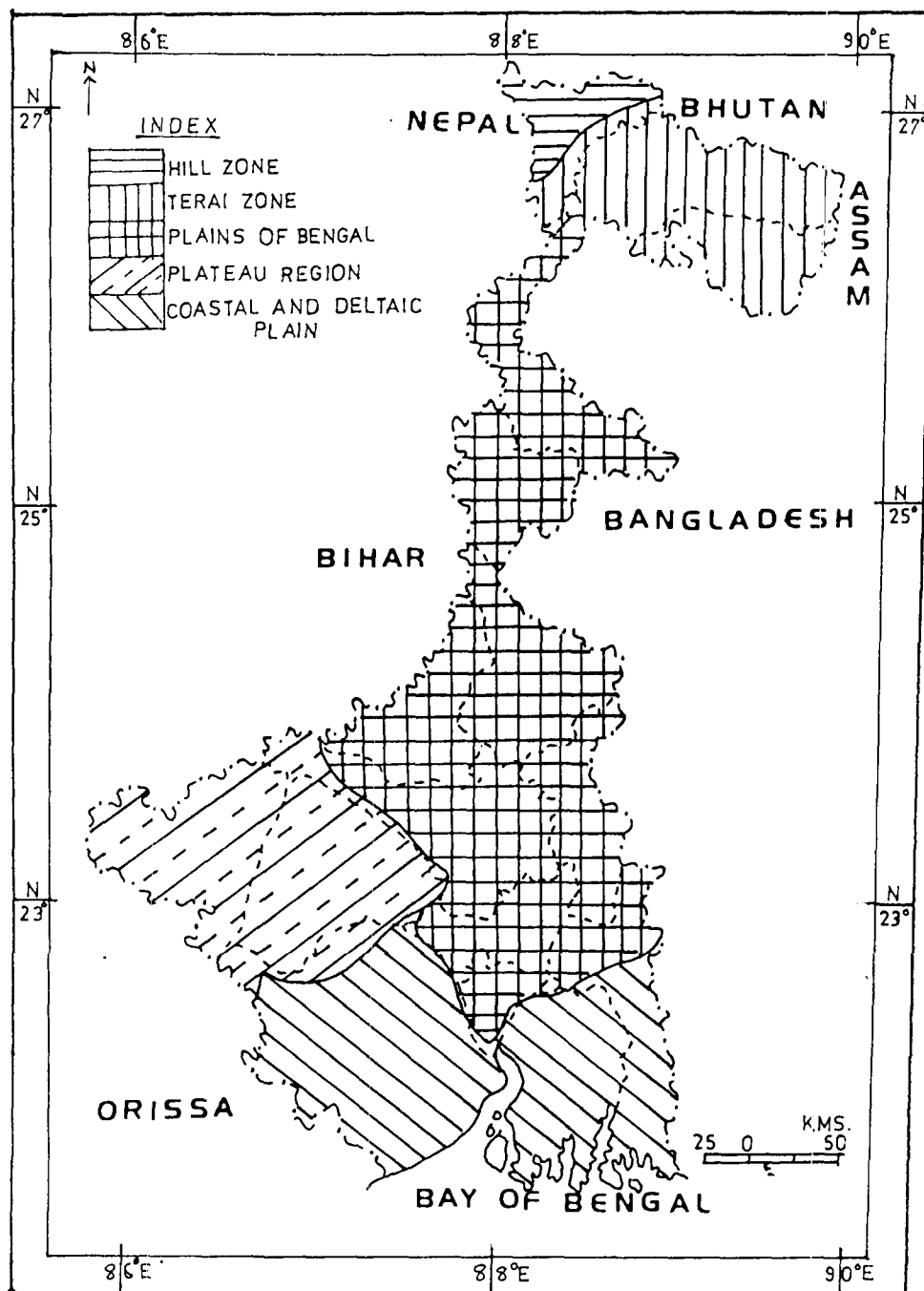


Fig - 2

has prominent swells here and there. The thickness of alluvium varies between 500-1000 ft. This region is ideal for tea plantation due to gentle gradient and soil conditions.

Plains of Bengal

Plains of Bengal have been formed of the alluvial deposits of different river, mainly flowing in the northern and southern parts of the State. Main contributions to this are from the Himalayan rivers comprising the Ganga, Bhagirathi and Hooghly river system for the north and the rivers of Damodar , Ajoy for the south. Plains of Bengal consist of the districts of West Dinajpur, Malda , Murshidabad, Birbhum Nadia, Burdwan, Hooghly, Howrah and parts of North 24-Parganas.

Along the western bank of river Ganga a belt of raised land has been formed by natural silting and it is called natural levees. Except this marshes and shallow depressions, which are usually known as bills, are found here. All over the plain contour height is low, it varies between 10 metres to 160 mts.

- (iv) **Plateau region** - Compared to the northern hills, the western plateau is relatively gentle. It is the continuation of the Chotonagplur plateau of the Central India. This region includes a small part of Burdwan, Bankura, Purulia and south west Midnapore. This region consists of rugged uplands consisting the districts of Bankura and Purulia lying in the western part

of the rivers Subarnarekha and the Kangsabati. This plateau region consists of broken hills, which rises upto 1483 ft. at Biharinath hill.

- (v) **The coastal and deltaic plain** - The districts of North and South 24 Parganas and the South east Midnapore district lie in this region. This is a typical coastal plain. The coastal plain is drained by the rivers of the Kasai, the Rupnarayan, the Subarnarekha, the Hooghly, the Thakuran, the Gosaba, the Herobhanga, the Raimangal, the Vidyadhari and the Matla. It is formed of an intricate network of tidal creeks and channels. There are many islands between them. Some of them are completely covered with dense mangrove forest, known as Sundarbans. Meanders, ox bow lakes are the characteristic features of delta plain.

Drainage

Though West Bengal is said to be a land of rivers, most of the rivers except the Ganga and those coming from the northern hills are ephemeral in character. Most of the northern rivers with the exception of the Mahananda are diverted to Bangladesh. The rivers of West Bengal may be broadly classified into three group, they are, namely, (i) the snowfed rivers of the north or Himalayas (ii) the torrential and rainfed rivers, which originate either from the low hills of Chotonagpur or the Santal Parganas and drain into the Bhagirathi Hooghly and (iii) the tidal rivers of the south east.

DRAINAGE MAP

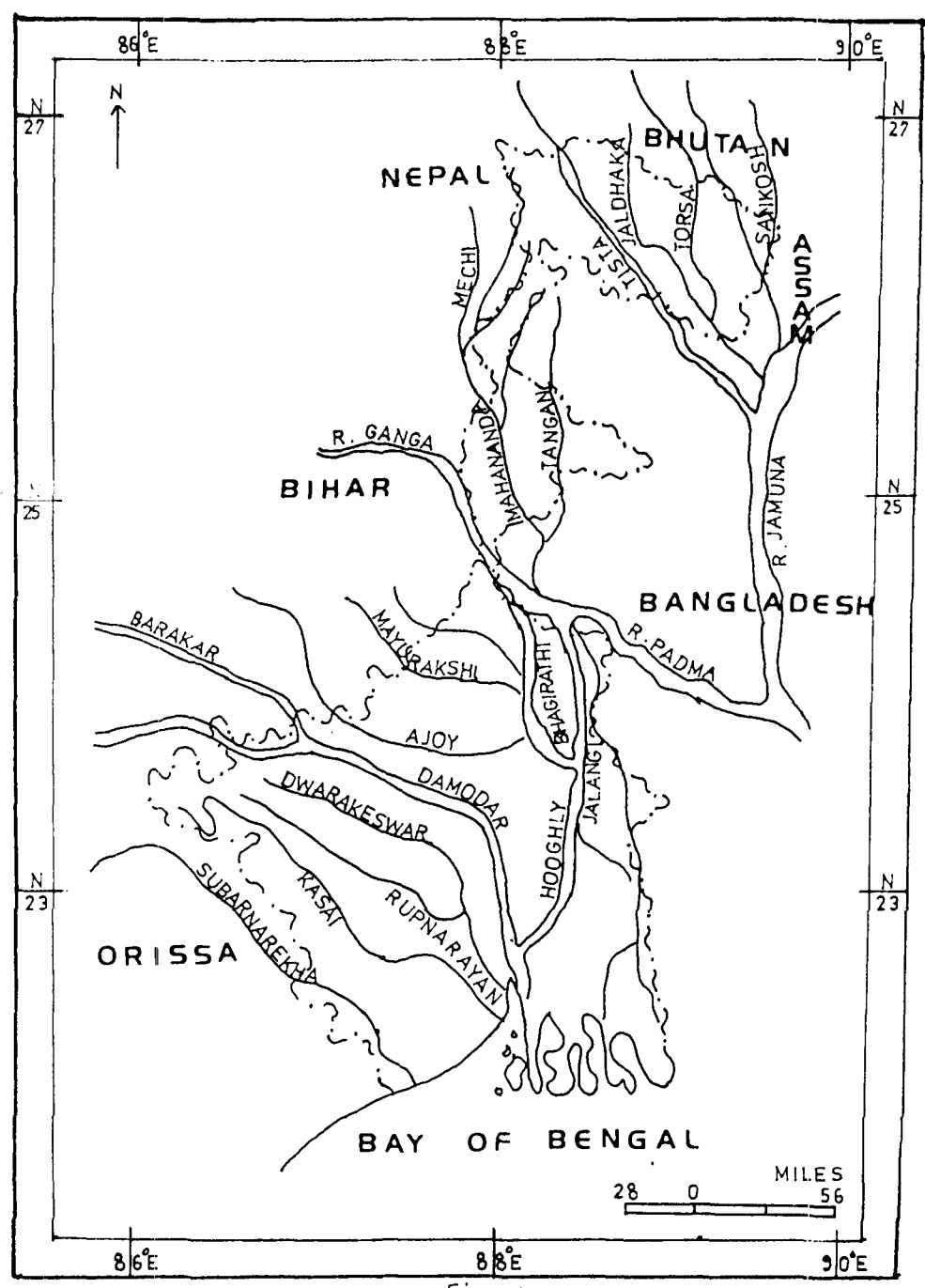


Fig - 3

- (i) **Snowfed rivers** - Among the snowfed rivers of the north, Tista, Mahananda, Jaldhaka, Torsha, Sankosh etc. influence the economic life of North Bengal to a considerable extent. The Tista and a few other rivers of the east flow into Brahamaputra. Darjeeling district is divided into two parts by the river Tista. A good number of hilly tributaries like Lish, Gish, Dharla and Karla join the Tista at Jalpaiguri district. Other important rivers of the north are, Mechi, Rongpo, Raidak, and Balason. The Ganga which actually originates from the Himalayas, after its long journey enters West Bengal at the south western boundary of Malda district. The Ganga throws a number of spill channels like Bhagirathi, Jalangi etc. The Bhagirathi is called the life line of Bengal. It is the main river of West Bengal.
- (ii) The rainfed or torrential river of the west are Dwarka, Mayurakshi, Kulu and Kana. These rivers originate from Santal Parganas and are torrential in nature. Ajoy, Damodar, Rupnarayan and Kangsabati originate from Chotonagpur Plateau. The Ajoy flows along the border of Birbhum. The Damodar flows through the districts of Burdwan, Hooghly and Howrah before it joins the Hooghly, Rupnarayan is a combined flow of river Dwarakeswar and Silai. The Kangsabati flows through Bankura and Midnapore. At the border of West Bengal and Orissa, the Subarnarekha river flows.
- (iii) The rivers of the south east are the distributory channels of the Ganga delta drainage network, but they are cut from

the parent streams because of heavy deposition of silt at their offtake points. As a result most of those rivers have become dead or drying channels. The rivers of this part of the State are, Matla, Gosaba, Piyali, Bidyadhari etc. Most of the low-lying plains in the south eastern part of the State are protected by embankments to save the settlements and agricultural fields from the periodic flooding.

Climate

Like terrain, the climate of the State has also been marked by the diversities of climate. West Bengal is influenced largely by its relative position to the eastern Himalayas and the Bay of Bengal. The State enjoys a typical tropical monsoonal climate. Agriculture in the State largely depends on the timely arrival of the monsoons.

In general, the winter is short and dry. It lasts only for three months, that is, December to February. North - eastern trade wind blows during this season with little rain. The average temperature of Darjeeling varies between 5°C to 10°C. Except the northern hilly tract of West Bengal the remaining regions enjoys cool climate. The average temperature varies between 15°C to 20°C.

Summer (March to May) is a major season of West Bengal. It occupies almost half of the year that is, from March to August including the rainy season. The average maximum temperature in the plains is attained in April and the highest maximum in May.

NORMAL ANNUAL RAINFALL

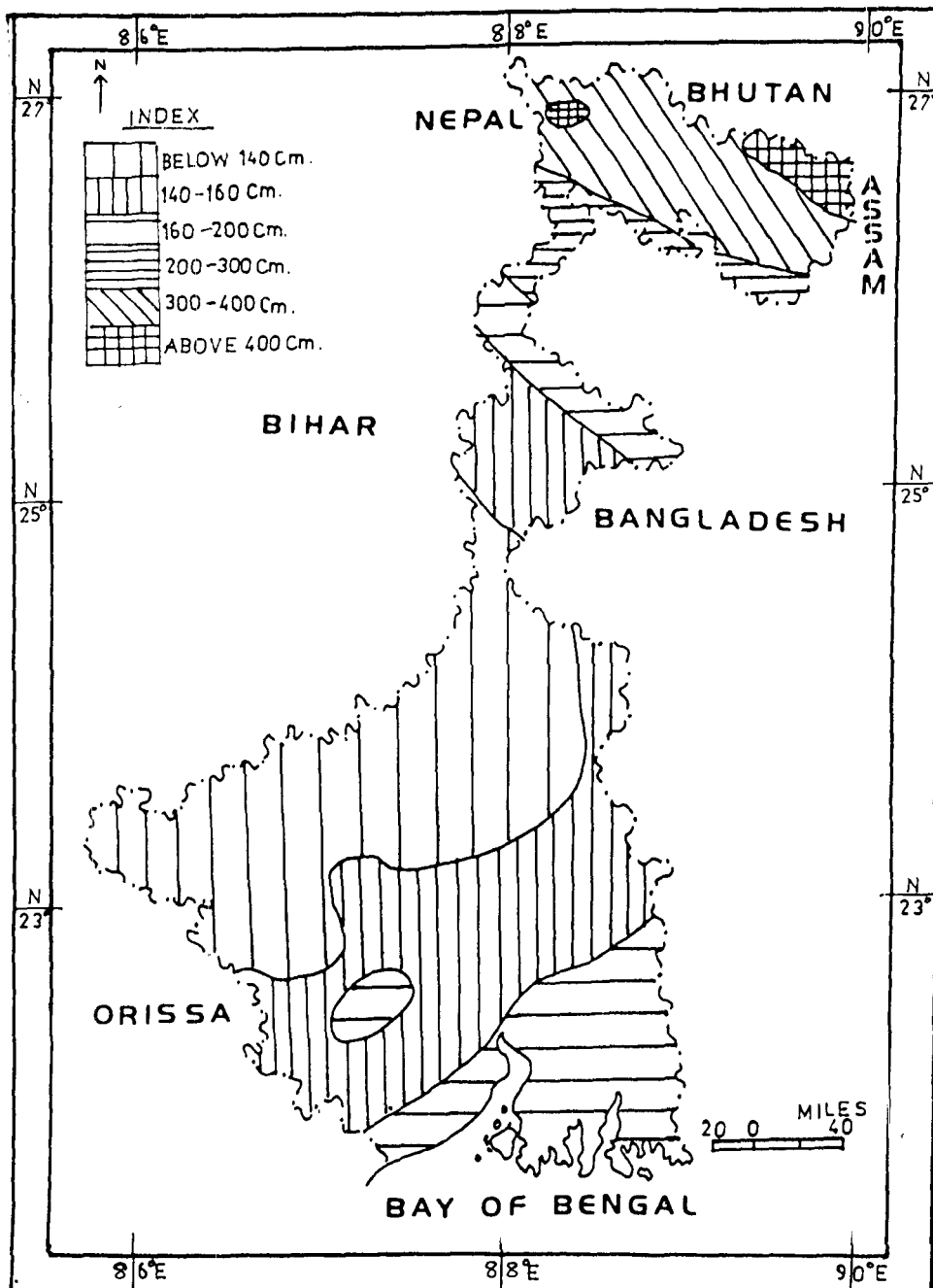


Fig - 4

The summer temperature in the plains varies 28°C to over 42°C. The western plateau fringe receives maximum temperature. But in the north, Darjeeling remained cool due to its height.

The tropical monsoon brings abundant moisture during June to September, when 80% of the rain of the State is concentrated. The heaviest rainfall occurs in the Himalayan region. Some portion of Darjeeling district and extreme north-eastern portion of Jalpaiguri district receive more than 400 cm rainfall. The other portion of Darjeeling, Jalpaiguri and Coochbehar receives 300 cms to 400 cms of rainfall. Rainfall varies between 100 cms to 300 cms. in West Dinajpur. Rainfall varies between 140 cm to 160 cm in Malda, eastern part of Nadia, Murshidabad, eastern part of Burdwan, northern part of North 24-Parganas, Hooghly, Howrah, and Midnapore and the South 24-Parganas district receives 160 - 200 cm. of rainfall. The western plateau receives the least rain and also suffers from variability of rainfall. Purulia, Bankura, Birbhum, Western part of Burdwan and Murshidabad districts have the lowest rainfall, that is, below 140 cm.

With such wide variations, the state frequently suffers from droughts and floods. Droughts in the State more often means want of adequate rainfall in time than complete failure of rainfall. Similarly floods are not always without their compensation, as they flush the land, the land are regenerated by the deposition of silt.

Soil

Various types of soils are found in West Bengal. The soils

of the State may be classified broadly into six types.

- (a) **Hilly soil** - The brown podsol or the hilly soil are acidic in nature and suitable for tea plantations. This type of soil occurs in the northern hills of Darjeeling district and also in the foothill areas.
- (b) **Terai soil** - The soil of terai region in general is alluvium, ranging from pure sand to clay. Terai soil is found in the district of Jalpaiguri. The uplands of North Duars have ferruginous clay soil which is highly suitable for tea cultivation.
- (c) **New alluvium soil** - This type of soil is found in the vast plain of north and south Bengal. The district of Coochbehar, West Dinajpur, Malda, Murshidabad, Nadia, and north-eastern part of North 24-Parganas are the land of new alluvium. This region is fertile and highly productive. The alluvium loams to a large degree is suitable for almost all crops which are grown in the State.
- (d) **Old alluvium soil** - This type of soil occurs in the western part of Murshidabad district, parts of Nadia, northern Howrah, Hooghly, east-central Burdwan and Birbhum districts. This region is suitable for almost all crops that grown in the State.
- (e) **Red and Laterite soil** - This type of soil is found in the district of Purulia, Bankura, West Midnapore and western

SOIL MAP

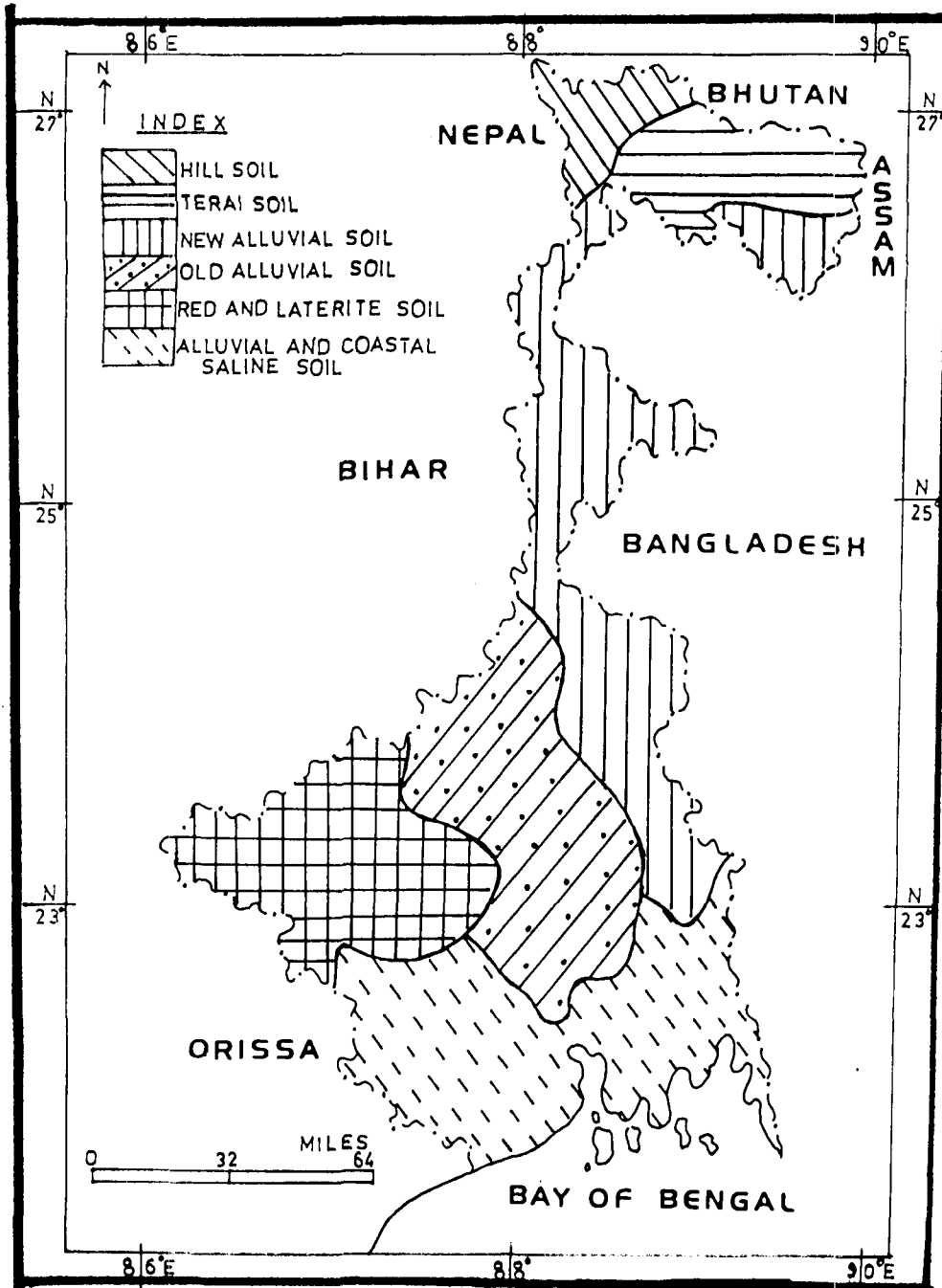


Fig - 5

part of Burdwan district. These soils are highly porous and not retentive of moisture. So this type of soils are not effectively utilized for agriculture.

- (f) **Alluvial and coastal saline soil** - the region adjoining to the delta have alluvial soil. The areas nearest to the coast and the tidal estuaries contain saline and alkaline soil. These type of soil is found in Midnapore, Southern Howrah, North 24 Parganas and south 24 Parganas. Due to the close proximity to the sea, the soil is sandy and salinity is high. To filter the salinity of soil, irrigation and soil treatment is necessary.

Depending on these natural diversities in different regions, various types of agriculture have been evolved with distinctive characteristics of their own. The hilly and the terai region of the north have typical agriculture of tea plantations along with rice, jute and tobacco, while in the coastal regions of the south use to grow jute, mustard along with rice. Similarly, the gangetic alluvial region becomes an example of highly developed agriculture. The red and laterite soil zone has agriculture very insignificantly developed. This clearly explains how the climatic and the soil conditions affect the growth and pattern of agriculture in West Bengal. Accordingly it is seen that the areas with unfavourable natural conditions have less development in agriculture while development is almost spontaneous in the favourable zones.

The fact implies two interesting points, (a) where technology adoption is highly necessary to combat the unfavourable situations, technological innovation is less conspicuous and the regions with favourable edapho - climatic conditions set the stage for higher innovation. Depending on the variations in the degree of innovation and adoption pattern socio-cultural conditions of the farmers have also been diversified in different regions of West Bengal.

In the following chapters, a detailed analysis has been attempted to clarify the relationship between these two variables.