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Changing Agricultural Pattern In The Perspective Of Demographic Change A Study On Kaliganj Block, West Bengal, India

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Abstract

Present discussion is a micro level study for a small administrative unit within a densely populated state of India. For the country like India, where fast growth of population is a common phenomenon, events related to demographic change like changes in land-use, expansion of present urban centers in cost of rural areas, growth of congested centers acting as service centers for rural areas are all common. Related another important event is the changes in agriculture that the rural areas are observing. Here such a rural area is selected as study area which observes the development of census towns and loss of cultivable land in expense of agricultural land. Objective of this study is to highlight on changing pattern of agriculture for this area as a result of demographic change and to mention probable planned way of using the land.

Key words: demography, land-use, cropping pattern

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Introduction: Present study area is under Nadia District of West Bengal, India covering the community development block named Kaliganj with an area of about 317.2 sqkm. The community development block is within 23°41'N-23°44'N and 88°12'E-88°15'E extension. Remarkable events related to the area are faster growing population in last two census periods in comparison to the district as well as the state average. Study of land-use for this area represents a continuous growth in residential zone as well as growth in gross cropped area. Growing population influences increasing demand of foods from agricultural lands and a change in agricultural production is taking place both in variety and in quantity.

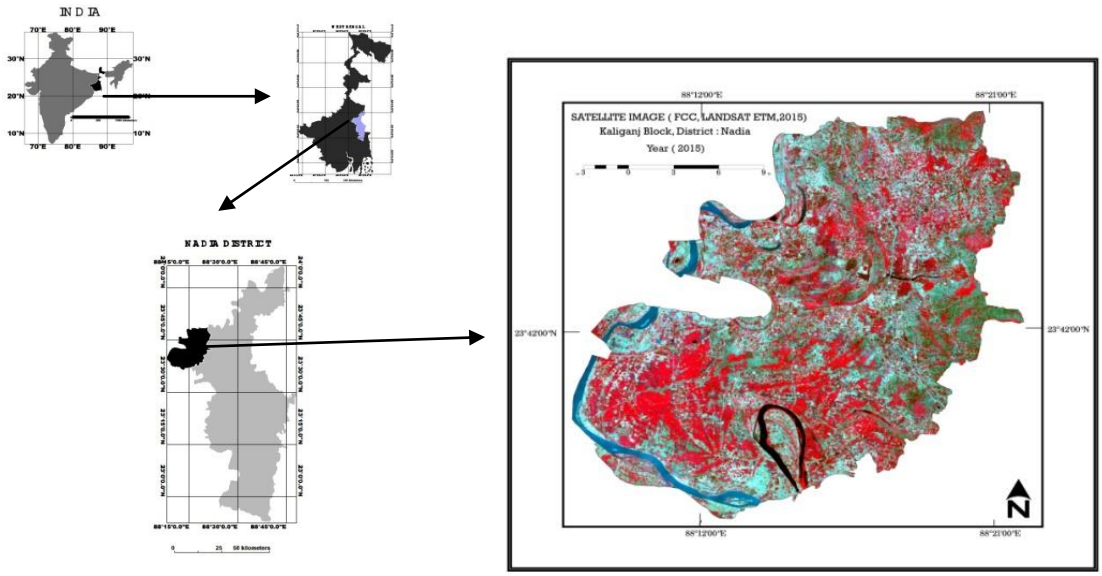
Objective of the study: The paper aims to highlight on

- Demographic changes those the study area observed in previous three census years in comparison to the district as well as state average.
- Land-use changes those occur during this period.
- Changes in agricultural pattern those the area observed in the very period.

Methodology:

- To study demographic pattern as well as to identify changes census reports of 1981, 1991, 2001, 2011 published by Govt. of India was used.
- Study of land-use changes is based upon image classification of LANDSAT images of 1990 and 2015 with the use of ARC-GIS 10.3 ; preparation of map in TNT mips 2012.
- Changes in agricultural pattern is studied on the basis of reports published in District Statistical Handbook, Nadia-1990,1995,2000,2005,2010 published by the Bureau of Applied Economics and Statistics, Govt. of West Bengal.
- Interview with local people related to agriculture for perception study.
- Quantitative analysis of the collected information.

Figure-1: LOCATION MAP OF THE STUDY AREA



Selection of the study area:

Present study area is lying on the Gangetic delta covered by several wetlands and alluvial deposit. It is one of the dependable crop production regions for the state. Such an area is also suitable for residential growth. Considering both the events of population growth and growing demand of crops the area is observing changes in agricultural practices. For such a fertile land proper planning is needed to sustain agriculture.

Discussion: Interaction among the demographic changes, changes in land-use and changing pattern of agriculture may be related as follows:

Demographic criteria:

A brief idea about the study area from demographic point of view may be achieved through the following table:

Table-1: Demographic criteria of Kaliganj Block in comparison to the district and state

State/District/Block	Growth rate during 1991-2001 in %	Growth rate during 2001-2011 in %	Population density in 2011 per sq. km
West Bengal	17.84	13.84	1028
Nadia	19.54	12.22	1316
Kaliganj	21.87	15.1	1046

Data source: Census report 1991, 2001, 2011

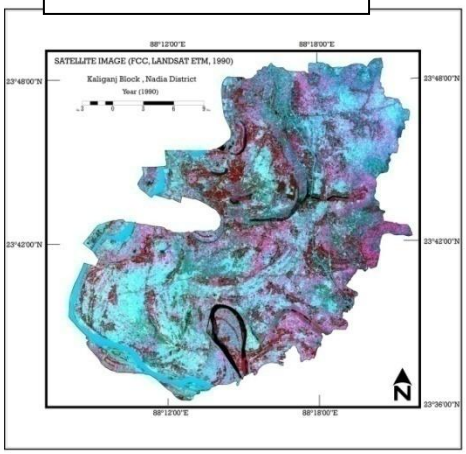
Other important event related to the selected community development block is the rapid growth in population density that the area achieved. During 1991 and 2001 it was 746/sq. km and 909/sq. km respectively. Study of primary census report of past two decades show that during 1991 only 10 villages within the block was of population 5000 and more, while it turned to 17 during 2011 report. Villages having the population 10,000 and more also increased from 4 to 5 during this period. In villages with more than 10,000 population increase rates are 32.95% for Debagram, 30.08% for Uttar Hajrapota, 38.63% for Mira and 25.98% for Matiari during 1991 to 2011 census periods.

Land-use criteria:

Land-use is the way of using any tract of land to produce best resources for human need, though concept of sustainability is often ignored. In a general way we may term land-use as the product of several physical elements and the human attitude to satisfy human beings themselves at the best level by utilizing those natural elements. It is true that with growing population as well as with growing need the way to utilize the land changes, the event is true for our study area, too. In a gap of twenty five years the changes in land-use observed by the area is as follows:

Figure-2: Base map for Land-use Land cover map of Kaliganj Block

In 1990



In 2015

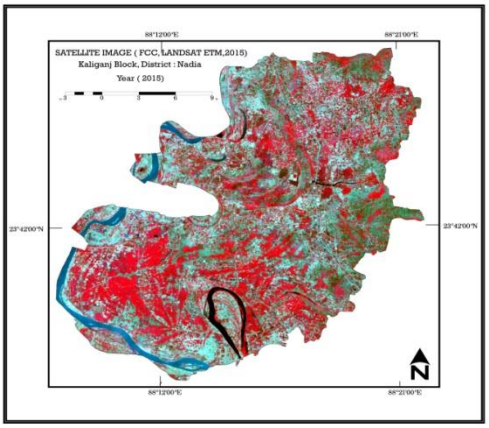


Figure-3: Land-use Land cover map of Kaliganj Block in 1990

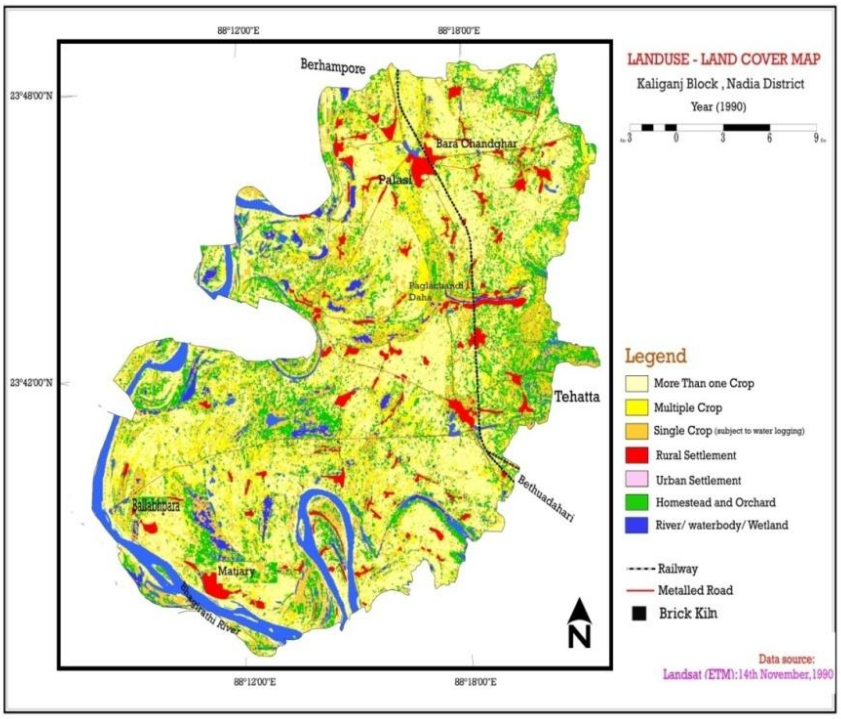
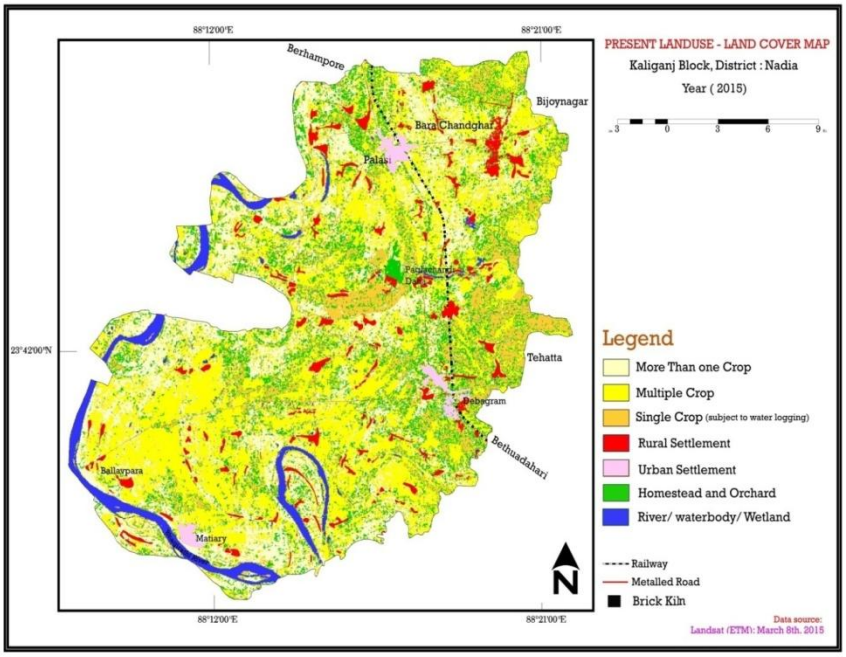


Figure-4: Land-use Land cover map of Kaliganj Block in 2015



The above mentioned image classification was done on the basis of following method:

- Collection of LANDSAT ETM images of 1990 and 2015.
- Land-use classification in unsupervised method based upon supportive data sources like Topographical map prepared by Survey of India (map number-79A/6).
- Use of GIS soft ware like ARC GIS 10.3 was done for such classification.

Summary of comparison in land-use for two different years is as follows:

Table2: Land-use in temporal change

Year	**In 1990 based on LANDSAT data**		**In 2015 based on LANDSAT data**		**Changes in %**
Land-use, Land-cover type	Area in hectare	% to total area	Area in hectare	% to total area	
SETTLEMENT	1193.7	3.68	1922	5.92	+61.01
WATERBODY	3696.2	11.39	2892.2	8.91	-21.75
MONOCROPPED	8901.8	27.44	8001.8	24.66	-10.11

(BORO)					
DOUBLE (Kharif)	11337.44	34.95	8940.14	27.58	-21.14
MULTIPLE	3859.9	11.9	8432.9	25.99	+118.47
HORTICULTURE AND ORCHARDS	3453.22	10.64	2253.22	6.94	-34.75
TOTAL	**32442.26**	**100**	**32442.26**	**100**	

Data source: LANDSAT Image classification and the computation is done by the researcher

Remarkable events related to land-use study is

- Due to growth of settlement net cropped area has been reduced but to cope with the growing demand gross cropped area has increased in the form of multi cropped zone.
- Massive changes in land-use has occurred in the rapidly grown centers like Debagram, Matiari, Plassey etc and their surrounding zones.

Agricultural criteria: Recent changes in agricultural production rate specially the changes in concentration of choosing the crop for production may be summarized as follows:

Table-3: Temporal comparison for major crops in Kaliganj Block

Major crops	Total area under production in hectare		Total production in '000kg		Changes in area in %	Changes in totalproduction in %
	In 1994-95	In 2013-14	In 1994-95	In 2013-14		
Aus	*4030*	*4797*	*8.26*	*12.497*		
Aman	*15310*	*9361*	*34.43*	*25.125*		
Boro	*7670*	*8013*	*28.88*	*32.211*		
Total rice	27010	22171	71.57	69.833	-17.91	-2.43
Wheat	5390	2923	14.95	11.028	-45.76	-26.23
Jute	7320	8428	77.06*	152.125*	-15.13	97.41
Mastard	3910	1560	3.63	1.525	-60.10	57.98
Till	1430	3252	1.36	3.780	127.41	177.94
Masur	1500	2543	0.83	2.310	69.53	178.31
Potato	100	251	1.82	7.731	151	324.78

Data source: District Statistical Hand-Book Nadia-1995 and 2014 published by Bureau of Applied Economics and Statistics, govt. of West Bengal

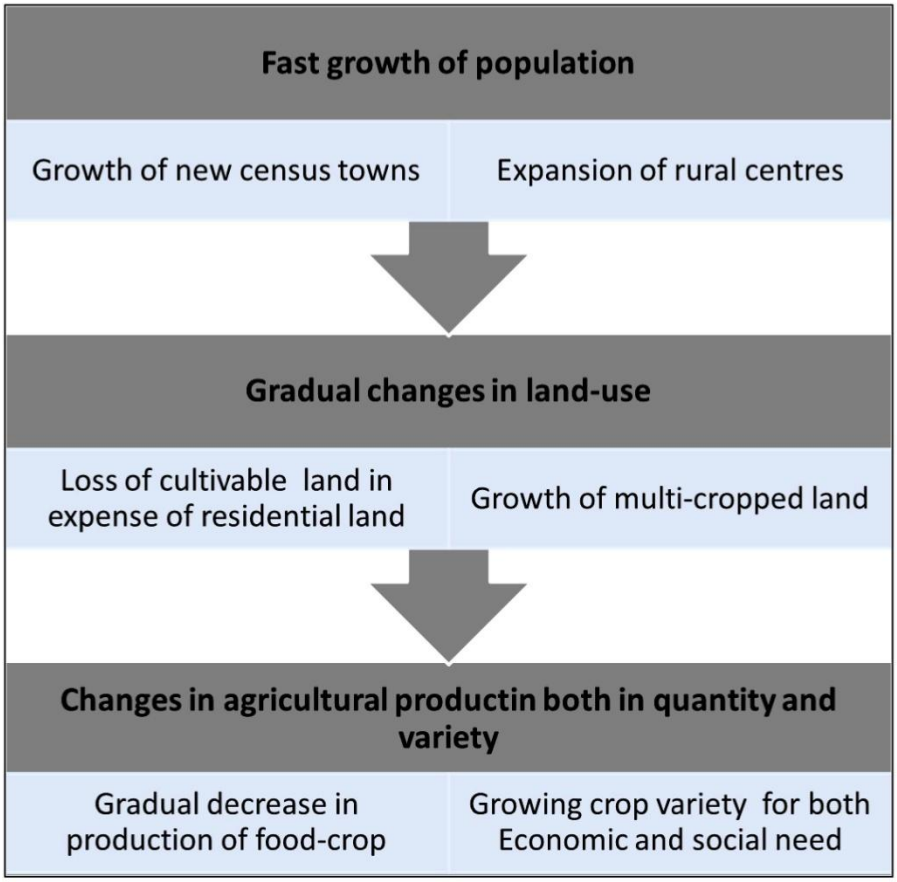
*Production rate in thousand bales of 180 kg.

Remarkable events from the temporal changes include:

- Total area under production for major fodder crops has reduced, though introduction of several new crops is common for this area.
- Though in cases of most of the crops area under production has reduced but rate of production either has massively increased or has decreased in a negligible rate.
- As per the result of interview with local people related to agriculture growth in horticultural production especially for fruits like banana, guava and plum are being profitable in comparison to production of food-crops and cash crop like jute.

Findings from the study:

Demographic changes and the related events may be inter-related in the following manner:



According to field work other important events related to agriculture for the area include

- dependence on chemical fertilizers to maintain as well as to increase agricultural productivity
- sole dependence on underground water for irrigation throughout the year

Probable Planning strategies:

- Plassey and Debagram like nodal centers should get urban facilities and development of the mentioned centers in a planned manner is needed to accommodate more settlements such that nearby horizontal expansion of residential zone may be checked.
- The farmers should be well informed about soil quality and more scientific information they need before choosing the crop.

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