

## CHAPTER – 7

### CHANGES IN AGRICULTURAL LAND USE SCENARIO

#### 7.0 Introduction

Agricultural land is the largest land use in terms of the total geographical area, and at the worldwide level it is the most important land use in conditions of environmental influence. Agricultural land use refers to the primary use of the geographical area for different purposes and activities. Land use is the surface utilization of all developed and vacant land on a specific point at the given time and space (Siddiqui, et al, 2013). Not only that, the study of agricultural land use has remained dynamic around bigger settlements and urban centres, whereas in the large tracts of rural areas changes were not prominently visible (Jha, et al, 2008). On the other side, land use can be defined as an inclusive, interdisciplinary subject that focuses on material related to the nature of land use and land cover, their changes over space and time, and the social, economic, cultural, political, decision-making, environmental, and ecological processes that produce these patterns and changes (Aspinall, et al, 2006). Land resources are the most important nature wealth of any region and their proper utilization is a matter of utmost concern to its people. Changing pattern of land use is not a new phenomenon rather this is a constant process that has been continuously taking place over time and space (Singh, et al, 2009). As a result, land use survey areas are grouped into different regions in much the same way as has been discussed in criteria, such as the respective proportions of different classes of land use, including forest area, urban area, industrial area and unused land. They may coincide closely with the agricultural region, even exactly the criteria used for definition and delimitation are different-they are land use criteria (Symons, 1968). The structure of agriculture land use in any region is continuous processes of evaluation through the interplay of ecological, technological and institutional influences (Lal et al., 1987).

Changing agricultural land use in all the revenue blocks in Uttar Dinajpur District is not uniform. According to the variation in the quantity of land, its productivity potential and availability of water resources, it varies from one revenue block to another revenue block. Most of the revenue blocks in the district are facing the problem of acute water shortage, increasing population and higher trends of urbanization; large agricultural plots are fragmented into several small plots and encroachment of cultivated field leads to small landholding. Day-by-day agricultural land use is changing in Uttar Dinajpur District for this reason. Land use changes to fulfil man's needs. Man's needs can be classified into six major categories viz. the

need for wood, house, food, transport & communication, defence and recreation. Man utilizes the land into various forms to fulfil his needs.

Uttar Dinajpur District's total geographical area is 3,140 km<sup>2</sup> which accounts for 3.54 per cent of the total geographical area of West Bengal (88,752 km<sup>2</sup>) and the net cultivated area is 2,48,000 hectares comprising 79 per cent of the area of the district and 4.51 per cent of the total geographical area of the state (Census of India, 2011). The common land use type of the study area can be categorized into four groups-

- (i) Cultivable area (which consist of Net Sown Area (NSA), Current Fallow, Fallow and other than Current Fallow, Culturable Waste Land, Land under misc. tree crops and groves, Permanent pastures and other grazing lands).
- (ii) Barren and Unculturable land
- (iii) Net Cropped Area
- (iv) Forest Land (PAO, Uttar Dinajpur).

Since the last few years, a change has come up in the agricultural sector in all blocks of the District. Most changes in the agricultural scenario of the district Uttar Dinajpur and its effect are shown from 1992 onwards. The introduction of HYV paddy and wheat is more common than the local variety of paddy and wheat because of its high yield rate. The cropping intensity of the district was 206.10 per cent in 2001 and it has increased to 212.10 per cent in 2015 (PAO, Uttar Dinajpur).

### **7.1 Changes in cropping pattern**

Cropping patterns are not the same all over the district. In some blocks, these are superior while in other blocks these are inferior. Moreover, no cropping pattern can hold good for all time to come. It has to change with the improvement in farm technology and economic factors. Uttar Dinajpur District agriculture has usually been characterized as a 'gamble in monsoon'. A great deal of uncertainty in crop prospects still exists, as the monsoon plays a decisive role in determining agricultural output and its failure results in widespread famine and misery. In this context, interest revolves around the nature of the growth of crops which is related to the agricultural production. This relationship emerges in the context of new technology and in the context of regional diversities. Land resources form the most essential natural wealth of any nation and their proper operation is a matter of utmost concern to its people (Hiremath and Karenavar, 1978). The cropping pattern in a particular period is one of the necessary indicators of agricultural development and the socio-economic situation of the population in the area (Gajaa and others, 1984).

A study of cropping patterns of a nation should logically begin with a study of its climate and soil situations which constitute local and subterranean environments of crop plant life (Krishnan and Singh, 1972). On the other hand, the cropping pattern is 'the proportion of area under different crops at a point of time' (Kanwar, 1972). It indicates how intensively the newly sown area is utilized for different crops. In Uttar Dinajpur District under study, the variety of crops are cultivated in its sown area, but they are generally classified as a food and non-food crops as below:

- a) *Food crops*- i) Food grains: Cereals and pulses.
  - ii) Non-food grains: Sugarcane, fruits and vegetables.
- b) *Non-food crops*- iii) Oilseeds.
  - iv) Fibers.
  - v) Drugs and narcotics (PAO, Uttar Dinajpur).

Cropping pattern is not only the crop-mix grown in a particular area in an agricultural year. The introduction of new agricultural technologies has influenced the crop-mix which is more prominent in the agriculturally developed region (Singh, 1980). The cropping pattern of Uttar Dinajpur District is identical in sense that it shows a very imperfect change in its conventional cropping pattern which the farmers of the district have inherited from their ancestors. It is a fact that agriculture of the district is totally rain-fed. The whole economy of the district is oriented towards the production of rice. Rice is the foremost food of the inhabitants of not only the Uttar Dinajpur District but West Bengal state as whole. So, area under rice acquires the uppermost quantity of cultivated area. In Uttar Dinajpur District, during the year 2015-16, recorded cultivated area is 5,00,635 hectares of total land which is variably distributed in nine C.D. Blocks. Foodgrains have occupied nearly three-fourth (74.72 per cent) of the total cropped area, near one-fifteen (11.27 per cent) area under oilseeds, about 1.27 per cent area under pulses and 42.19 per cent area under miscellaneous crops of the total gross cropped area. About 59.06 per cent of the foodgrains of the total gross cropped area of the district has been occupied by two main kinds of cereal crops i.e. paddy and wheat. Some other cereals are maize, jowar, millet and barley. The area under paddy, wheat and maize has recorded an increase, while Jowar, mustard has decreased during the period 1995-96 and 2015-16. It is interesting that more than 50 per cent area under food grains crops is an indication of self-sufficiency in food in the district. Not only that, the change in land use depends on the natural environment particularly nature of the terrain, availability of water supply in crop area and soil situation are the main factors which determine cropping pattern in an area (Jain, 1988).

### 7.1.a Cropping seasons in Uttar Dinajpur District

There are two main agricultural seasons in the district. The *Kharif* or the season of summer crops and the *Rabi* or the season of winter crops. The foremost agricultural season starts with the arrival of South-West monsoon showers which lasts up to the middle of October and accounts for 70-80 per cent of the twelve months rainfall received. In the basis of monsoon, there are three major crop seasons in Uttar Dinajpur District. These are discussed below-

#### i) Kharif season (July to October)

The *Kharif* crops are associated with the monsoon season. They are sown in the months of June-July and are harvested in autumn months i.e. in October-November. The various *Kharif* crops are reaped between September and December. Important *Kharif* crops in Uttar Dinajpur District are rice, *jowar*, maize, ragi, sugarcane and jute etc. *Kharif* season includes early maturing crops of Bhadoi crops. Bhadoi crops are grown during the first part of the rainy season. These crops mature within two and a half to three months and crops are raised without irrigation. During 2015-16, Uttar Dinajpur District recorded 1,984.80 hundred hectares of land devoted to the cultivation of *Kharif* paddy crops. The total area devoted to the production of *Kharif* crops constituted 38.68 per cent of the total gross cultivated area of the district. The *Kharif* crops area in different blocks of the district is not uniform.



**Plate 7.1** Fertile alluvial soil is in favour of kharif paddy cultivation in Itahar block.

#### ii) Rabi season (November to April)

The *Rabi* crops are shown in the period between late November to April and May. This crop differs in kind from the *Kharif* crops and requires cool weather and only a moderate supply of water. In the district, important *Rabi* crops are wheat, maize, groundnut, pulses, mustard, peas and rapeseed. *Rabi* crops are the cropping season of dry weather periods. Not only is that, *Rabi* crops fully depend upon huge irrigation. After 1980-81, the *Rabi* crop area increases

tremendously. The causes of increases in *Rabi* crop area are: farmers are benefiting from different package programs of agricultural development and introduction of chemical fertilizers as well as pesticides. During 2015-16, total 2,111.46 hundred hectares of cropped land was devoted to the production of *Rabi* crops in the district this constitutes 42.17 per cent of the total gross cropped area. The proportionate area under *Rabi* crops is highly variable from one block to another. This is the period of only some infrequent rainfall which favors the crops of the period. But irrigation developments in the area under the *Rabi* crops are limited. In the district, *Rabi* is the important season of different types of vegetable production. According to the demand, the district is reaching a satisfactory level of vegetable demands. Not only are that, over and above vegetables exported to the other districts of West Bengal. In the year 2015-16, total of 228.58 thousand metric tonnes of *Rabi* vegetables are produced in the district (Deputy Directorate of Agriculture, Uttar Dinajpur, 2015).

### iii) Zaid season (April to July)

*Zaid* crops are sown in the summer season. The *Zaid* crops are sown in the period between April to July. In the district, important *Zaid* crops are maize, cucumber, melon and different vegetables.



**Plate 7.2** Proper use of chemical fertilizer and pesticides in *rabi* mustard in Kaliaganj block.

Changing the cropping pattern depends on different things like; trends in the area under different crops, production rate, the productivity of crops, size of farms etc. The sub-unit has been divided into three sections viz, trends in the area under major crops, changes in production and productivity and farm size and cropping pattern.



**Plate 7.3** Supply of irrigation water in *zaid* season cucumber in Itahar block.

### **7.1.b Agricultural operations**

The nature and type of tilling, cultivation and agricultural operations like ploughing, cold-crushing and levelling, sowing, harvesting, threshing and winnowing in the district are interdependent on the various type's implements which are in practice (Kumar, 1986). Agricultural operations normally start in the district during the last week of May to the 1<sup>st</sup> week of June when Bhadoi crops are sown. Paddy seedling is sown in the early middle of June and the transplantation of paddy normally starts in middle July and ends by the end of August. Periodic rains from December to February are also essential for good rabi harvest. The agricultural calendar reveals the operation of agriculture of different crops. The calendar concerning the start of agricultural seasons beginning of harvest in the region are also worth-mentioning which is noted in the table 7.1 (Appendix VII).

#### **7.1.1 Trends in area under major crops**

In Uttar Dinajpur District during the year 1995-96 cultivated land was 358.23 thousand hectares and it has increased to 499.63 thousand hectares in the year 2015-16 (PAO, Uttar Dinajpur, 2015) of total land which is variably distributed in nine C.D. Blocks of the district. Foodgrains have occupied nearly three-fourth (74.88 per cent) of the total cropped area; nearly 11.29 per cent of the area under oilseeds, and about 11.10 per cent cropped area is under fiber crops in the district. About 59.18 per cent of the food grains of the total cropped area of the district has been occupied by two main kinds of cereal crops i.e. *paddy* and *wheat*. Some other important cereals are *barley*, *jowar*, *maize* and some types of millet. The area under *wheat*, *rice* and *maize* has recorded an increase, while *bajra*, *the mustard* area has decreased during the period 1995-96 and 2015-16. The *khesari*, *pea* and *lentil* have occupied 0.86 per cent of the

total cropped area and 67.56 per cent of the total area of the pulses in the year 2015-16. The area under *gram*, *tur* and *lentil* have increased while area under *gram*, *arhar* and *mashkalai* has decreased during 1995-96 to 2015-16. Not only was that, about 11.56 per cent of the total cropped area under miscellaneous crops. More than 70 per cent of area is under food grain crops i.e. a good indication of self-sufficiency in food in the district. For a better analysis of this section, we have analyzed the areas under some major crops at block level from the year 1995-96 to 2015-16 of Uttar Dinajpur District.

### 7.1.1.1 Paddy area

Paddy is the major cereal crop in the district. It is sown in June and harvested from about the middle of September onwards depending upon the weather (main paddy growing in winter season). It is a water-loving tropical crop requiring high temperature and well-distributed rainfall between 1,200 to 1,500 mm during the growing season. It best thrives well on clay and clay loam soils (Morepatil, 1995). The paddy plant grows from 60 to 150 cm tall with a round, joint stem and long pointed leaves. In the district, mainly three types of paddy are grown in Autumn season known as '*Aus*', grown in Winter season known as '*Aman*' and grown in summer season known as '*Boro*'. The total area under paddy was 2,651 hundred hectares in the year 1995-96, and it has increased to 2,785.86 hundred hectares in 2005-06. But in the last ten years, it rose from 2,785.86 in 2005-06 to 2,966.50 hundred hectares in the year 2015-16 in the district. The block-wise paddy area of the district is shown in table 7.2.

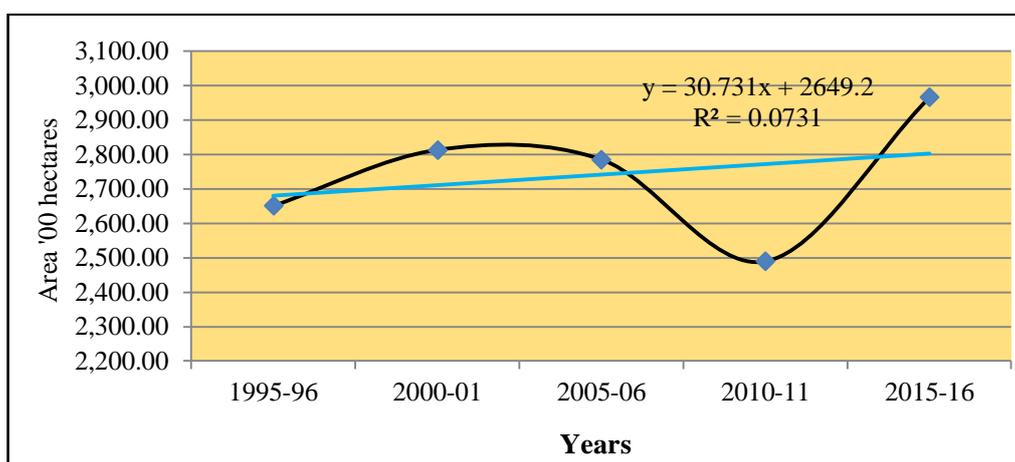
**Table 7.2** Block-wise area under paddy (1995-96 to 2015-16).  
(Area in '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	255.40	246.30	177.70	168.32	289.20	13.23
Islampur	259.60	229.60	230.07	219.85	293.00	12.86
Goalpokher-I	277.30	300.90	284.30	295.51	345.00	24.41
Goalpokher-II	245.30	199.40	258.14	247.34	290.00	18.22
Karandighi	464.10	494.40	471.50	357.77	498.70	7.45
Raiganj	324.20	451.30	402.98	422.04	362.50	11.81
Hemtabad	179.60	179.60	198.02	158.61	199.00	10.80
Kaliaganj	276.90	339.40	343.27	238.02	301.10	8.73
Itahar	368.60	372.80	419.88	382.55	388.00	5.26
<b>Uttar Dinajpur</b>	<b>2,651.00</b>	<b>2,813.70</b>	<b>2,785.86</b>	<b>2,490.01</b>	<b>2,966.50</b>	<b>11.90</b>

- Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

From table 7.2, it is revealed that the block-wise lowest growth of paddy area (5.26 per cent) found in Itahar Block i.e. 368.60 hundred hectares in 1995-96 and it has increased to 388.00

hundred hectares in 2015-16. And highest growth was found in Goalpokher-I (24.41 per cent), it was 277.30 hundred hectares in 1995-96 and it was 345 hundred hectares in 2015-16. Not only that, out of nine blocks five of them namely; Karandighi (7.45 per cent), Raiganj (11.81 per cent), Hemtabad (10.80 per cent), Kaliaganj (8.73 per cent) and Itahar (5.26 per cent) are showing changing rates far below the district average. But remaining four blocks namely; Chopra (13.23 per cent), Islampur (12.86 per cent), Goalpokher-I (24.41 per cent) and Goalpokher-II (18.22 per cent) are showing the change of paddy area far higher than the district average (11.90 per cent). In the year 2000-01, the total area was 2,813.70 hundred hectares and it has decreased to 2,785.86 hundred hectares in 2005-06. Once again, the total area of paddy has decreased in 2010-11 and it was 2,490.01 hundred hectares. The most interesting fact that the total area of paddy again increases in 2015-16 which has been 2,966.50 hundred hectares. But if we consider the same in respect of West Bengal it is seen that in 2000-01 it was 54,353 hundred hectares and in 2015-16 it stood at 54,830 hundred hectares (NFSM, 2015-16).



**Figure 7.1** Growth of paddy area in Uttar Dinajpur District (1995-2016).

A better understanding of the growth of the paddy area in the district between 1995-96 and 2015-16 has been shown in the table 7.3.

**Table 7.3** Percentage change of the paddy area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very Low	<8	2	Itahar, Karandighi
Low	8-12	3	Raiganj, Hemtabad & Kaliaganj
Medium	12-16	2	Chopra, Islampur
High	16-20	1	Goalpokher-II
Very High	>20	1	Goalpokher-I

Source: Computed by the researcher.

From table 7.3 and figure 7.2-A, a very low zone lies in the northern and central part of the district with a change index value of less than 8 per cent. Out of total nine blocks, two blocks

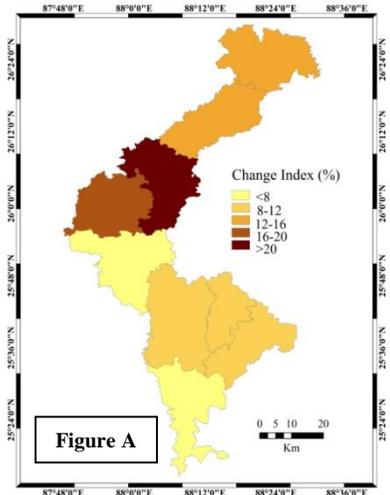
of them namely Itahar (5.26 per cent) and Karandighi (7.45 per cent) lies in this zone. Causes of low change of paddy area are an implementation of better production knowledge in harsh rainfed ecosystems has not pulled up its desire force. Therefore, the productivity of paddy in these ecosystems is considerably poor; farmers are interested to produce the vegetables for more profits, non-availability of bullock/power drawn vehicles for timely transplanting of paddy crops.

The low change of paddy area is observed in three blocks namely, Raiganj (11.81 per cent), Hemtabad (10.80 per cent) and Kaliaganj (8.73 per cent). Medium change of paddy area with a change index value 12 to 16 per cent is observed in two blocks namely, Chopra (13.23 per cent) and Islampur (12.86 per cent) in the district. On the other hand, high paddy area is observed in Goalpokher-II Block (18.22 per cent) in the district. This zone lies in the North-western part of the district. The very high change was observed in only one Block namely Goalpokher-I (24.41 per cent) with an index value of more than 20 per cent (table 7.3). This zone lies in the Northern part of the district. Major causes behind the very high change of paddy area are the development of irrigation, increasing-price of paddy, availability of high yielding varieties seeds of paddy i.e. more productiveness and many others.

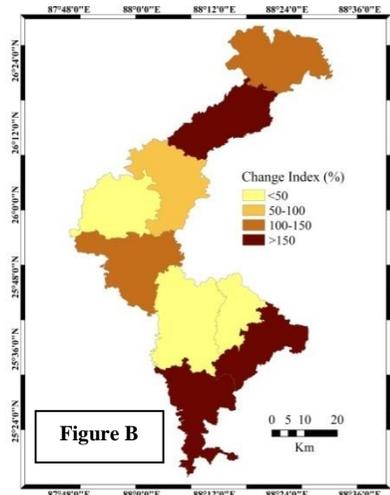
#### **7.1.1.2 Wheat area**

Next to paddy, wheat is the second most important food grain of Uttar Dinajpur District. It is rich in proteins, vitamins and carbohydrates and provides balanced food. Conditions of growth for wheat are more flexible than those of paddy. In contrast to paddy, wheat is a *rabi* crop that is sown at the beginning of winter and harvested at the beginning of summer. Most of the famous and reputed wheat sown in the district are *Poorva (HD-2824)*, *HP-1731*, *Raj-3765*, *Sonalika-80*, *HRD 77* and *PBW-343*, etc. The total area under wheat was 261 hundred hectares in the year 1995-96, which was 8.43 per cent of the total food grains and 6.19 per cent of the total cropped area. But the area under wheat has been registering an increasing trend from 1995-96. In the year 2015-16, the total area under wheat is increased to 533.30 hundred hectares which was 14.25 per cent of the total foodgrains and 10.65 per cent of the total cropped area in the district. The block-wise wheat area of the district is shown in table 7.4.

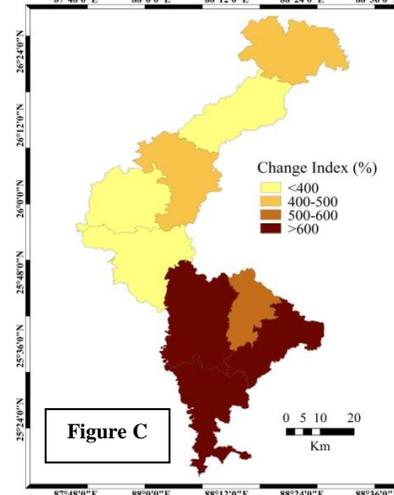
CHANGE OF THE PADDY AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



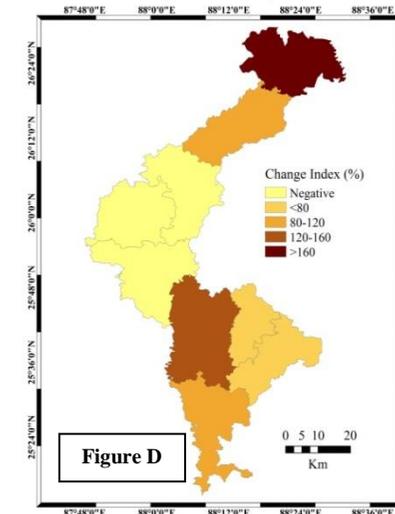
CHANGE OF THE WHEAT AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



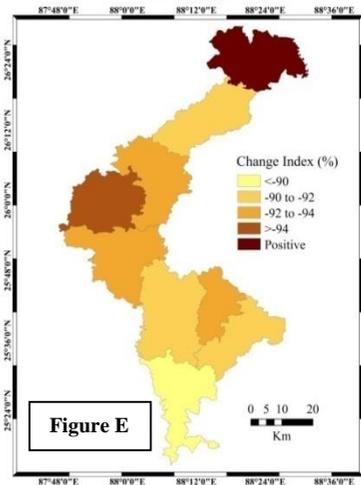
CHANGE OF THE POTATO AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



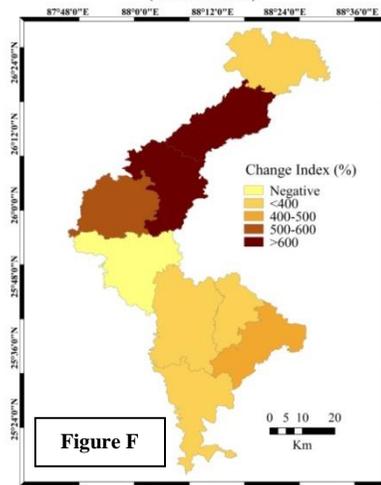
CHANGE OF THE MUSTARD AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



CHANGE OF THE MUSHKALAI AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



CHANGE OF THE LENTIL AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)



CHANGE OF THE JUTE AREA (%) IN UTTAR DINAJPUR DISTRICT (1995-96 to 2015-16)

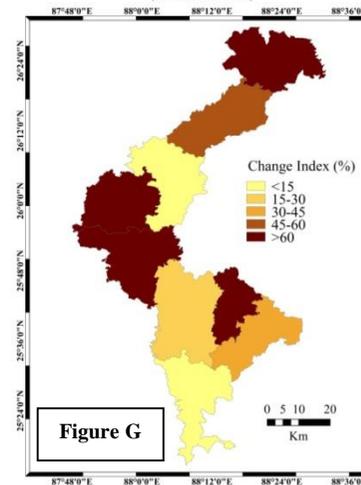


Figure 7.2 Change of area (%) of selected crops in Uttar Dinajpur District (1995-96 to 2015-16).

**Table 7.4** Block-wise area under wheat in Uttar Dinajpur District (1995-96 to 2015-16).  
(Area in '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	13.60	47.30	15.33	10.51	32.10	136.02
Islampur	8.80	31.20	31.79	37.54	35.00	297.72
Goalpokher-I	49.30	42.90	38.51	57.38	74.00	50.10
Goalpokher-II	35.60	37.30	39.81	50.00	46.00	29.21
Karandighi	38.80	19.40	87.39	69.14	90.00	131.96
Raiganj	56.70	68.80	75.39	64.60	85.00	49.91
Hemtabad	26.30	44.20	36.87	15.51	38.50	46.38
Kaliaganj	14.50	27.00	25.49	22.68	55.00	279.31
Itahar	17.40	57.00	31.72	42.69	77.70	346.55
<b>Uttar Dinajpur</b>	<b>261.00</b>	<b>375.10</b>	<b>382.30</b>	<b>370.05</b>	<b>533.30</b>	<b>104.33</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

From table 7.4 it is revealed that the block-wise highest growth rate of the wheat area found in Itahar Block which is 346.55 per cent growth over last twenty years in the district. It was 17.40 hundred hectares in 1995-96, but it reached 77.70 hundred hectares in 2015-16. And the lowest growth rate of wheat found in Hemtabad Block (46.38 per cent) over the study period. The area under wheat has registered an increasing trend since 1995-96 (except 2010-11). During 2000-01, the total wheat area was 375.10 hundred hectares but the area of wheat has increased and it was 382.30 hundred hectares in 2005-06. Once again in 2010-11, the area of wheat has decreased by 370.05 hundred hectares in the district. The causes of decrease in the wheat area are climate change as well as monsoon reverting before the time, irrigation application problems, increasing temperature and shortage of soil water can failure or inadequacy of rains cause fluctuation in yields.

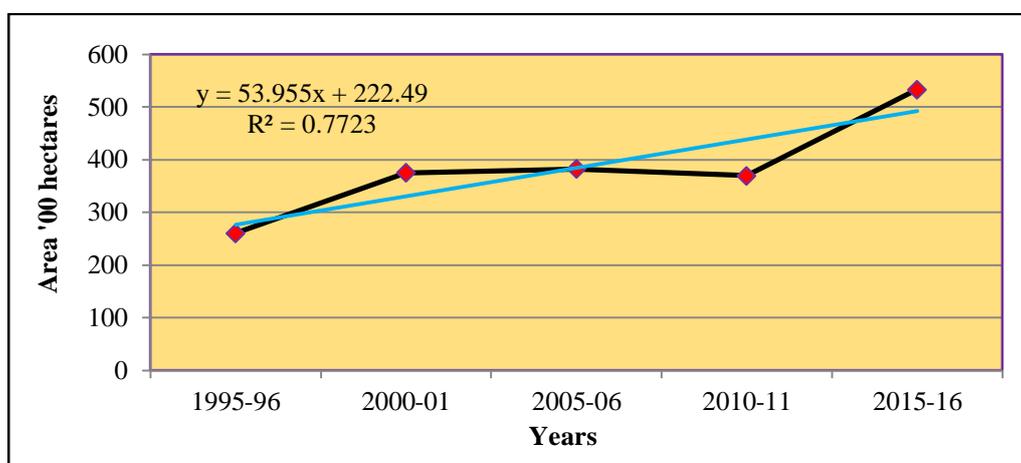
To understand the actual change of wheat area for the study period, changes were categorized and findings are represented in the table 7.5.

**Table 7.5** Percentage change of the wheat area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very Low	< 50	3	Goalpokher-II, Raiganj and Hemtabad
Low	50-100	1	Goalpokher-I
Medium	100-150	2	Chopra and Karandighi

High	>150	3	Islampur, Kaliaganj and Itahar
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Source: Computed by the researcher.



**Figure 7.3** Growth of wheat area in Uttar Dinajpur District (1995-2016).

From table 7.5 it is observed that a very low zone of wheat area (figure 7.2-B) lies in the central and southern part of the district with a change index value of less than 50 per cent. Out of total nine blocks, three blocks of them namely Goalpokher-II (29.21 per cent), Raiganj (49.91 per cent) and Hemtabad (46.38 per cent) lies in this zone. Causes of low change of wheat area are- farmers are not interested in sowing for fewer profits, last few years dazzling diseases of wheat are major causes of very low change in these blocks. Therefore, productivity of wheat in these ecosystems is considerably poor; farmers are interested in products such as the mustard, maize and potato for more profits, non-availability of bullock/power drawn vehicles for timely transplanting of wheat crops. Low change of wheat area is observed in one block namely, Goalpokher-I (50.10 per cent). Medium change of wheat area with a change index value 100 to 150 per cent is observed in two blocks namely, Chopra (136.02 per cent) and Karandighi (131.96 per cent) in the district. On the other hand, high wheat area change is observed in Islampur Block (297.72 per cent), Kaliaganj (279.31 per cent) and Itahar (346.55 per cent) in the district. This zone lies in Northern and southern part in the district (figure 7.2-B) with an index value more than 150 per cent (table 7.5). Major causes behind the very high change of wheat area in these Blocks are fertile soils, no dominance of dazzling diseases, availability of irrigation and availability of high yielding varieties seeds of wheat i.e. more profitable and many others outcomes.

### 7.1.1.3 Potato area

Among the foodgrains, potato is the most important crops in Uttar Dinajpur District. Potato is a starchy plant tuber which is one of the most important crops in *rabi* season, cooked and eaten as a vegetable. Potatoes like cool weather and well-drained, loose soil that is about 10° to 18°C and 300-450 mm rainfall required. The popular varieties of potatoes are *Kufri Alankar*, *Kufri Sutlej*, *Kufri Himsona*, *Kufri Dabshah* and *Kufri Jyoti*, etc. The actual time of potato sowing in the district during the months October to November. In the district, the total area under potato was 51.03 hundred hectares, which was 1.64 per cent of the total food grains and 1.21 per cent of the total cropped area in the year 1995-96. The area under potato has registered an increasing trend since 1995-96. The potato area has recorded more than four and half times increase during the last twenty years, from 51.03 hundred hectares to 232.75 hundred hectares in the year 2015-16 which was 4.65 per cent of the total food grains area and 6.22 per cent of the total cropped area. The block-wise clear concept of area change under the potato is considered in the table 7.6.

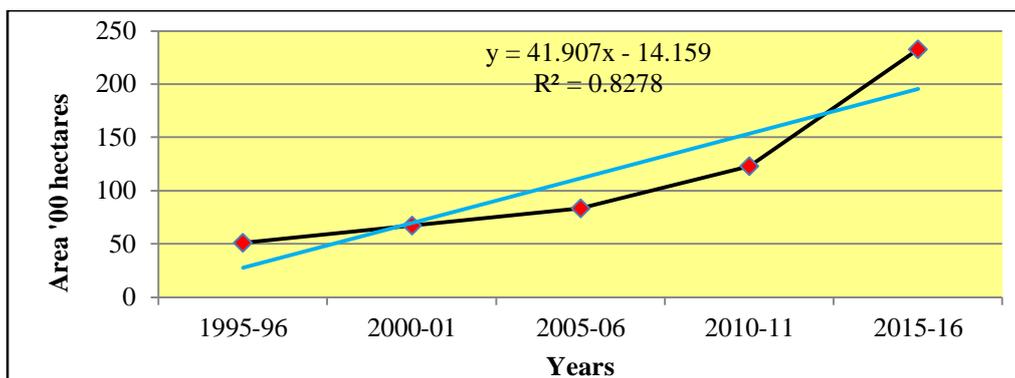
**Table 7.6** Block-wise area under potato in Uttar Dinajpur District (1995-96 to 2015-16).  
(Area in '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	6.14	17.50	5.40	7.55	31.80	417.91
Islampur	21.30	9.50	11.68	27.56	43.00	101.87
Goalpokher-I	4.33	5.70	6.77	15.33	24.50	465.82
Goalpokher-II	6.71	10.20	7.49	11.39	14.30	113.11
Karandighi	3.69	1.10	16.11	8.12	6.60	78.86
Raiganj	2.23	2.80	17.99	10.65	33.00	1379.82
Hemtabad	1.99	4.80	1.66	9.25	12.00	503.01
Kaliaganj	2.72	3.50	11.73	19.06	34.50	1168.38
Itahar	1.92	12.30	4.77	14.12	33.05	1621.35
<b>Uttar Dinajpur</b>	<b>51.03</b>	<b>67.40</b>	<b>83.60</b>	<b>123.03</b>	<b>232.75</b>	<b>356.10</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

From table 7.6 it is revealed that Block-wise highest potato growth rate is found in Itahar Block which constitutes about 1,621.35 per cent. The total area under potato was 2.23 hundred hectares in 1995-96, which has increased to 33 hundred hectares in the year 2015-16. But the lowest growth rate is found in Karandighi Block (78.86 per cent) i.e. it was 3.69 hundred hectares in 1995-96, and the area increased to 6.60 hundred hectares in the year 2015-16 (table 7.6). The area under potato has registered an increasing trend from 1995-96 to 2015-16. During 2000-01, the area of potato was 67.40 hundred hectares which increased to 83.60 hundred hectares in 2005-06, 123.03 hundred hectares in 2010-11 and 232.75 hundred hectares in 2015-

16. For the better idea of the actual change of potato area for the study period is considered in the table 7.7.



**Figure 7.4** Growth of potato area in Uttar Dinajpur District (1995-2016).

**Table 7.7** Percentage change of the potato area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very Low	<400	3	Islampur, Goalpokher-II and Karandighi
Low	400-500	2	Chopra and Goalpokher-I
Medium	500-600	1	Hemtabad
High	>600	3	Raiganj, Kaliaganj and Itahar

Source: Compiled by the researcher.

Table 7.7 shows changes in potato area in the district. All of the blocks are showing positive changes but the proportion of area involved in increase ranges from 78.86 per cent to over 1379 per cent. Very low change is found in three blocks namely Islampur (101.87 per cent), Goalpokher-II (101.11 per cent) and Karandighi (78.86 per cent). This zone lies in the northern part of the district (figure 7.2-C). But low potato area change found in two blocks namely Chopra and Goalpokher-I with a change index 417.91 per cent and 465.82 per cent respectively (table 7.6). This zone lies in the northern part of the district (figure 7.2-C). Its distribution ranges from 400-500 per cent. The main causes of low change is unfavorable physical factors as well as the undulating surface which is not suitable for potato cultivation in these two blocks. The medium proportion of potato area change ranges from 500-600 per cent is recorded in only block namely Hemtabad (503.10 per cent). On the other side, high changes in potato area proportion above 600 per cent are recorded in the remaining three blocks namely Raiganj (1,379.82 per cent), Kaliaganj (1,168.38 per cent) and Itahar (1,621.35 per cent). The change rate is very high due to favorable physical conditions as well as plain surface, sandy types of soil which is suitable for potato grown, irrigation facilities available and location of cold storage in these blocks.

### 7.1.1.4 Mustard area

Mustard is the most important oilseed in the district. It is a *rabi* crop and sowing in the winter season. Mustard is cultivated from October to November month and harvested in 3-4 months in February to March. The temperature required during sowing time is 20-22°C and harvesting time is 28-30°C. The most popular mustards are *Rai* (botanical name-brassica alba) and *Hirta* (botanical name-Sinapis alba). The total area under mustard was 322.50 hundred hectares in the year 1995-96, which was 89.33 per cent of the total oilseed area and 7.64 per cent of the total cropped area in the district. But in the year 2015-16, the mustard area has increased from 322.50 hundred hectares to 399.60 hundred hectares, which was 70.80 per cent of the total oilseeds area and 7.98 per cent of the total cropped area in the district. For the better understanding, the block-wise mustard area has been considered and discussed in the table 7.8.

**Table 7.8** Block-wise area under mustard in Uttar Dinajpur District (1995-96 to 2015-16).  
(Area in '00 hectares)

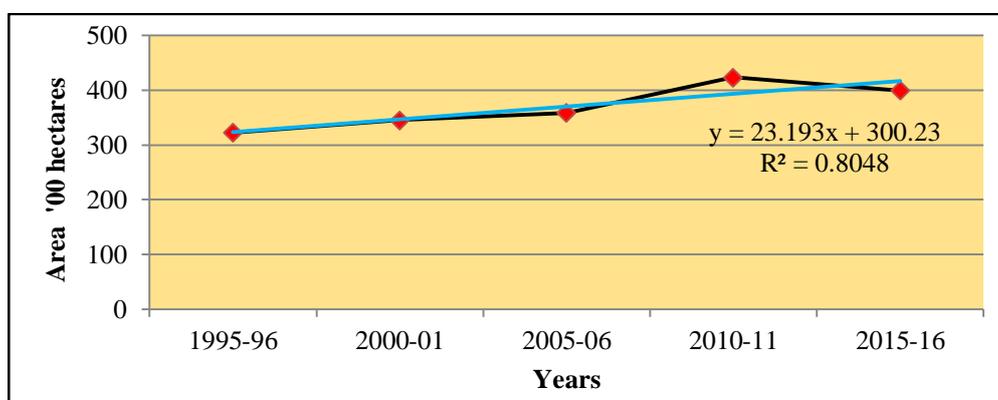
Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	3.20	3.90	4.28	7.50	21.05	557.81
Islampur	16.20	25.80	30.26	37.33	34.00	109.87
Goalpokher-I	53.90	35.10	24.72	53.50	37.20	-30.98
Goalpokher-II	26.90	35.10	30.48	40.69	21.50	-20.07
Karandighi	48.60	51.40	35.95	44.89	39.40	-18.93
Raiganj	73.00	88.60	79.94	88.19	98.15	134.45
Hemtabad	26.90	21.00	27.07	27.92	29.10	8.17
Kaliaganj	34.50	29.40	26.40	25.15	36.65	6.23
Itahar	39.90	55.00	99.53	97.86	82.10	108.90
<b>Uttar Dinajpur</b>	<b>322.50</b>	<b>345.30</b>	<b>358.63</b>	<b>423.03</b>	<b>399.60</b>	<b>23.90</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

It is revealed from table 7.8, the block-wise highest growth rate of the mustard area found in Chopra Block which is 557.81 per cent. In 1995-96, the area under mustard was 3.20 hundred hectares and it has increased to 21.05 hundred hectares in the year 2015-16. The causes of growth of area under mustard are undulating surface not suitable for rice or wheat. So, farmers are interested in growing the oilseeds, pulses, etc. and the lowest change is observed in Goalpokher-I Block (-30.98 per cent) which is negative growth of the mustard area in the district. It is because farmers are interested in growing other profitable crops like potato, turmeric and many other food grain crops. In the study period, out of nine C.D. Blocks, three of them show negative growth rates- namely Goalpokher-I, Goalpokher-II and Karandighi. The total area under mustard was 322.50 hundred hectares in 1995-96, in 2000-01 it has increased

345.30 hundred hectares, in 2005-06 it was increased 358.63 hundred hectares, once more has been increased to 423.03 hundred hectares in 2010-11 and 2015-16, it has decreased to 399.60 hundred hectares in the district. For the proper understanding of area change of mustard, it is represented in the table 7.9.

From the table 7.9, changes in the mustard area are also observed in the district. It is notable fact that, out of the nine blocks comprising the district only three blocks have registered negative change for the study period namely Goalpokher-I (-30.98 per cent), Goalpokher-II (-20.07 per cent) and Karandighi Block (-18.93 per cent). Very low change of mustard area is observed in two blocks namely Hemtabad (8.17 per cent) and Kaliaganj (6.23 per cent) in the district (table 7.8).



**Figure 7.5** Growth of mustard area in Uttar Dinajpur District (1995-2016).

**Table 7.9** Percentage change of the Mustard area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative	(-)	3	Goalpokher-I, Goalpokher-II and Karandighi
Low	<80	2	Hemtabad and Kaliaganj
Medium	80-120	2	Itahar and Islampur
High	120-160	1	Raiganj
Very high	>160	1	Chopra

Source: Compiled by the researcher.

This zone lies in the Northern part of the district (figure 7.2-D). Medium change of mustard area is found in two blocks namely Itahar and Islampur with change index 108.90 per cent and 109.87 per cent respectively. But high change area of mustard is observed in only one block namely Raiganj (134.45 per cent) with ranges from 120 to 160 per cent (table 7.9). This zone lies in the North-Eastern part of the district. Causes of high change are day to day increasing demand for mustard oil, available oil mills located in the nearest block (at Kaliaganj), more profits and many others. On the other hand, a very high change area is observed in one block namely Chopra (557.81 per cent) i.e. proportion of gross cropped area under mustard has

recorded 27.89 per cent increase per annum during the period (3.20 hundred hectares to 21.05 hundred hectares).

### 7.1.1.5 Mashkalai (vigna mungo) area

Mashkalai is a pulse generic crop. It is a *rabi* crop and it is sown in the winter season. Mashkalai is cultivated in September to October month and harvesting in 2 to 2<sup>1</sup>/<sub>2</sub> months in December to January. The temperature required in sowing time is 22° to 25°C and harvesting time 20° to 22°C. Irrigation water is not required in this crop. Major varieties of mashkalai in the district are *Goalior-2*, *JU-2*, *Pant U-13* and *Barkha*. The total area under mashkalai was 50.90 hundred hectares in 1995-96, which was 46.69 per cent of the total pulses area and 1.21 per cent of the total cropped area in the district. But in the year 2015-16, mashkalai area increased from 50.90 hundred hectares to 64.01 hundred hectares, which was 8.04 per cent of the area of the total pulse and 0.10 per cent of the total cropped area in the district. It is notable that, total area has increased (50.90 hundred hectares to 64.01 hundred hectares) but the area in percentage has decreased (1.21 per cent in 1995-96 to 0.10 per cent in 2015-16). For the better appreciation block-wise areas of mashkalai have been considered and criticize in the table 7.10.

**Table 7.10** Block-wise area under Mashkalai in Uttar Dinajpur District (1995-96 to 2015-16).  
(Area in '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	0.10	1.00	-	0.10	0.12	20.00
Islampur	-	1.30	0.48	0.90	0.13	-90.00
Goalpokher-I	2.90	1.50	0.87	3.35	0.18	-93.79
Goalpokher-II	7.10	8.20	0.32	-	0.12	-98.31
Karandighi	1.50	-	1.78	-	0.10	-93.33
Raiganj	8.90	0.70	7.65	1.91	0.80	-91.01
Hemtabad	11.50	2.80	1.30	2.69	0.70	-93.91
Kaliaganj	15.60	0.20	6.66	5.14	1.50	-90.38
Itahar	3.30	0.60	0.14	-	1.50	-54.55
<b>Uttar Dinajpur</b>	<b>50.90</b>	<b>16.30</b>	<b>19.20</b>	<b>14.09</b>	<b>5.15</b>	<b>-89.88</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

It is notable from the table 7.10, the area changes in mashkalai are based on the data of two periods i.e. 1995-96 and 2015-16. The increase and decrease in crop area is assessed by the simple subtraction of two percentage values and thus the blocks are grouped into five categories of change (table 7.10). Block-wise highest (positive) growth rate of mashkalai area found in Chopra Block which is 20 per cent (i.e. 0.10 hundred hectares in 1995-96 to 0.12 hundred hectares in 2015-16). The cause of growing area under mashkalai is the undulating surface

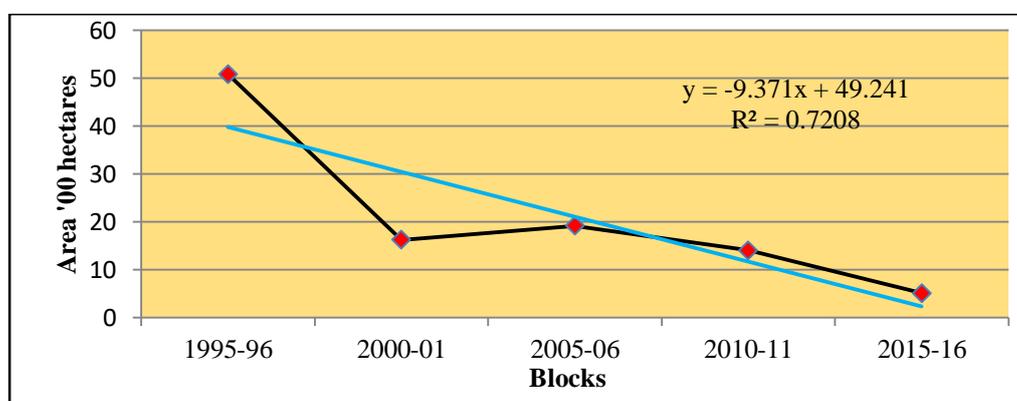
where irrigation water cannot stay a long time. So, soil moisture scarcity occurs after a few days. In this type of surface character, it is suitable for pulses type of crops. On the other hand lowest (negative change) change is observed in Goalpokher-II (-98.31 per cent). Wherefore food grain crops area increased day to day in this block. The most noticeable change of mashkalai is observed in all blocks of the district. Out of the total nine blocks, only one block namely Chopra (20 per cent) have registered positive increase in mashkalai area. But the decrease (negative change) in mashkalai area is observed in the remaining eight blocks. Over negative (-90 per cent) change in mashkalai area is recorded in six blocks (table 7.10) and below 90 per cent decrease is in two blocks in the district. From the overall district, in 1995-96, total area under mashkalai is 50.90 hundred hectares; in 2000-01 it has decreased to 16.30 hundred hectares. But in the year 2005-06, it has increased to 19.20 hundred hectares. Once more in 2010-11 and 2015-16, it has decreased to 14.09 and 5.15 hundred hectares respectively in the district. A better understanding of actual change in the mashkalai area is discussed in table 7.11.

**Table 7.11** Percentage change of the Mashkalai area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	<90	1	Itahar
Low	90 to 92	3	Islampur, Kaliaganj and Raiganj
Medium	92 to 94	3	Goalpokher-I, Karandighi and Hemtabad.
High	>94	1	Goalpokher-II
Positive	20	1	Chopra

Source: Compiled by the researcher.

Table 7.11 also reveals a significant decrease in mashkalai area. A striking decrease i.e. below -90 per cent is noted in only one block namely Itahar (-90.38 per cent). This zone lies in the Northern part of the district (table 7.11 and figure 7.2-E). But low negative change of mashkalai area is observed in three Blocks namely Islampur (-90 per cent), Raiganj (-91.01 per cent) and Kaliaganj (-90.38 per cent).



**Figure 7.6** Growth of mashkalai area in Uttar Dinajpur District (1995-2016).

This zone lies in Northern and northern-western part of the district (figure 7.2-E). Medium negative change of mashkalai area found in only three blocks namely Goalpokher-I (-93.79 per cent), Karandighi (-93.33 per cent) and Hemtabad (-93.91 per cent). On the other hand, high category of negative change is found in one block namely Goalpokher-II (-98.31 per cent). This zone lies in the central part of the district (figure 7.2-E). The cause of negative growth of mashkalai in eight blocks is cereals crop as well as food grains crop area year to year increased (table 7.2, 7.4 and 7.6) in the district. A positive change area is observed in one block namely Chopra (20 per cent) i.e. proportion of gross cropped area under mashkalai has recorded only 0.80 per cent increase per annum during the period, from 0.10 hundred hectares (1995-96) to 0.12 hundred hectares (2015-16).

### 7.1.1.6 Lentil area

Lentil is greatly helpful for its nutrition perspective. The reason being it comprises 25 per cent to 30 per cent of the non-vegetarian component. In Uttar Dinajpur District there is enough demand for lentils and it is also well cultivated. It grows well in almost all types of land and where water is stagnant there this crop cannot be cultivated well. The suitable soil for lentils is loamy and sandy soil. In the district, high yield varieties of lentils are *Asha (B-77)*, *Ranjan (B-256)* and *Subrata (WBL)* and local varieties are *Mallika (K-75)* and *L- 4076*. It is sown in the winter season. The ideal planting time is the middle of October to the first week of November and harvesting in 3 to 3½ months in the last week of February to the middle of March month. Generally, it does not call for any irrigation but in sandy soil, sometimes irrigation is required. In the district, the total area under lentil was 14.28 hundred hectares in the year 1995-96, which was 13.10 per cent of the total pulses area and 0.33 per cent of the total cropped area. But in the year 2015-16, the lentil area increased from 14.20 hundred hectares to 17.25 hundred hectares, which was 26.95 per cent of the area of the total pulse and 0.34 per cent of the total cropped area. Remarkably, a total of 2.97 hundred hectares area has been increased in the study period i. e. 1995-96 to 2015-16. A clear picture of lentil area change in the district is shown in the table 7.12.

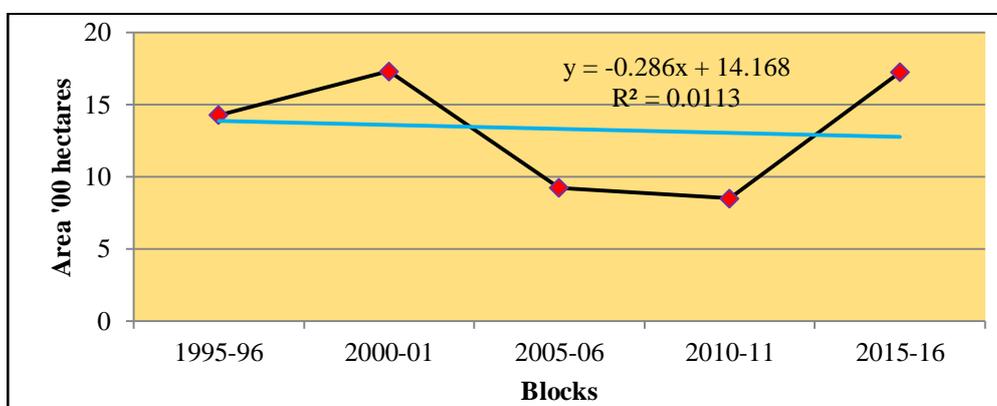
**Table 7.12** Block-wise area under Lentil in Uttar Dinajpur District (1995-96 to 2015-16).  
(Area in '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	-	-	1.50	-	1.80	20.00
Islampur	0.04	0.03	-	-	0.60	1400.00
Goalpokher-I	0.03	0.04	-	0.20	1.15	3733.33
Goalpokher-II	0.20	0.03	-	-	1.40	600.00
Karandighi	0.50	0.05	1.71	0.49	0.30	-40.00

Raiganj	11.60	2.10	4.42	2.81	21.30	83.62
Hemtabad	0.09	1.30	0.21	0.55	2.00	122.22
Kaliaganj	0.70	0.50	2.64	3.90	3.60	414.28
Itahar	0.03	11.90	0.19	0.54	0.25	16.67
<b>Uttar Dinajpur</b>	<b>14.28</b>	<b>17.30</b>	<b>9.22</b>	<b>8.50</b>	<b>17.25</b>	<b>20.80</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

Table 7.12 shows the noticeable change in the lentil area of all blocks in Uttar Dinajpur District. Out of the nine blocks, only one block namely Karandighi has a negative (-40 per cent) change. Remaining eight blocks have registered an increase in lentil area. Block-wise highest growth rate of lentil area is found in Goalpokher-I Block (3,733.33 per cent), which was 0.03 hundred hectares in 1995-96 and in the year 2015-16 it has increased to 1.15 hundred hectares. The main causes of lentil area increase are scarcity of rainwater as well as irrigation in this season, late monsoon and high price of chemical fertilizer and many others which forces the farmers to sow the lentil as well as pulse types of crops. Not only that, only three blocks namely Chopra (20 per cent), Karandighi (-40 percent) and Itahar (16.67 per cent) growth rate are below the district level. The remaining six blocks namely Islampur (1400 per cent), Goalpokher-I (3,733.33 per cent), Goalpokher-II (600 per cent), Raiganj (83.62 per cent), Hemtabad (122.22 per cent) and Kaliaganj (414.28 per cent) are far above the district level (20.80 per cent). From the overall district in 1995-96, total area under lentil was 14.28 hundred hectares; in 2000-01 it has increased to 17.30 hundred hectares. But in the year 2005-06, it has again decreased to 9.22 hundred hectares. Once more in 2010-11, it has decreased to 8.50 hundred hectares and in 2015-16, the total area of lentil increased to 17.25 hundred hectares in the district. For the proper idea of lentil area change in each block in the district has been represented in the table 7.13.



**Figure 7.7** Growth of lentil area in Uttar Dinajpur District (1995-2016).

**Table 7.13** Percentage change of the lentil area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative	-	1	Karandighi
Very low	<400	4	Chopra, Raiganj, Hemtabad and Itahar
Low	400-500	1	Kaliaganj
Medium	500-600	1	Goalpokher-II
High	> 600	2	Islampur & Goalpokher-I

Source: Compiled by the researcher.

Table 7.13 noted that a significant decrease in the lentil area is shown in some blocks in the district. A noticeable decrease observed in one block namely Karandighi (- 40 per cent). This zone lies in central part of the district (figure 7.2-F). But very low change of lentil area observed in four blocks namely Chopra (20 per cent), Raiganj (83.62 per cent), Hemtabad (122.22 per cent), and Itahar (16.67 per cent) in the district (table 7.12). This zone lies in Northern and Southern part of the district (figure 7.2-F). Low change of the lentil area is observed in one block namely Kaliaganj (414.28 per cent) with change index of 400 to 500 per cent. On the other hand, medium change area is found in also one block namely Goalpokher-II (600 per cent). This zone lies in the northern-western part of the district (figure 7.2-F). But high change areas observed in two blocks namely Islampur (1,400 per cent) and Goalpokher-I (3733.33 per cent) in the district. Causes of high change of lentil area are- it is a profitable crop, low fertilizers required and it is suitable in this block for dark brown soil.

#### 7.1.1.7 Jute area

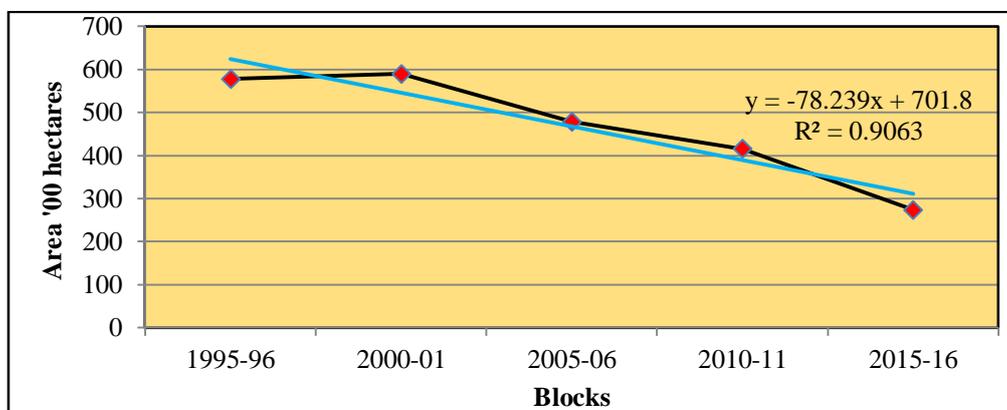
Uttar Dinajpur is the undisputed king of jute production nearly one-tenth area of under jute. In the district, hot and humid climate and alluvial, loamy soil coupled with inexpensive plentiful labour make available the par quality conditions for the growth of jute. Jute is one of the important natural fiber crops. Jute requires a warm and humid climate and can be grown within a temperature range of 24° to 36°C and relative humidity required from 80 to 95 per cent and during the period of its growth small amount of pre-monsoon rainfall varying from 25 cm to 50 cm is very useful because it helps in the proper growth of the plant till the arrival of the proper monsoon. Sowing time of jute is the middle of March to the middle of April months and the cutting time of jute is last of June to middle of July months. Major jute cultivated in the district is *olitorius* types- *JRO 878*, *JRO 524* and *JRO 7835* and *capsularis* types- *JRC 7447*, *JRC 212* and *JRC 321*. The total area under jute was 577.60 hundred hectares in the year 1995-96, which was 93.61 per cent of the total fiber and 13.70 per cent of the total cropped area in the district.

But in the year 2015-16, jute area decreased from 577.60 hundred hectares to 280.75 hundred hectares, which was 88.65 per cent of the total fiber area and 5.60 per cent of the total cropped area. It is notable that, a total of 296.85 hundred hectares of jute area decreased during the study period (per annum average decrease rate is 14.84 hundred hectares). The block-wise clear observation of jute area growth is presented in table 7.14.

**Table 7.14** Block-wise area under jute of Uttar Dinajpur District (1995-96 to 2015-16).  
(Area '00 hectares)

Name of the C.D. Blocks	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	90.30	127.80	18.78	40.62	12.80	-85.82
Islampur	60.00	82.30	55.06	46.57	32.00	-46.67
Goalpokher-I	45.10	47.00	49.27	56.70	41.00	-9.10
Goalpokher-II	82.60	57.70	46.93	42.37	13.39	-83.78
Karandighi	80.00	20.30	95.58	54.70	19.20	-76.00
Raiganj	67.70	101.00	95.72	86.24	54.70	-19.20
Hemtabad	51.10	24.30	25.00	29.53	19.35	-62.13
Kaliaganj	45.50	39.50	25.38	36.60	30.75	-32.42
Itahar	55.30	90.10	66.89	42.30	50.40	-8.86
<b>Uttar Dinajpur</b>	<b>577.60</b>	<b>590.00</b>	<b>478.61</b>	<b>415.63</b>	<b>273.59</b>	<b>-52.63</b>

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.



**Figure 7.8** Growth of jute area in Uttar Dinajpur District (1995-2016).

It is evident from the table 7.14 that, all of the blocks of Uttar Dinajpur District have seen negative changes in jute production. Block-wise highest negative jute growth rate is observed in Chopra Block (-85.82 per cent). In Chopra Block, during 1995-96, the total area under jute was 90.30 hundred hectares and it has come down to 12.80 hundred hectares in the year 2015-16. But the lowest negative change is observed in Itahar Block (-8.86 per cent). The causes of high negative change of jute production are- failure to pay the farmers their due, the farmers are

losing interest in cultivating jute as they rarely get expected price for their produce and noticeable low growth has been observed the past years in the jute bag market. On the other side, in local and international markets high price of Indian jute goods. So, the demands of jute goods are falling day by day in the district. The proper idea of the actual change of jute area is considered in the table 7.15.

**Table 7.15** Percentage change of the jute area and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change (Negative)	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	< 15	2	Goalpokher-I and Itahar
Low	15-30	1	Raiganj
Medium	30-45	1	Kaliaganj
High	45-60	1	Islampur
Very high	> 60	4	Chopra, Goalpokher-II, Karandighi and Hemtabad

Source: Compiled by the researcher.

It is observed from the table 7.15 that, amazing decrease (negative growth) of jute area for the study period in all of the blocks of the district. A remarkable decrease is observed (below 15 per cent) in two blocks namely Goalpokher-I (-9.10 per cent) and Itahar (-8.86 per cent). This zone lies in the Northern part (Goalpokher-I) and southern part (Itahar) of the district (figure 7.2-G). A low negative change of jute area is observed in one block namely Raiganj (-19.20 per cent) and a medium change of jute area also is observed in one block namely Kaliaganj (-32.42 per cent). This zone lies in south-eastern part of the district. On the other side, high change is found in one block namely Islampur (-46.67 per cent) with change index -45 to -60 per cent. The remaining four blocks namely Chopra (-85.82 per cent), Goalpokher-II (-83.78 per cent), Karandighi (-76.00 per cent) and Hemtabad (-62.13 per cent) show very high change with change index of above 60 per cent. This zone lies in the northern, north-western and south-eastern part of the district (figure 7.2-G). The main cause of high change of jute area is they are converted into other profitable crops area and now-a-days it is not a profitable crop to the farmers.

#### **7.1.1.8 Tea area**

In recent time, tea is the best crop under miscellaneous crops in the district. Tea plantation increasing due to land is less suitable for foodgrains (Chopra and Islampur blocks), one time investment, low serving than the other crops, suitable soil and climate and tea processing factory is situated near the district (in Darjeeling District). According to the report of PAO of Uttar Dinajpur District, tea plantation has been started from 2002-03 in the district. But officially the process of preservation of tea plantation data was started from 2009-10. It is observed that only

two blocks namely; Chopra and Islampur are tea plantation area of the district. The growth of the area under the tea garden is shown in the table 7.16.

**Table 7.16** Area under tea of Uttar Dinajpur District (2010-11 to 2015-16)

(Area '00 hectares)

District	Years							Change 2010-11 to 2015-16 (%) (base year-2010-11)
	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	
<b>Uttar Dinajpur</b>	<b>167.25</b>	<b>212.45</b>	<b>243.31</b>	<b>242.84</b>	<b>242.84</b>	<b>242.84</b>	<b>242.00</b>	<b>44.69</b>

Source: i. District Statistical Handbook, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur.

It is remarkable that, the total area under tea was 167.25 hundred hectares in the year 2009-10. But in the year 2015-16, the tea area has increased from 167.25 hundred hectares to 242.00 hundred hectares, which was 0.89 per cent of the total miscellaneous crop area (within 7 years total of 74.75 hectares tea area increased). It is noticed that, before 2010 the tea plantation area was very much negligible in the district and all tea plantation area was converted from the foodgrains and fibers crops area.

#### 7.1.1.9 Horticulture crops area

It is known to all as of humanoid food point of view, horticulture (crops and fruits) is furthest essential to our everyday living. Various horticulture crops and their production find a place in our mealtimes and nutrition. In the study area, horticulture crops namely pineapple, banana, mango, litchi and papaya (fruits) and brinjal, cauliflower, tomato, peas, cabbage, ladyfinger, turmeric and chilies (vegetables) are grown. Horticulture crops area in the district increased due to availability of irrigation water and HYV seeds supplied from Government agencies as well as in the local market. On the other hand, demand of horticulture crops and fruits is increasing (pineapple at Bidhan Nagar, marigold at Raiganj and Karandighi and brinjal at vigore in Raiganj block) in the neighbour districts as well as the state. Increasing trends of horticulture areas in the district are represented in table 7.17.

**Table 7.17** Area under horticulture in Uttar Dinajpur District (1995-96 to 2015-16).

(Area '00 hectares)

District	Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
	1995-96	2000-01	2005-06	2010-11	2015-16	
<b>Uttar Dinajpur</b>	<b>319.00</b>	<b>364.50</b>	<b>385.60</b>	<b>450.80</b>	<b>464.80</b>	<b>45.70</b>

Source: i. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
ii. Agriculture Contingency Plan of Uttar Dinajpur District (different years)  
iii. Statistical Abstract, Bureau of Applied Economics & Statistics, Govt. of West Bengal.

The total area under horticulture crops (fruits and vegetable) was 319.00 hundred hectares in the year 1995-96 but in the year 2015-16, horticulture crops (fruits and vegetable) area has increased from 319.00 hundred hectares to 364.50 hundred hectares, which was 3.18 per cent of the total cropped area of West Bengal. It is notable that, total of 145.80 hundred hectares of horticulture area has increased during the study period (per annum average growth rate is 5.83 hundred hectares).

### 7.1.2 Changes in production and productivity

Agricultural production in Uttar Dinajpur District can be broadly classified into food crops and non-food crops. As discussed earlier, in the district food crops includes Paddy, Wheat, Potato, Pulses and Mustard, etc. Similarly, the non-food crops include Jute, Mesta and Cotton, etc. total agricultural production has been increasing with the combined effect of growth in total cultivated areas and increases in the average yield per hectare of the various crops. The production pattern has been studied at five points of time i.e. 1995-96, 2000-01, 2005-06, 2010-11 and 2015-16. Vigorous efforts have been made to increase the agricultural production in Uttar Dinajpur from the time of separation from West Dinajpur. Not only that, recently the district has surplus agricultural production. It is clear that agricultural production mainly paddy, wheat and potato has increased very significantly during the last few decades (According to the PAO record, Uttar Dinajpur). One more matter is that the district has sufficient fertile soil for crop cultivation. The section deals briefly with block-level changes in the growth of production and productivity of major seven crops that are considered during 1995-96 to 2015-16.

#### 7.1.2.1 Paddy production and productivity

Paddy is one of the food grains crops in the district. In 1995-96, the total production of paddy had 5,996.90 hundred metric tonnes and it has decreased to 5,733.53 hundred metric tonnes in 2015-16 (negative change have occurred). Not only that, Uttar Dinajpur District is having 3<sup>rd</sup> position in the production of paddy in West Bengal and its productivity is 2,490 kg/hectares. For the better concept of block-wise paddy production in the district is represented in the table 7.18.

**Table 7.18** Block-wise production and productivity of paddy in Uttar Dinajpur (1995-96 to 2015-16).  
(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	239.70	440.00	382.97	326.48	298.99	24.73
	P <sub>2</sub>	1556	2347	2263	2392	2346	50.77
	P <sub>1</sub>	233.60	483.60	530.30	577.24	371.79	59.15

Islampur	P <sub>2</sub>	1462	2147	2353	2575	2267	55.06
Goalpokher-I	P <sub>1</sub>	486.90	577.00	556.45	758.80	571.56	17.38
	P <sub>2</sub>	2,065	2,124	2,390	2,624	2,250	8.95
Goalpokher-II	P <sub>1</sub>	413.00	486.20	565.88	658.27	615.50	49.03
	P <sub>2</sub>	2,097	2,577	2,391	2,633	2,519	20.12
Karandighi	P <sub>1</sub>	1,282.50	1,283.30	1,242.03	964.00	496.22	-61.30
	P <sub>2</sub>	2,853	2,634	2,682	2,668	2,226	-21.97
Raiganj	P <sub>1</sub>	580.60	1234.10	1183.49	1085.33	929.11	60.02
	P <sub>2</sub>	2,055	2,972	2,953	2,545	2,562	24.67
Hemtabad	P <sub>1</sub>	1,399.60	421.10	517.41	379.59	709.02	-49.34
	P <sub>2</sub>	2,298	2,696	2,654	2,470	2,913	26.76
Kaliaganj	P <sub>1</sub>	580.70	532.90	803.87	782.29	721.39	24.22
	P <sub>2</sub>	2,403	1,783	2,542	2,919	2,725	13.39
Itahar	P <sub>1</sub>	780.30	822.50	1,016.46	1,016.01	1,019.95	30.71
	P <sub>2</sub>	2,262	2,619	2,436	2,654	2,601	14.98
<b>Uttar Dinajpur</b>	<b>P<sub>1</sub></b>	<b>5,996.90</b>	<b>6,280.70</b>	<b>6,798.86</b>	<b>5,738.73</b>	<b>5,733.53</b>	<b>-4.39</b>
	<b>P<sub>2</sub></b>	<b>2,117</b>	<b>2,394</b>	<b>2,518</b>	<b>2,609</b>	<b>2,490</b>	<b>17.61</b>

All figures are in the rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

It may be observed from the table 7.18 that, the production of main principal crops viz; paddy increased during the period under the study. Growth rates of production for paddy are highly significant in the district. The highest growth rate of production recorded of 1,399.60 hundred metric tonnes in Hemtabad Block during 1995-96 through 2015-16 and this increase in production has been not equally shared by the increase in productivity as well as acreage. But the lowest paddy production is found in Islampur Block (233.66 hundred metric tonnes) equally shared by the increase in productivity as well as acreage in the district. Total production of paddy had increased from 5,996.90 hundred metric tonnes in 1995-96 to 6,280.70 hundred metric tonnes in 2000-01 and then increased to 6,798.86 hundred metric tonnes in 2005-06. But in 2010-11 total paddy production came down to 5,738.73 hundred metric tonnes mainly due to the high production of other crops in the district. During 2015-16, the total production of paddy has further decreased to 5,733.53 hundred metric tonnes. Production of rice from 1995-96 to 2010-11 is more or less same. Thus in the post green revolution period (1967-2007), paddy production had experienced an annual growth rate of 2.16 per cent.

Table 7.19 shows that the new agricultural strategy introduced by the farmers of each block in the district. Let us consider the block-wise growth in the production of paddy in all blocks of the district. The highest change is observed in Raiganj Block (60.02 per cent) and the lowest change (negative change) is found in Karandighi Block (-61.30 per cent). To understand the

actual change of paddy production for the study period, they were categorised and findings are represented in the table 7.19.

**Table 7.19** Percentage change of the paddy production and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative change	-	2	Karandighi and Hemtabad
Low	<20	1	Goalpokher-I
Medium	20-40	3	Chopra, Kaliaganj and Itahar
High	40-60	2	Islampur and Goalpokher-II
Very high	>60	1	Raiganj

Source: Compiled by the researcher.

Table 7.19 shows the block-wise category of change in the percentage of paddy production. Out of the nine blocks, in two of them namely Karandighi (-61.30 per cent) and Hemtabad (-49.34 per cent) negative change of production is observed. This zone lies in south-eastern part of the district (figure 7.9-A). But the low change of production is found in only one Block namely Goalpokher-I (17.38 per cent) with change index of below 20 per cent. The medium category of change of production is observed in three blocks namely Chopra (24.73 per cent), Kaliaganj (24.22 per cent) and Itahar (30.71 per cent). This zone lies in the North and Southern part of the district (figure 7.9-A). But high change of production is observed in only two blocks namely Islampur (59.15 per cent) and Goalpokher-II (49.03 per cent) in the district. The causes of high change in the production of paddy are total area and productivity of paddy increased in these blocks over the study. Lastly, a very high change of production is observed in one block namely Raiganj (60.02 per cent) with a change index of above 60 per cent.

In the district, the productivity of paddy increased during the period under study. Moreover, the productivity of paddy declined during the period 2005-06 in Karandighi Block which had 2,853 kg/hectares in 1995-96 and 2,682 kg/hectares in 2005-06. Contrarily, in the remaining eight blocks general belief of stagnant growth in agricultural production as well as productivity is seen. On the basis of above discussion (table 7.16), it may be observed that there has been a substantial increase in the productivity of paddy crop. There was a spectacular growth of paddy per hectares in Raiganj Block (2,972 kg/hectares) during the period 2005-06 mainly due to introduce of chemical fertilizer, pesticides and new technology in the study area. Not only that, the lowest productivity per hectare is found in Islampur Block (1,462 kg/hectares) during the period 1995-96. In respect of district, total productivity per hectare of paddy was 2,117 kg/hectare in 1995-96. But it increased from 2,117 kg to 2394 kg/hectares in 2000-01 and then it increased to 2,518 kg/hectares in 2005-06. Further, gross productivity under paddy has

decreased from 2,609 kg/hectares in 2010-11 to 2,490 kg/hectares in 2015-16 (table 7.16). To understand the actual change of paddy productivity/hectare for the study period were categorized and findings are represented in the table 7.20.

**Table 7.20** Percentage change of the paddy productivity and the number of blocks in each category in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative change	-	1	Karandighi
Low	<10	1	Goalpokher-I
Medium	10-20	2	Kaliaganj and Itahar
High	20-30	3	Goalpokher-II, Raiganj and Hemtabad
Very high	>30	2	Chopra and Islampur

Source: Compiled by the researcher.

It is observed from table 7.20, only one block namely Karandighi which has shown negative change (-21.97 per cent) in the district. This zone lies in Western part of the district (figure 7.10-A). The area of paddy decreased from 2,853 hundred metric tonnes in 1995-96 to 2,226 hundred metric tonnes in 2015-16 in this block. Low and medium change of productivity of paddy is observed in three blocks namely Goalpokher-I, Kaliaganj and Itahar with change of 8.95, 13.39 and 14.98 per cent respectively (table 7.18). But high change of productivity found in three blocks namely Goalpokher-II (20.12 per cent), Raiganj (24.67 per cent) and Hemtabad (26.76 per cent). This zone lies in western and southern part of the district. Remaining two blocks namely Chopra (50.77 per cent) and Islampur (55.06 per cent) has been very high change in the district (figure 7.10-A). The cause of very high change of productivity of paddy in these blocks is the production of paddy which has increased and an irrigation facility in *Boro* season is available from the Teesta canal.

### 7.1.2.2 Wheat production and productivity

It is worth pointing out that wheat cultivation increased after the 1980s in the district. Wheat is the only crop that recorded a sustained production growth of more than 50 per cent in the projected area during the period under study. In the district, a total of 589.10 hundred metric tonnes of wheat production in 1995-96 and it has increased to 893.24 hundred metric tonnes in 2015-16. But productivity was 2,200 kg/hectare in 1995-96 and it has increased to 2,383 kg/hectares during 2015-16 in the district. The block-wise change in production and productivity of wheat in the district is represented in the table 7.21.

**Table 7.21** Block-wise production and productivity of wheat in Uttar Dinajpur District (1995-96 to 2015-16).  
(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	28.60	92.50	27.91	27.31	21.19	-23.42
	P <sub>2</sub>	2111	1957	1821	2598	2224	5.35
Islampur	P <sub>1</sub>	19.00	57.40	57.22	63.72	70.72	272.21
	P <sub>2</sub>	2168	1841	1780	1697	1887	-12.96
Goalpokher-I	P <sub>1</sub>	120.00	83.00	63.64	140.20	138.07	15.05
	P <sub>2</sub>	2447	1936	1663	2443	2330	-4.78
Goalpokher-II	P <sub>1</sub>	82.50	79.90	83.06	159.95	111.67	35.36
	P <sub>2</sub>	2316	2142	2087	3199	2233	-3.58
Karandighi	P <sub>1</sub>	111.10	50.50	208.02	137.38	134.64	21.18
	P <sub>2</sub>	2865	2609	2381	2323	2347	-18.08
Raiganj	P <sub>1</sub>	109.60	211.60	164.96	197.17	172.77	57.64
	P <sub>2</sub>	1669	3073	2189	3052	2663	59.55
Hemtabad	P <sub>1</sub>	46.40	96.40	70.06	48.11	42.29	-8.85
	P <sub>2</sub>	1762	2183	1901	3102	2923	65.89
Kaliaganj	P <sub>1</sub>	27.50	45.80	51.61	60.57	62.77	128.25
	P <sub>2</sub>	1901	1698	2025	2670	2267	19.25
Itahar	P <sub>1</sub>	44.40	145.30	51.23	148.84	139.12	213.33
	P <sub>2</sub>	2559	2551	1617	3487	2571	0.46
<b>Uttar Dinajpur</b>	<b>P<sub>1</sub></b>	<b>589.10</b>	<b>862.40</b>	<b>777.71</b>	<b>983.25</b>	<b>893.24</b>	<b>51.62</b>
	<b>P<sub>2</sub></b>	<b>2200</b>	<b>2221</b>	<b>1942</b>	<b>2730</b>	<b>2383</b>	<b>8.31</b>

All figures are in rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha.

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

From table 7.21 it is revealed that the production of wheat normally increased for the study period. Block-wise highest wheat production is found in Goalpokher-I (120 hundred metric tonnes) in 1995-96 but in 2000-01, it was found in Raiganj Block (211.60 hundred metric tonnes). On the other side, in 2005-06 the highest production of wheat is found in Karandighi Block (208.02 hundred metric tonnes) and 2015-16, total production of wheat has increased (234.64 hundred metric tonnes). The lowest wheat production is found in Kaliaganj Block (27.50 hundred metric tonnes) and in 2005-06, it was found in Chopra Block (27.91 hundred metric tonnes). But in 2015-16, it was found in Chopra Block (21.19 hundred metric tonnes) in the district. Total production of wheat had increased from 589.10 hundred metric tonnes in 1995-96 to 862.40 metric tonnes in 2000-01 and then decreased to 777.71 metric tonnes in 2005-05. But in 2010-11, total production of wheat once again increased to 983.25 hundred metric tonnes. The cause of increasing production is the productivity rate of wheat in 2010-11 has increased to 2,730 kg/hectare. And it is noticeable that the area of wheat was 370.05 hundred hectares in 2010-11. During the five years from 2010-11 to 2015-16, for Uttar Dinajpur as a whole the wheat area decreased from 983.25 hundred hectares in 2010-11 to 893.24 hundred

hectares. In 1995-96, the bloke-wise highest productivity was found in Karandighi Block (2,865 kg/hectares) and the lowest productivity found in Raiganj Block (1,669 kg/hectares). But in 2015-16, this situation has changed and the highest productivity is observed in Hemtabad Block (2,923 kg/hectare) and lowest productivity is found in Islampur Block (1,887 kg/hectares). The overall situation of wheat production in the district, total production had increased from 589.10 hundred metric tonnes in 1995-96 to 862.40 metric tonnes in 2000-01 and then decreased to 777.71 hundred metric tonnes in 2005-06. But in 2010-11, total production of wheat once again increased to 983.25 hundred metric tonnes and it further declined to 893.24 hundred metric tonnes during 2015-16. The causes of increased production are productivity rate of wheat in 2010-11 increased to 2,730 kg/hectares and area also increased day by day in the district. The productivity situation in the district is 2,200 kg/hectare in 1995-96. Table 7.19 depicted shows the highest change of wheat production is observed in Islampur Block (272.21 per cent) and lowest change is found in Chopra Block (-23.42 per cent). Not only that, out of total nine blocks two of them have negative change namely Chopra and Hemtabad Block in the district. Actual changes in production over the study are represented in the table 7.22.

**Table 7.22** Percentage change of wheat production and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative change	-	2	Chopra and Hemtabad
Low	<20	1	Goalpokher-I
Medium	20-40	2	Goalpokher-II and Karandighi
High	40-60	1	Raiganj
Very high	>60	3	Islampur, Kaliaganj and Itahar.

Source: Compiled by the researcher.

From table 7.22 it is noticed that the negative change of production is observed in two Blocks namely Chopra (-23.42 per cent) and Hemtabad (-8.85 per cent). This zone lies in northern part (Chopra) and the south-eastern (Hemtabad) part of the district. The causes of low change of wheat production are- yield rate of wheat has been decreased and many food grain crop area has been increased in these blocks. Low change of wheat production is observed in one Block namely Goalpokher-I (15.05 per cent) and medium change of wheat found in two blocks namely Goalpokher-II (35.36 per cent) and Karandighi (21.18 per cent) in the district. These two zones are located in central part of the district (figure 7.9-B). But high change of wheat production is found in Raiganj Block (57.64 per cent). This zone lies in the Southern part of the district. Most of the blocks (three blocks) are in very high change namely Islampur (272.21 per cent), Kaliaganj (128.25 per cent) and Itahar (213.33 per cent) in the district. This zone lies in the

Northern part (Islampur) and Southern (Kaliaganj and Itahar) part of the district. The causes of very high change of wheat production in these blocks are soil fertility and P<sup>H</sup> suitability for wheat, irrigation facility is good and in *rabi* season wheat is the main crop.

The productivity situation of wheat declined (negative growth) during 1995-95 to 2015-16, confined in four blocks. The productivity of this crop was comparatively higher indicating a positive increasing trend in productivity of wheat found in rest five blocks. For the proper idea of productivity change in the district, the following representation in the table 7.23.

**Table 7.23** Percentage change of wheat productivity and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Negative change	-	4	Islampur, Goalpokher-I, Goalpokher-II and Karandighi
Low	<15	2	Chopra and Itahar
Medium	15-30	1	Kaliaganj
High	30-45	-	-
Very high	>45	2	Raiganj and Hemtabad

Source: Compiled by the researcher.

From table 7.23 it may be observed that there is four negative change of wheat productivity blocks namely Islampur (-12.96 per cent), Goalpokher-I (-4.78 per cent), Goalpokher-II (-3.58 per cent) and Karandighi (-18.08 per cent) in the district. This zone lies in the Northern part to central part of the district (figure 7.10-B). The low proportion of wheat productivity range below 15 per cent is recorded to two blocks namely Chopra (5.35 per cent) and Itahar (0.46 per cent). The district having medium productivity change with ranges between 15-30 per cent includes the block of Uttar Dinajpur district namely Kaliyaganj (19.25 per cent). This zone lies in the Eastern part of the district (figure 7.10-B). But very high change of productivity of wheat is found in Raiganj Block (59.55 per cent) and Hemtabad (65.89 per cent) with change index value above 45 per cent. The reasons behind the very high change in these blocks are modern development of irrigation, use of HYV seeds and chemical fertilizer and other situations are available.

### 7.1.2.3 Production and productivity of potato

In Uttar Dinajpur District, the production and productivity of potato in major blocks have increased during the period under study. Moreover, the production and productivity of potato declined during the period 2000-01 to 2005-06. In the district, total 51.03 hundred metric tonnes potato production was in the year 1995-96 and it has increased to 67.40 hundred metric tonnes in 2015-16. The productivity of potatoes grew at faster rate during 2010-11 than the

corresponding rate (table 7.22). During 1995-96, productivity of potatoes was 13,897 kg/hectare and it has increased to 31,756 kg/hectare in 2015-16. Block-wise production and productivity of potato over the study period are represented in the table 7.24.

**Table 7.24** Block-wise production and productivity of potato in Uttar Dinajpur District (1995-96 to 2015-16).  
(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	6.14	17.50	96.98	263.26	247.09	3924.26
	P <sub>2</sub>	15005	18182	17959	34869	36121	140.72
Islampur	P <sub>1</sub>	21.3	9.50	139.53	964.73	964.53	4428.30
	P <sub>2</sub>	19091	24621	11946	35005	35331	85.06
Goalpokher-I	P <sub>1</sub>	4.33	5.70	141.96	418.09	327.56	7464.89
	P <sub>2</sub>	15006	22726	20970	27272	22132	47.48
Goalpokher-II	P <sub>1</sub>	6.71	10.20	169.94	234.52	353.35	5166.02
	P <sub>2</sub>	13284	22534	22690	20590	44135	232.24
Karandighi	P <sub>1</sub>	3.69	1.10	338.70	255.03	377.55	10131.70
	P <sub>2</sub>	15010	19136	21025	31408	24041	60.16
Raiganj	P <sub>1</sub>	2.23	2.80	434.58	350.44	249.26	11077.57
	P <sub>2</sub>	12002	24685	24157	32874	23165	93.00
Hemtabad	P <sub>1</sub>	1.99	4.80	26.97	285.78	341.73	17,057.28
	P <sub>2</sub>	11519	15907	16246	30895	34109	196.11
Kaliaganj	P <sub>1</sub>	2.72	3.50	212.71	455.70	355.62	12,978.26
	P <sub>2</sub>	12144	16993	18135	23909	24655	103.02
Itahar	P <sub>1</sub>	1.92	12.30	108.84	159.95	360.83	18,693.22
	P <sub>2</sub>	12007	15940	22818	38824	42104	250.66
Uttar Dinajpur	P <sub>1</sub>	<b>51.03</b>	<b>67.40</b>	<b>1643.21</b>	<b>3387.50</b>	<b>3577.22</b>	<b>6,910.03</b>
	P <sub>2</sub>	<b>13897</b>	<b>20080</b>	<b>19550</b>	<b>30628</b>	<b>31756</b>	<b>128.51</b>

All figures are in rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

The production of potato normally increased for the study period (table 7.24). Block-wise highest potato production is found in Goalpokher-II Block (6.71 hundred metric tonnes) in 1995-96 and lowest in Itahar Block (1.92 hundred metric tonnes). But in 2005-06, the highest potato production block is Raiganj (434.58 hundred metric tonnes) in the district. Production has increased in 2015-16, highest production is found in Islampur (964.53 hundred metric tonnes) and lowest production is observed in Chopra Block (247.03 hundred metric tonnes). But productivity of potato in the district was 51.03 hundred metric tonnes and it has increased to 67.40 hundred metric tonnes in 2000-01. In 2005-06, total production of potato increased from 1,643 hundred metric tonnes. It once again increased from 3387.50 hundred metric tonnes in 2010-11 to 3,577.22 hundred metric tonnes in 2015-16. But overall situation of productivity in the district is increased over the study period except the year 2005-06. Highest productivity is observed in Raiganj Block (15,010 kg/hectare) and lowest productivity of potato per hectare

is observed in Kaliaganj Block (11,519 kg/hectare). During 2015-16, highest productivity is found in Goalpokher-II Block (44,135 kg/hectare) and lowest productivity is observed in Goalpokher-I Block (22,132 kg/hectare). However, total productivity of potato was 13897 kg/hectare in 1995-96, it was 20,080 kg/hectare in 2000-01 and productivity once again decreased to 19,550 kg/hectare in 2010-11. And then productivity has been consummately increasing from 30,628 kg/hectare in 2010-11 to 31,756 kg/hectare in 2015-16. For the better understanding in block-wise actual production and productivity of potato, the table 7.25 has been presented.

**Table 7.25** Percentage change of potato production and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	< 4000	1	Chopra
Low	4000-8000	3	Islampur, Goalpokher-I, Goalpokher-II
Medium	8000-12000	2	Karandighi and Raiganj
High	12000-16000	1	Kaliaganj
Very high	>16000	2	Hemtabad and Itahar

Source: Compiled by the researcher.

The very low proportion of potato production range below 4,000 per cent is recorded in only one block namely Chopra (3,924.26 per cent). This zone lies in Northern part of the district (figure 7.10-C). Major causes behind low production in the block are heavy rain fall, acidic soil, soil erosion and existence of vast tea garden covering area. Low production zone is observed in three blocks namely Islampur (4,428.30 per cent), Goalpokher-I (7,464.89 per cent) and Goalpokher-II (5,166.22 per cent) in the district. This zone lies in North to middle part of the district (table 7.25 and figure 7.9-C). Medium production change is with a range of 8,000-12,000 per cent. This zone is confined in two blocks namely Karandighi (10,131.70 per cent) and Raiganj (11,077.57 per cent) and zone is located in the central (Karandighi) and south-western (Raiganj) part of the district. But high and very high production change is observed in three blocks namely Kaliaganj, Hemtabad and Itahar with change index are 12,974.26, 17,057.28 and 18,693.22 per cent respectively. The main cause of high and very high change of production nature of slope is plain i.e. fertile soil; the demand of potato is very high in the local market and many others. The productivity situation of potato in the district is all of the blocks have been positive growth. The block-wise proper idea of potato production change block-wise changing nature depicted in the table 7.26.

**Table 7.26** Percentage change of potato productivity and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	<100	4	Islampur, Goalpokher-I, Karandighi and Raiganj
Low	100-150	2	Chopra and Kaliaganj
Medium	150-200	1	Hemtabad
High	200-250	1	Goalpokher-II
Very high	>250	1	Itahar

Source: Compiled by the researcher.

From table 7.26 it is revealed that the very low change productivity is confined in four blocks namely Islampur (85.06 per cent), Goalpokher-I (47.48 per cent), Karandighi (60.16 per cent) and Raiganj (93.00 per cent) in the district. Causes of very low productivity of potato are poor irrigation facility, slow rate of water exhausted and low price of potato in local market. This zone lies in Northern (Islampur & Goalpokher-I) and the south-eastern (Karandighi & Raiganj) part of the district (figure 7.10-C). But low and medium productivity change is confined in three blocks namely Chopra, Kaliaganj and Hemtabad with change index 140.72, 103.02 and 196.11 per cent respectively. The high proportion of potato productivity ranges from 200-250 per cent is confined in one block namely Goalpokher-II (232.24 per cent). The causes behind high and very high productivity changes are fertile types of soil, better irrigation facility, use of HYV seeds and huge chemical fertilizer use in potato fields in this block.

#### 7.1.2.4 Production and productivity of mustard

The total increase in production and productivity of mustard is observed during the period under investigation because of its commercial value. Not only that, mustard as an oilseed is very useful in many ways as they are used both for edible and industrial purposes. Except in 2005-06, production and productivity of mustard have increased during the study period. In the district mustard production has increased from 222.60 hundred metric tonnes in 1995-96 to 415.15 metric tonnes in 2015-16. But productivity of mustard also has increased in the study period i.e. 20 years from 598 kg/hectare in 1995-96 to 835 kg/hectare in 2015-16. For the better understanding block-wise production and productivity of mustard over the study period are represented in the table 7.27.

**Table 7.27** Block-wise production and productivity of mustard in Uttar Dinajpur District (1995-96 to 2015-16). (Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	1.70	3.20	1.56	4.03	5.34	214.12
	P <sub>2</sub>	150	819	394	538	646	330.67
Islampur	P <sub>1</sub>	4.90	22.30	19.79	18.44	20.07	309.59

	P <sub>2</sub>	299	866	655	494	523	74.92
Goalpokher-I	P <sub>1</sub>	35.10	28.40	15.96	39.56	38.97	11.02
	P <sub>2</sub>	650	809	646	739	658	1.23
Goalpokher-II	P <sub>1</sub>	13.20	24.30	20.14	22.25	41.40	231.64
	P <sub>2</sub>	492	735	661	547	847	72.15
Karandighi	P <sub>1</sub>	45.60	45.50	21.92	33.47	36.70	-19.52
	P <sub>2</sub>	939	882	610	746	1001	6.60
Raiganj	P <sub>1</sub>	46.10	64.60	55.52	76.90	95.65	107.48
	P <sub>2</sub>	631	729	695	872	1065	68.77
Hemtabad	P <sub>1</sub>	17.60	15.80	19.90	23.26	32.13	82.55
	P <sub>2</sub>	655	751	736	833	1050	60.30
Kaliaganj	P <sub>1</sub>	21.50	17.40	12.55	22.81	40.45	88.13
	P <sub>2</sub>	622	594	496	872	887	42.60
Itahar	P <sub>1</sub>	36.90	48.90	92.84	109.38	104.80	184.01
	P <sub>2</sub>	938	889	933	1118	839	-4.80
Uttar Dinajpur	P <sub>1</sub>	<b>222.60</b>	<b>270.20</b>	<b>260.15</b>	<b>350.10</b>	<b>415.51</b>	<b>86.41</b>
	P <sub>2</sub>	<b>598</b>	<b>786</b>	<b>648</b>	<b>751</b>	<b>835</b>	<b>39.62</b>

All figures are in rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

From table 7.27 it is stated that during 1995-96, the highest mustard production is found in Raiganj Block (46.10 hundred metric tonnes) and lowest production is found in Chopra Block (1.70 hundred metric tonnes). But in 2005-06, total production of mustard has been increased and it is found in Itahar Block (92.84 hundred metric tonnes). Lowest production is found also in Chopra Block (1.56 hundred metric tonnes) in the district. During 2015-16, highest mustard production is found in Itahar Block (104.80 hundred metric tonnes) and lowest mustard production block is also Chopra (5.34 hundred metric tonnes). Although, total production of mustard has increased from 222.60 hundred metric tonnes in 1995-96 to 270.20 hundred metric tonnes in 2000-01 and then it has decreased to 260.15 hundred metric tonnes in 2005-06. Further, total production of mustard once again has increased from 350.10 hundred metric tonnes in 2010-11 to 415.15 hundred metric tonnes in 2015-16. On the other hand, in 1995-96, highest productivity of mustard is observed in Karandighi Block (939 kg/hectare) and lowest productivity of mustard is found in Chopra Block (150 kg/hectare). But in 2010-11, productivity rate of mustard has increased in all of the blocks of the district except one or two. In this year highest productivity per hectare is found in Itahar Block (1,118 kg/hectare) and lowest productivity of mustard is investigated in Islampur Block (494 kg/hectare) in this study area. It is an interesting fact that the lowest production and productivity is seen in Chopra Block and highest in Itahar Block for the study period (1995-96 to 2015-16). The block-wise actual change of production and productivity in the district is exhibited in the table 7.28 and 7.29.

**Table 7.28** Percentage change of mustard production and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Negative	1	Karandighi
Low	<100	3	Goalpokher-I, Hemtabad and Kaliaganj
Medium	100-150	1	Raiganj
High	150-200	1	Itahar
Very high	>200	3	Chopra, Islampur and Goalpokher-II

Source: Compiled by the researcher.

From table 7.27 it is noticed that only one block in the district has negative change of mustard production namely Karandighi Block (-19.52 per cent) and this block is located in the central part of the district (figure 7.9-D). Total three blocks are confined in low change production namely Goalpokher-I (11.02 per cent), Hemtabad (82.55 per cent) and Kaliaganj block (88.13 per cent). The causes of low production of mustard are profitable crops like wheat and potato which two dominate in these two blocks and per hectare low productivity for use of local seeds. But medium and high production change of mustard is seen in two blocks namely Raiganj (103.48 per cent) and Itahar Block (184.02 per cent) respectively. These two zone lie in south-western (Raiganj) part and southern (Itahar) part of the district. About 33.33 per cent of the total blocks (3 Blocks) namely Chopra (214.12 per cent), Islampur (309.59 per cent) and Goalpokher-II Block (213.64 per cent) in the district have high change of mustard. This zone lies in the northern part of the district (figure 7.9-D). The causes behind of very high change of mustard are soil acidic conditions are not suitable for mustard; it is a low valuable crop than the tea as well as a tea garden and many others. For suitable conviction of actual change of mustard productivity depict in the table 7.29.

**Table 7.29** Percentage change of mustard productivity and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Negative	1	Itahar
Low	<30	2	Goalpokher-I and Karandighi
Medium	30-60	1	Kaliaganj
High	60-90	4	Islampur, Goalpokher-II, Raiganj and Hemtabad
Very high	>90	1	Chopra

Source: Compiled by the researcher.

It is observed from table 7.29, out of total nine blocks one of them in the district has negative as well as very low change of mustard productivity block namely Itahar (-4.80 per cent). The reasons behind very low productivity are high humidity and rainfalls as well as cloudy weather that is not favorable for mustard in this block. There are two blocks which are confined in low change productivity blocks namely Goalpokher-I (1.23 per cent) and Karandighi (6.60 per cent)

in the district. Change index range from 30-60 per cent indicates medium productivity change. In this zone only one block is observed namely Kaliaganj (42.60 per cent) and this zone lies in South-eastern part of the district (figure 7.10-D). But high change productivity of mustard is seen in four blocks namely Islampur, Goalpokher-II, Raiganj and Hemtabad with 74.92, 72.15, 68.77 and 60.30 per cent respectively. On the other side, very high change of productivity of mustard is confined in one block namely Chopra (330.67 per cent) in the district. This zone is located in Northern part of the study area. Causes of very high productivity of mustard are- farmers are use tremendous rate of chemical fertilizers per hectare and soil is suitable for mustard.

#### **7.1.2.5 Production and productivity of maskalai**

Mashkalai is a multipurpose use crop. Its diversified accommodating facility has popularized to the people. Supplementation of mashkalai bran promoted higher (<0.05) digestible nutrients intake with the consequent higher daily weight gain (about 70 g) than those fed grass alone (about 30 gm). Not only that, mashkalai bran could be a suitable supplement for goats consuming common grass in the tropics. But it is a desponding matter that, total production of mashkalai in the district has decreased day by day over the study period. The total production of mashkalai was 26.65 hundred metric tonnes in the year 1995-96 and has decreased to 8.40 hundred metric tonnes in the year 2015-16. The productivity of mashkalai per hectare was 466 kg in 1995-96 and it has increased by 689 kg/hectare in 2015-16. The total production and productivity of mashkalai for the study period (from 1995-96 to 2015-16) are represented in the table 7.30.

During 1995-96, block-wise highest mashkalai production is observed in Hemtabad Block (8.70 hundred metric tonnes) and lowest production is found in Islampur Block (0.10 hundred metric tonnes). The highest mashkalai production block is observed in Raiganj (3.29 hundred metric tonnes) and the lowest production block in the district is observed in Itahar (0.07 hundred metric tonnes) in 2005-06 (table 7.30). On the other hand, highest production of mashkalai is observed in Kaliaganj Block (3.62 hundred metric tonnes) and lowest also in Itahar Block (0.03 hundred metric tonnes). The total production of mashkalai was 26.65 hundred metric tonnes in 1995-96. Once again, total production under mashkalai has decreased from 8.40 hundred metric tonnes in 2000-01 to 8.39 hundred metric tonnes in 2005-06 and then it decreased from 8.33 hundred metric tonnes in 2010-11 to 7.57 hundred metric tonnes in 2015-16. But overall situation of productivity for the study has increased except in 2000-01 and it is just the reverse of production. Highest productivity is observed in Hemtabad Block (754 kg/ha) and lowest

productivity of mashkalai is observed in Islampur Block (366 kg/ha) in 1995-96 and it is observed also in Hemtabad Block (893kg/ha) and Islampur block (431kg/ha) in 2005-06 respectively.

**Table 7.30** Block-wise production and productivity of mashkalai in Uttar Dinajpur District (1995-96 to 2015-16).

(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	0.10	0.40	-	0.01	0.31	210.00
	P <sub>2</sub>	435	418	-	615	662	52.18
Islampur	P <sub>1</sub>	0.05	0.60	0.21	0.55	-	1000.00
	P <sub>2</sub>	366	493	431	615	-	68.03
Goalpokher-I	P <sub>1</sub>	1.40	0.60	0.37	2.06	1.54	10.00
	P <sub>2</sub>	482	418	432	615	662	37.34
Goalpokher-II	P <sub>1</sub>	3.10	3.40	0.14	-	-	-95.48
	P <sub>2</sub>	435	418	428	-	-	-1.60
Karandighi	P <sub>1</sub>	0.60	-	0.77	-	0.39	-35.00
	P <sub>2</sub>	400	-	436	-	662	65.50
Raiganj	P <sub>1</sub>	4.70	1.40	3.29	1.07	0.34	-92.76
	P <sub>2</sub>	530	582	427	662	659	24.33
Hemtabad	P <sub>1</sub>	8.70	1.70	1.16	1.50	1.34	-84.59
	P <sub>2</sub>	754	607	893	658	894	18.56
Kaliaganj	P <sub>1</sub>	5.70	0.10	2.38	3.44	3.62	-36.49
	P <sub>2</sub>	365	425	358	668	635	73.97
Itahar	P <sub>1</sub>	2.30	0.20	0.07	-	0.03	-98.69
	P <sub>2</sub>	420	354	490	-	652	55.23
Uttar Dinajpur	P <sub>1</sub>	<b>26.65</b>	<b>8.40</b>	<b>8.39</b>	<b>8.33</b>	<b>7.57</b>	<b>-71.59</b>
	P <sub>2</sub>	<b>466</b>	<b>465</b>	<b>487</b>	<b>639</b>	<b>689</b>	<b>47.85</b>

All figures are in rounded form of productivity kg/ha

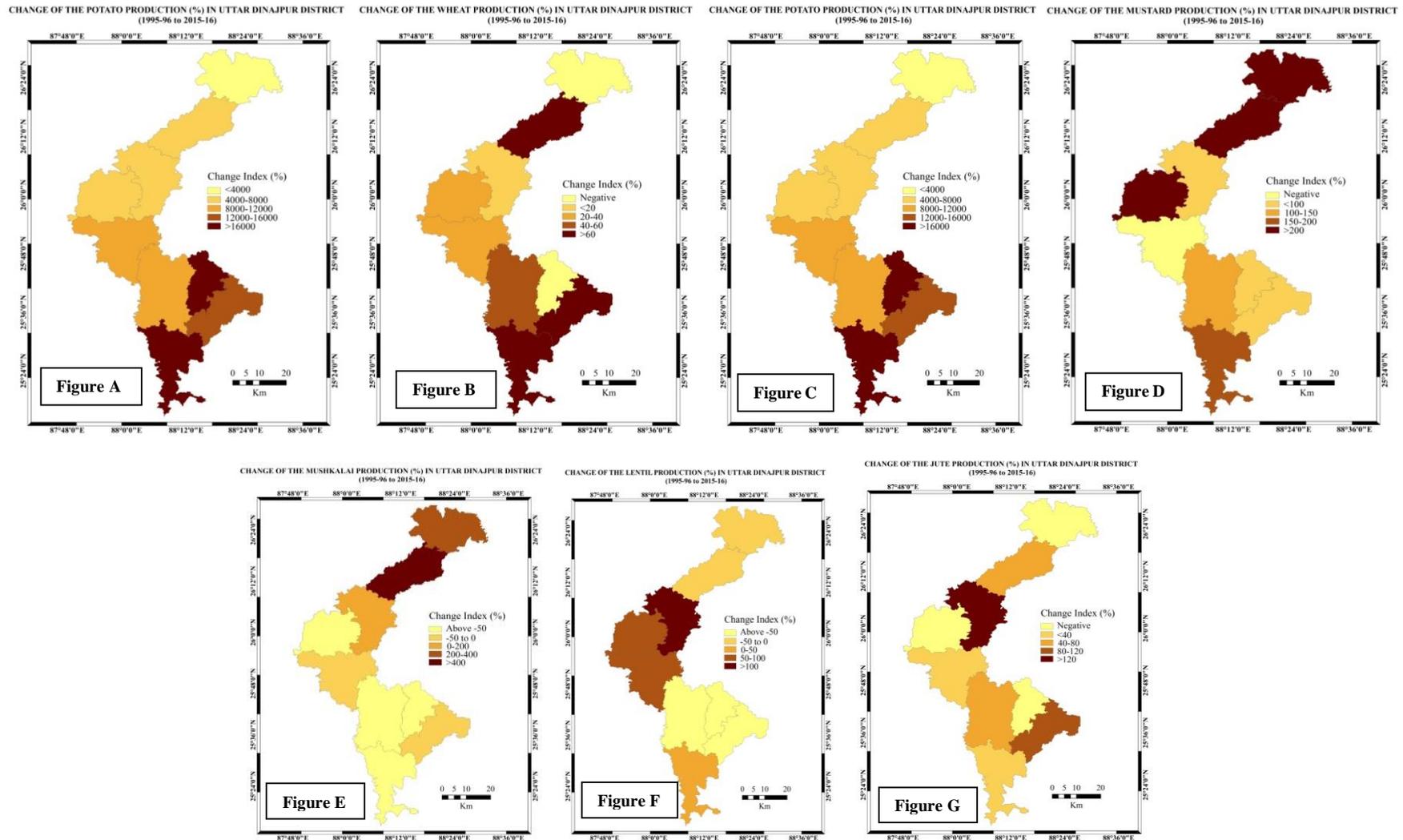
P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

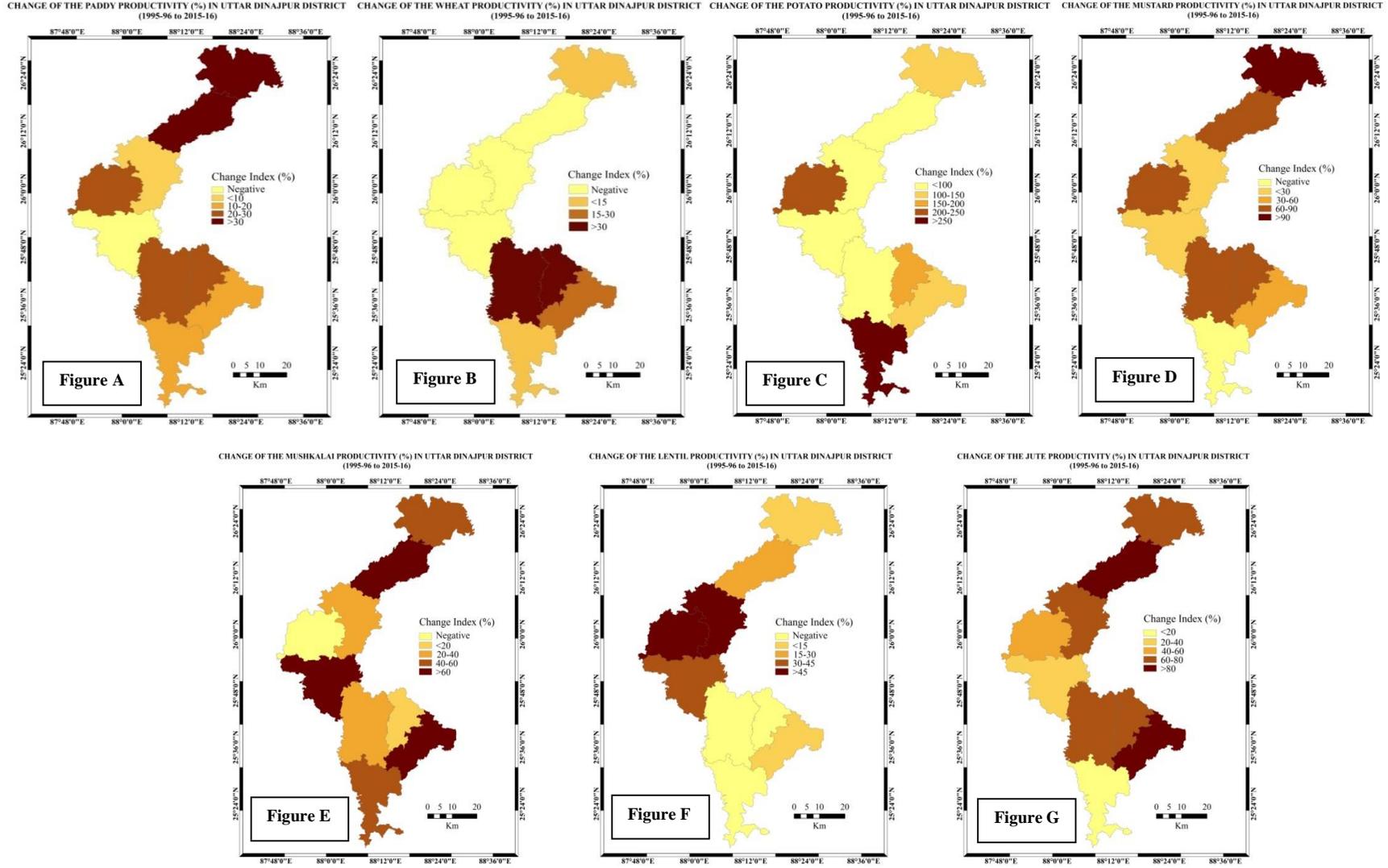
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

During 2015-16, highest productivity is observed in Hemtabad Block (894 kg/ha) and lowest in Kaliaganj Block (635 kg/ha). The average productivity rate in the district was 466 kg/hectare in 1995-96 and then it decreased to 465 kg/hectare in 2000-01. Further, the productivity under mashkalai has increased from 487 kg/hectare in 2005-06 to 639 kg/hectare in 2010-11 and then to 689 kg/hectare in 2015-16. The block-wise actual change of production in the district is exhibited in the table 7.31.



**Figure 7.9** Change of production (%) of selected crops in Uttar Dinajpur District (1995-96 to 2015-16).



**Figure 7.10** Change of productivity (%) of selected crops in Uttar Dinajpur District (1995-96 to 2015-16).

**Table 7.31** Percentage change of mashkalai production and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Above -50	4	Goalpokher-II, Raiganj, Hemtabad and Itahar.
Low	-50 to 0	2	Karandighi, Kaliaganj
Medium	0-200	1	Goalpokher-I
High	200-400	1	Chopra
Very high	>400	1	Islampur

Source: Compiled by the researcher.

It is seen from table 7.31, the blocks of negative production change are divided into two categories; very low and low zone. Very low (negative) change is observed in four blocks with change index above -50 per cent namely Goalpokher-II (-95.48 per cent), Raiganj (-92.76 per cent), Hemtabad (-84.59 per cent) and Itahar (-98.69 per cent) in the district. But low change is confined to only two blocks namely Karandighi (-35 per cent) and Kaliaganj (-36.49 per cent). This zone lies in central (Karandighi) and South-eastern (Kaliaganj) part of the district. Causes of very low and low change of mashkalai are low prices, unirrigated land converted into irrigated areas which are useful for valuable crops and productivity rate is very low/hectare. The medium production zone (figure 7.9-E) lies in southern part of the district with a change value ranging between 0 to 200 per cent. In the study area, block having medium production change is Goalpokher-I (10 per cent). On the other hand, high and very high production change of mashkalai confined in two blocks namely Chopra (210 per cent) and Islampur (1,000 per cent). This zone lies in the Northern part of the district. Causes of high and very high production change are fallow and permanent pasture area use for cultivation of mashkalai and soil of these blocks suitable for mashkalai.

The actual productivity changing situation of mashkalai in the district shows all blocks having positive growth except Goalpokher-II. The block-wise actual change of productivity in the district is exhibited in the table 7.32.

**Table 7.32** Percentage change of mashkalai productivity and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Negative	1	Goalpokher-II
Low	<20	1	Hemtabad
Medium	20-40	2	Goalpokher-I, Raiganj
High	40-60	2	Chopra and Itahar
Very high	>60	3	Islampur, Karandighi and Kaliaganj

Source: Compiled by the researcher.

In the study area, only one block is confined in very low change (negative) namely Goalpokher-II (-1.61 per cent). This zone lies in the Northern part of the district (table 7.30 and figure 7.10-E). Causes of very low change of productivity are- nature of major lands of this block is lowland i.e. not suitable for mashkalai, the moisture of soil is very high and many others. The low productivity change of mashkalai is limited to one block namely Hemtabad (18.56 per cent). But medium productivity zone of mashkalai (figure 7.10-E) lies in central and south-eastern parts of the district with a change index value range of 20-40 per cent. In the study area, blocks having the medium productivity change are namely Goalpokher-I (37.34 per cent) and Raiganj (24.33 per cent). But high productivity change of mashkalai confined in two blocks namely Chopra (52.18 per cent) and Itahar (55.23 per cent) of the district. The very high productivity change zone of mashkalai (figure 7.10-E) lies in northern (Islampur) and south-central (Karandighi and Kaliaganj) part of the district with a change value of above 60 per cent. This zone is confined in three blocks namely Islampur (68.03 per cent), Karandighi (65.30 per cent) and Kaliaganj (73.97 per cent) in the study area.

#### 7.1.2.6 Production and productivity of lentil

Lentil is the best dal close to Bengali people. A meal at home is not normally full without dal (Lentil). In the district, the production of the lentil has been decreased in all of the blocks. Production and productivity of lentil have decreased in 2015-16 from the previous years of 1995-96 to 2010-11. Lentil cultivation is not found in some blocks of the district namely Islampur, Goalpokher-I and Goalpokher-II in 2005-06 and Islampur, Goalpokher-II and Itahar in 2015-16. Block-wise production and productivity of lentil for the study period are categorized and represented in the table 7.33.

**Table 7.33** Block-wise production and productivity of lentil in Uttar Dinajpur District (1995-96 to 2015-16)  
(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years				Change 1995-96 to 2015-16 (%) (base year-1995-96)	
		1995-96	2000-01	2005-06	2010-11		2015-16
Chopra	P <sub>1</sub>	-	-	0.06	-	0.04	-33.33
	P <sub>2</sub>	-	-	391	-	410	4.87
Islampur	P <sub>1</sub>	0.05	0.04	-	-	-	-20.00
	P <sub>2</sub>	238	285	-	-	-	19.74
Goalpokher-I	P <sub>1</sub>	0.04	0.05	-	0.10	0.15	275.00
	P <sub>2</sub>	237	716	-	511	528	122.78
Goalpokher-II	P <sub>1</sub>	0.20	0.10	-	-	-	50.00
	P <sub>2</sub>	237	471	-	-	-	98.74
Karandighi	P <sub>1</sub>	0.50	0.40	0.67	0.25	0.85	70.00
	P <sub>2</sub>	403	854	392	513	528	31.01
Raiganj	P <sub>1</sub>	11.60	2.10	1.85	1.34	0.26	-97.75
	P <sub>2</sub>	991	992	419	477	510	-48.53

Hemtabad	P <sub>1</sub>	0.90	0.60	0.04	0.28	-	-68.89
	P <sub>2</sub>	563	476	192	511	-	-9.23
Kaliaganj	P <sub>1</sub>	0.70	0.20	0.75	2.01	0.29	-58.57
	P <sub>2</sub>	481	458	284	515	532	10.60
Itahar	P <sub>1</sub>	0.30	5.30	0.11	0.39	-	30.00
	P <sub>2</sub>	830	445	579	718	-	-13.43
<b>Uttar</b>	<b>P<sub>1</sub></b>	<b>14.29</b>	<b>8.79</b>	<b>3.48</b>	<b>4.37</b>	<b>1.59</b>	<b>-88.87</b>
<b>Dinajpur</b>	<b>P<sub>2</sub></b>	<b>498</b>	<b>588</b>	<b>377</b>	<b>541</b>	<b>525</b>	<b>5.42</b>

All figures are in rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

From table 7.33 the total production and productivity situation of lentil has been revealed during the period under study. Moreover, the block-wise highest production of lentil is observed in Raiganj Block (11.60 hundred metric tonnes) and lowest production is observed in Itahar Block (0.30 hundred metric tonnes) in 1995-96. But in 2005-06, highest and lowest production blocks are Hemtabad (0.04 hundred metric tonnes) and Raiganj (1.85 hundred metric tonnes) respectively. On the other hand, the highest production is observed in Karandighi Block (0.85 hundred metric tonnes) and lowest production found in Chopra Block (0.04 hundred metric tonnes). The total production of lentil had 14.29 hundred metric tonnes in 1995-96. But the production of lentil has decreased from 8.79 hundred metric tonnes in 2000-01 to 3.48 hundred metric tonnes in 2005-06 and then it increased to 4.37 hundred metric tonnes in 2010-11. But once again, it has decreased to 1.59 hundred metric tonnes in 2015-16. The average production of the district was 498 kg/hectare in 1995-96 and it has increased 588 kg/hectare in 2000-01 in the district. It is just about baffling matter that, productivity of lentil had decreased to 377 kg/hectare in 2005-06. But in 2010-11, it once more increased to 541 kg/hectare and then decreased 525 kg/hectare in 2015-16 in the district. The highest productivity of lentil is observed in Raiganj Block (991 kg/ha) and lowest productivity is observed in two blocks namely Goalpokher-I and Goalpokher-II i.e. 237 kg/hectare in 1995-96. But in 2005-06, highest productivity block was Itahar (718 kg/ha) and lowest productivity was Goalpokher-I (511 kg/ha). At last in 2015-16, highest and lowest productivity of lentil is observed in Kaliaganj (532 kg/ha) and Chopra (410 kg/ha) respectively. To understand the level of actual production change of lentil were categorized and findings represented in the table 7.34.

**Table 7.34** Percentage change of lentil production and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Above -50	3	Raiganj, Hemtabad and Kaliaganj
Low	-50 to 0	2	Chopra and Islampur

Medium	0-50	1	Itahar
High	50-100	2	Goalpokher-II and Karandighi
Very high	>100	1	Goalpokher-I

Source: Compiled by the researcher.

From the table 7.33, it is revealed that the blocks have negative production change are divided into two categories like; very low and low zone. Very low zone is confined to three blocks namely Raiganj (-97.75 per cent), Hemtabad (-68.89 per cent) and Kaliaganj (-58.57 per cent) in the district. But low production change is observed in only two blocks namely Chopra and Islampur with change index -33.33 per cent and -20 per cent respectively. This zone lies in Northern part of the district (figure 7.9-F). Medium production change lies in the Southern part of the district with a change index value ranges between 0-50 per cent (table 7.34). This zone confined in one blocks namely Itahar (30 per cent). High and very high production change is confined in three blocks namely Goalpokher-II (50 per cent), Karandighi (70 per cent) and Goalpokher-I (275 per cent) in the study area. It is interesting fact that production changes are far high in these blocks than the standard change i.e. -88.77 per cent compared to the district. The cause behind the high and very high change of lentil is way of farming, some part of the blocks has less irrigation coverage and comparatively high land available in these blocks which is the best for lentil cultivation (Researcher's observation). On the other side, the actual productivity changing situation of lentil in the district is depicted in the table 7.35.

**Table 7.35** Percentage change of lentil productivity and the number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Negative	3	Raiganj, Hemtabad and Itahar
Low	<15	2	Chopra and Kaliaganj
Medium	15-30	1	Islampur
High	30-45	1	Karandighi
Very high	>45	2	Goalpokher-I and Goalpokher-II

Source: Compiled by the researcher.

The very low zone is confined to three blocks namely Raiganj (-48.53 per cent), Hemtabad (-9.23 per cent) and Itahar (-13.43 per cent) in the district (table 7.33). This zone lies in southern part of the district (figure 7.10-F). But low change of productivity zone lies in northern (Chopra) part and the south-eastern (Kaliaganj) part of the district with change index range below 15 per cent. Change index of medium productivity ranges between 15-30 per cent and is confined in one block namely Islampur (19.74 per cent). This zone lies in northern part of the district (figure 7.10-F). High and very high change of productivity zone are confined to three blocks namely Karandighi, Goalpokher-I and Goalpokher-II with change index 31.01,

122.78 and 98.74 per cent respectively. This zone lies in the central (Karandighi) part and the northern (Goalpokher-I and Goalpokher-II) part of the district. The causes of high and very high productivity per hectare are the usage of a huge amount of chemical fertilizer, HYV seeds and many other situations preferable for lentil cultivation.

### 7.1.2.7 Production and productivity of jute

Jute is the second most important vegetable fiber after cotton due to its versatility. Not only is that, it is a natural, long and soft vegetable fiber with golden silky shines, also termed as “The Golden Fiber”. But the production of jute has declined day-to-day in the district. Total production of jute had 830.17 hundred metric tonnes in 1995-96 and it has decreased to 816.78 hundred metric tonnes in 2015-16. On the other hand, average jute productivity per hectare had 1,418 kg/hectare in the year 1995-96 and it has been increased 2,293 kg/hectare in 2015-16. The overall situation of production and productivity pattern are discussed in the table 7.36.

**Table 7.36** Block-wise production and productivity of jute in Uttar Dinajpur District (1995-96 to 2015-16)  
(Production '00 mt and productivity kg/ha)

Name of the C.D. Blocks		Years					Change 1995-96 to 2015-16 (%) (base year-1995-96)
		1995-96	2000-01	2005-06	2010-11	2015-16	
Chopra	P <sub>1</sub>	81.39	118.98	153.43	70.19	56.10	-31.07
	P <sub>2</sub>	900	936	1948	1727	1586	76.22
Islampur	P <sub>1</sub>	69.93	96.67	108.72	100.17	105.69	51.13
	P <sub>2</sub>	1080	1170	1975	2157	2314	114.25
Goalpokher-I	P <sub>1</sub>	53.71	76.64	105.71	98.48	112.16	125.58
	P <sub>2</sub>	1260	1638	2146	1737	2083	65.31
Goalpokher-II	P <sub>1</sub>	117.41	86.25	869.23	93.73	64.64	-44.94
	P <sub>2</sub>	1440	1494	1853	2213	2142	43.37
Karandighi	P <sub>1</sub>	162.90	35.83	258.40	153.30	212.96	30.73
	P <sub>2</sub>	1980	1764	2704	2803	2704	36.56
Raiganj	P <sub>1</sub>	104.40	175.68	206.06	217.63	187.27	79.37
	P <sub>2</sub>	1440	1746	2153	2524	2373	64.79
Hemtabad	P <sub>1</sub>	74.82	38.91	55.39	63.78	65.23	-12.81
	P <sub>2</sub>	1440	1602	2216	2160	2369	64.51
Kaliaganj	P <sub>1</sub>	60.30	46.54	52.53	103.32	108.85	80.51
	P <sub>2</sub>	1260	1170	2070	2817	2747	118.01
Itahar	P <sub>1</sub>	105.30	147.90	133.64	115.20	127.70	21.27
	P <sub>2</sub>	1980	1638	1998	2724	2315	16.91
<b>Uttar Dinajpur</b>	<b>P<sub>1</sub></b>	<b>830.17</b>	<b>823.44</b>	<b>1157.80</b>	<b>1015.72</b>	<b>816.78</b>	<b>-1.61</b>
	<b>P<sub>2</sub></b>	<b>1418</b>	<b>1462</b>	<b>2119</b>	<b>2318</b>	<b>2293</b>	<b>61.70</b>

All figures are in rounded form of productivity kg/ha

P<sub>1</sub> denotes total production and P<sub>2</sub> denotes productivity in kg/ha

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal

ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur

iii. Compiled by the researcher.

The overall situation of production of jute has increased except in 2000-01 and 2015-16. But productivity of jute also normally increased for the study period except in 2015-16 (table

7.36). Block-wise highest jute production is found in Karandighi Block (162.90 hundred metric tonnes) and lowest in Goalpokher-I (53.71 hundred metric tonnes) in 1995-96. But in 2005-06, it was found also in Karandighi Block (258.40 hundred metric tonnes) and lowest in Kaliaganj Block (52.53 hundred metric tonnes). In 2015-16, the highest jute production was in Karandighi Block (212.96 hundred metric tonnes) and lowest in Chopra Block (56.10 hundred metric tonnes) in the study area. Production of jute in the district was 823.44 hundred metric tonnes in 2000-01 and it has increased to 1,157.80 hundred metric tonnes in 2005-06. In 2010-11, total production of jute once again decreased to 816.78 hundred metric tonnes in 2015-16. Block-wise highest productivity is found in two blocks namely Karandighi and Itahar with 1,980 kg/hectare in 1995-96. But in the year 2005-06, it was found in Karandighi and Goalpokher Block with 2,704 kg/hectare and 1853 kg/hectare respectively. The highest productivity of jute is found also in Karandighi Block (2,704 kg/ha) and lowest in Chopra Block (1586 kg/ha) in 2015-16 of the district. Total productivity rate was 1,418 kg/hectare in 1995-96 and it was 1462 kg/hectare in 2000-01. Then it once again increased 2,119 kg/hectare in 2005-06 to 2,318 kg/hectare in 2010-11. But in 2015-16, total productivity of jute has decreased to 2,293 kg/hectare 2,293 kg/hectare in the district. To understand the level of actual production of jute, the data were categorized and findings are represented in the table 7.37.

**Table 7.37** Percentage change of jute production and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	Negative	3	Chopra, Goalpokher-II and Hemtabad
Low	<40	2	Karandighi and Itahar
Medium	40-80	2	Islampur and Raiganj
High	80-120	1	Kaliaganj
Very high	>120	1	Goalpokher-I

Source: Compiled by the researcher.

In the district, negative change is found in three blocks namely Chopra (-31.07 per cent), Goalpokher-II (-44.94 per cent) and Hemtabad (-12.81 per cent). This zone lies in northern (Chopra), Central (Goalpokher-II) and Hemtabad (south-eastern) part of the district. This category is far below the district average (-1.61 per cent). The causes of very low changes in jute are shortage of labour at peak periods, high disease infestation, and lack of retting water and weed problem, inadequate supply of quality fertilizers and high cost of production and low price of jute. But low change of jute production is confined in two blocks namely Karandighi (30.73 per cent) and Itahar (21.27 per cent). Medium production zone ranges between 40-80 per cent and is confined in two blocks namely Islampur (51.13 per cent) and Raiganj (79.37

per cent). This zone lies in northern (Islampur) and southern (Raiganj) part of the district (figure 7.9-G). Kaliaganj and Goalpokher-I Blocks are confined in high and very high zone with 80.51 per cent and 125.58 per cent respectively. The causes of high and very high production of jute for the study are increasing demand for jute materials day by day. As per the demand of jute materials, the price of raw jute increases. So, farmers are interested in sowing jute production.

As discussed earlier, the overall situation of jute is good in the district in comparison to the other districts of West Bengal. It has positive growth in all blocks in the district for the study period. Better conceptions of jute position, the actual change of jute productivity are considered in the table 7.38.

**Table 7.38** Percentage change of jute productivity and number of blocks in each category of change in Uttar Dinajpur District (1995-96 to 2015-16).

Category of Change	Change Index (%)	No. of C.D. Blocks	Name of the C.D. Blocks
Very low	<20	1	Itahar
Low	20-40	1	Karandighi
Medium	40-60	1	Goalpokher-II
High	60-80	4	Chopra, Goalpokher-I, Raiganj and Hemtabad
Very high	>80	2	Islampur and Kaliaganj

Source: Compiled by the researcher.

In the study area, the very low productivity of jute is limited to one block namely Itahar (16.91 per cent) with a change index value below 20 per cent. This zone lies in southern part of the district (figure 7.10-G). Low zone also is observed in one block namely Karandighi (36.56 per cent). Causes of very low productivity of jute are shortage of proper irrigation system and labour shortage at the time of weeding. Not only is that, but medium productivity zone is also observed in one block namely Goalpokher-II (43.37 per cent) in the district. This zone lies in the northern part of the district (figure 7.10-G). Blocks having high productivity are namely Chopra (76.22 per cent), Goalpokher-I (65.31 per cent), Raiganj (64.79 per cent) and Hemtabad (64.51 per cent). This zone lies in northern and southern part of the district. But very high productivity zone is observed in rest two blocks namely Islampur (114.25 per cent) and Kaliaganj (118.01 per cent) in the district. The causes of high and very high productivity are irrigation modernization in these blocks, available credit facilities from the local bank, use of huge rate chemical fertilizers and pesticides per hectare.

per cent). This zone lies in northern (Islampur) and southern (Raiganj) part of the district (figure 7.9-G). Kaliaganj and Goalpokher-I Blocks are confined in high and very high zone with 80.51 per cent and 125.58 per cent respectively. The causes of high and very high production of jute for the study are increasing demand for jute materials day by day. As per the demand of jute materials, the price of raw jute increases. So, farmers are interested in sowing jute production.

As discussed earlier, the overall situation of jute is good in the district in comparison to the other districts of West Bengal. It has positive growth in all blocks in the district for the study period. Better conceptions of jute position, the actual change of jute productivity are considered in the table 7.38.

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Very low	<20	1	Itahar
Low	20-40	1	Karandighi
Medium	40-60	1	Goalpokher-II
High	60-80	4	Chopra, Goalpokher-I, Raiganj and Hemtabad
Very high	>80	2	Islampur and Kaliaganj

Source: Compiled by the researcher.

In the study area, the very low productivity of jute is limited to one block namely Itahar (16.91 per cent) with a change index value below 20 per cent. This zone lies in southern part of the district (figure 7.10-G). Low zone also is observed in one block namely Karandighi (36.56 per cent). Causes of very low productivity of jute are shortage of proper irrigation system and labour shortage at the time of weeding. Not only is that, but medium productivity zone is also observed in one block namely Goalpokher-II (43.37 per cent) in the district. This zone lies in the northern part of the district (figure 7.10-G). Blocks having high productivity are namely Chopra (76.22 per cent), Goalpokher-I (65.31 per cent), Raiganj (64.79 per cent) and Hemtabad (64.51 per cent). This zone lies in northern and southern part of the district. But very high productivity zone is observed in rest two blocks namely Islampur (114.25 per cent) and Kaliaganj (118.01 per cent) in the district. The causes of high and very high productivity are irrigation modernization in these blocks, available credit facilities from the local bank, use of huge rate chemical fertilizers and pesticides per hectare.

### 7.1.2.8 Production and productivity of tea

Tea is more than just a popular cold-weather beverage. In the district, mainly two types of tea are sown namely; black tea and herbal tea. The production and productivity of tea are shown in the table 7.39.

**Table 7.39** Production and productivity of tea in Uttar Dinajpur District (1995-96 to 2015-16)  
(Production '00 mt and productivity kg/ha)

Uttar Dinajpur	Year						Change 1995-96 to 2015-16 (%) (base year-2010-11)
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	
Production	6.50	7.00	7.00	9.00	10.00	10.00	53.84
Productivity	2143	2233	2532	2250	2303	2342	9.28

Source: i. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal  
ii. Office of the Principal Agricultural Officer, Karnojora, Uttar Dinajpur  
iii. Compiled by the researcher.

Total production of tea had 6.50 hundred metric tonnes in 2010-11 and it has increased to 10.00 hundred metric tonnes in 2015-16. On the other hand, average tea productivity per hectare had 2,143 kg/hectare in the year 1995-96 and it has been increased 2,342 kg/hectare in 2015-16. Total 53.84 per cent production is increased over the 6 years and productivity increased by 9.28 per cent.

### 7.1.2.9 Agriculture region based on Weaver's Multi-element or Statistical technique

The regional approach is of fundamental importance in the study of agriculture in geography. With an analysis of regional variations of farm practices and interpretation of the changing pattern of the agricultural region. In the study, Weaver's agricultural region technique (multi-element or statistical technique) has been used for agriculture crop variation which is a simple and convenient method of finding out of the combination of crops, having a significant share in the total cropped area. This technique is a development over the experimental of the agricultural regionalization (Singh and Dhillon, 2005). Block-wise different crop (dominating crops) area in percentage showing in the table 40 (Appendix VIIa). Hypothetical monoculture area is the theoretical percentage share of a crop is 100 per cent and five crop combination it is 20 per cent for each and so on. It may be expressed as:

$$\sigma^2 = \sum(x_i - \bar{X})^2 / N$$

Where,  $\bar{X}$  = theoretical percentage,  
 $x_i$  = actual percentage,  
N = number of crops.

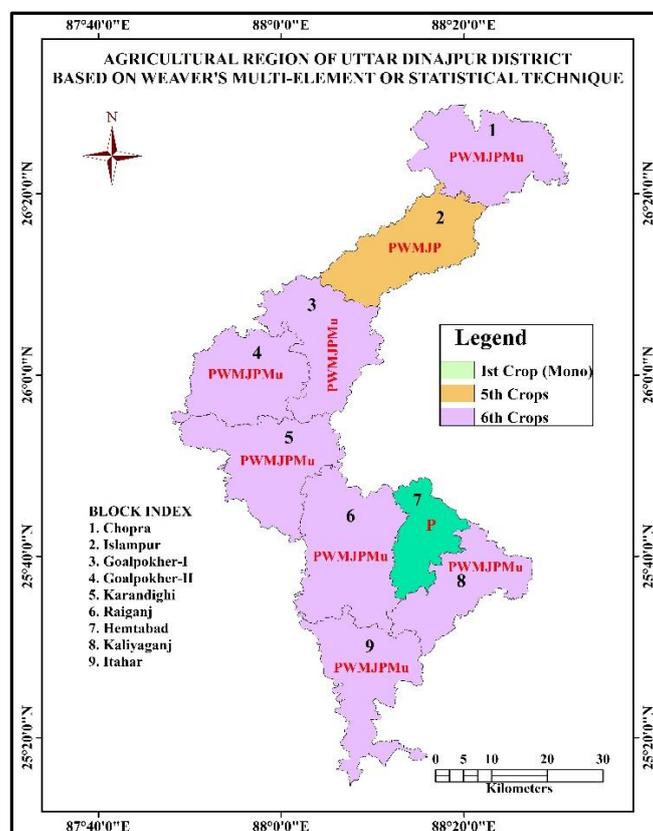
**Table 7.41** Crop combinational value of different crops in Uttar Dinajpur District, 2018

Name of the C.D. Blocks	1 <sup>st</sup> crop	2 <sup>nd</sup> crop	3 <sup>rd</sup> crop	4 <sup>th</sup> crop	5 <sup>th</sup> crop	6 <sup>th</sup> crop
	Paddy (P)	Wheat (W)	Maize (M)	Jute (J)	Potato (P)	Mustard (Mu)
Chopra	1252.45	1135.03	772.99	562.76	490.71	<b>451.02</b>
Islampur	2272.42	505.47	361.49	279.89	<b>233.75</b>	258.08
Goalpokher-I	2151.10	721.72	552.35	393.57	332.35	<b>277.34</b>
Goalpokher-II	1774.09	705.95	588.16	467.21	407.55	<b>340.54</b>
Karandighi	2329.02	664.71	514.50	323.54	309.45	<b>268.38</b>
Raiganj	1709.82	814.37	684.42	488.26	441.16	<b>364.55</b>
Hemtabad	<b>650.25</b>	953.91	1114.35	889.55	773.72	657.89
Kaliaganj	1083.72	1078.54	951.41	721.44	621.83	<b>519.68</b>
Itahar	1371.96	940.96	--	493.33	469.24	<b>405.41</b>

Source: i. Office of the Deputy Director of Agriculture (Administration), Uttar Dinajpur

ii. Data compiled by the researcher depend on District Statistical Hand Book, Uttar Dinajpur.

From table 7.41 and figure 7.11 it is observed that only one block namely Hemtabad under monocrop (paddy dominating) and Islampur block under 5<sup>th</sup> crop dominating (potato dominating). Because Hemtabad block's agricultural land is the low land type where irrigation water in the summer season stays one and half of one week and suitable soil. Rest 7 blocks namely Chopra, Goalpokher-I, Goalpokher-II, Karandighi, Raiganj, Kaliaganj and Itahar under 6<sup>th</sup> crop dominating (mustard). In these blocks, mustard is an additional crop which is sowings before the *rabi* paddy.



**Figure 7.11** Agricultural region of Uttar Dinajpur District based on Weaver's Multi-element or Statistical Technique.

### 7.1.3 Farm size and cropping pattern

A farm is an area of land that is committed principally to agricultural processes and the principal purpose of producing cereal and other crops; it is the basic facility in food production. The relationship between farm size and cropping pattern has been intensely inverse in Uttar Dinajpur District. The average landholding farm size of households has shrunk marginally from 0.95 hectares in 1995-96, to 0.88 hectares in 2011-12 (District Statistical Hand Book, Uttar Dinajpur, 1995 and 2011). Rapidly increasing population in the district is the main cause of fragmenting a plot into two or more plots. So, the sizes of most farms are small and marginal. But it has been observed in the time of field survey that the productivity rate of different crops is high in small and marginal farm size households. In the district, the problem of the small farm is not one of providing enough food, but of getting an income comparable with that obtainable in other parts of the economy. The incomes of small farmers in the last 30 years have fallen below the incomes of those employed in the industry. It is a fact that farm size influences the type of farming practice. In the district, occupiers of a hectare or less are rarely able to buy their food and have to use all their land for growing food crops. They are incapable to spare land for cash crops or fodder crops. On big farms, however, farmers can get a good income even with enterprises with a comparatively low net return per hectare, such as cereals. On small farms, labour inputs and crop yields are high; both decline as farm size increases. Output per capita, however, is low on small farms and increases with size. On the basis of data, farm size is divided into five board categories, like; marginal (<1.0 hectares), small (1.0-2.0 hectares), semi-medium (2.0-4.0 hectares), medium (4.0-10.0 hectares) and large class (>10.0 hectares). A clear picture of farm size and no. of holdings is depicted in the table 7.42.

**Table 7.42** Farm size wise its holdings and area of holdings in Uttar Dinajpur District  
(Classes as per Census of India) (1995-96 to 2011-12).  
(Area in hectare)

Farm size (ha)	1995-96		2005-06		2000-01		2011-12		Change in % (1995-96 to 2011-12)	
	No. of holdings	Area of holdings	No. of holdings	Area of holdings	No. of holdings	Area of holding	No. of holdings	Area of holdings	No. of holdings	Area of holdings
<1.0	1,28,156	83,264	2,19,312	1,18,378	2,07,906	1,23,540	2,21,027	1,20,067	72.46	44.20
1.0-2.0	75,005	60,822	50,047	81,833	42,753	77,828	49,163	79,478	-34.45	30.67
2.0-4.0	21,592	55,137	13,660	38,341	13,110	39,165	15,139	40,896	-29.66	-25.82
4.0-10.0	3,787	17,308	1,086	5,233	1,613	8,010	593	2,801	-84.34	-83.81
>10.0	46	626	71	8,685	74	5,140	60	8,565	30.43	36.58
<b>Uttar Dinajpur</b>	<b>2,28,586</b>	<b>2,17,157</b>	<b>2,84,176</b>	<b>2,52,470</b>	<b>2,65,456</b>	<b>2,53,783</b>	<b>2,85,982</b>	<b>2,51,807</b>	<b>25.11</b>	<b>15.95</b>

Source: i. Office of the Principal Agricultural officer, Government of West Bengal, Karnojora, Uttar Dinajpur  
ii. District Statistical Hand Book, Bureau of Applied Economics & Statistics, Government of West Bengal, Kolkata.

Table 7.42 presents farm size-wise pattern of distribution of no. of holdings and their area holding obtained from data provided by the Principal Agricultural Officer, Karnojora, Uttar Dinajpur and Office of the Bureau of Applied Economics and Statistics, Government of West Bengal. In 1995-96, the marginal average size of holdings has been largely due to the higher concentration of households within the marginal size class in the land distribution. But only 46 land holdings are in large size farms i.e. above 1.60 hectares in the district. About 56.06 per cent of holdings in the marginal class is caused by the land reforms as implemented in the district and huge population pressure as well as fragmentation of land by hereditary. As per 2011-12, a total of 2,21,027 landholdings have less than 1.0 hectares of land in the district. But only 60 land holdings in the whole district have above 10.0 hectares size of farm. On the other hand, marginal land holdings (<1.0 hectares) cover a total area of 83,264 hectares, semi-medium (2.0-4.0 hectares) covers a total area of 55,137 hectares and large (>10.0 hectares) farm size bears a total area of 626 hectares of land. But in 2011-12, the picture of area holdings has changed. The picture in the marginal land holdings is 1,20,067 hectares covered by 2,21,027 landholdings; 40,896 hectares is covered by semi-medium class (2.0-4.0 hectares) and 855 hectares covered by the large size holdings (>10.0 hectares) in the district. Percentage of positive change picture is confined to two groups i.e. marginal and large farm size and the rest three group's namely small, semi-medium and medium class have a negative change in 1995-96 but in 2011-12, change picture has been inversed. Area of holdings has a positive change in percentage as is observed in three groups' i.e. marginal, small and large size of the farm which is above the district average. Low or negative change is found in the two-class group i.e. semi-medium and medium size of farm.

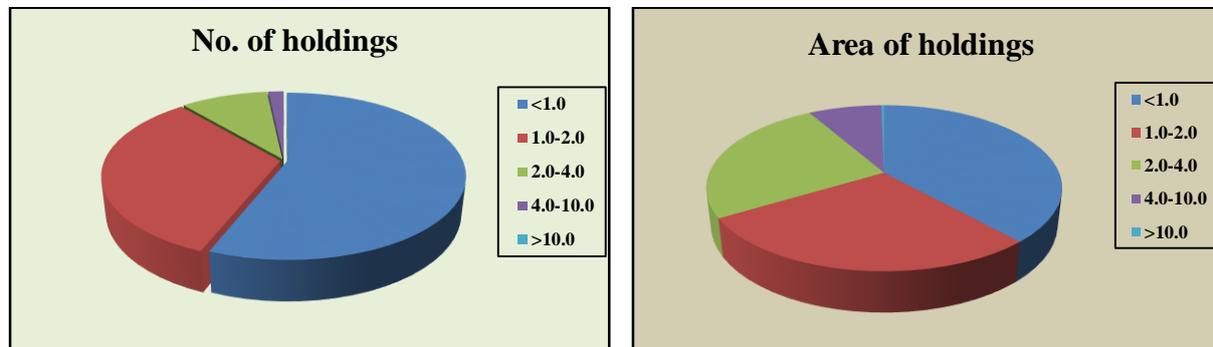
**Table 7.43** Percentage distribution of land holdings and area of holdings (1995-96 to 2011-12).  
(No. of holdings and area of holding in %)

Size of class	Farm area (ha)	1995-96		2000-01		2005-06		2011-12	
		No. of holdings	Area of holdings						
Marginal	<1	56.06	38.34	78.32	48.67	77.17	46.88	77.29	47.68
Small	1-2	32.81	28.00	16.10	30.66	17.61	32.41	17.19	31.56
Semi-medium	2-4	9.44	25.39	4.93	15.43	4.80	15.18	5.29	16.24
Medium	4-10	1.65	7.97	0.60	3.15	0.38	2.07	0.21	1.11
Large	>10	0.02	0.29	0.02	2.02	0.02	3.44	0.02	3.40

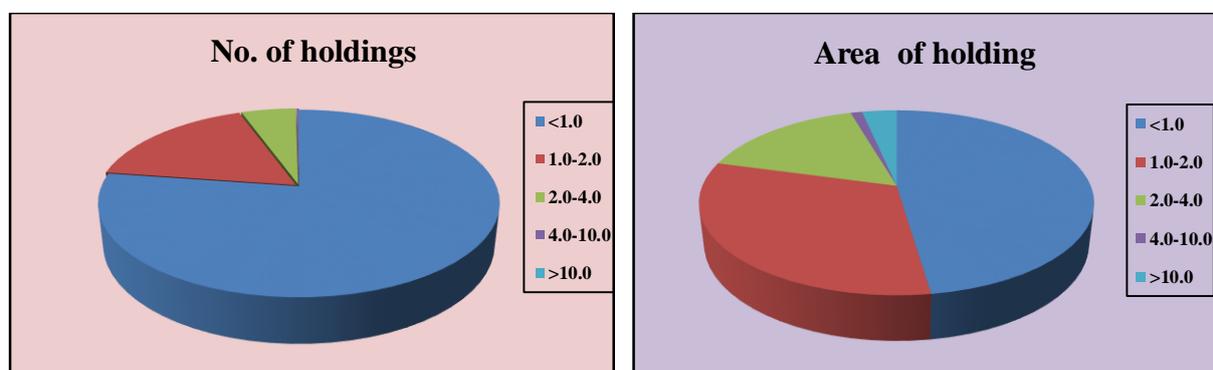
Source: As in table 7.41

Table 7.43 and figure 7.12 & 7.13 present the distribution of landholdings in provisions of a percentage of the total holdings and area owned and altered size classes as defined. As discussed earlier most of the landholders in Uttar Dinajpur District have been concentrated within the marginal group and the share of this group has increased dramatically from 56.06

per cent in 1995-96 to 77.29 per cent in 2011-12. The causes of the increase of marginal landholders for the study period are family fragmentation, purchase of land from other landholders, fewer labours and many others. The percentage share of land area in marginal size class has also increased at different rates. In the district 38.34 per cent area of marginal holdings was in 1995-96 and it increased to 47.68 per cent in 2011-12. But only a negligible percentage (0.02 per cent) of landholdings within the large group was in 1995-96 and the share of this group is the same in 2011-12. On the other hand, the share of land area in a large group of landholdings has increased from 0.29 per cent in 1995-96 to 0.34 per cent in 2011-12 in the study period. The causes of the increase large class are small farmers who have sold their land, change of work pattern of marginal and small farmers, etc. But it is true that many times marginal and small areas of land are not suitable for cultivating by the tractor and power tiller. So, animal-driven force and manpower are usually used in agricultural fields. Not only that, the farm size decides the degree of risk that a farm operator may bear, i.e. larger the size of the farm, greater the capacity of the farmer to take the risk and vice versa. This in turn would affect the extent of specialization and also the quantity of equipment and power to be used. Moreover, land size is linked with the pressure of population, the economic requirements and the fertility of the land.



**Figure 7.12** Percentage distribution of landholding and area of operational holdings among the different class in Uttar Dinajpur (1995-96).



**Figure 7.13** Percentage distribution of landholding and area of operational holdings among the different class in Uttar Dinajpur (2011-12).

### 7.1.3.1 Cropping pattern

In the district, overall cropping pattern, food crops occupy 3,741.11 thousand hectares which are about 74.73 per cent of the total cropped area during 2015-16. Paddy is the leading crop followed by wheat. Other food grain crops occupy a small proportion of the area. Amongst non-food crops, groundnut and fodder occupy the dominant place. Other non-food crops are insignificant in the cropping pattern of the study area. On the contrary, cash crops constitute only a negligible percentage of the cropped area. The fundamental inferiority owes mainly to the limitations of rainfall and soil, and secondly, exasperation with the economic and cultural variables. Block-wise variations in the cropping pattern are, at the same time, noticeable because of spatial differences in the interface between the physical and non-physical environment. There are remarkable changes in the cropping pattern of the district during the period under investigation. Besides these generalities, spatial variations are depending upon the use of HYV seeds, chemical fertilizer use, rainfall and soil conditions, etc. In each and every cropping pattern each crop is given its position in terms of percentage in relation to the whole cropped area of an areal unit. It may be expressed as:

$$C_p = (C_a \div N, C_b \div N, C_c \div N, \dots, C_k \div N) \times 100 \text{ (Singh and Dhilon, 2005)}$$

Where,  $C_p$  represents the cropping pattern

$C_a, C_b, C_c, \dots, C_k$  cropped area and a,b,c,..... k in an enumeration unit and N is the total cropped area in the same units.

Therefore a detailed analysis of each agronomy crop based on the quinquennial study (1995-96 to 2015-16) of different main crop's cropping pattern therein now follows in the table 7.44.

**Table 7.44** Trends of cropping pattern in Uttar Dinajpur District (1995-96 to 2015-16).  
(Percentage of the total cropped area)

Name of crops	Years					Change 1995-96 to 2015-16 (%)
	1995-96	2000-01	2005-06	2010-11	2015-16	
Total Foodgrain	69.49	73.59	75.19	74.31	74.73	7.54
Total Oilseeds	6.90	10.09	8.98	10.44	11.27	63.33
Total fiber	9.08	13.67	12.78	10.39	5.61	-38.21
Miscellaneous	3.32	2.64	3.11	4.84	3.78	13.85
Paddy (Amon +boro)	68.88	62.54	61.92	58.34	59.26	-13.96
Wheat	6.19	8.33	8.53	8.42	11.90	92.24
Potato	1.21	1.49	1.87	2.64	4.65	284.29
Mustard	7.65	7.67	8.00	9.92	7.98	4.31
Mashkalai	1.20	0.36	0.42	0.39	0.10	-91.67
Lentil	0.34	0.37	0.20	0.31	0.34	No change
Linseed	0.59	0.69	0.39	0.14	0.17	-71.19
Ginger	1.02	0.56	0.74	0.28	0.20	-80.39

Gram	0.26	0.38	0.13	0.11	0.04	-84.61
Jute	8.51	13.11	10.68	10.20	5.47	-35.72

Source: Compiled by the researcher from the District Statistical Hand Book Data, Bureau of Applied Economics and Statistics, Government of West Bengal and PAO, Karnojora, Uttar Dinajpur.

From table 7.44 it is observed that foodgrains crops play a major role in the cropping pattern of the district. This is mainly due to their importance both as grains for human beings and straw for animals (Singh, 1974). About 69.49 per cent of the cropped area is under food grains (1995-96) in the district under the study period (cereals and pulses). But it has increased to 74.73 per cent of the total cropped area in 2015-16. On the whole, cereals and pulses dominate the agricultural landscape of the district. The variation in the major food grains as well as cereals crop paddy covers about 68.88 per cent of the total cropped area and 59.26 per cent of the total cropped area in 1995-96 and 2015-16 respectively in the district. Most of the paddy in the district is grown in the Kharif season. However, in some areas of the district especially where artificial water supply is available there some paddy is also taken as a summer crop. The total cropping area has changed (negative change) of paddy by about -13.97 per cent over the study period. Wheat is ranking second among the most widely grown crop in the district occupying an area of about 6.13 per cent in 1995-96 and it has increased to 11.90 per cent in 2015-16. A total of 92.24 per cent cropping area of wheat has been changed over the study period in the district.

Oilseeds are very useful in many ways. The oilseeds cultivated in the district on a minor scale are *mustard* and *rape seeds*, *linseed*, *rabi groundnut*, *winter til*, and *sunflower*, etc. They together occupy about 6.90 per cent of the total cropped area of the district in 1995-96. But in 2015-16, the cropping area has increased to about 11.27 per cent of the total cropped area. In all, a total increase in cropping area under oilseeds is observed during the period under investigation because of its commercial value as well as daily demand to the district's peoples.

The total fiber cropping pattern in the district has decreased from 1995-96 to 2015-16. It was 9.08 per cent in 1995-96 and it decreased to 5.61 per cent in 2015-16 of the total cropped area of the district. At last miscellaneous cropping pattern has increased over the study period i.e. 3.32 per cent in 1995-96 to 3.78 per cent of the total cropped area in the district. Changes in the cropping pattern during the period under investigation are very negligible. In the district, the miscellaneous crops include cotton, fruits and vegetables etc.

The pattern of change in potato is observed in the whole district. The proportion of area under potato in the district is 35,610 hectares (4.65 per cent). The potato cropping pattern increase during the study period in the district is 284.29 per cent. In 1995-96, total of 1.21 per

cent area was in under potato. But it has increased to 4.65 per cent area of the total cropped area in 2015-16 and this is mainly due to the increased irrigation facilities in recent years, increase in demand of potato day-by-day and suitable price in local and international markets.

Mustard occupies the third place among the cereal crops (according to 2015-16 record) in the district, with 39,960 hectares of total cropped area (accounting to 7.98 per cent). The changing pattern of mustard cultivation i.e., increase in cropping area, during the period which was 7.65 per cent in 1995-96 to increase 7.98 per cent of the total cropped area in the study area. The total net cropping area has been increased for the study period (1995-96 to 2015-16) by about 4.31 per cent.

Lentil is very useful in many ways. This crop is grown during the *rabi* season. The proportion of area under lentil in 1995-96 and 2015-16 is the same i.e. 0.34 per cent of the total cropped area. Elsewhere, the proportions are very low and cultivation has diminished in importance during the last 20-30 years in the district.

Ginger is the most negligible crop in the district. The proportion of area under ginger has decreased over the study period. It was 1.02 per cent in 1995-96 and it has decreased to 0.20 per cent in 2015-16 in the district. Total - 80.39 per cent (Negative change) cropping area decrease is seen in the total cropped area.

The proportion area under cropping pattern of mashkalai in the district is 1.20 per cent of the total cropped area in 1995-96. But the crop area has decreased to 0.10 per cent in 2015-16 of the total cropped area in the district due to low demand in the market, per hectare low production and high rainfall condition at the time of growing.

The changes in the linseed cropping area are also noticed in the district and negative change is observed. Linseed occupies second place among the pulses crops of the district, with 2,400 hectares of total cropped area (Amounting to 0.59 per cent) in 1995-96. And it has decreased by 0.17 per cent of the total cropped area in 2015-16. Total 71.18 per cent area has decreased over the study period i.e. 0.59 per cent in 1995-96 to 0.17 per cent in 2015-16.

The proportion of area under gram in the district is 1,100 hectares (0.26 per cent) of the total cropped area in 1995-96 of the district. And the area of proportion has decreased by 0.04 (negligible) per cent of the total cropped area in 2015-16 due to local variety seeds and the productivity rate per hectare is very low.

The pattern of change in jute cropping in the district is also observed. The area under jute has decreased during the period under investigation and this is mainly due to the lack of irrigation facilities in the lower-lying rate of jute in recent years of the district. The proportion of area under jute in the district occupies 35,900 hectares (amounting to 8.51 per cent) in 1995-

96 and it has decreased to 28,075 hectares (amounting 5.48 per cent) of the total cropped area. Total 35.72 per cent of jute cropping area is decreased overall in the study period.

### 7.1.3.2 Difference between agricultural land use and cropping pattern

Agricultural land is defined as the land area which is either arable, land under temporary (annuals) and permanent (perennials) crops, land under gardens and temporarily fallow (table 7.45). Not only that, the land is essential under replanted of different crops in every year (paddy) or a certain time gap (tea plantation) On the other hand, the cropping pattern means different crops produce in a particular year on agricultural land (UNFAO). Agricultural land use depends on several factors like soil fertility, amount of rainfall and irrigation facility etc. But appropriate cropping pattern depends on its nature of the soil (pH, NPK, Sulphur, organic carbon, etc.), nature of topography and availability of water supply, location of land for cultivation, Supply of chemical fertilizer, subsidy from the Government and awareness of farmers about the use of bio-fertilizers etc. (table 7.44).

## 7.2 Cultivated area

Basically, the cultivated area includes regular plough land which includes both village and fallow lands. In the District, it is reported that in 2000, about 63.47 per cent area was covered under net cultivated lands. But in the year 2010, it reached 61.45 per cent (i.e. about 2 per cent of cultivated lands are converted to different categories of land). This area is generally fertile land which is characterized with two or three crop production within a year. In 2000, block-wise highest cultivated land is observed in Itahar Block which constitutes 72.11 per cent and the lowest is observed in Chopra Block which is about 45.55 per cent of the total geographical area (table 7.45). It is a significant matter that, in all blocks cultivated land is decreased from the year 2000 to 2010.

**Table 7.45** Block-wise agricultural land use pattern of Uttar Dinajpur District, 2000  
(Area in hectare)

Name of the C.D. Blocks	Geographical area	Net area sown	Cultivable area	Current fallow*	Fallow land other than current fallow*	Culturable waste land	Land under misc. tree crops & groves (Not included in N.A.S)	Permanent pastures and other grazing land
Chopra	37,840	22,260	17,273	337	-	608	107.80	13
Islampur	36,010	26,000	20,020	265	21	816	176	100
Goalpokher-I	35,641	29,500	24,190	924	-	100	195	50
Goalpokher-II	32,208	29,076	21,876	738	20	502	112	20
Karandighi	38,574	29,061	24,411	243	18	1,009	168	22
Raiganj	47221	35,200	32,032	1,137	12	140	1,015	-

Hemtabad	19,160	16,653	12,616	615	6	-	240	260
Kaliaganj	31,160	23,360	20,900	208	-	327	122	190
Itahar	34656	30182	24992	293	4	95	410	175

**Note:** all figures are rounded form.

Source: i. District Statistical Hand Book, Bureau of applied economics & Statistics, Karnojora, Uttar Dinajpur-2001

ii. \* Office of the Principal of Agricultural officer, Government of West Bengal, Karnojora, Uttar Dinajpur

But the picture is changes in 2010, in this year the highest percentage share of cultivated land is observed in Karandighi Block. It constitutes about 67.36 per cent. On the other hand, the lowest percentage share of cultivated land is also observed in Chopra Block which constitutes about 49.40 per cent (table 7.46).

**Table 7.46** Block-wise Agricultural land use pattern of Uttar Dinajpur District, 2010  
(Area in hectares)

Name of the C.D. Blocks	Geographical area	Net area sown	Cultivable area	Current fallow*	Fallow land and other than current fallow*	Culturable waste land	Land under misc. tree crops & groves (Not included in NAS)	Permanent pastures and other grazing land
Chopra	37,840	22,360	18,695	49	-	190	14	109
Islampur	36,010	26,000	19,420	3,697	9	3,387	126	-
Goalpokher-I	35,641	29,500	23,152	-	-	340	187	32
Goalpokher-II	32,208	29,176	20,100	420	16	1,226	132	-
Karandighi	38,574	29,751	25,984	-	13	1,715	101	15
Raiganj	47,221	35,200	30,869	62	8	140	579	12
Hemtabad	19,160	16,653	15,652	-	6	-	190	-
Kaliaganj	31,160	23,360	18,765	421	-	427	488	10
Itahar	34,656	30,182	23,418	299	10	101	294	23

**Note:** All figures are rounded form.

Source: i. District Statistical Hand Book, Bureau of applied economics & Statistics, Karnojora, Uttar Dinajpur 2011

ii. \* Office of the Principal of Agricultural officer, Government of West Bengal, Karnojora, Uttar Dinajpur

### 7.3 Net area sown

Net area sown denotes the geographical area of cultivated or sown land throughout an exacting area. The ecological factors appear to be significant in determining the extent of net area sown in the district under study. The high ratio of land under plough is due to the fertile nature of the plainest land and heavy pressure of population and resultantly urgently requiring more land to produce more food crops. The pressure of population is so intense that nearly every available patch of land is cultivated. The ratio of net sown area to the total area of the district varies considerably from block to block, depending mainly upon the surface conditions including the fertility of the soil, use of huge amounts of chemical fertilizers and pesticides, availability of water for irrigation and mechanization in the agricultural sector. The spaces are located over the undulating as well as sloppy surfaces or close to the urban centers the latter of which records

a small percentage of land under this category. Blocks situated in the northern part of the district and highly residential places namely Chopra, Goalpokher-I and Raiganj record comparatively lower percentage of land as under net area sown.

From table 7.45 and 7.46, it is revealed that there was a fairly speedy deceleration in the change of net area sown over point in time. In terms of percentage share of net sown area to the reporting area, in 2000, 4 blocks namely Goalpokher-I, Goalpokher-II, Karandighi and Itahar have more than 75 per cent of the reporting areas as net sown area. The blocks have more than 75 per cent area as the net sown area which is a good sign for agricultural developments and one of the most important driving forces for changing the land use pattern in any region. On the other side rest 5 blocks namely Chopra, Islampur, Raiganj, Hemtabad and Kaliaganj which can be placed as the poorest blocks in terms of cultivable lands as a net sown area in the district. The percentage of the reported area, Raiganj Block occupies about 10.25 per cent of area as cultivable area and is followed by the Karandighi with 7.79, Goalpokher-I with 7.72 per cent area under cultivable in the year 2000. But in these two blocks, cultivable land area increased by 8.31 per cent and had decreased by 7.40 per cent during 2000 and 2010 respectively. It is also reported that in these two blocks cultivable area increased under this category which is a good sign in terms of agriculturally productive and fertile lands.

#### **7.4 Fallow lands**

Fallow land is land that a farmer kept fallow for a certain period but does not cultivate for one or more seasons to permit the field to become more productive another time. The exercise of leaving the field's fallow dates back to primordial times when farmers realized that using soil over and over again depleted its nutrients. This category includes all lands which were taken out for cultivation and are temporarily out of cultivation for a period not less than one year and not more than five years in a region. Generally, fallow lands are two types. Like;

##### **7.4.1 Current fallow**

This group of land consists of cropped areas which are reserved fallow during the present year. If any planting area is not cropped in a similar year, it is also treated as current fallow land or lands which are lying empty or fallow for a period of less than one year are considered as current fallow land. The extent of current fallow land is customarily spread in altered blocks of the study area.

Block-wise percentage share of current fallow indicates that from table 7.45 & 7.46, Goalpokher-I with 3.31 per cent land under current fallow was among the highest of vacant

land during 2000, but in the year 2010, Islampur with 10.26 per cent land under current fallow was among the highest of vacant land and Chopra with 0.13 per cent land under current fallow was among the lowest of vacant land during the same period. The remaining four blocks namely Goalpokher-II, Raiganj, Kaliaganj and Itahar Blocks fall below 1.40 per cent of land as fallow and the overall share of current fallow in Uttar Dinajpur district is reported as 0.82 per cent. It is noticed that three blocks namely Goalpokher-I, Karandighi and Hemtabad have no current fallow land in the year 2010.

#### **7.4.2 Fallow and other than current fallow**

This includes all types of lands which are taken up for agriculture but are temporarily out of agriculture for a period of not less than one year and not exit five years. The causes for keeping such lands fallow may be one of the following: Insufficiency money of cultivators, inadequate supply of irrigation water, malarial climate condition, silting of canals and rivers, soil erosion and un-remunerative nature of farming. Land under fallow land other than current fallow clearly indicates serious misuse of available land. As discussed earlier, agriculture in the study area is labour oriented activity. In the last few years, the farmers could not cope with their all cultivated lands within the short rainy period as well as break of the monsoon. Most of the farmers in the district belong to lower income groups and due to the lack of capital farmers are powerless to prepare the agricultural land for smooth cultivation. In addition, owing to the vagaries of monsoon and its late arrival or abnormally low amount of rainfall in the rainy period, therefore lands are also left as a fallow. Not only that, a maximum of the poor class lands fail to provide sufficient compensation to the cultivators in view of the price of production and the farmers leave such type of lands as uncultivated. Consequently, the lands are absent as fallow land for more than one year up to an extreme of 5 years.

In the block-wise study, it is manifested from the table 7.45 & 7.46, that, there were 3 blocks namely Islampur, Goalpokher-II and Karandighi, where the percentage share of other fallow land was more than 0.05 per cent in 2000 of its geographical area. But this category further declined by 0.03 per cent in 2010. Only 3 blocks namely, Chopra, Goalpokher-I and Kaliaganj having an area of zero per cent other than fallow land both in the years 2000 and 2010. In the rest 3 blocks, the percentage share of the other fallow lands is less than 0.03 per cent in Raiganj, Hemtabad and Itahar in 2000 and in 2010 its percentage has fallen to less than 0.02 per cent.

### **7.5 Culturable waste land**

These lands contain land available for agriculture but not taken up for agriculture or abandoned after a limited year for one purpose or the other. Such lands may be fallow or covered with bushes or jungles which are not put to several uses. They may be evaluated or not assessed and may be isolated blocks or surrounded by cultivated holdings. Land one time cultivated but not cultivated for the last five years or additional in succession are also involved in this category. Culturable waste as the name designates can be reclaimed for agronomic production. It is a fact that due to the growth of population on land areas and family partitions of agrarian land, the rescue of much of culturable waste has taken place. In course of the extension of agrarian lands the extent of culturable waste has been reduced in the study area. Notwithstanding, day-by-day extensions and permission of new industries, establishing new settlements have also reduced the extent of culturable waste land in the district. Some villages in the district lying over the plain areas record very restricted extent of land under this category and the areas with the adverse landscape, record a high percentage of lands. As such, it was also observed in course of field study, culturable waste land is also variably distributed in different block of the study area.

It is observed in table 7.45 and 7.46, that, the block-wise situation of culturable wasteland having the highest percentage share was Karandighi Block with 2.61 per cent in 2000 and this percentage increased to 4.44 per cent during 2010. There was only one block namely Hemtabad, the percentage share of culturable wasteland is zero (negligible) per cent during 2000 and 2010. On the other hand, there are 3 blocks namely; Chopra, Islampur and Goalpokher-II percentage share of culturable wasteland indicate that 2.11 per cent, 2.25 per cent and 1.55 per cent respectively during 2000 in the reporting area. But these 3 blocks the percentage share of culturable wasteland declined to 0.50 per cent in Chopra and increased to 9.40 per cent in Islampur and 3.80 per cent in Goalpokher-II Block in 2000. In the remaining 4 blocks namely, Goalpokher-I, Raiganj, Kaliaganj and Itahar percentage share of culturable wasteland is 0.64 per cent. But in the year 2010, 4 blocks namely Goalpokher-I, Raiganj, Kaliaganj and Itahar, 0.67 per cent can be placed as a potent block in terms of culturable wastelands of the reporting area.

### **7.6 Land under misc. tree crops and groves**

Every Cultivable land which is not included in the Net Sown Area (NSA) but is meant for specific other agronomic uses. Lands under *casuarina* trees, thatching grasslands, bamboo scrublands and other groves for fuel, etc., but are not involved under orchards as considered

under this group. Since long past, there had been a propensity of growing food-bearing or timber producing trees either on the public lands or on the separate lands. Fuel wood supply was the principal reason behind planting trees on separate lands. The most suitable place for land under miscellaneous tree crops and groves is old planted zones. The zones having deficiency of forest and lying over the comparatively natural surface have documented a high proportion of land under this group.

It is evident from table 7.45 and 7.46 that the percentage of shares of land under this category with the reporting area, Raiganj has the highest percentage share i.e., 2.15 per cent and Chopra has the lowest (negligible) percentage share i.e., 0.28 per cent of the reporting areas during 2000 while 2 Blocks namely Hemtabad and Itahar covers 1-2 per cent of reporting areas. In the remaining 5 Blocks namely Islampur, Goalpokher-I, Goalpokher-II, Karandighi and Kaliaganj land under this category is less than 1 per cent. The condition of land under misc. tree crops and groves further declined in 2010, highest percentage was recorded in the block Kaliaganj (1.57 per cent) and the lowest percentage was recorded in Chopra (0.03 per cent). There is only one block namely, Raiganj which has 1-2 per cent of the total block area under this category of reporting areas whereas the remaining six Blocks namely Islampur, Goalpokher-I, Goalpokher-II, Karandighi, Hemtabad, and Itahar have less than 1 per cent of land under this category. It is clear that, the area covered by this category of land use much low in the year 2010 than the year 2000 due to the rapid growth of population and growing needs of food production.

### **7.7 Permanent pasture and other grazing lands**

Permanent pastures cover whole grazing lands whether they are permanent pastures and other grazing as well as hamlet common grazing lands. This land lies between cultivated land and reserved forest land which are not appropriate for cultivation. In the study area, block-wise common grazing lands are comprised under this category (permanent pastures & other grazing lands). But mono-cropping economy delivers the opportunity of grazing cattle over agricultural lands, throughout offseason. Though, degradation of forest area and narrowing of forest area along with the escalation of agriculture, pasturing of cattle has become a problem to the cultivators. The extent of land under permanent pasture & other grazing land is extremely irregular from one block to other blocks in the district.

From the block-wise study, it is observed from table 7.45 & 7.46, that situation of land under permanent pasture and other grazing land is having the highest percentage share followed by Hemtabad Block with 1.26 per cent in the year 2000 and these percentage decreased to zero

per cent in the year 2010. Rest 7 blocks namely, Chopra, Islampur, Goalpokher-I, Goalpokher-II, Karandighi, Kaliaganj and Itahar covers less than 1 per cent of reporting areas whereas remaining 1 block namely Raiganj has zero per cent of land under this category in 2000. On the other side, the condition has further declined under this category in the year 2010. The highest percentage was recorded in Chopra Block (0.19 per cent) and other 5 blocks namely; Goalpokher-I, Karandighi, Raiganj, Kaliaganj and Itahar having the negligible percentage share under this category. The remaining 2 blocks namely; Islampur and Goalpokher-II have zero per cent of land under this category of the reporting areas. This low percentage is mainly due to the reclamation of such areas and being converted to the cultivation area.

### **7.8 Trend of changes in agricultural land use**

The changes occurred with time in above mention land use classification of a particular area or region is known as changing land use pattern. Land use is an important aspect of geographical studies, particularly relevant to agricultural geography. Land use survey has become the spearhead for the advancement of geography onto the applied sciences. Maps of land use have become recognized as essential tools of agricultural development as well as regional planning (Jana et al, 1997). Study of the trend of changes in agricultural land use scenario in Uttar Dinajpur District and the analysis of land use classification from 1992 to 2016 (25 years) are discussed in the table 7.47 (Appendix VIIIb).

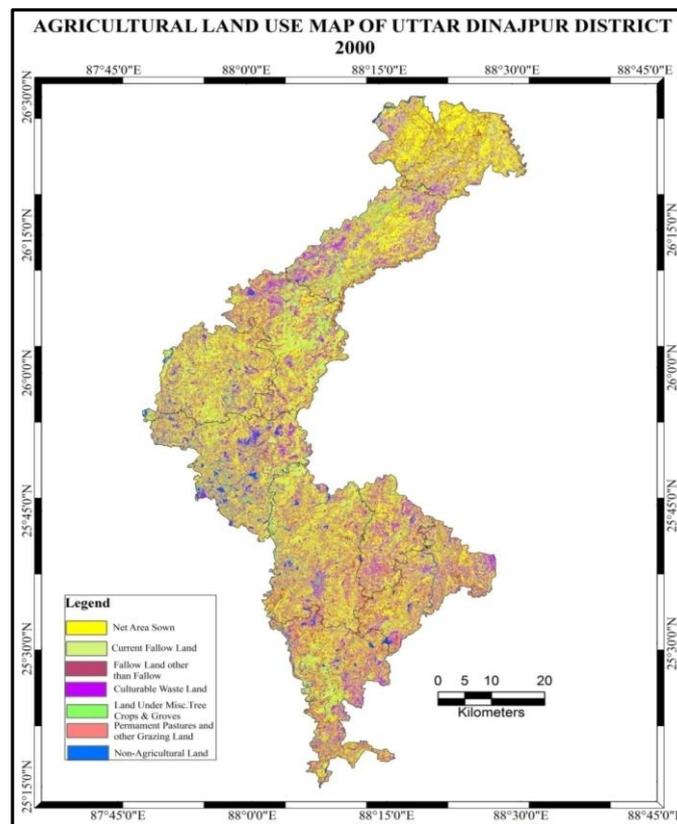
It is observed from table 7.46 that, in Uttar Dinajpur District during 1992, about 83.92 per cent of the area is covered under the net sown area. On the other hand, in 2000 the net sown area increased to 83.38 per cent (figure 7.14). But in the year 2016, this percentage further increased to 88.27 per cent (figure 7.15) i.e. the land under net area sown was 262.26 thousand hectares during 1992 and 260.54 thousand hectares during 2000 while it is reported to be 275.84 thousand hectares in the year 2016. Net 13.58 thousand hectares of net area sown is increased due to permanent pasture and other grazing land and land under misc. tree crops are converted to the net sown area over the study period.

But the share of current fallow in the study area was 1.85 per cent in 1992 of the total geographical area which further decreased to 0.10 per cent in 2016; the total current fallow lands in Uttar Dinajpur District in 1992 was 5.78 thousand hectares area and it has been increased to 6.08 thousand hectares in 2000. But it has been decreased to 0.32 thousand hectares in 2016. Causes of decreased are mainly due to the conversion of this land to the cropped area and settlement area. Total 5.46 thousand hectares of current fallow land decreased over the study period. On the other side, total fallow land other than current fallow land was 0.89

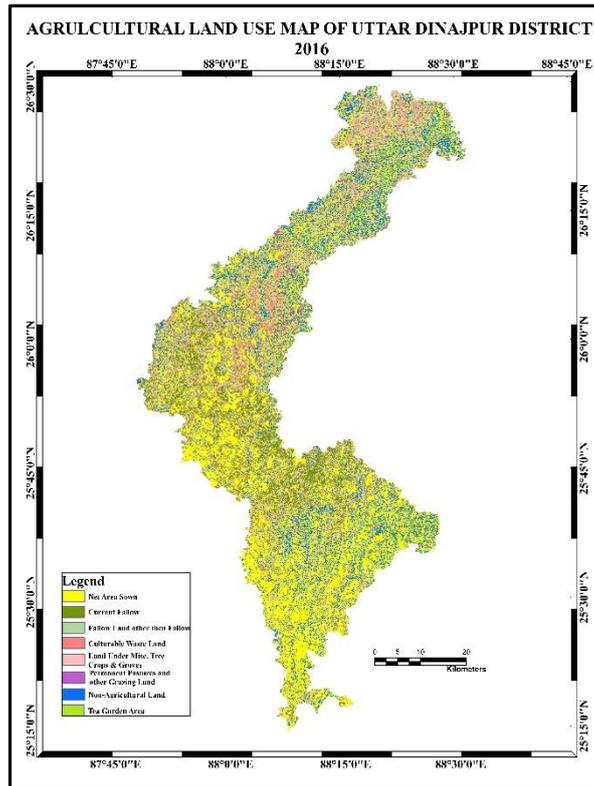
thousand hectares which was 0.28 per cent of the geographical area in 1992 and there is a negligible decline in this particular land type to the total geographical area i.e. the land under fallow and other than fallow was 0.01 thousand hectares (0.003 per cent) in 2000 (figure 7.14) while it is reported to be 0.09 thousand hectares in the year 2016 (figure 7.15).

From the study, it is observed that the culturable wasteland in Uttar Dinajpur District is only 0.65 per cent of the reporting area in 1992 which is far below the national average (4.60 per cent) and the state average i.e. 3.17 percentage. But the condition of culturable wasteland further increased to 0.77 per cent in 2000 and in 2016, it has decreased to 0.07 per cent of the reporting area in Uttar Dinajpur District (i.e., 2.04 thousand hectares in 1992, 2.43 thousand hectares in 2000 and it has decreased to 0.22 thousand hectares in 2016). This category of land total decreased by 1.82 thousand hectares over the study period due to pressure of population and conversion of this type of land into cultivated land (Researcher’s observation).

In the year 1992 land under miscellaneous tree crops and groves is only 2.15 thousand hectares (0.69 per cent) of the reporting area. But this category further decreased from 2.15 to 2.12 thousand hectares (0.67 per cent) of the reporting area in 2000 (figure 7.14). But it has decreased to 1.98 thousand hectares which constitute 0.63 per cent (figure 7.15). This type of land very negligibly declined over the study period i.e. 0.17 thousand hectares.



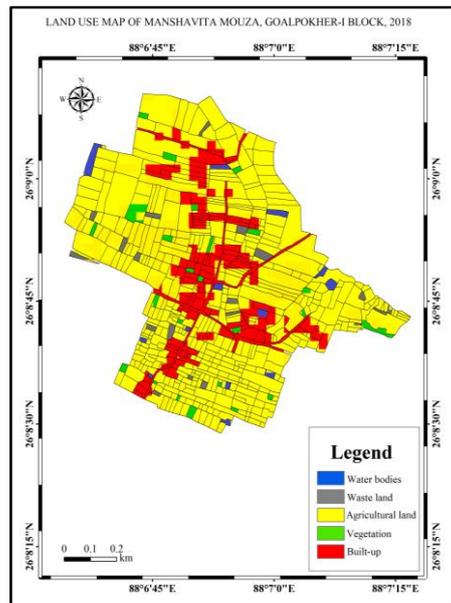
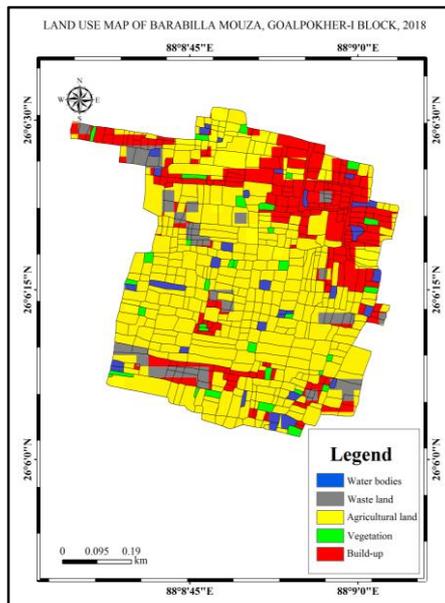
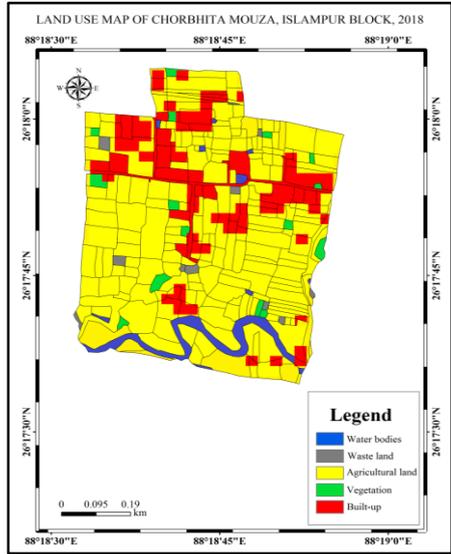
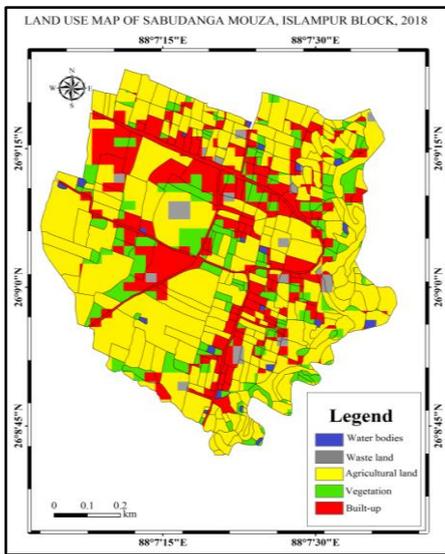
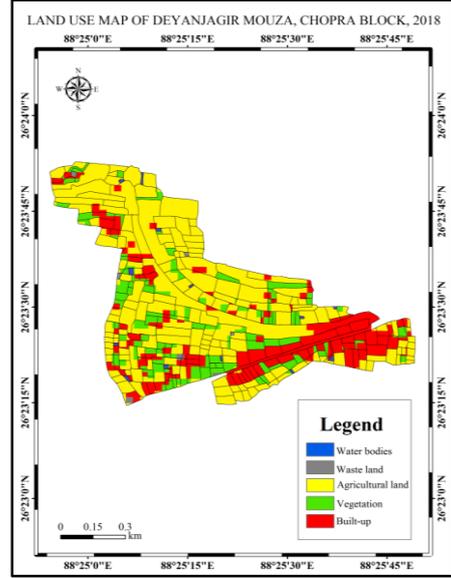
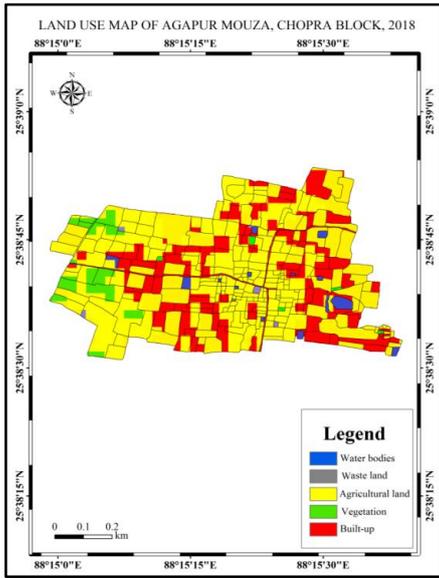
**Figure 7.14** Agricultural land use map in Uttar Dinajpur, 2000

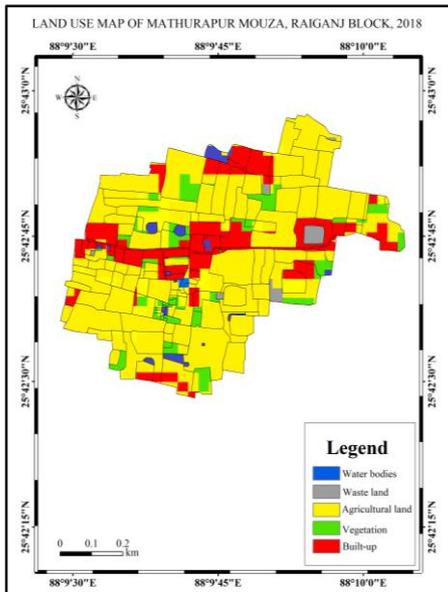
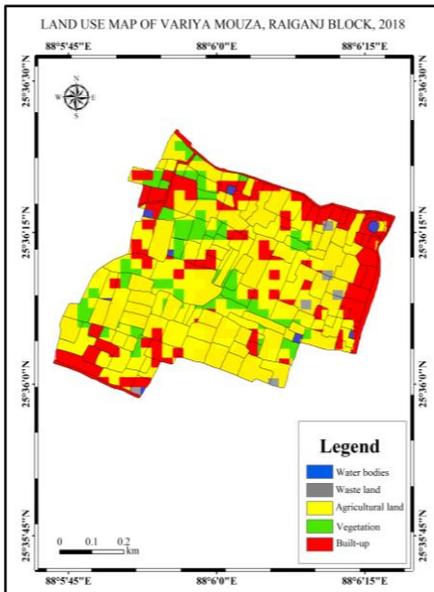
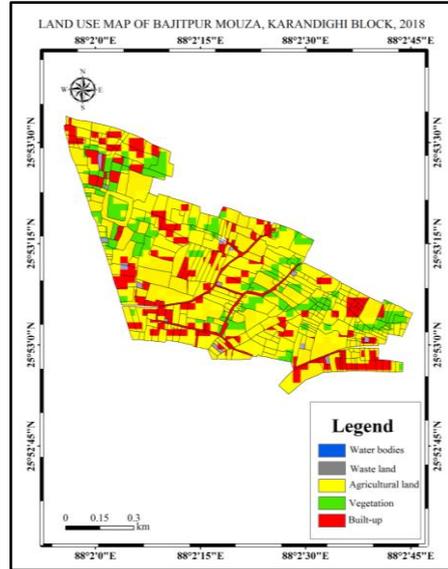
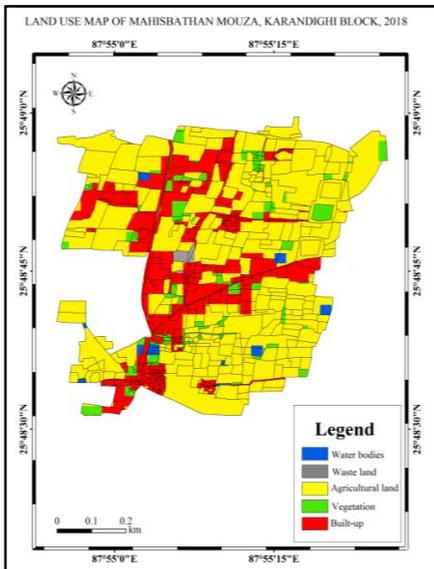
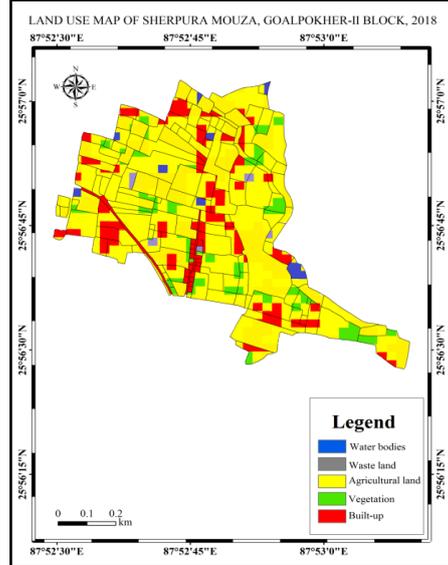
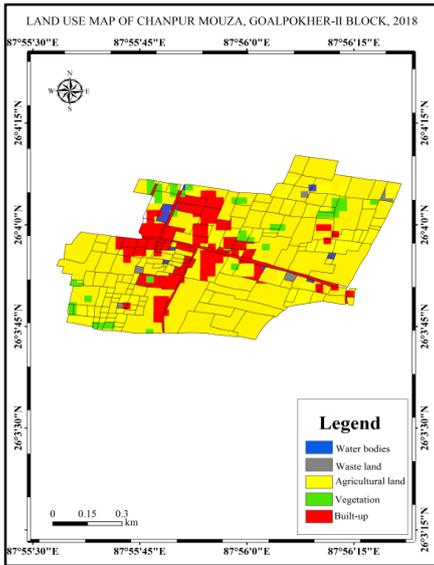


**Figure 7.15** Agricultural land use map in Uttar Dinajpur, 2016

The percentage share of permanent pasture and other grazing land was 0.96 thousand hectares in 1992 which is 0.30 per cent of the total geographical area. But in 2000, it has decreased to 0.88 thousand hectares and once again it has decreased to 0.02 thousand hectares during 2016 which is 0.006 per cent (negligible per cent) of the total geographical area of the district. So, the farmers of the district are facing various difficulties for the grazing of their cattle.

In this situation, farmers are using barren lands, cultivable wastelands, fallow and other than fallow lands and land under miscellaneous tree crops & groves for grazing purposes. Not only that, sometimes net area sown is also used for grazing purposes mainly for the period after the harvest of paddy and other important crops. Block-wise present land use scenario (2018) in the district and mouza wise sampled (plot to plot land use) maps are considered in figure 7.16.





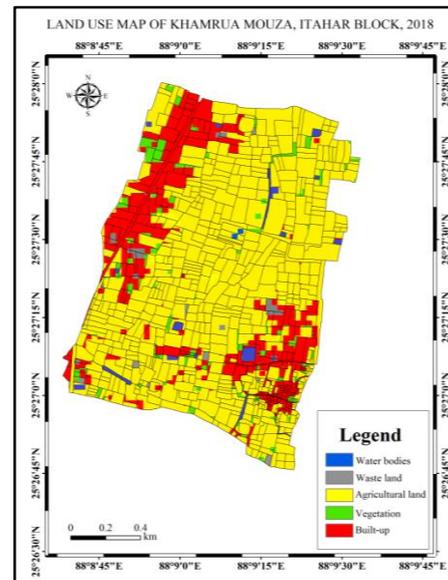
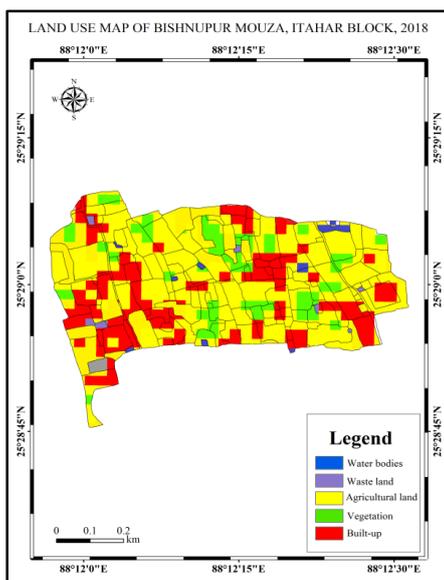
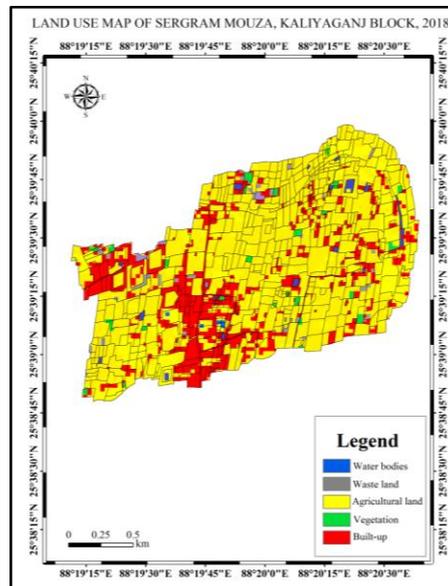
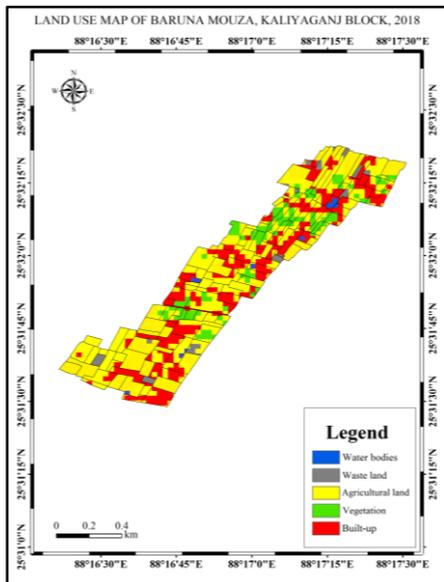
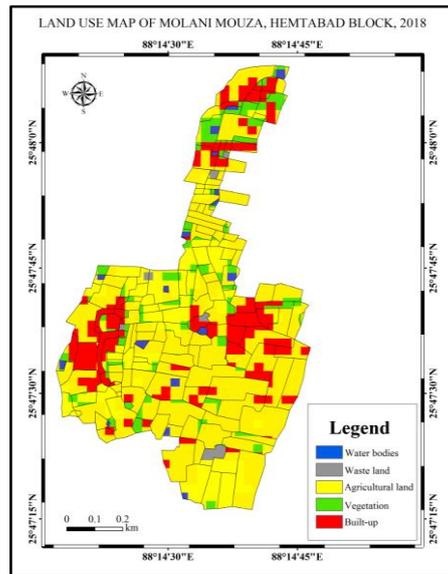
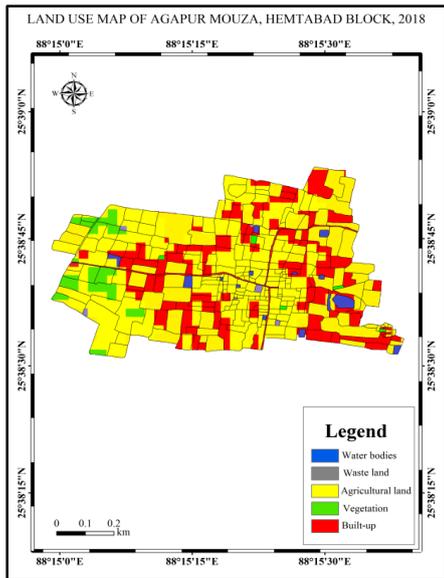


Figure 7.16 Mouza-wise land use map of Uttar Dinajpur District, 2018

## **7.9 Conclusion**

On the basis of the above discussion, it may be concluded that there has been a substantial increase in the area of principal crops in Uttar Dinajpur District. However, the increase in the production of crops was more pronounced in the study period. There was spectacular growth in potato production in the period 2015-16 mainly due to the introduction of the best pesticides and weather situations favorable for potato. Paddy production also increased during the period 2005-06 but the increase experienced a setback during the period 2010-11. Not only that, there was a spectacular decrease in mashkalai production during 1996 to 2015-16. Wheat production increased during the period 1995-96 to 2015-16.

An increase in production of paddy, wheat and potato is due to an increase in crop area as well as productivity per hectare, whereas the increase of production of other principal crops was only due to an increase in productivity. It is also worth pointing out that the productivities of almost major principal crop categories were comparatively higher during 2015-16 than the year 1995-96.

In the last few decades district farming results in different new technologies. New technologies create new cultures. Under the various improved techniques and agro-climatic conditions, the area is bound to develop a number of crops during different seasons to feed the increased population. In this new information age of green revolutions man himself creates employment permanently, seasonally and occasionally as largest sector of economy in the study area.

On the other hand, it is clear that the fragmentation of landholding due to increase in population, soil erosion, expansion of infrastructural facilities, and urbanization processes on one hand and lack of proper planning and policy which addressed the local problems leads to a decrease in agricultural land use in Uttar Dinajpur District. To redress this problem, locally suited policy and planning are required. While formulation the policy and planning it should be kept in mind that the carrying capacity of land should be maintained for proper utilization of land, proper planning measurement and evaluation of the capability of land of the district. Planning means the land has to be graded according to its productivity for raising the most suitable crops in consideration with availability of moisture, socio-economic and cultural factors as well as the availability of labour forces because the prevailing situation in the district does not permit the large scale mechanization of farming. But it is the right time for recovering a new technological base for future plans of work to get multiple cropping under suitable agro-climatic conditions and applying organic fertilizers in the study area.

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