Impact of Irrigation Intensity on Cropping Intensity in Purba Bardhaman District, West Bengal, India

Chanchal Kumar Dey[1*] and Dr. Tapas Mistri[2]

1. Research scholar, Department of Geography, The University of Burdwan, West Bengal, India.

2. Assistant Professor, The University of Burdwan, West Bengal, India.

chanchaldeygeo@gmail.com, tapasam76@gmail.com

Abstract

India is an agrarian economy and Indian's agriculture is mainly dependent on monsoon which is highly erratic and variable in nature. So, irrigation is a proper way of supplying water to the dry areas and dry seasons as a supplement of rain water. Most of the rainfall is in India is concentrated during May to September and rests of the months face acute shortage of water. Thus, irrigation is one of the main factors influencing cropping intensity- providing, assured, adequate and timely supplies of water for increasing agricultural production. Undivided Bardhaman district was known as 'granary of West Bengal' and most of the parts are now in Purba Bardhaman district. The present study is based on secondary data and interview of farmers of some selected blocks. Cropping intensity and irrigation intensity is measured by general formula and compiled data have been processed, computed in tabulated form and finally mapped by QGIS tool and relevant statistical diagrams. Out of 22 blocks 11 blocks have been showing increase in cropping intensity and 13 blocks have registered increasing irrigation intensity in between 2005-06 & 2015-16. In many cases it has shown negative relationships due to infrastructural deficient &acquisition of land for non-agricultural purposes etc.

Key Words: - Irrigation intensity, Cropping intensity, Measure, Relationship, Impact.

1. Introduction

Indian economy is based on agriculture. Successful cultivation is depending on proper, regular and well maintained irrigation systems. Irrigation system is one of the most important agricultural infrastructural facilities. Timely and adequately rainfall is considered as one of the most important sources of irrigation. But rain fall in India as well as Purba Bardhaman district is uncertain, uneven and periodic in nature. So, proper

irrigation is must for developing agriculture. Crop concentration, diversification, intensity and combination depend on availability and suitable mode of irrigation system. According to large number of farmers "without water nothing else matters". Kautilya described in his *Arthashastra* in 37 B.C "Agriculture cannot be made solely dependent on a rain which amounts to Grambling with nature" (kurukshetra, 2017). Kumar and Mahanta (2017) examined that fifty percentages of cultivable land has still being rain-fed in India, where is mammoth potential for promoting micro-irrigation i.e., more crop per drop (drip irrigation. Sprinklers, pivots, rain-guns etc). Hoque (2015) highlights that cropping intensity dependent on the irrigation and others infrastructural facilities with the expansion in the irrigation the ground water abstraction has very high resulting ground water depletion as well as unavailability of ground water in Murshidabad district. Karunakaran and Palanisami (1998) has analyzed that canal and tank irrigation, dug well irrigation also significantly positive impact on the cropping intensity (tube and dug well) which showed enviable impact on intensity of cropping, need more investment in subsequent plants. Shivay and Teekam (2017) said that agricultural technology needs move from production oriented toward profit oriented sustainable farming. That will create millions of micro economics with sustainable utilization of water resources in the water abundant region. Kalaiselvi and Sundar (2011) have described the variation in cropping intensity in India and concluded that highest cropping intensity was found in the northern region and lower cropping intensity was observed in dry regions depending on rainfall. Another study reveals that found cropping intensity was dependent on irrigation facilities. Sivanappan (2017) has examined that India should become a developed country in 2020/2025. To become a developed nation, India should be apex position in agriculture and also top in agricultural production. It is possible with the help of irrigation system which interlinking of peninsular rivers. Ahlawal and Renu (2016) highlights that enhancement of cropping intensity is possible by improved irrigation facilities, use of proper fertilizers, seeds and adoption of modern agricultural techniques and by improving the cropping patterns. So, proper irrigation facility must be ensured to achieve and retain better cropping intensity.

Undivided Bardhaman district was always agriculturally richer than the rest of the district in West Bengal. Erstwhile Bardhaman district was largest producer of rice in West Bengal. This was designated as "*rice bowl of Bengal* "and irrigation facility is the main causes for this rice boom. No doubt rice is water intensive crop. So, artificial water supply is necessary for almost all the important crops like rice, wheat, pulses, potato, onion, vegetable etc. different mode of irrigation are available in Purba Bardhaman district like tanks, shallow, *donga*, basket, canal, deep well, submersibles etc. In 1881, the first irrigation canal was constructed namely Eden canal from Kanchannagar to Jamalpur only 22 K.M. Therefore, cultivation of Bardhaman district has improved since 1953 with the help of irrigation project undertaking by Damodar Valley Corporation (DVC). Another one of the significant factors behind, out of sixteen selected district, Bardhaman is one of the district was implementated of IADP (Intensive Agricultural District Programme) in 1962.

Government of India is giving high priority to farmers for their doubling income in 2022. For fulfillment of this mission, government declared *'Pradhan Mantri Krishi Sinchayee Yojana (PMKSJ)'* was developed twin objectives of *'Har Khhet Ko Pani'* – providing irrigation to each farmers and *'Per Drop More Crop'* – improving water productivity. As per United Nation, Food and Agriculture Organization (UNFAO, 2011) irrigation and livestock segments use 91% of water withdrawal in India. In India, most common method of irrigation is surface irrigation, but it overall efficiency value is low nearly 30-35%, where sprinkler efficiency value is 50-70% and drip irrigation efficiency is 80-90%.

The present study is discussing about impact of irrigation of irrigation intensity on cropping intensity and their relationship in Purba Bardhaman district in West Bengal and also suggests for an alternative methods of irrigation rather than highly water intensive method of irrigation.

2.0 Study area

The study area covers Purba Bardhaman district in West Bengal. It has come into existence on $\mathbf{7^{th}}$April 2017, after bifurcation of erstwhile Burdwan district and its head quarters is Bardhaman. Purba Bardhaman is an agriculturally prosperous district of West Bengal. This part of the West Bengal is traditionally familiar as the agriculturally developed is known as the *'granary of the West Bengal'*. The study area extended from 22˚15′08″N to 23˚15′17″N latitudes and 87˚13′17″E to 88˚7′22″E longitudes. It contain an area 5432.69 $\boldsymbol{km^2}$(2097.57 sq miles) as ascertained by the bifurcation, and population (according to 2011 census) is 4835532, density of population is 890/$\boldsymbol{km^2}$.The district lies mainly between the river Ajoy, the Bhagirathi and the Damodar .It bounded on the north by Birbhum district and Murshidabad district, on the east by Hooghly district, on the south by Hooghly-Bankura district and west by the Paschim Bardhaman district. (See Map no.1)

3.0 Objectives

The main objectives of the paper are as below:

i. To find out impact of irrigation intensity on cropping intensity in Purba Bardhaman district.

ii. To make a comparative analysis of relationship between irrigation intensity and cropping intensity in Purba Bardhaman district.

4.0 Data base & methodology

The study is based on mainly secondary data. The data has been collected from following sources:

i. Office of the Deputy Director of Agriculture (DDA), Bardhaman.
ii. Burdwan District Statistical Hand Book in 2005 & 2015.
iii. Burdwan District Gazetteers, 1997.
iv. Office of the South Mayurakshi canal division, Shyambati, Bolepur, Birbhum.

v. Office of the Damador canal division, Bardhaman.
vi. Office of the Executive engineer, irrigation section, Purba Bardhaman.
vii. Interview of farmers of some selected blocks in Purba Bardhaman district.

The collected data have been compiled, computed and tabulated by using following formula:

i. For cropping intensity: $\frac{Gross\ Cropped\ Area}{Net\ Cropped\ Area} \times 100$

ii. For irrigation intensity: $\frac{Gross\ Irrigated\ Area}{Gross\ Cropped\ Area} \times 100$

iii. To show relationship between irrigation intensity and cropping intensity at C.D blocks level for the year 2005-06 & 2015-16.

iv. To understand and analysis the blocks wise variation of cropping intensity and irrigation intensity mapping has done by using QGIS tool and also relevant statistical diagrams have been used for this purpose.

5.0Result & Discussions

Result has been discussed in following steps

5.1 Irrigation and cropping intensity in 2005-06 databases:

From table no. 1&3, it is clear that the highest irrigation intensity is found in Memari-II (58.76) and lowest irrigation intensity is recorded in Purbasthali-II (13.08) C.D block. Therefore, on the basis of cropping intensity, highest intensity is registered in Jamalpur (242.23) C.D block and lowest intensity is found in Ausgram-II (140.62) C.D block. Cropping intensity of Purba Bardhaman can be classified as below:

5.1.1 Low cropping intensity zone (174 and below): It is found in Ausgram-I (142.65), Ausgram-II (140.62), Bhatar (173.31), Khandoghosh (168.41), Raina-II (158.2), Katwa-II (172.5) and Ketugram-I (154.14) etc C.D blocks.

5.1.2 Medium cropping intensity zone (175 to 208): It is seen only eight (08) C.D blocks. These are Galsi-I (188.64), Memari-I (197.5), Raina-I (198.54), Kalna-I (198.49), Monteswar (189.1), Katwa-I (184.21), Ketugram-II (199.84) and Mongolkote (174.44) etc C.D blocks.

5.1.3 High cropping intensity zone (209 and above): This scenario is observed only six C.D blocks. These are Galsi-II (219.4), Jamalpur (242.23), Memari-II (218.12), Kalna-II (209.45), Purbasthali-I (218.32) and Purbasthali-II (239.75) etc C.D blocks. (See map no.2)

5.2. Irrigation and cropping intensity in 2015-16 databases:

From table no. 2 &3, it is clear that the highest irrigation intensity is seen in Galsi-I (95.62) and lowest irrigation intensity is observed in Purbasthali-II (16.01) C. D block. Therefore, in respect of cropping intensity , it is clear that the highest cropping intensity is found in Purbasthali-II (257.46) and lowest cropping intensity is observed in Galsi- I (127.24) C.D block. On the basis of cropping intensity of Purba Bardhaman district can be classified into three intensity zones as below:

5.2.1 Low cropping intensity zone (174 and below): It is observed only nine (09) C.D blocks. These are Bardhaman (165.39), Ausgram-I (165.59), Ausgram-II (132.07), Bhatar (163.37), Galsi-I (127.24), Galsi-II (161.38), Katwa-II (173.28), Ketugram-I (160.56) and Mongolkote (167.34) etc C.D blocks.

5.2.2 Medium cropping intensity zone (175 to 208): This scenario is seen only in seven (07) C.D blocks. These are Jamalpur (203.88), Raina-I (206.97), Raina-II (206.74), Kalna-II (199.92), Katwa-I (182.59), Memari-I (179.64) and Ketugram-II (204.11) etc C.D blocks.

5.2.3 High cropping intensity zone (209 and above): It is observed only six C.D blocks. These are Khandoghosh (220.83), Memari-II (209.91), Kalna-I (229.94), Purbasthali-I (240.48), Purbasthali-II (257.46), Monteswar (219.24) etc C.D blocks. (See map no.3)

5.3.0 Changing trends of irrigation and cropping intensity in between 2005-06 and 2015-16:

From table no 3, 4 & 5; it is clear that changing trends of cropping intensity are observed in two ways. First one is positive change another is negative change. This is analysis as below:

5.3.1 Positive growth of irrigation intensity in between 2005-06 and 2015-16 cropping year: It is observed only 13 C.D blocks (See table no. 3& 4). The main causes of such changes are, financial conditions of farmers are improved, Drip irrigation is implementation, Governmental initiative in respect of irrigation is increasing, improved crop diversification practices, farmers can use better technological systems & already installed and adopt and tailor cropping patterns for lower water demand and usage.

5.3.2 Negative growth of irrigation intensity in between 2005-06 & 2015-16 cropping year: It is observed only nine C.D blocks (See table no.5). The main causes of such changes are ground water over drafting, climatic changes/ erratic nature of monsoon, main source of canal irrigation Durgapur dam is becoming more and more unsuitable for irrigation, lesser development of water treatment and management, lack of infrastructural facilities, unfair pricing of water, depletion of ground water, increasing practices of water extensive crops.

5.4.0 Changing trends of cropping intensity in between 2005-06 and 2015-16 cropping year:

5.4.1 Positive growth of cropping intensity: Only 11 C.D blocks is found it(See table no.6), due to rural infrastructural development, improvement of modern agricultural technologies and irrigation facilities, NAS implementation, agriculture is moved toward profitable business, changes of agricultural systems.

5.4.2 Negative changes of cropping intensity: It is observed only 11 C.D blocks (See table no.7). The main causes of such changes are adverse effect of urbanization, acquisition of land for non agricultural purposes and over all infrastructural deficiency.

5.5.0 Impact of irrigation on cropping intensity:

Irrigation plays a vital role for increasing cropping intensity in Purba Bardhaman district. Actually irrigation is the real finance minister in Indian agriculture as well as Purba Bardhaman district. So, here we discuss relationship between irrigation on cropping intensity.

5.5.1 C.D blocks with positive impact of irrigation intensity on cropping intensity are as below: Only six C.D blocks have improved their cropping intensity due to increasing irrigation intensity. These C.D blocks are Khandoghosh, Raina-I& II, Purbasthali-I&II, Ketugram-II etc.

5.5.2 C.D blocks with negative impact of irrigation on cropping intensity are as follows: only 7(seven) C.D blocks have shown their decreasing cropping intensity with improved their irrigation facilities. These are Bardhaman, Galsi-I&II, Jamalpur, Kalna-II, Katwa-I, Mongolkote etc C.D blocks. And Kalna-I, Monteswar and Katwa-II, Ketugram-I, Ausgram-I etc five C. D blocks have registered decreased irrigation intensity but improved cropping intensity. The main causes of such negative impact of irrigation intensity are rapid growth of urbanization, acquisition of land in non agriculture purposes, agricultural deficient, rice crop concentration and low to medium crop diversification is observed (Dey & Mistri, 2018).

5.5.3 C.D blocks showing both irrigation & cropping intensity both are decreasing in nature: Only four C.D blocks are falling in this category. These are Ausgram-II, Bhatar, Memari- I&II etc C.D blocks.

6.0 Conclusion

Undivided Bardhaman district was termed as *'granary of West Bengal'*. But now major agricultural development portion is now in Purba Bardhaman district. Infrastructural development's mainly irrigation has a key role to play in both agricultural growth and

development (Dey and Mistri, 2018). Innovative irrigation practices can enhance water efficiency, gaining an economic advantage of farmers.

As a part of development, irrigation intensity has grown in each and every nook and corner of the district. But it is amazing that cropping intensity has not grown as earlier years positively. In many cases it has shown negative relationship. The root of this causes lies in socio-economic issues, like growth of settlement density, urban growth, infrastructural development, acquisition of agricultural land for non-agricultural purposes and also the attitude of the young generation those are being less interested and depended on agriculture as before.

From above analysis and comparative study of 22 C.D blocks of Purba Bardhaman district, it is clear that most of the blocks (12) have registered negative impact of irrigation on cropping intensity, due to changing character of land use, improved crop diversification, drip & sprinkler irrigation system started to be adopted, micro-irrigation like, the evaporation, runoff and deep percolation losses are reduced, increasing practices of micro-irrigation have adopted new crops. Therefore, only six blocks have recorded positive relationship between irrigation and cropping intensity. It is hoped that if these negative relationship are minimized with proper care in future this blocks will create the new vista of agricultural growth and development in the Purba Bardhaman district

7.0 Selected References:

1. A. Kumar and R. K. Mohanta, “Micro-Irrigation and Approaches for Improving Water Use Efficiency in Agriculture”, Kurukhetra, vol. 66, no. 1, (2017), pp. 26-31.

2 C. K. Dey and T. Mistri, “Changing Pattern and Causes of Crop Diversification in the Purba Bardhaman District, West Bengal”, Practising Geographer, vol. 21, no. 2 (2017), pp. 109-135.

3. C. K. Dey T. Mistri, “Relationship between the Infrastructural and Agricultural Development in the Purba Bardhaman District, West Bengal- A Comparative Analysis”, Asian Journal of Research in Social Sciences and Humanities. vol. 8, no. 4, (2018), pp. 85-98.

4. J.C. K. Peterson, Bengal District Gazetteers, Burdwan district, Government of West Bengal, Calcutta, (1997).

5. K. R. Karunakaran and K. Palanisami, “An Analysis of Impact of Irrigation on Cropping Intensity in Tamilnadu”, Indian Economic Review, vol.33, no.02, (1998), pp. 207-220.

6. M. Hussain, Systematic Agricultural Geography, Rawat Publications, Jaipur, (2015).

7. P. K. Sivanappan, “Floods and Droughts: Water for Irrigation and Population Needs of India”, Kurukshetra, vol. 66, no. 1, (2017), pp. 42-44.

8. S. Haque, “Impact on Cropping Intensity and Potentiality of Groundwater in Murshidabad District of West Bengal, India”, International Journal of Ecosystem, vol. 5, no. 3A, (2015), pp. 55-64.

9. S. Kalaiselvi and I. Sundar, “Interstate Disparity in Cropping Intensity in India”, International Journal of Business Management, Economics and Information Technology, vol. 3, no.2, (2011), pp. 269-273.

10. V. Ahlawal and Renu, “Regional Disparity in Cropping Intensity and Relative Impact of Irrigation in Haryana”, IOSR- Journal of Business and Management, vol. 18, no. 9, (2016), pp. 41-45.

11. Y.S. Shivay and T. Singh, “Sustainable Agriculture: Aligning Cropping Pattern with the Availability of Water”, vol. 66, no. 1, (2017), pp. 45-50

Table no.1 Relationship between Cropping Intensity and Irrigation Intensity in 2005-06						
Sl.NO	Name of the block	Gross cropped area	Net sown area	Cropping intensity	Gross irrigated area	Irrigation intensity
1	Bardhaman	69173	32500	212.84	27199.38	39.32
2	Ausgram-I	25408	17811	142.65	11757.86	46.28
3	Ausgram-II	24408	17357	140.62	12139.03	49.73
4	Bhatar	54271	31315	173.31	34135	62.9
5	Galsi-I	32550	17255	188.64	17373.42	53.37
6	Galsi-II	40979	18678	219.4	10918.33	26.64
7	Jamalpur	50045	20660	242.23	15030.51	30.03
8	Khandoghosh	33461	19869	168.41	16540.29	49.43
9	Memari-I	33355	16889	197.5	19306.61	57.88
10	Memari-II	33781	15487	218.12	19849.48	58.76
11	Raina-I	41935	21122	198.54	16005.83	38.17
12	Raina-II	28788	18197	158.2	15038.69	52.24
13	Kalna-I	25954	13076	198.49	10776.3	41.52
14	Kalna-II	28605	13657	209.45	7713.53	26.97
15	Purbasthali-I	33331	15267	218.32	5809.99	17.43
16	Purbasthali-II	45751	19083	239.75	5987.08	13.08
17	Monteswar	41099	21734	189.1	21295.76	51.82
18	Katwa-I	26124	14182	184.21	7141.01	27.34
19	Katwa-II	24662	14297	172.5	8016.96	32.51
20	Ketugram-I	23162	15027	154.14	8986.85	38.8
21	Ketugram-II	25680	12850	199.84	11706.65	45.59
22	Mongolkote	51176	29338	174.44	19755.81	38.6

Sources: i. Office of the Deputy Director of Agriculture, Purba Bardhaman, ii.Burdwan District Statistical Hand Book, 2005 &2015 (Compiled by authors)

Table no.2 Relationship Between Cropping Intensity & Irrigation Intensity in 2015-2016

Sl No	Name of the block	Gross cropped area	Net cropped area	Cropping intensity	Gross irrigated area	Irrigation intensity
1	Bardhaman	50862	30752	165.39	26312.9	51.73
2	Ausgram-I	28474	17195	165.59	10165.6	35.7
3	Ausgram-II	26474	20045	132.07	10677.72	40.33
4	Bhatar	48072	29247	163.37	28798.87	59.91
5	Galsi-I	21723	17072	127.24	20771.13	95.62
6	Galsi-II	27721	17178	161.38	15484.81	55.86
7	Jamalpur	43155	21167	203.88	16331.27	37.84
8	Khandoghosh	32363	14655	220.83	16137.21	49.86
9	Memari-I	30760	17123	179.64	12802.73	41.62
10	Memari-II	30962	14750	209.91	15991.06	51.65
11	Raina-I	25573	12356	206.97	15592.61	60.97
12	Raina-II	19655	9507	206.74	14376.5	73.14
13	Kalna-I	25758	11202	229.94	9946.69	38.62
14	Kalna-II	26554	13329	199.92	8963.61	33.76
15	Purbasthali-I	27129	11281	240.48	5526.06	20.37
16	Purbasthali-II	35509	13792	257.46	5686.34	16.01
17	Monteswar	46027	20994	219.24	21049.96	45.73
18	Katwa-I	21379	11709	182.59	7245.39	33.89
19	Katwa-II	21592.5	12461	173.28	5959.46	27.6
20	Ketugram-I	21404	13331	160.56	8907.29	41.62
21	Ketugram-II	25430.5	12459	204.11	11320.09	44.51
22	Mongolkote	45989	27482	167.34	17848.36	38.81

Sources: i. Office of the Deputy Director of Agriculture, Purba Bardhaman, ii.Burdwan District Statistical Hand Book, 2005 &2015 (Compiled by authors)

Table no.3 Changing Trends of Irrigation Intensity & Cropping Intensity in Purba Bardhaman District							
		Cropping year -2005-06		Cropping year - 2015-16		Change in Cropping intensity in between 2005-06 and 2015-16	Change in irrigation intensity in between 2005-06 and 2015-16
Sl.No	Name of the block	cropping intensity	Irrigation intensity	Cropping intensity	Irrigation intensity		
1	Bardhaman	212.84	39.32	165.39	51.73	-47.45	12.41
2	Ausgram-I	142.65	46.28	165.59	35.7	22.94	-10.58
3	Ausgram-II	140.62	49.73	132.07	40.33	-8.55	-9.4
4	Bhatar	173.31	62.9	163.37	59.91	-9.94	-2.99
5	Galsi-I	188.64	53.37	127.24	95.62	-61.4	42.25
6	Galsi-II	219.4	26.64	161.38	55.86	-58.02	29.64
7	Jamalpur	242.23	30.03	203.88	37.84	-38.35	7.81
8	Khandoghosh	168.41	49.43	220.83	49.86	52.42	0.43
9	Memari-I	197.5	57.88	179.64	41.62	-17.86	-16.26
10	Memari-II	218.12	58.76	209.91	51.65	-8.21	-7.11
11	Raina-I	198.54	38.17	206.97	60.97	8.43	22.8
12	Raina-II	158.2	52.24	206.74	73.14	48.54	20.9
13	Kalna-I	198.49	41.52	229.94	38.62	31.45	-2.9
14	Kalna-II	209.45	26.97	199.92	33.76	-9.53	6.79
15	Purbasthali-I	218.32	17.43	240.48	20.37	22.16	2.94
16	Purbasthali-II	239.75	13.08	257.46	16.01	17.71	2.93
17	Monteswar	189.1	51.82	219.24	45.73	30.14	-6.09
18	Katwa-I	184.21	27.34	182.59	33.89	-1.62	6.55
19	Katwa-II	172.5	32.51	173.28	27.6	0.78	-4.91
20	Ketugram-I	154.14	42.62	160.56	38.8	6.42	-3.82
21	Ketugram-II	199.84	45.59	204.11	44.51	4.27	1.08
22	Mongolkote	174.44	38.6	167.34	38.81	-7.1	0.21

Sources: i. Office of the Deputy Director of Agriculture, Purba Bardhaman, ii.Burdwan District Statistical Hand Book, 2005 &2015 (Compiled by authors)

Table no.4: Positive Growth of Irrigation Intensity in between 2005-06 &2015-16		
Sl.no	Name of the block	Irrigation intensity
1	Bardhaman	12.41
2	Galsi-I	42.25
3	Galsi-II	29.64
4	Jamalpur	7.81
5	Khandoghosh	0.43
6	Raina-I	22.8
7	Raina-II	20.9
8	Kalna-II	6.79
9	Purbasthali-I	2.94
10	Purbasthali-II	2.93
11	Katwa-I	6.55
12	Ketugram-II	1.08
13	Mongolkote	0.21
	Compiled by authors	

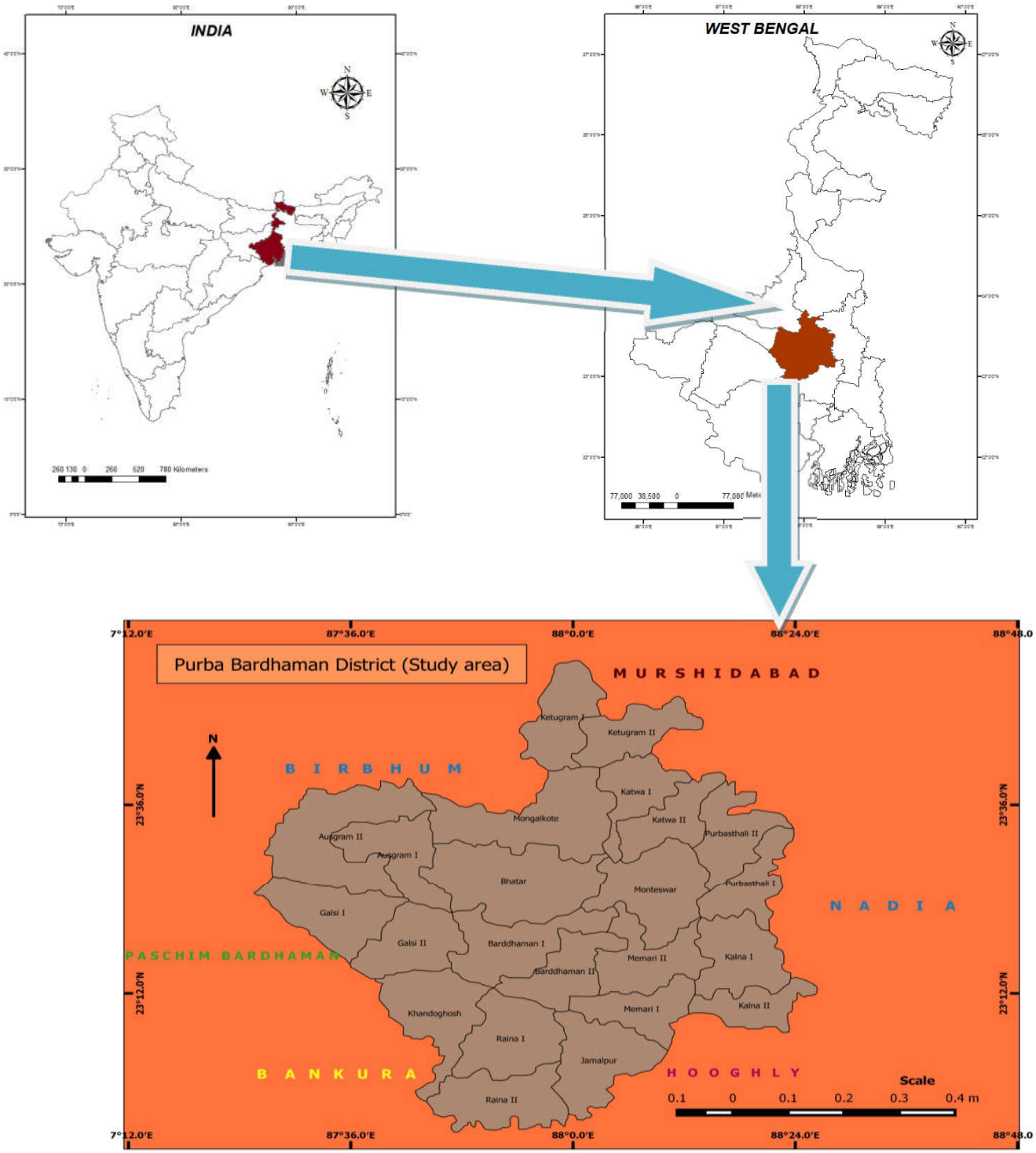
Table no.5: Negative Growth of Irrigation Intensity in between 2005-06 &2015-16		
Sl.no	Name of the block	Irrigation intensity
1	Ausgram-I	-10.58
2	Ausgram-II	-9.4
3	Bhatar	-2.99
4	Memari-I	-16.26
5	Memari-II	-7.11
6	Kalna-I	-2.9
7	Monteswar	-6.09
8	Katwa-II	-4.91
9	Ketugram-I	-3.82

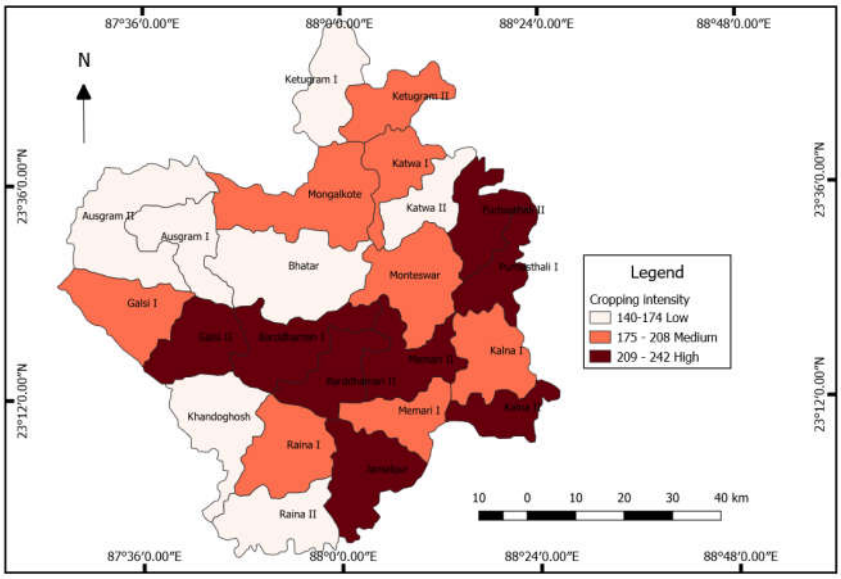
(Compiled by authors)

Table no.6: Positive Growth of Cropping Intensity		
Sl no.	Name of the block	C. intensity
1	Ausgram-I	22.94
2	Khandoghosh	52.42
3	Raina-I	8.43
4	Raina-II	48.54
5	Kalna-I	31.45
6	Purbasthali-I	22.16
7	Purbasthali-II	17.71
8	Monteswar	30.14
9	Katwa-II	0.78
10	Ketugram-I	6.42
11	Ketugram-II	4.27
(Compiled by authors)		

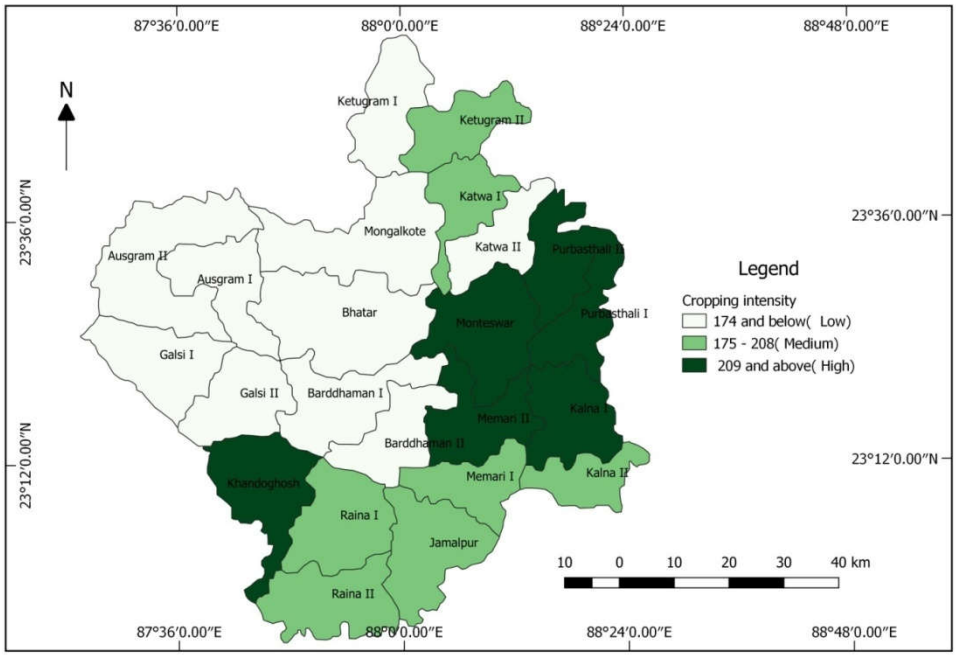
Table no. 7: Negative Growth of Cropping Intensity		
Sl.no.	Name of the C.D block	Irrigation intensity
1	Bardhaman	-45.45
2	Ausgram-II	-8.55
3	Bhatar	-9.94
4	Galsi-I	-61.4
5	Galsi-II	-58.02
6	Jamalpur	-38.35
7	Memari-I	-17.86
8	Memari-II	-8.21
9	Kalna-II	-9.53
10	Katwa-I	-1.62
11	Mongolkote	-7.1
(Compiled by authors)		

Map no.1: Location map of the study area

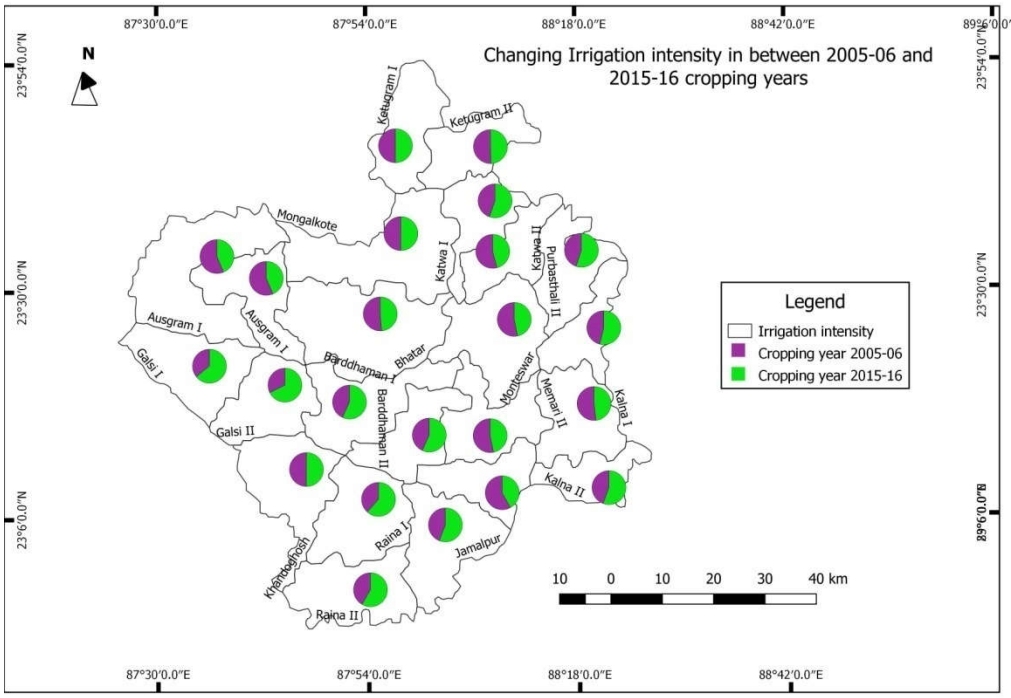




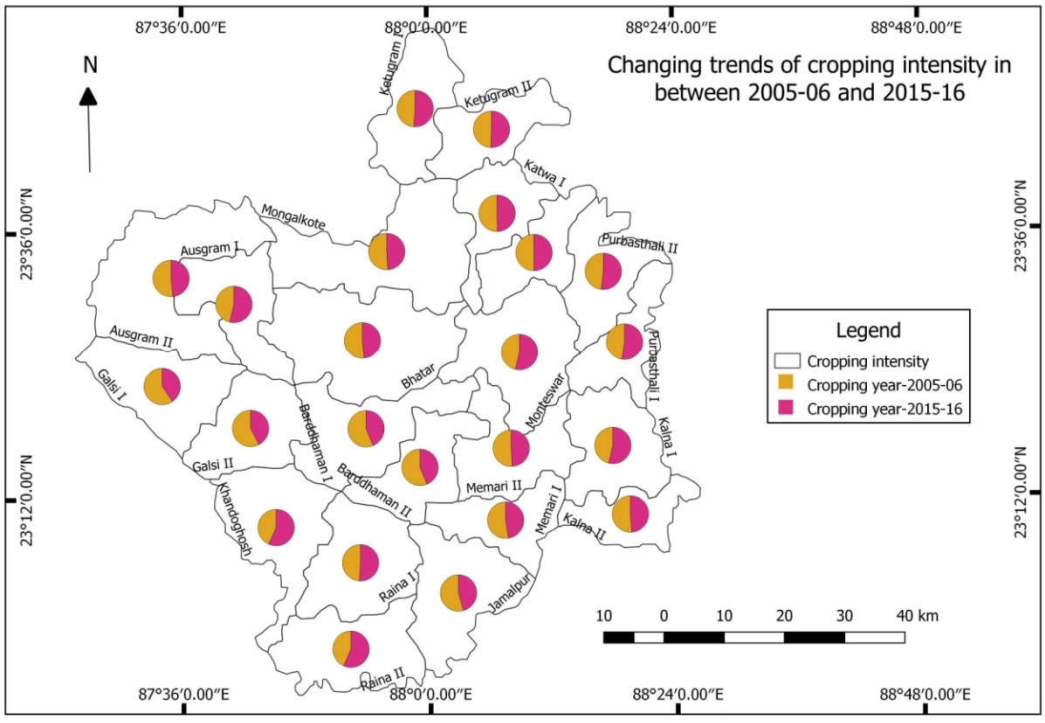
Map no.2: Cropping intensity zone in 2005-06 of Purba Bardhaman district



Map no. 3: Cropping intensity zone in 2015-16



Map no.4: Changing Trends of Irrigation Intensity in between 2005-06&2015-16



Map no. 5: Changing Trends of Cropping Intensity in between 2005-06&2015-16