



## Irrigation Intensity on Cropping Intensity in Purba Bardhamna Katwa Subdivision West Bengal, India.

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**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 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 5 blocks 3 blocks have been showing increase in cropping intensity and 2 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. 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 Katwa Subdivision 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 Gambling with nature" (Kuruksheetra, 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 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

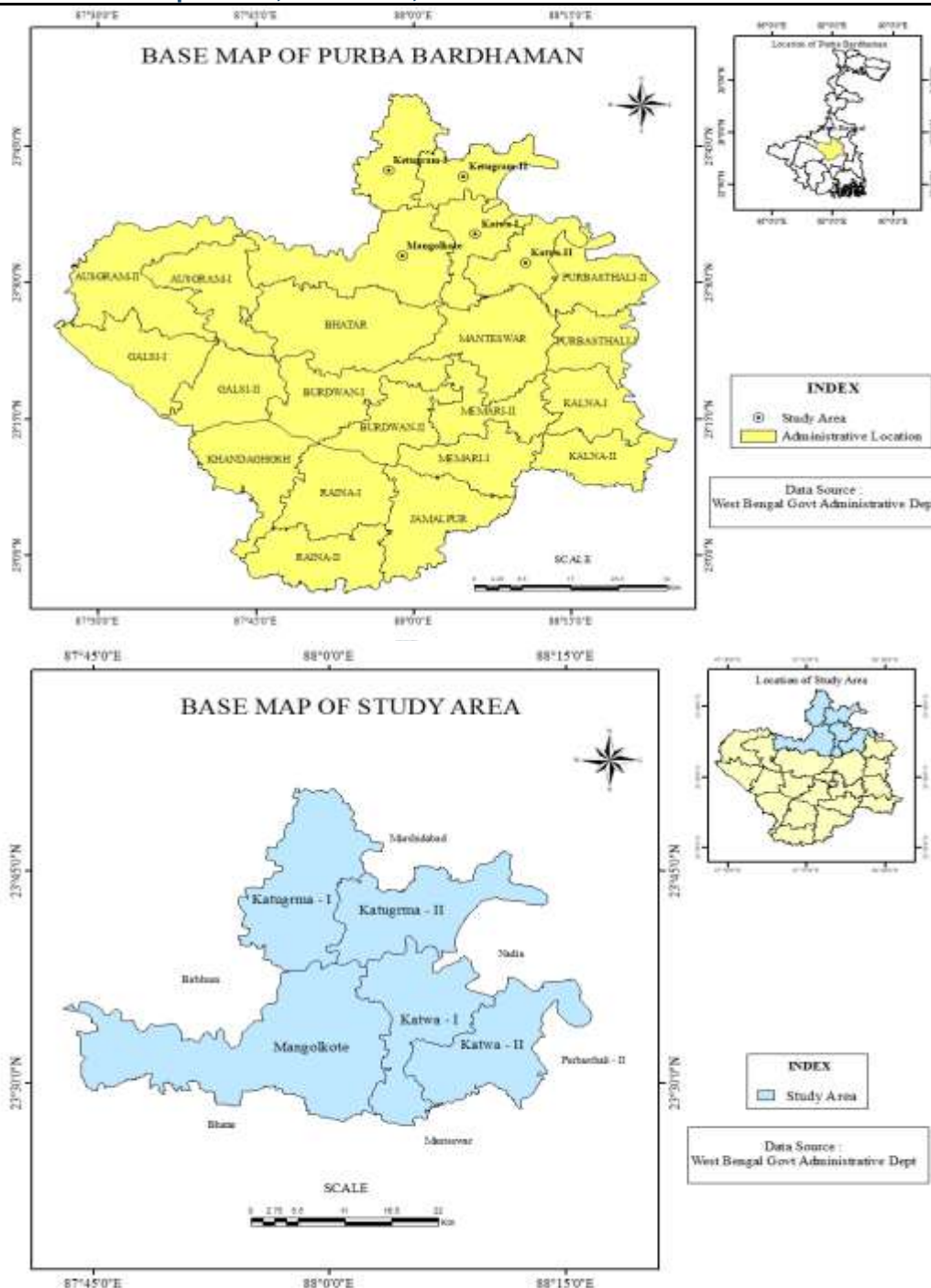
improved irrigation facilities, use of proper fertilizers, seeds and adoption of modern agricultural techniques and by improving the cropping patterns. So, proper irrigation facility must be ensured to achieve and retain better cropping intensity. Undivided Bardhaman district was always agriculturally 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 22 K.M. Therefore, cultivation of Bardhaman district has improved since 1953 with the help of irrigation project undertaken by Damodar Valley Corporation (DVC). Another one of the significant factors behind, out of it, Bardhaman is one of the district was implemented 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 (PMKSY)*’ was developed twin objectives of ‘*Har Khet 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 its overall efficiency value is low nearly 30-35%, where sprinkler efficiency value is 50-70% and drip irrigation efficiency is 80-90%.

**KEYWORD:** IRRIGATION, INTENSITY, CROPPING, STUDY AREA, PMKSY, INTENSIVE AGRICULTURE.

**INTRODUCTION:-** The present study is discussing about impact of irrigation of irrigation intensity on cropping intensity and their relationship in Katwa subdivision in West Bengal and also suggests for an alternative methods of irrigation rather than highly water intensive method of irrigation.

**Study area** The study area covers Purba Bardhaman district in West Bengal. It has come into existence on 7th 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 district lies mainly between the river Ajoy, the Bhagirathi and the

Damodar. It is 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. The data has been collected from following sources: Office of the Deputy Director of Agriculture (DDA), Bardhaman. District Statistical Hand Book in 2005 & 2015. Burdwan District Gazetteers, 1997. Office of the South Mayurakshi canal division, Shyambati, Bolepur, Birbhum. Office of the Damodar canal division, Bardhaman. Office of the Executive engineer, irrigation section, Purba Bardhaman. Review of farmers of some selected blocks in Purba Bardhaman district. Collected data have been piled, computed and tabulated by using following To understand and analysis the blocks wise variation of cropping intensity and irrigation Intensity mapping has been done by using QGIS tool and also relevant statistical diagrams have been used for this purpose.



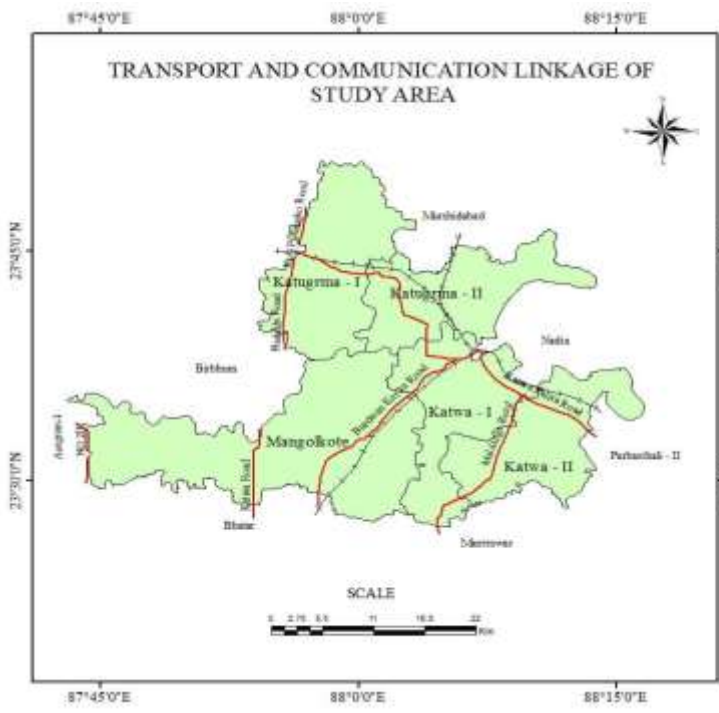
**Irrigation and cropping intensity in 2005-06 databases:** *cropping intensity zone (174 and below):* It is found in Katwa-II (172.5) and Ketugram-I (154.14) etc C.D blocks.

**Medium cropping intensity zone (175 to 208):** It is seen 3 C.D blocks. These are Katwa-I (184.21), Ketugram-II (199.84) and Mangolkote (174.44) etc C.D blocks.

**High cropping intensity zone (209 and above):** This scenario is observed no 3 CD blocks. Ketugram -1 3 C.D blocks. These are Bardhaman (165.39), Katwa-II (.) Ketugram-I (160.56) and Mangolkote (167.34) etc C.D blocks.

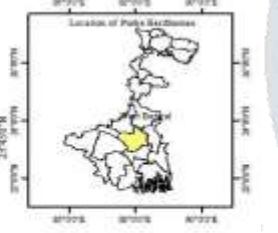
**Medium cropping intensity zone (175 to 208):** This scenario is seen only in Two C.D blocks. These are Katwa-I (182.59), and Ketugram-II (204.11) etc C.D blocks.

**High cropping intensity zone (209 and above):** It is observed no C.D blocks IN Katwa subdivision.



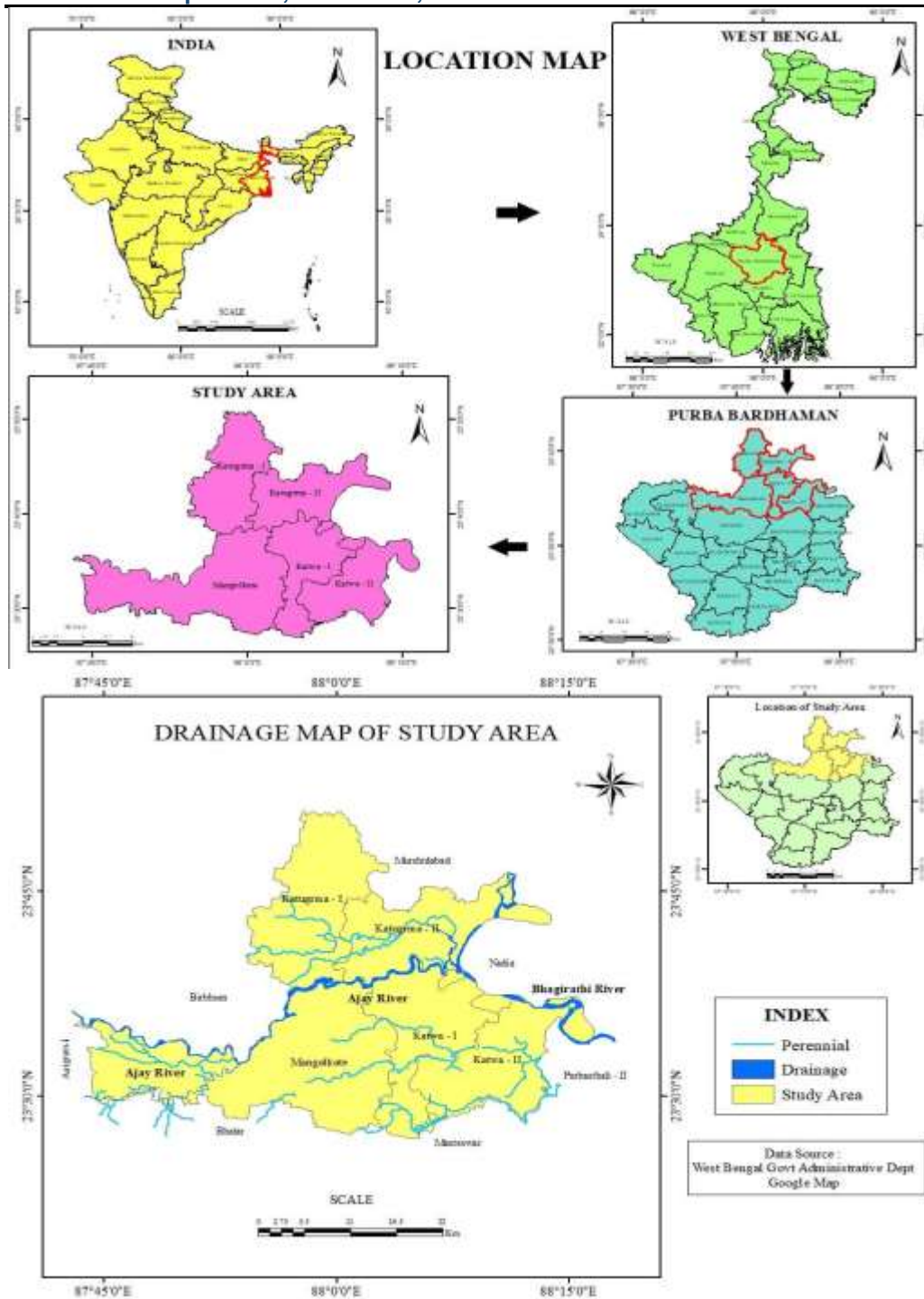
**INDEX**  
— State Highway & Major Road  
— Railway Line  
■ Study Area

Data Source :  
West Bengal Govt Administrative Dept  
Google Maps



**INDEX**  
■ Study Area  
■ Administrative Location

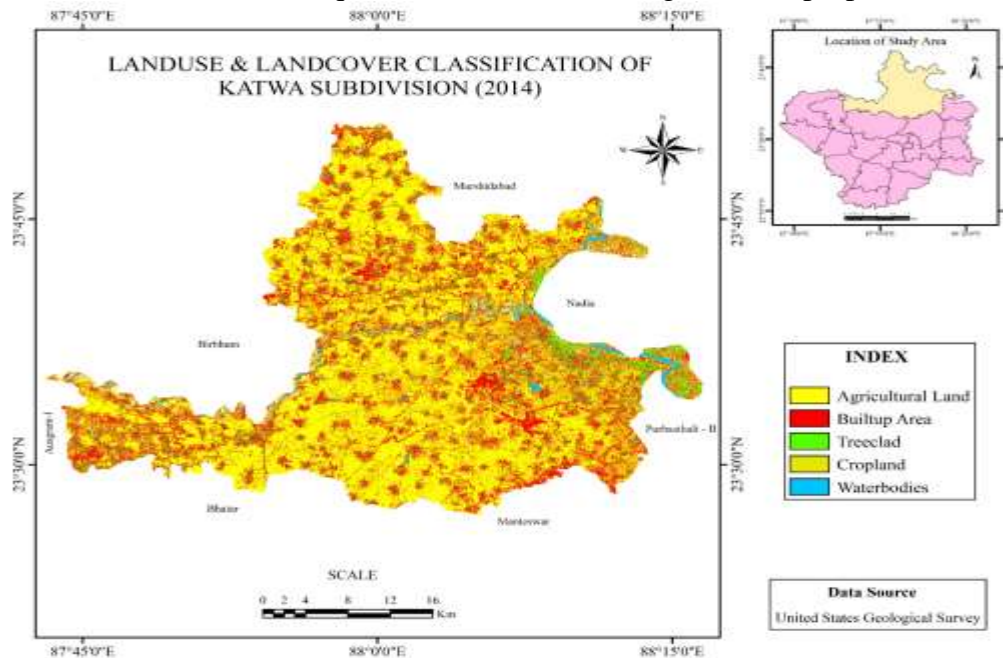
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West Bengal Govt Administrative Dept



**Positive growth of irrigation intensity in between 2005-06 and 2015-16 cropping year:** 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.

**Negative growth of irrigation intensity in between 2005-06 & 2015-16 cropping year:** 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 practice business, changes of agricultural systems.

**Negative changes of cropping intensity:** The main causes of such changes are adverse effect of urbanization, acquisition of land for non agricultural purposes and over all infrastructural deficiency.



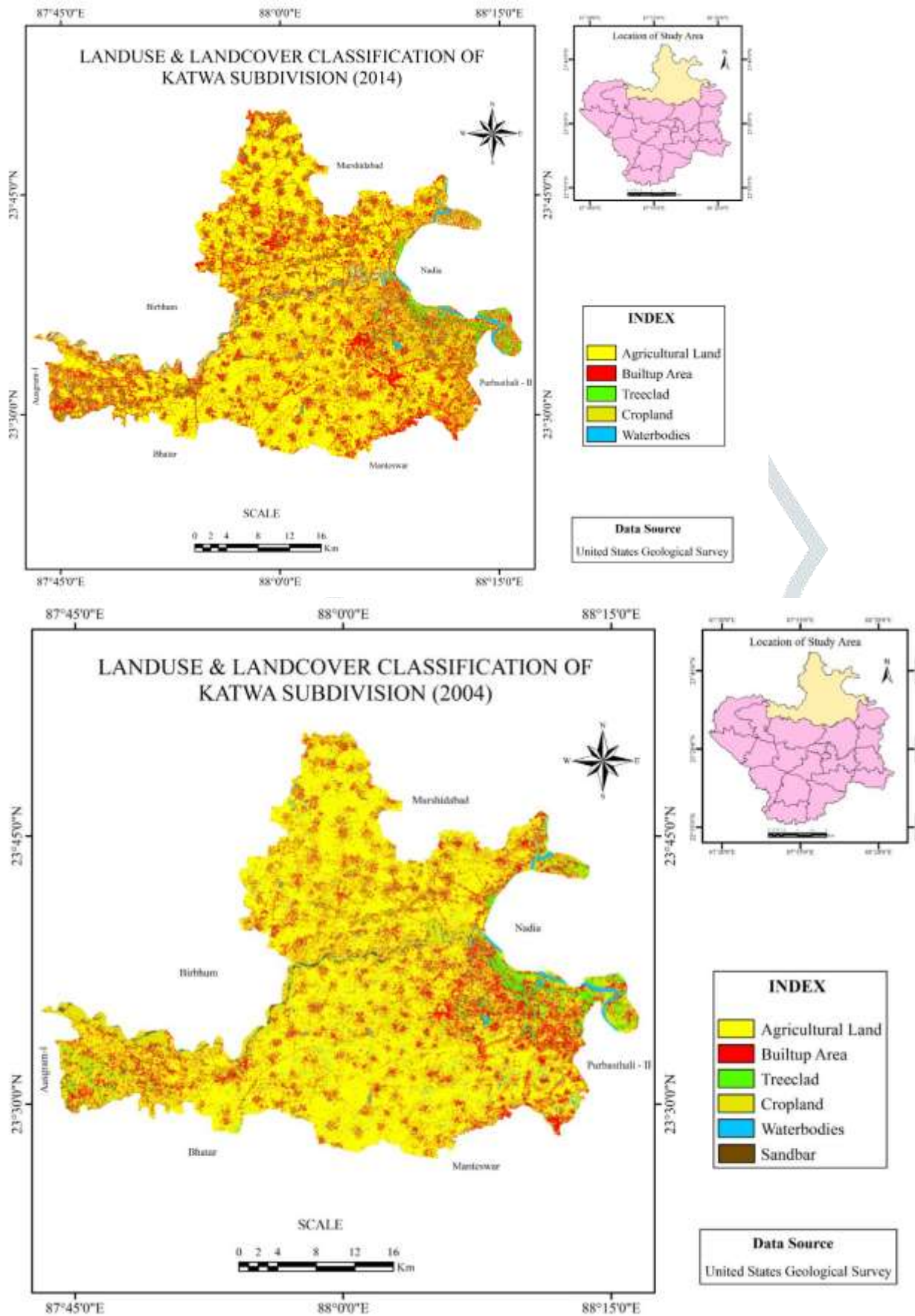
**Impact of irrigation on cropping intensity:** irrigation plays a vital role for increasing cropping intensity in Katwa subdivision. Actually irrigation is the real finance minister in Indian agriculture as well as katwa subdivision Purba Bardhaman district. So, here we discuss relationship between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

**C.D**

**blocks with positive impact of irrigation intensity on cropping intensity are as below:** Only one C.D blocks have improved their cropping intensity due to increasing irrigation intensity. These C.D blocks are Ketugram-II etc.

**C.D blocks with negative impact of irrigation on cropping intensity are as follows:** only 2 C.D blocks have shown their decreasing cropping intensity with improved their irrigation facilities. These are Katwa-I, Mongolkote etc C.D blocks. And Katwa-II, Ketugram-I, 2 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.

**Cropping both irrigation & cropping intensity both are decreasing in nature:** No C.D blocks are falling in this category.



### 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 5 C.D blocks in Katwa subdivision of Purba Bardhaman district, it is clear that most of the blocks 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 Katwa subdivision Purba Bardhaman district.

**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	Katwa-I	21379	11709	182.59	7245.39	33.89
2	Katwa-II	21592.5	12461	173.28	5959.46	27.6
3	Ketugram-I	21404	13331	160.56	8907.29	41.62
4	Ketugram-II	25430.5	12459	204.11	11320.09	44.51
5	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)

**Trendsetting of Irrigation Intensity & Cropping Intensity in Purba Bardhaman District**

Sl.No	Name of the block	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
		cropping intensity	Irrigation intensity	Cropping intensity	Irrigation intensity		
01	Katwa-I	184.21	27.34	182.59	33.89	-1.62	6.55
02	Katwa-II	172.5	32.51	173.28	27.6	0.78	-4.91
03	Ketugram-I	154.14	42.62	160.56	38.8	6.42	-3.82
04	Ketugram-II	199.84	45.59	204.11	44.51	4.27	1.08
05	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)

<b>Positive Growth of Irrigation Intensity in between 2005-06 &amp;2015-16</b>		
Sl.no	Name of the block	Irrigation intensity
01	Katwa-I	6.55
02	Ketugram-II	1.08
03	Mongolkote	0.21

<b>Positive Growth of Cropping Intensity</b>		
Sl no.	Name of the block	C. intensity
01	Katwa-II	0.78
02	Ketugram-I	6.42
03	Ketugram-II	4.27

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