

## II. PHYSICAL SETTING

Agriculture has always dominated the socioeconomic and cultural landscapes of the world and has claimed most of the man's working hours. Agriculture in India is not merely an occupation or business proposition for the people, it is a tradition a way of life, which for the centuries has shaped their thoughts, out-look and culture. An attempt therefore, needs to be made to identify, classify and describe the various forms of agricultural determinants and to assess regional and locational variations in agricultural activities. In this chapter these determinants are analysed for Malda district, which is one of the most underdeveloped district of West-Bengal, and is heavily dependent on agriculture.

The district lies between 25° 32' 08" and 24° 40' 20" north latitude and 88° 28' 10" and 87° 45' 50" east longitude .The district is bounded on the north by Purnea and Dinajpur districts, on the east by Dinajpur and Rajshashi districts, on the south by Murshidabad and the west by Murshidabad and Purnea districts. The physical setting of this district can be best identified with the help of the physical divisions, structure and relief, drainage, soils, climate, water bodies etc.

### a) **Structure and Relief**

The district is situated on the western part of the alluvium filled gap between the Rajmahal hills on the west and the Garo hills on the east. The entire area is covered by alluvium, which is of two different ages displaying different physical and physiographic characteristics.

The river Mahananda flowing north and south roughly divides the district into two equal parts – the Rarh and the Barind. The eastern part of Mahananda is called Barendra (the Barind) and western part of Mahananda is called the Rarh. West of the Mahananda, the Kalindri River flowing west and east from the Ganga again divides the district into two well-defined parts. North of the Kalindri the distinguishing natural feature is the 'Tal' land. The most striking natural feature is the continuous line of islands and accretion formed in the bed of Ganga, by its ever-changing course and known as the Diara.

In the north is the alluvial fan surface of the Himalayan foot – hills the Piedmont alluvial plain, formed by the streams descending from the mountains. The recent alluvium found in

the western part of the district is typically dark loosely compacted and has a high water content and variable but appreciable quantities of organic material.

The pleistocene deposits can be readily distinguished from the recent alluvium. They generally stand above monsoon floods and are drained by relatively few streams, which have developed distinctive meandering courses. Local relief consists of well oxidized massive argillaceous beds typically reddish brown or tan and mottled and some times weathering yellowish. *Kankar* and Pisolitic ferruginous concretion are plentifully distributed throughout this formation.

There are no hills in the district other than a few elevated tracts with an elevation from 15.24 to 30.48 metre. Apart from these undulations the district is a low lying plain covered with a succession of settlement sites with their adjacent fields and swampy tracts.

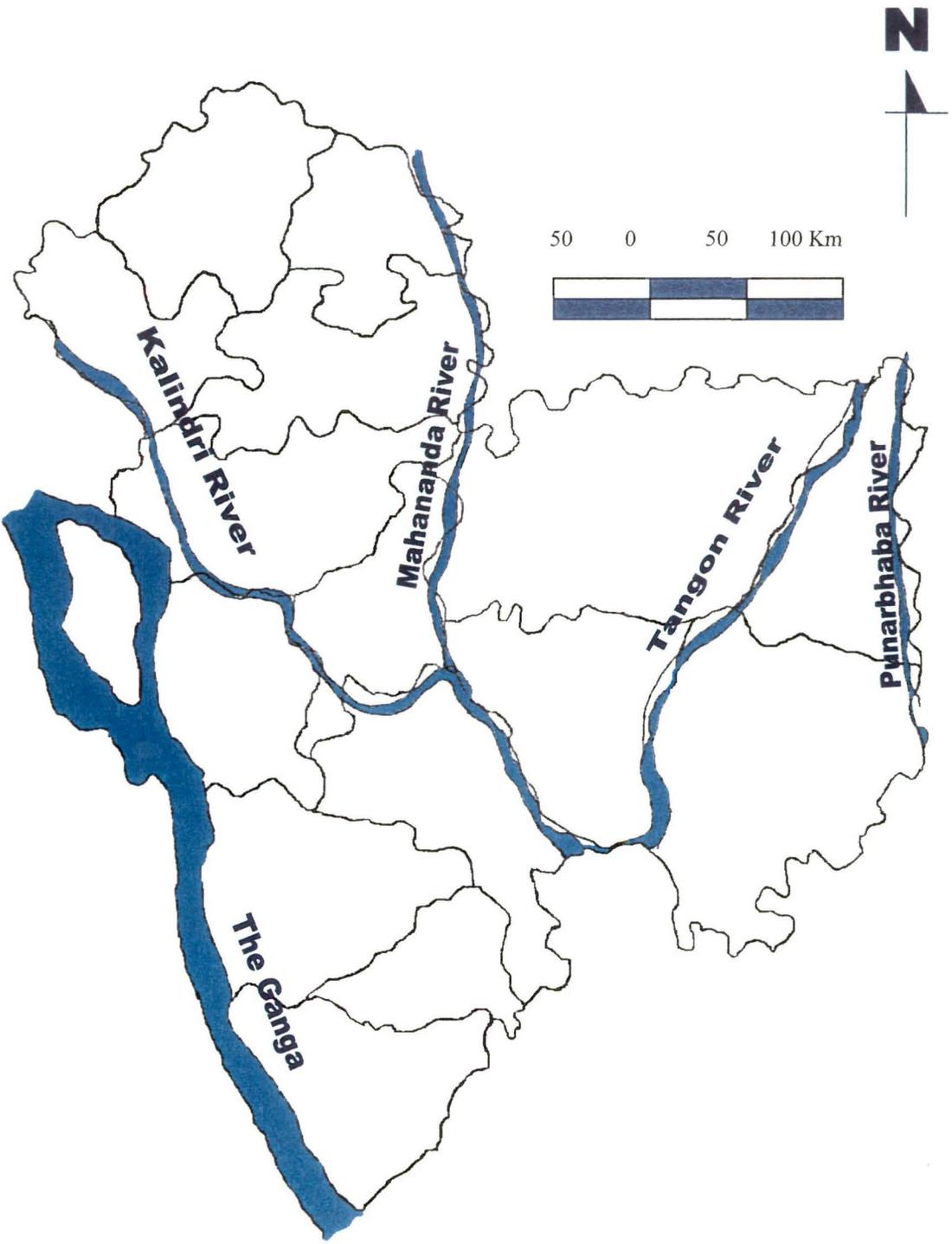
The district slopes generally from the north to south. The highest elevation of this district is 39.7 meters and the elevations range between 30 and 39 meters above sea levels. In other places of the district the elevation varies between 23.54 meters and 38 meters.

## b) **Drainage**

The main rivers of the district are all of Himalayan or sub-Himalayan origin and flow in southerly direction. Mahananda, the next most important river after the Ganga, flows north to south, through the middle of the district. The Kalindri, the Tangan and the Punarbhava are the tributaries of the Mahananda. Two other streams of the Kalindri are the Pagla and the Bhagirathi. Map 2.1 shows the drainage pattern of Malda district. A short account of the rivers of the district is given below.

- i. ***The Ganga***: The Ganga first touches the district as it sweeps south round the Rajmahal hills. At this point it is connected with the Kalindri, though at the present much of the Ganga water does not find its connection having been silted up considerably as the Ganga has receded further to the west. About two miles below Rajmahal the Ganga sends off a small stream the Chota Bhagirathi. A little way further down near Gour the Ganga sends off, also to the last, a larger branch, the Pagla into which Chota-Bhagirathi ultimately flows. During the rains they carry huge volume of water to rejoin the Ganga near the mouth of the Mahananda.
- ii. ***The Mahananda***: The Mahananda enters the district from the north. It acts as the boundary between the police station of Itahar in the district of North – Dinajpur and that of Chanchal in the district of Malda. The actual entry is made at the tri-junction point of the police stations of Chanchal, Ratua and Gazole. It acts as the boundary between the police station of Ratua and Gazole and flows along the towns of Englishbazar and Old-Malda keeping the town of Old Malda slightly to the north until it is joined by the Tangan at Aiho. The length of the river in this district is 55 miles (88.6 Kilometers).
- iii. ***The Kalindri***: The Kalindri is taken as an off-shoot the eastern branch of the Ganga but actually it is a branch of the Mahananda, which by the name of Fulahar passes through the district of Purnea, enters the district of Malda near Mihaghat from where it is known as the Kalindri. It is flowing mainly in the south-eastern direction, to its junction with the Mahananda opposite the town of Old Malda.

# Map No 2.1 Drainage Pattern of Malda District



- iv. **The Tangan and Punarbhaba** : The Tangan and Punarbhaba on the left bank are the next important tributaries of the Mahananda. These rivers flow from Dinajpur into the north-eastern corner of the district, where they are connected. Both the Tangan and Punarbhaba have steep banks, particularly where they pass through the Barind. Their average width is about 40 yards.

Table 2.1 shows the river system of Malda district.

**Table – 2.1 The River System of Malda District**

Sr.No.	Particulars	The Ganga	The Mahananda	Punarbhaba	Tangan	Kalindri
1	Entry Point	Gadai of Bhutnichar (Manikchak Block)	Trijunction Point of Chanca – I Ratua – II and Gazale Block	North-East Bamongola	Junction of Bamongola and Gazole	Mihaghat of Harischandrapur-II
2	Runs through	Manikchak, Kaliachak – II and III blocks	Gazale, Old-Malda, English – bazar, Habibpur blocks	Bamongola	Bamongola, Habibpur, Old-Malda and Gazole Blocks	Harischandrapur II Ratua –I, Manikchak and Englishbazar block
3	Length of the river in the district	172 Kms. (including tributaries)	88.6 Km. (including tributaries)	64.4 Km. (including tributaries)	64.6 Kms. (including tributaries)	N. A.
4	Branches	Fulahar, Bhagirathi and Kalindri	Kalindri and Pagla	Haria	Hara Tangan and ChunaKhali Khal	Fulahar
5	End Point	Par – deonapur of Kaliachak III blocks	Aiho and Habibpur block	Eastern border of Bamogola Block	Mahananda	Mahananda at Bachamari of Old-Malda Block

- v. **Beels and Tanks**: Beels are like lakes frequently brought into existence by a river abandoning its existing bed and flowing along new channel. The largest beell in the district is Ahora in Tangan valley covering an area of about 2 sq. miles. Other than Ahora there are some other beels located mainly in the marshy tract between the Mahananda river and the main road from English Bazar to Gour. Some beels are also found in the Diara tract caused by depressions left by the Ganga e.g. Gadai beel. In the district here are approximately thirty thousands tanks of different size out of which about eleven thousands are irrigation tanks.

c) **Physical Division – The Terrian**

On the basis of the physiography, Malda district can be divided into three regions i) Tal  
ii) Barind and iii) Diara. Map 2.2 shows the physiographic divisions of Malda district.

- i. **Tal Region:** The northern portion of the Kalindri river is popularly known as ‘Tal’. This is a low-lying area, subjected to inundation, by floodwaters of the rivers during the rainy season. The region reveals a gradual slope towards south and west. The total area of this tract is about 1,14,099 hectares and covers Ratua-I, Ratua-II, Chanchal-I, Chanchal-II, Harishchandrapur-I and Harishchandrapur-II blocks. Tal area is composed of mud and finer variety of sand. Retaining capacity of this type of soil is very poor. Wheat, paddy, jute, pulses and oil seeds are abundantly grown in this area. The physiographic aspects of this region are shown in Table 2.2. It shows the physical situation of cultivable land, categorized for the individual blocks of the region.

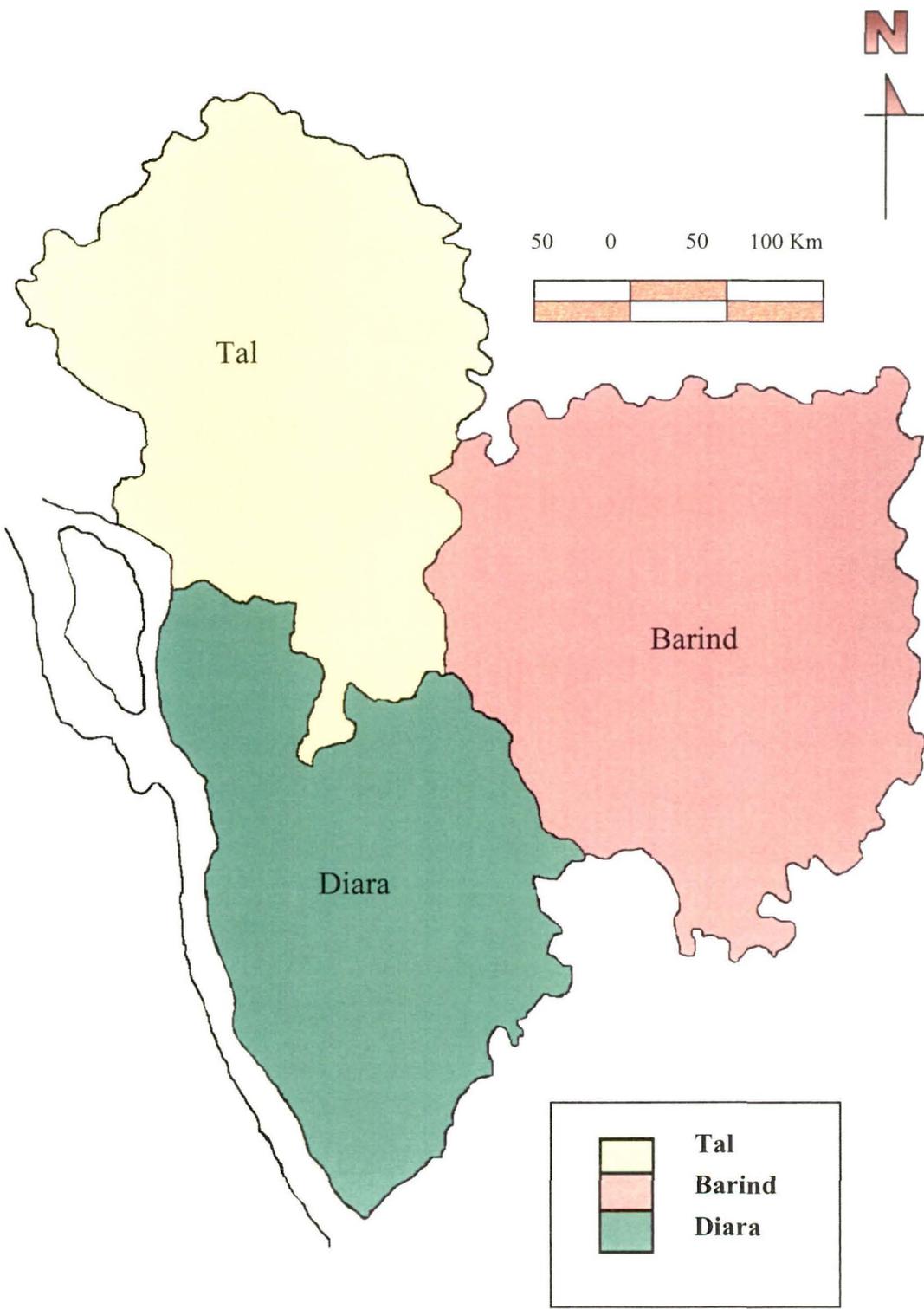
**Table – 2.2 Physical Situation of Cultivation Land (Tal Region)**

Block	Geographical Area in hect.	% of the district	High land in hect.	% of the district	Medium land in hect.	% of the district	Low land in hect.	% of the district	Total area in hect.
Harishchandrapur-I	17202	4.82	2194	16.0	9598	70.0	1920	14.0	13712
Harishchandrapur-II	21156	5.93	1855	11.0	11977	71.0	3036	18.0	16868
Chanchal-I	15855	3.79	1280	12.0	7793	73.0	1600	15.0	10673
Chanchal-II	20550	6.42	2550	14.0	12933	71.0	2735	15.0	18218
Ratua-I	22126	6.21	2655	15.1	12174	68.8	3850	16.1	17679
Ratua-II	17210	4.83	1915	14.0	9712	71.0	2055	15.0	13682
<b>Total Tal</b>	<b>114099</b>	<b>32.02</b>	<b>12449</b>	<b>13.70</b>	<b>64187</b>	<b>70.66</b>	<b>14196</b>	<b>15.63</b>	<b>90832</b>

Source : Annual Plan – Malda District (1998-99)

- ii. **Barind Region:** Extending eastward from the Mahananda river is a relatively upland tract, the Barind, composed mostly of ferallitic materials. The Barind land is undulating in character and presenting a dissected appearance (Chakraborty 1970). The tract extends over a wide area east of the Mahananda and continues into the district of Dinajpur in West-Bengal and Rajsahi and Bogura in Bangladesh. The highest elevation of this tract, within the district, is 39.7 meters above mean sea level in Gazole police station. In Malda district Barind tract extends over an area of 1,32,761 hectares comprising the areas of Gazole, Bamongola Habibpur and Old-Malda blocks.

**Map No: 2.2**  
**Physiographic Division of Malda**



The Barind is composed of old alluvial soil of reddish colour with medium degree of acidity. Granite stone is occasionally found below this soil. In Barind region ground water level is very low, except in the rainy season. The complex geological evolution has given these tracts a distinct character in contrast to the most recent alluviums of north. The characteristic features of this 'Barind' region are its surface undulation with depression and wide valleys of small watercourses. Due to the presence of ferralitic materials, surface becomes hard during summer season and underground water levels fall. The physical situation of the cultivable land of Barind has been categorized as highland, medium land and low land in the Table 2.3.

**Table – 2.3 Physical Situation of Cultivation Land (Barind Region)**

Block	Geographical Area in hect.	% of the district	High land in hect.	% of the district	Medium land in hect.	% of the district	Low land in hect.	% of the district	Total area in hect.
Gazale	50772	14.24	7306	18.0	28818	71.0	4465	11.0	40589
Bamongala	20380	5.72	2927	18.0	10572	65.0	2764	17.0	36643
Habibpur	39234	11.01	6246	20.0	19675	63.0	5309	17.0	31230
Old – Malda	22375	6.28	3415	20.0	11607	68.0	2050	12.0	17072
<b>Total Barind</b>	<b>132761</b>	<b>37.25</b>	<b>19894</b>	<b>19.0</b>	<b>70672</b>	<b>67.2</b>	<b>14588</b>	<b>13.8</b>	<b>105154</b>

Source : Annual Plan – Malda District (1998-99)

- iii. **Diara Region:** The flat land on the western side of Mahananda, is the result of the fluvial action of the river Ganga. The Ganga has shifted westward from its old-course and traces of its old channel are found in this area. This tract is known as the 'Diara' covering an area of 1,09,494 hectare and covers Englishbazar, Manikchak, Kaliachak-1, Kaliachak-II and Kaliachak-III blocks. The soil of this area is extremely fertile due to regular deposition of alluvium by the Ganga. As a result the cropping pattern of this region is comparatively different from other parts of the district. A large 'area' of 'Diara' is covered with mango orchards while other crops are jute, aus, paddy, wheat, pulses etc. The water level of this region is very high. The physical situation of cultivable land has been categorized with the help of the following table 2.4.

**Table – 2.4 Physical Situation of Cultivation Land (Diara Region)**

Block	Geographical Area in hect.	% of the district	High land in hect.	% of the district	Medium land in hect.	% of the district	Low land in hect.	% of the district	Total area in hect.
English bazar	25190	7.07	2613	14.0	13257	71.0	2795	15.0	18665
Manickchak	31654	8.90	3017	12.0	18358	73.0	3772	15.0	25147
Kalichak – I	10350	3.76	1015	10.0	7902	78.0	1215	12.0	10132
Kalichak – II	21377	5.34	1500	10.0	11752	78.0	1807	12.0	15059
Kalichak – III	23617	5.67	1430	9.0	12366	78.0	2065	13.0	15861
<b>Total Diara</b>	<b>112188</b>	<b>30.72</b>	<b>9575</b>	<b>11.28</b>	<b>63635</b>	<b>75.00</b>	<b>11654</b>	<b>13.73</b>	<b>84864</b>

Source : Annual Plan – Malda District (1998-99)

#### d) **Soil**

Soil is the basic component of agriculture. Soil properties are determined by parent materials, climate, relief and living organisms. In Malda district there is the presence of different physical and physiographic characteristics. It is mainly covered by alluvium. Older alluvium dominates in Barind region. The red soil of old alluvium formation is composed of clay containing iron and lime which becomes extremely hard in the cold weather. The soil is mostly acidic and the PH of soil mainly varies from 4.6 to 5.9. Newer alluvium dominates both Tal and Diara tracts of this district. This soil consists of a mixture of sand and clay. The proportion of clay increases towards the east whereas proportion of sand increases towards the west. The PH ranges from 6 to 7 in 'Tal' areas; while in Diara region the PH value of soil ranges from 6.5 to 8 which means slightly alkaline soil is found in this region. In low lying areas of Malda district like beels, and river valleys dark loam soil with admixture of clay are also found which is also known as '*Matial*.'

#### ***Soil Texture***

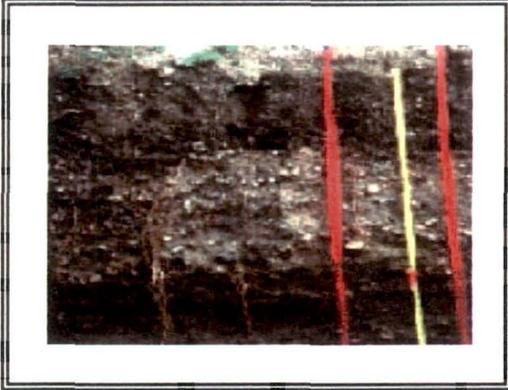
Soil texture refers to the size and proportion of soil particles and is the measure of the average size of channel between the particles. The retaining capacity and moisture largely depend upon soil texture. Heavy clay becomes hard during hot dry period and under heavy rainfall become too heavy which restrict the intensity of cropping. Light sandy alluvium is too friable. Hot-rainless condition is best in wet season. Under monsoon rainfall heavy soil is able to store moisture for use during the ensuring dry period.

An attempt has been made by the soil survey branch of soil conservation wing of Malda district to classify soils of cultivable areas of the blocks on the basis of their texture. The spatial variation of soil texture within the physiographic region of Malda district is shown in Table 2.5. It is revealed that 29.7 percent of agricultural area of the district has clay loam while soils of 28.8 percent and 25.5 percent of agricultural lands are dominated by loam and clay. Sandy loam and silt loam cover 7.6 and 5.2 percent of cultivable areas of the district.

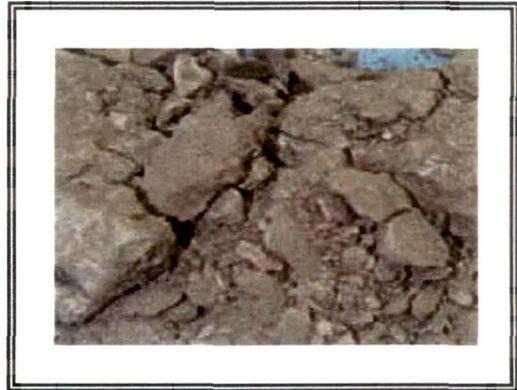
Regional variation of soil texture is much obvious in Tal, Barind and Diara tracts. Clay soil covers 42.3 percent in Tal region followed by loam with 35.3 percent sandy loam with 8.7 percent.

In Barind region clay soils cover 57.4 percent of the cultivable lands followed by the clay loam with 32.1 percent area under it, loam occupies 10% cultivable areas of Barind region.

## 2.1 Types of Soil



Alluvium



Sandy



Clay



Loam

**Table – 2.5 Textural Classification of Soil (Malda District)**

Region	Block	Soil texture (hectare)					
		Sandy	Sandy Loam	Loam	Clay Loam	Silt Loam	Clay
TAL	Harischandrapur-I	....	680	3427	8915	--	690
	Harischandrapur-II	60	790	4374	9964	--	1680
	Chanchal – I	100	436	3065	6937	--	1135
	Chanchal – II	150	761	5350	11042	--	915
	Ratua – I	1200	3270	8991	1168	2500	550
	Ratua – II	1000	1971	6893	1368	2000	450
BARIND	Gazole	--	500	4060	12647	--	23382
	Bamongola	--	50	1578	4565	--	10070
	Habibpur	--	--	3123	10246	--	17861
	Old-Malda	--	100	1607	6268	--	9097
DIARA	English Bazar	....	933	2800	9199	--	5733
	Manikchak	2257	4788	13102	500	4500	--
	Kaliachak-I	940	1500	5592	600	1500	--
	Kaliachak-II	1518	2500	8541	500	2000	--
	Kaliachak-III	2000	3151	8310	400	2000	--
<b>District Total</b>		<b>9225</b>	<b>21430</b>	<b>80813</b>	<b>83319</b>	<b>14500</b>	<b>71563</b>

Source : Annual Plan (2000-2001), Soil Survey Branch of Soil conservation wing.

In Diara tract the dominant soil texture is loam which occupies 45.2 percent of cultivable land. Sandy loam and clay loam also occupy 15.2 and 13.2 percent of land respectively. Sandy soils also occupy 15.2 and 13.2 percent of land respectively. Sandy soils also cover 8.0 percent of cultivable land of the region. Fig. 2.5 shows the textural classification of soil of Malda district.

### **Soil Types**

The soils of Malda district has been classified taxonomically into broad types by the soil survey branch of soil conservation wing in Malda District. Table 2.6 shows the classification of soil types in Malda district.

**Entisol:** Entisols are rich in mineral soil materials with absence of pedogenic horizon. It is associated with recent deposit of alluvium in which inert parent materials such as quartz, sand are present in abundance and lack of sufficient time has restricted the development of pedogenic horizons. Due to restrictions on their depth, clay content and water balance, the intensive use of this soil is limited. This is the dominant soil of Diara tract. Crops like aus, paddy, jute, maize, wheat, pulses, oilseeds, barley and sugarcane are grown in the soil with the help of adequate water supply and fertilizers.

**Altiisol:** Altiisols considers moderately active soil forming processes by accumulation of silicate clays and other fine materials without much depletion of base. The soil has

a thick dark coloured low base (ochric) on light coloured organic (umbic) surface horizon, water is available for more than ½ of the year or more than three months during warm season. Soil is naturally fertile. They generally occur in Barind and Diara tracts and it is intensively utilized for cultivation.

**Table – 2.6 Classification of Soil Types: Malda District**

Region	Block	Area Available for cultivation (ha.)	Soil Types			
			Predominant Type	% of Total areas	Other Types	% of Total area
TAL	Harischandrapur-I	13712	Inceptisal	100 %	Nil	Nil
	Harischandrapur-II	16868	Inceptisal	100 %	Nil	Nil
	Chanchal – I	10673	Inceptisal	100 %	Nil	Nil
	Chanchal – II	18218	Inceptisal	100 %	Nil	Nil
	Ratua – I	17679	Inceptisal	100 %	Nil	Nil
	Ratua – II	13682	Inceptisal	100 %	Nil	Nil
DIARA	English Bazar	18665	Entisol	96 %	Altilsol	4 %
	Manikchak	25147	Entisol	96 %	Altilsol	4 %
	Kaliachak-I	10332	Entisol	96 %	Altilsol	4 %
	Kaliachak-II	15059	Entisol	96 %	Altilsol	4 %
	Kaliachak-III	15851	Entisol	96 %	Altilsol	4 %
BARIND	Gazole	40589	Inceptisal	95%	Entisol Allisol	3 %
	Bamongola	16263	Inceptisal	95%	Entisol Allisol	2 %
	Habibpur	31230	Inceptisal	95%	Entisol Allisol	2 %
	Old-Malda	17072	Inceptisal	95%	Entisol Allisol	2%
	<b>District Total</b>	<b>280850</b>	<b>Inceptisal</b> <b>Entisol</b>	<b>68%</b> <b>29%</b>	<b>Entisol</b> <b>Allisol</b>	<b>1 %</b> <b>2 %</b>

Source : Annual Plan (2000-2001) Soil Survey Brand, Soil Conservation Wing, MALDA

Note : The classification is based on tentative broad soil type (order) as per comprehensive

***Inceptisols:*** This is the dominant soil type in Tal and Barind regions of the district. This is an advanced stage of entisal, where soil-forming process is active. In this type of soil one or more pedogenic horizon are found. Soil texture is finer than loamy sand. Retaining capacity of this soil is very high during the greater parts of the year. These type of soils are generally fertile and intensively used for cultivation. In northern parts of Malda district, jute and aman paddy is main Kharif crop and in some places wheat is grown during Rabi season. While in the *doba* areas summer paddy is extensively cultivated because these areas are subjected to water stagnation.

### ***Soil Nutrient Status***

The amount of nutrients in soil, to a considerable degree determines crop growth. These nutrients viz. organic carbon, potassium, and phosphorus account for soil fertility, have been rated as low, medium and high according to limit, laid down by the co-ordinating unit at the

Indian Agricultural Research Institute (Ramamoorthy and Bajaj, 1969) to determine the nutrient level of the soil. On the basis of the survey conducted by the soil testing unit of Malda district the fertility status of soils of the various blocks have been determined and presented in the Table 2.7.

**Table – 2.7 Soil Fertility Status: Malda District**

Region	Block	Range of Nutrient Status and PH				
		O.C.	AV. P <sub>2</sub> O <sub>5</sub>	AV. K <sub>2</sub> O	PH	Conductivity
TAL	Harischandrapur-I	L to M	VL	L to H	SA to N	N
	Harischandrapur-II	ML to M	VL to L	VL to ML	SA to N	N
	Chanchal – I	L to ML	VL to L	ML	SA to N	N
	Chanchal – II	L to ML	VL	L to M	SA to N	N
	Ratua – I	L to ML	VL	L to M	SA to N	N
	Ratua – II	L to ML	VL	L to M	SA to N	N
BARIND	Gazole	L to ML	VL	VL to ML	N	N
	Bamongola	L to ML	VL	VL to ML	VA to N	N
	Habibpur	L to ML	VL	ML to VH	SA to N	N
	Old-Malda	L to ML	VL	VL to M	SA to N	N
DIARA	English Bazar	L to ML	VL	ML to M	N	N
	Manikchak	L to ML	VL	ML to M	N to AL	N
	Kaliachak-I	L to ML	VL	VL to H	N	N
	Kaliachak-II	ML to M	VL	VL to H	N to AL	N
	Kaliachak-III	ML to M	VL	L to H	N to AL	N

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	O.C.	AV. P <sub>2</sub> O <sub>5</sub>	AV. K <sub>2</sub> O	PH	
Very Low (VL)	Upto 0.20	Upto 22	Upto 120	Very Acidic (VA)	Less than 4.5
Low (L)	0.21 - 0.40	23-45	121-180	Slightly Acidic	4.6 to 5.9
MEDIUM LOW (ML)	0.41 - 0.60	46-72	181-240	Neutral (N)	6.0 to 8.0
MEDIUM (M)	0.61 - 0.82	73-92	241-300	Alkaine (AL)	Above 8.0
HIGH (H)	0.83 - 1.00	93-115	301-360		
VERY HIGH (VH)	Above 1.00	Above-115	Above-360		

Source : Annual Plan (2000-2001), Soil Survey Branch, Soil Conservation wing, MALDA

Soil acidity and alkalinity confirm that proportion of neutral soil is more than acidic or alkaline soil in the district. Frequency of occurrence of slightly acidic and slightly alkaline soils in different parts however, may be responsible for nutritional uptake of the crops.

As a whole the soils with PH value ranging from 4.6 to above 8.0 are not resistant to crop growth as crop like potatoes favour slightly acidic soils. Most of the crops are suited to neutral to slightly alkaline soils. The PH value of soils in the district is suitable for paddy.

Organic matter is an important chemical constituent of productive soil. Its content in the soil increases with the rate at which plant residues are added. The organic status of soils in the district ranges between 0.20 to 0.82 percent, which reveals improper management of soils.

The organic matter content of soils plays a dominant part in crop production by interacting with other nutrients.

Soil potassium and phosphorus are macronutrients for crop production and are sufficiently low in the soil of the district.

It has been observed that in case of alluvial loamy and red soils the availability of Phosphorus decreases with increasing PH (Roy Chowdhury and Landay,1960). It is commonly low in alluvial soils and its proper application is required to maintain the status in the soil otherwise this excess of phosphate some times retards the crops yield.

Although potassium has no direct influence of the crop yield, it is considered essential for the photosynthesis process and plays an important role in plant metabolism. The table 2.7 indicates that soils of the district are low in phosphorus status compared to potash status. Crop productivity such as paddy, wheat potatoes are positively related to the nutrient status of soils.

e) **Climate**

The climate of Malda district is more or less same in the three physiographic divisions of Tal, Barind and Diara. The climate of this district is characterized by hot and oppressive summer season, plentiful rain and moisture in the air through out the year. The year may be divided into four seasons. The winter season starts about the middle of November and continues till the end of February. The period from March to May is the summer season. The south-west monsoon season commences by about first week of June and continues till the end of the September. October and 1<sup>st</sup> half of the November constitute the post monsoon season.

The year which has been divided into various seasons following the temperature and rainfall are characterized by different agricultural operation. Table 2.8 shows the agricultural crop year for the district.

**Table 2.8: Agricultural Crop Year: Malda District**

Season	Period	Crops
<b>Bhadoi season</b>	1 <sup>st</sup> Jul. to 15 <sup>th</sup> Oct.	Aus, Maize, Jute, Kalai, Mesta and Sugarcane
<b>Winter season</b>	16 <sup>th</sup> Oct. to 15 <sup>th</sup> Jan.	Aman, Kalai
<b>Rabi season</b>	16 <sup>th</sup> Jan. to 31 <sup>st</sup> Mar.	Wheat, Job, Gram, Arhar, Lentil, Khesari, Mustard, Linseed and Potato
<b>Summer season</b>	1 <sup>st</sup> Apr. to 30 <sup>th</sup> Jun.	Boro, Moong and Til

Note: Agriculture crop year has been determined based on the crop harvesting period

Source: Crop Harvesting Survey, Evaluation Brnch, Agriculture Office, Govt of West Bengal

**Temperature:**

The eight meteorological stations in this district record climatic data. From the month of March, temperature begins to rise rapidly. The day temperature reach the maximum in May or June. The night temperature continues to rise even in the monsoon season. In April the mean (Avg. of 4 yrs.) maximum temperature is 34.2° C and minimum is 20.8°C (1994 to 1998) January is the coldest month, with the maximum average temperature 22.1°C and minimum average temperature 9.7 °C (4 yrs. Aug. 1995 to 1998). Table 2.9 shows the monthly temperature variation in the district.

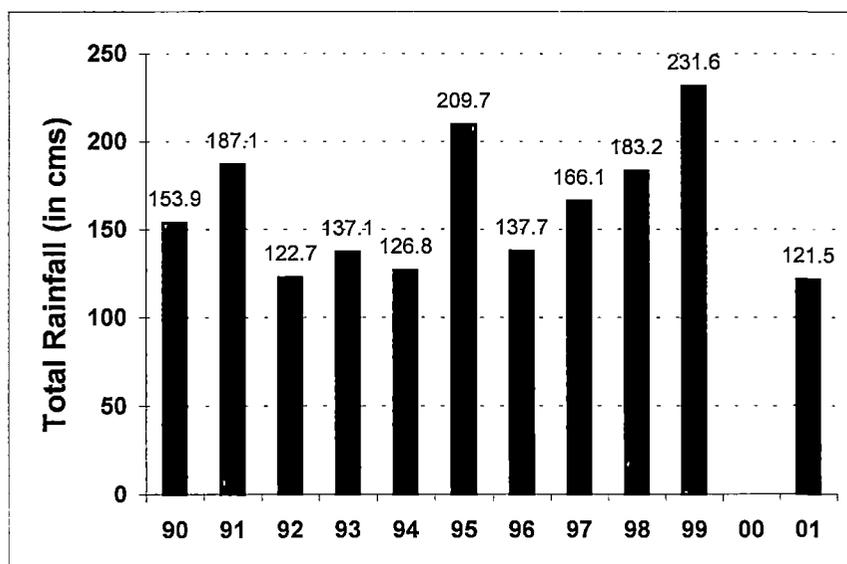
**Table 2.9 Monthwise Average Temperature: Malda District (1995-98) (in °C)**

Month	Maximum	Minimum	Mean
January	22.1	9.7	15.9
February	26.2	12.5	19.4
March	31.4	16.9	24.2
April	34.2	20.8	27.5
May	35.9	24.6	30.3
June	34.3	25.5	29.9
July	32.1	26	29
August	31.3	25.9	28.6
September	32.1	24.3	28.2
October	31	22.8	26.9
November	28	17.1	22.5
December	24.1	12.2	18.1
Average	30.2	19.9	25.0

**Rainfall:**

The average annual rainfall in the district is 1,655.9 mm for the period 1990 to 1999. The rainfall during the south-west monsoon season constitutes 78% of annual total; July to September are the months of the heavy rainfall. The variation in rainfall from year to year is significant (Fig 2.1).

**Fig 2.1: Total Rainfall in Malda District: Year wise**



Source :- Annual Plan, Agriculture Principal Office – 1999-2000

Table 2.10 shows the month wise average rainfall (mm) of the Malda district.

**Table 2.10 Month wise Rainfall: Malda District (in mm)**

YEAR	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	Total
1990	0.0	37.3	28.8	30.5	170.1	205.0	447.3	209.6	239.4	164.6	6.4	0.0	1539.0
1991	16.7	6.1	11.8	17.6	206.2	358.3	392.4	247.4	522.8	39.8	0.0	51.6	1870.7
1992	1.1	10.4	1.5	4.9	118.3	113.5	493.3	226.6	161.5	79.7	15.7	0.6	1227.1
1993	49.5	0.1	24.9	99.6	115.6	157.3	197.8	288.7	311.7	79.2	46.9	0.0	1371.3
1994	29.1	28.3	0.0	12.6	93.1	415.5	181.6	181.2	214.4	112.1	0.0	0.0	1267.8
1995	3.2	7.3	3.2	3.5	52.7	300.4	359.6	551.7	716.6	8.2	81.4	8.8	2096.6
1996	9.3	15.8	3.0	33.0	37.8	199.2	233.8	316.3	464.8	64.9	0.0	0.0	1376.9
1997	16.6	9.5	7.8	77.9	90.0	206.0	387.6	541.5	266.7	25.5	1.2	30.8	1661.1
1998	7.3	7.9	84.4	60.6	101.3	172.0	502.3	328.8	316.9	232.6	18.3	0.0	1832.4
1999	0.0	0.0	0.1	12.1	143.4	342.2	515.9	466.6	656.0	176.1	3.7	0.0	2316.1
2000	0.0	49.6	38.9	115.4	191.5	324.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	719.7
2001	0.0	26.3	33.3	84.4	93.1	232.7	72.2	144.7	493.5	34.7	0.0	0.0	1214.9

Source :- Annual Plan, Agriculture Principal Office, Malda – 2001-02

### **Humidity:**

Relative humidity is high throughout the year, but during the early part of the summer they are relatively less. In March, April and May, minimum relative humidity are accordingly 36 %, 43% and 49% (Avg. of 4 yrs. 1995 to 1998). In the month of the July, August and September it is very high at 94%, 93% and 94% (Avg. of 4 yrs. 1995 to 1998) respectively.

Table 2.11 shows the level of humidity of Malda district.

**Table 2.11 Monthwise Average Relative Humidity: Malda District (1995-98) (in %)**

Month	Maximum	Minimum	Mean
January	98.0	51.0	74.5
February	95.0	43.0	69.0
March	87.0	36.0	61.5
April	83.0	43.0	63.0
May	87.0	49.0	68.0
June	92.0	68.0	80.0
July	94.0	81.0	87.5
August	93.0	80.0	86.5
September	94.0	79.0	86.5
October	89.0	64.0	76.5
November	94.0	57.0	75.5
December	92.0	55.0	73.5
<b>Average</b>	<b>92.0</b>	<b>59.0</b>	<b>73.5</b>

Source :- Annual Plan, Agriculture Principal Office, Malda – 1999-2000

***Winds:***

Winds are generally moderate with some increase in speed in the late summer. In monsoon season winds blow mostly between south and east. In October winds are variable in direction. Southerlies and South westerlies appear in March and in the April winds are variable in direction.

***Clouds:***

Skies are moderately clouded in May and heavily clouded to overcast in southeast monsoon season. There is some moderate clouding in October. During rest of the year, skies are mainly clear on lightly clouded.