



RESEARCH ARTICLE

RELATIONSHIP BETWEEN NET IRRIGATED AREA AND NET SOWN AREA MAPPING IN SIMLAPAL BLOCK OF BANKURA DISTRICT: AN ASSESSMENT

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NSA- Net Sown Area.

ABSTRACT

Water is a unique substance and it is essential for human beings and other animals as well as plants for survival. Agriculture requires vast quantity of water. Irrigation is an important factor for determining the water balance and cropping pattern of a region. Cultivated area determines the productivity of a land when it is facilitated by irrigation water, fertilizer, good quality seeds and other facilities. Kharif crops (Aman) are cultivated in the Monsoon season. A good rainfall produces bumper production and vice-versa. The Present study is confined on Simlapal block of Bankura District. The study has been taken keeping in view of the analyses focuses on the identification of net irrigated area (NIA) that provides a clear areal differentiation in case of net sown area (NSA), which also gives opportunity to future planners to establish more suitable irrigation system and agricultural development strategies.

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INTRODUCTION

Indian agriculture is mainly rain-fed in nature. That is why farmers had to face risk coming from natural as well as economic factors. As per government database Bankura district has net cultivable area of the district is 4.30 lakh ha. And per cultivator availability of net shown area comes to 1.02 ha. About 46% of the net cropped area is under irrigation. The gross cropped area is about 6 lakh hectare rice, wheat, oil seeds and vegetables are the principal crop occupied major of the gross cropped area. Most of the pre-kharif and kharif rice are grown in rain-fed condition. H.Y.V. crops occupied about 9 percent in this district considering most in summer rice. Wheat is second most important cereal crop in the district and crop is cultivated in limited irrigated areas. Among different oil seeds, rape and mustard, and sesame are two important oil seeds grown in this district sesame are cultivated in three seasons while rape and mustard is cultivated during rabi season. It is paradoxical that though Bankura lies in sub-humid zone having total annual rainfall of 1300 mm to 1400 mm. Agriculture is largely dependent on the vagaries of monsoon.

Drought constitutes a major hazard in the district. Intermittent gaps of in precipitation and moisture stress during the monsoon gives rise to serious setback in production during the kharif, which is the main stay of agriculture in the district as well as the study area.

STUDY AREA

Simlapal block lies in between 22° 50' N to 23° 00' N latitude and 86° 55' E to 87° 15' E longitude. Total geographical area covered in the block 309.28 square kilometer. This is under the Survey of India topographical map number 73N/1 and 73 J/13. Two rivers, namely Shilaboti and Joyponda pass through Simlapal block. The block is bounded by West Mednipur districts towards east, Taldangra block towards north and Sarenga block towards south and Khatra block towards west. A lot of the area under the block is forest covered and is marked by tribal habitations. As per Census 2011 demographic details, the total population is 143038 with 73008 male and 70030 female populations. Where SC populations total is 37738 (26.38 %), ST populations total is 21277 (14.86%) and Gender ratio (number of females to 1000 males) is 959. Simlapal block registered a population growth of 12.25 per cent during the 2001-2011 decade.

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OBJECTIVES

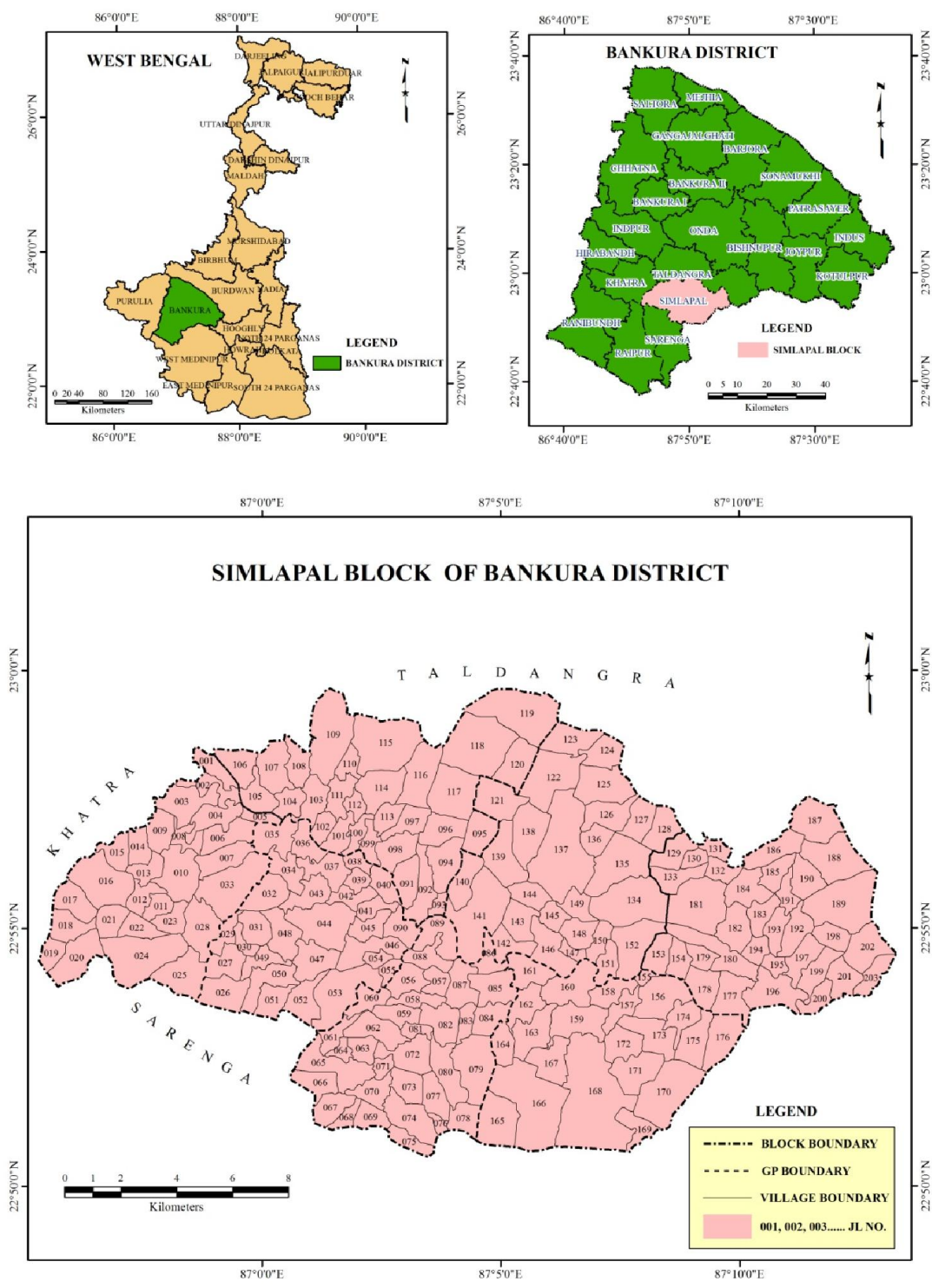
The main objectives of the study are:

- to find out the changes in the cultivated area
- to find out the problems of cultivated area
- to find out the relation between cultivated area and irrigated area
- to give planning proposals at village level

METHODOLOGY

The main objective of this work is to find out the relation between cultivation and irrigation by applying Annual Irrigation Growth rate, Z-score for village level landuse planning.

LOCATION MAP OF THE STUDY AREA



Data Source: Computed by the researcher from the District Census Handbook, Bankura & Statistical Abstract of West Bengal, 2011

After selecting the objectives, the authors have identified the agricultural problems of the study area. Secondly, the authors have collected data from Census Handbooks (2001 and 2011), CD Block Map, Topographical sheets and satellite image etc. to find out and to prepare the base map. Thirdly, the authors have computed and compiled the data and prepared thematic mapping. Finally, data and present scenario have been analysed for village level planning.

REVIEW OF LITERATURE

Willcocks, W. (1930) explained the ancient irrigation system in Bengal. He emphasized on wells and tanks for October irrigation and double cropping. He also put pressure on the regular cleaning and desilting of the irrigation canals in order to carry more rain and flood water in the next rainy season. A good deal of works has been done on changes of cultivated area and irrigation area (Berry and Marble, 1968; Manly, 1986; Tripathi and Tiwari, 1993; Renuka, and Ali, 1997; Rahman, 2008; Prasad and Ghosh, 2011). Bhattachariya, K. (1954) explicated the drainage characteristics of Bengal, their changes in courses. He also explained the river characteristics of Rarh region, with the special emphasis on river projects. He also justified the duty of water in various agricultural methods. Though, a considerable work has been done on landuse change and net sown area or cultivated area change but at village level no such work is done still on the relation between cultivated area and irrigated area. In the previous works numerous techniques are used to calculate the changes. Application of Z-score is an attempt to understand the relation between cultivated area and irrigated area to assess the agricultural landuse in Simlupal block of Bankura district.

RESULT ANALYSIS

To explore the village-wise parity and disparity between the distributions of net sown area and irrigated area, standard deviation (S.D.) and Z-score have been calculated. Some important observations have come out which are as follows:
Class interval = $R / 1+3.322\log N$

R = -7.34

N = 202

CI = 1.10753

Irrigated area Mean: 64.88 hect. SD: 9.14

Net Shown area Mean: 80.58 hect. SD: 51.77

$$Z \text{ Score} = \frac{x - \bar{x}}{\sigma}$$

x: individual, \bar{x} : mean, σ : Standard Deviation

The score value must be positive (+) or negative (-) and greater than 1 or less than one. Less than one value indicates that the area is deviated less than standard deviation and vice-versa. Positive value indicates that the area has net sown area or irrigation more than "Mean".

Changes in Cultivated area and Irrigated area

Irrigate and cultivated area have been considered as 'X' and 'Y' respectively.

Threshold value increases from 26.94 to 27.70 (2001 to 2011) indicating that if irrigation is '0' then also cultivation possible. Increase of intercept value indicates that cultivation is not determined by irrigation. Annual growth rate irrigation and NSA also shows the same results i.e. positive change in cultivable land but almost no change in irrigation within 2001 to 2011. Slope value also increases from 0.337 to 0.393 (2001 to 2011). It indicates that per unit change in irrigation can change the NSA more in 2011 than 2001.

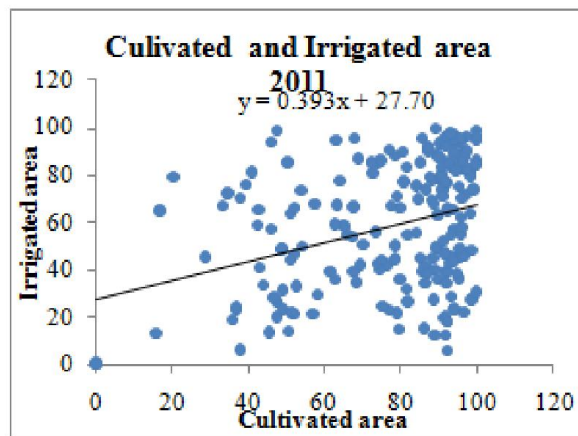


Fig. 2. Cultivated and Irrigated area 2011

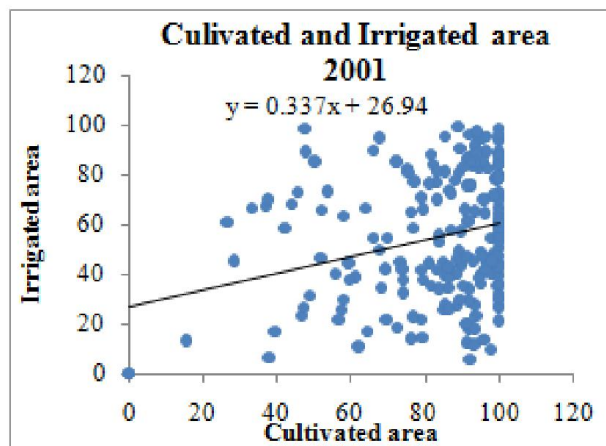


Fig. 3. Cultivated and Irrigated area 2001

Relation between NSA and Irrigated area: Comparative Analysis Z-Score

- Correlation (r) between the Standard deviation of net sown area (NSA) and irrigated area is 0.94.
- S.D. is relatively higher for the net sown area (SD 51.77 hect.) than the irrigated area (SD 9.14 hect.) which means greater variation exists in the available net sown area among the villages than irrigated area. There is huge gap between the mean (M) of net sown area (80.58 hect.) and irrigated area (64.88 hect.) on an average 15.7 hect. Planning is required to reduce the gap. When the whole net area will get irrigation facility then it will become zero.
- Positive score indicates that the villages have net area or irrigated area more than mean distribution.

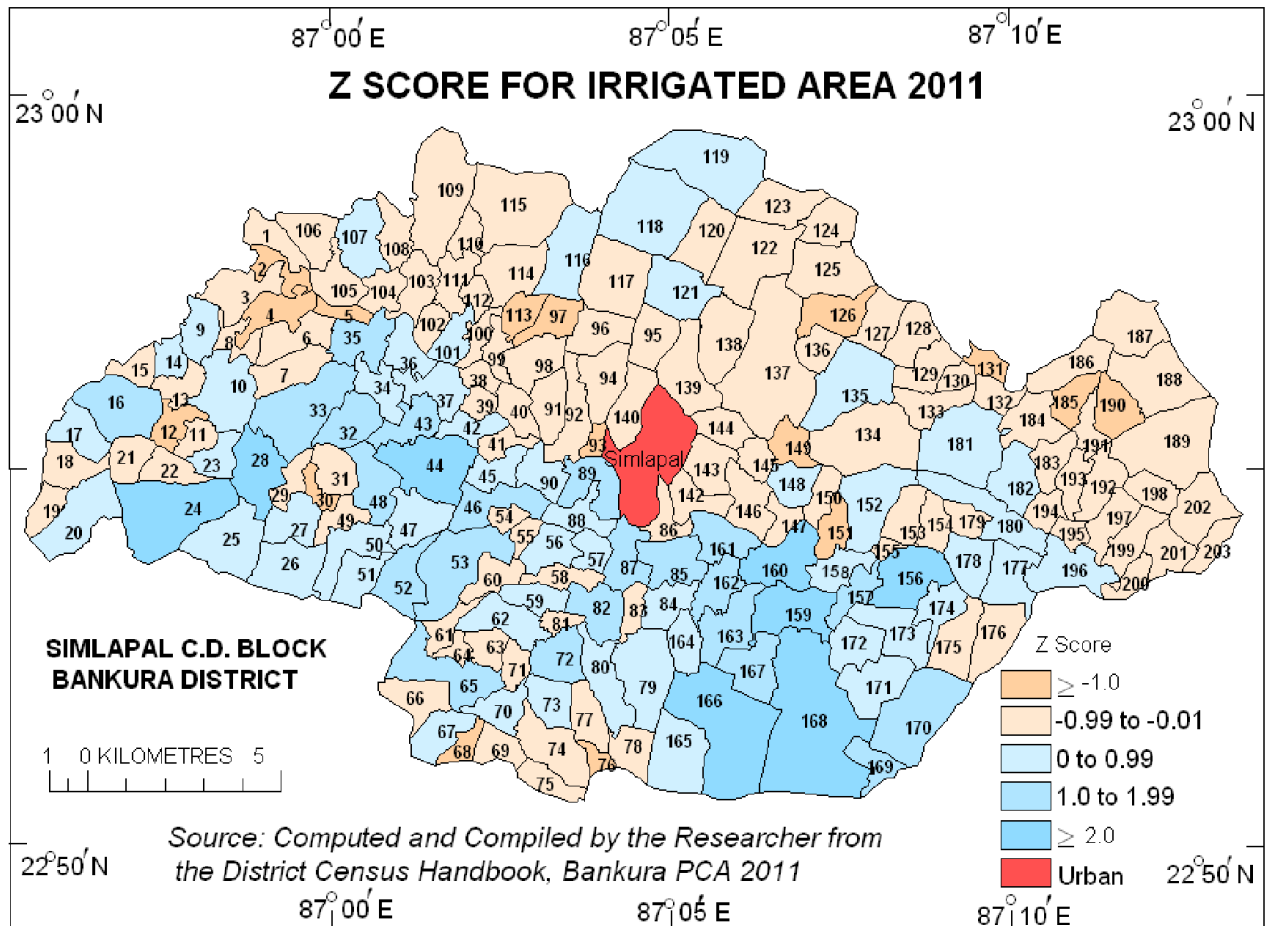


Fig. 4. 'Z' score for Irrigated Area 2011

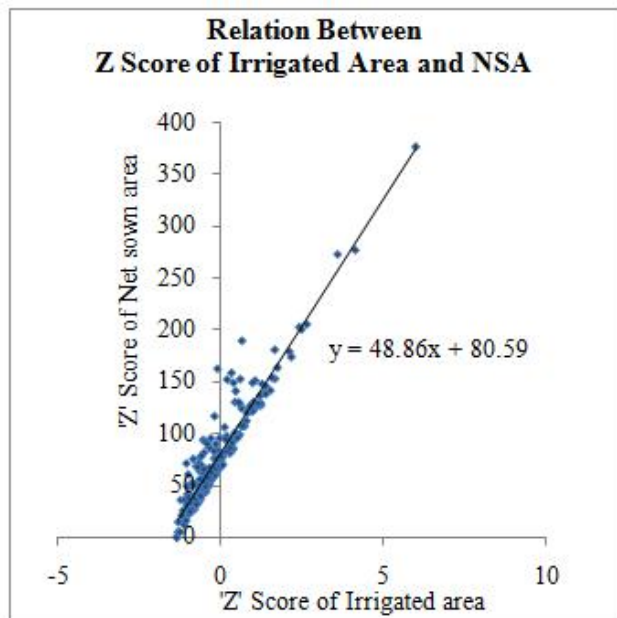


Fig. 5. Relation between Net Sown Area and Irrigated Area 2011

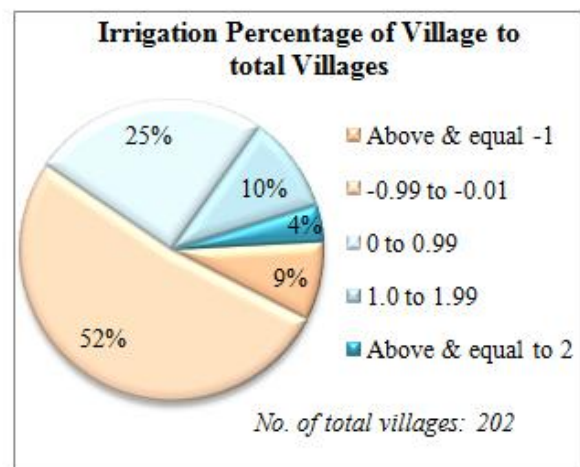


Fig. 6 NIA % of village to total village

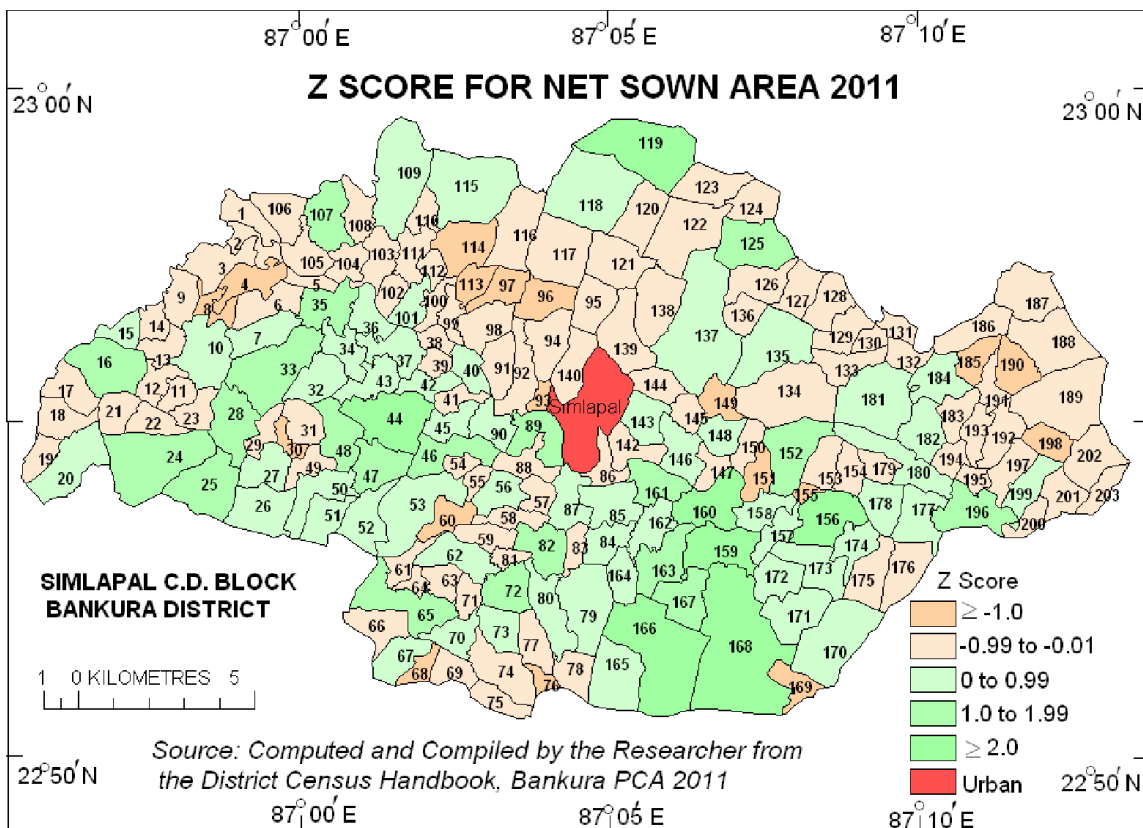


Fig. 7. ‘Z’ Score for Net sown Area 2011

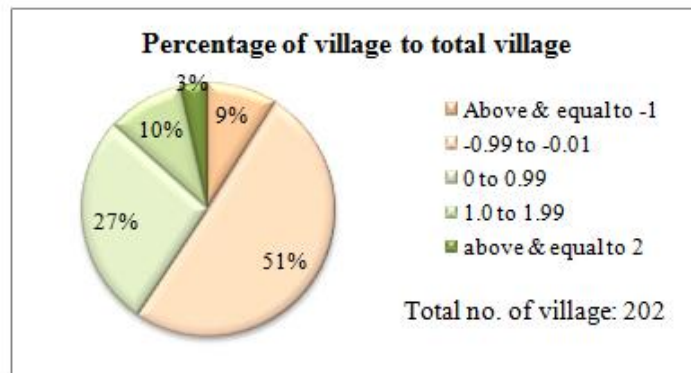


Fig. 8. NSA Percentage of village to total village

Table 1. Planning identified for Simlapal C.D. Block

	<i>Need plan for irrigation</i>	<i>Need plan for net sown area</i>
Simlapal C.D. Block	Mayna (J.L.30), Malatibad (J.L.68), Kadambandh (J.L.76), Sitarampur (J.L.113), Memouli (J.L.97), Ghaghrakhulia (J.L.169), Arjunia (J.L.149)	Mayna (J.L.30), Malatibad (J.L.68), Kadambandh (J.L.76), Sitarampur (J.L.113), Memouli (J.L.97), Ghaghrakhulia (J.L.169), Arjunia (J.L.149) Rengurbandh (J.L. 14), Bhalkamuri (J.L. 23), Krishnapur (J.L. 59), Bardi (J.L. 88), Kansachora (J.L. 116), Koldoba (J. L. 121)

Therefore, positive value has been treated here as a good symbol for the village than negative value. Because negative value indicates that the respective villages have lower net area or irrigated area than the mean.

- The score with a lower positive value (less than +0.50) indicates more stable condition than the score with lower negative value (less than -0.50).

- When the score is positive and more than 1, it reveals that the villages are in better condition than the other villages of the Simlapal.
- Negative scores more away from zero are representing more poor condition at regional aspect for both net area and irrigated area.

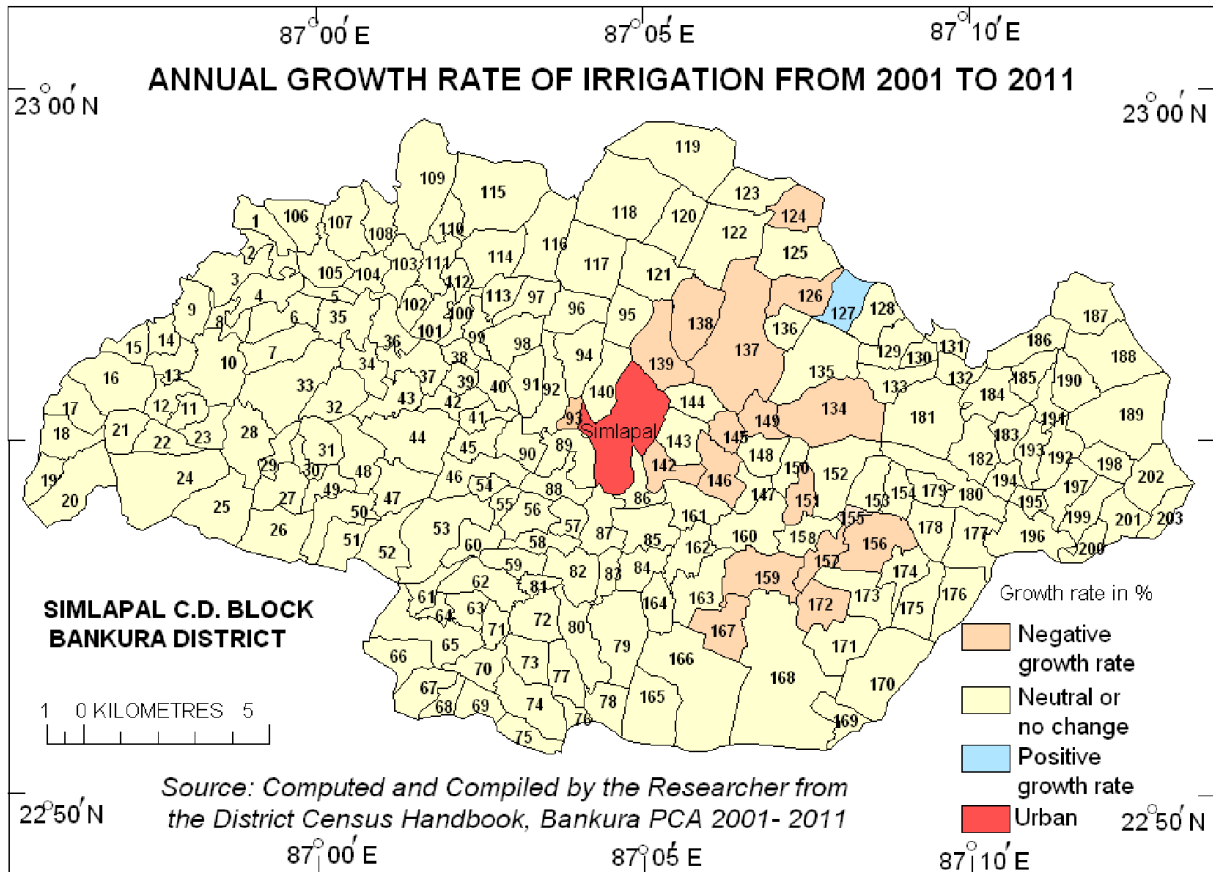


Fig. 9. Annual Growth rate of Irrigation from 2001 to 2011

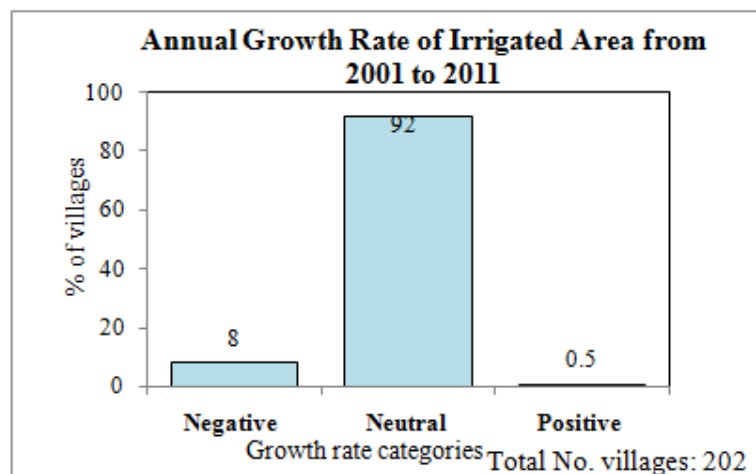


Fig. 10. Annual Growth Rate Categories of Irrigated Area from 2001 to 2011

- Villages of the 1st quadrant like Dubrajpur (J.L.168), Shyampur (J.L.44), Hatibari (J.L.166), Dhanghari (J.L.159), Puipal (J.L.160), Jhumka (J.L.156) etc. of the Simlapal Block are the most agriculturally advanced because their irrigation positively deviates up to 5 times than the SD and NSA positively deviates up to 3 (Fig. 4 and 7). These mouzas are relatively developed in respect of the study area.
- Villages of the 2nd quadrant represent positive change in NSA but negative in irrigation. Such villages like Rajabandh (J.L. 15), Jhikri (J.L. 40), Uparsol (J.L 115), Krishnapur (J.L. 137), Doldere (J. L.146) need more irrigation.
- The villages of the 3rd quadrant are characterized by negative deviation for NSA and irrigated area both. These villages are regionally lagging behind to the maximum.

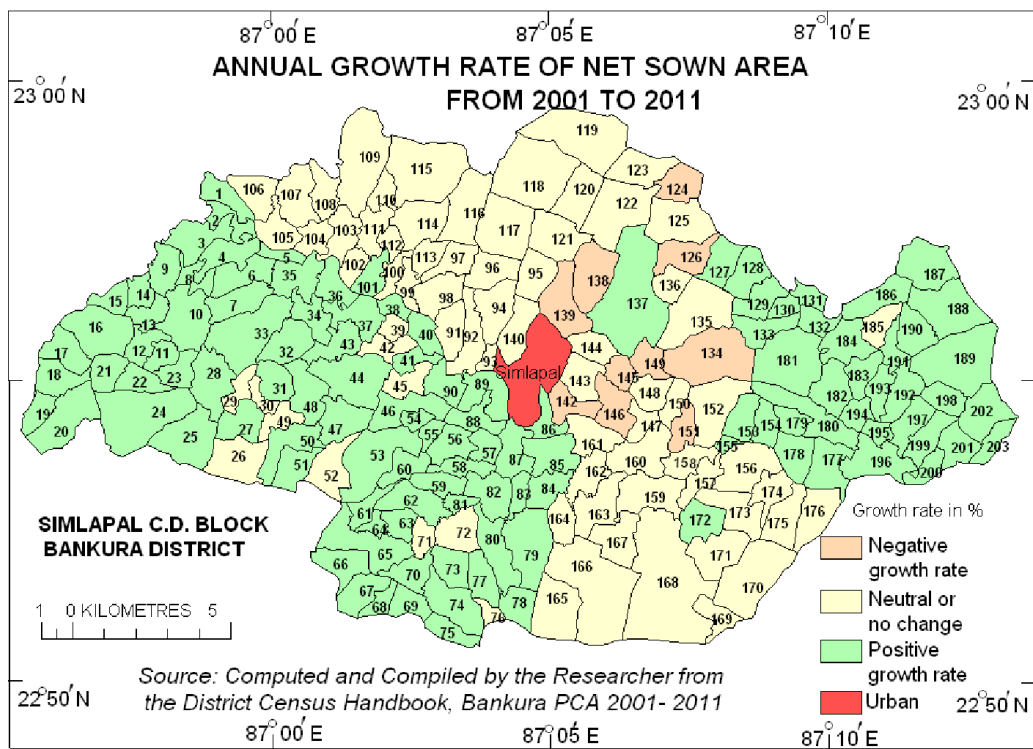


Fig. 11. Annual Growth Rate of Net Sown Area from 2001 to 2011

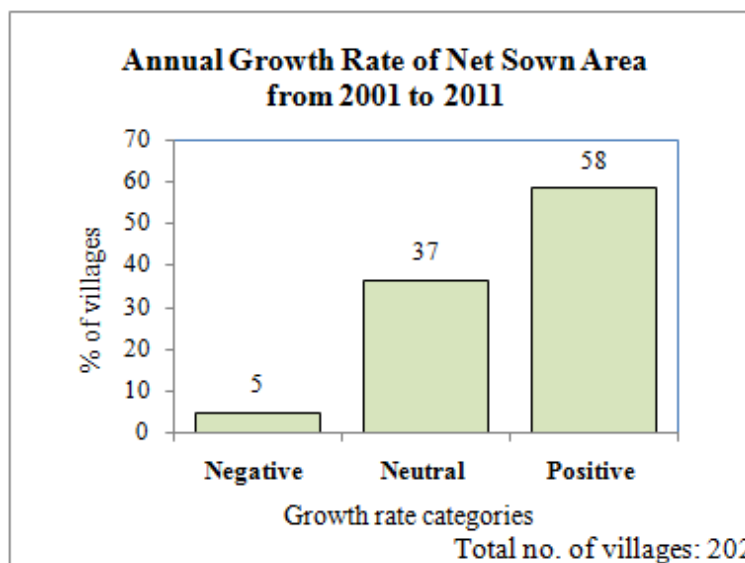


Fig.12. Annual Growth Rate Categories of Net Sown Area from 2001 to 2011

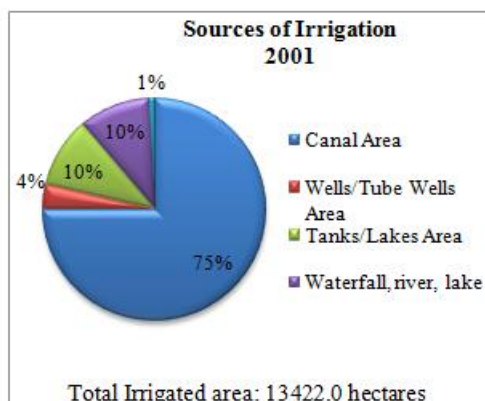


Fig. 13. Sources of Irrigation 2001

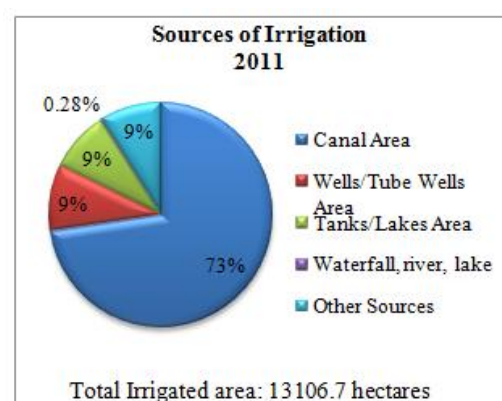


Fig.14. Sources of Irrigation 2011

In the Simlupal Block Mayna (J.L.30), Malatibad (J.L.68), Kadambandh (J.L.76), Sitarampur (J.L.113), Memouli (J.L.97), Ghaghrakhulia (J.L.169), Arjunia (J.L.149) etc. villages come under this category.

- The villages of the 4th quadrants are needed planning for NSA because in this quadrant the villages like Rengurbandh (J.L. 14), Bhalkamuri (J.L. 23), Krishnapur (J.L. 59), Bardi (J.L. 88), Kansachora (J.L. 116), Koldoba (J. L. 121) etc. are negatively deviated for NSA (Figs. 4 and 7).

Relation between NSA and Irrigated area: Comparative Analysis of Annual Growth Rate

Only one mouza shows positive changes in irrigation within last decades (2001 to 2011). Sixteen villages (8 %) have negative growth rate in irrigation from 2001 and rest of the villages (92%) has no change (Fig. 10). It is very clear from Annual growth rate scenario that the whole are have been suffering by poor irrigation facility. Annual growth rate of NSA exhibits that there are 5, 37 and 58 percentage of villages having negative, neutral and positive changes in cultivated area respectively. These two maps (Figs. 9 and 11) express that although there is no change in irrigation but NSA increases through time. Therefore, it can be said that ever increasing food demand makes compulsion to the inhabitants to extend their agricultural field depending on the rain water.

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