The Research Analytics
Volume 3, Special Issue 3, May 2026
ISSN (Online): 3107-6165

The Research Analytics
(A Peer Reviewed and Open Access Journal)

15

A Geographical Analysis of Agricultural Bases and its impact on Rural Development in Bihar: A Micro-level Case Study

Ashutosh Kumar [1]* & Deepak Kumar [2]

[1] Department. of Geography, Kartik Oraon College, Gumla, A Constituent Unit of Ranchi University, Ranchi, Jharkhand, India
[2] Department of Geography, Simdega College, Simdega, A Constituent Unit of Ranchi University, Ranchi, Jharkhand, India
* Email: ashu.bhu596@gmail.com
Page No. 184-197

Abstract: *Indian agricultural development can be looked at from two different perspectives i.e., institutional and technological. The institutional approach, mainly typified by land reforms and changing agrarian relations, was the strategy adopted way back in the mid-fifties just after independence. Land reforms, as an engine of agricultural development, registered limited success and by passing of time it became only a matter of politics at both the national and the state level. Moreover, on the background of rapidly growing population it was realized that in the absence of further scope for increasing the area under cultivation, advances in productivity remained the only means of stepping up food-grain production in the country. As a result technological approach to agricultural development, popularly known as the "Green Revolution" was adopted in the mid-sixties, which made a decisive impact on agricultural production and productivity. But, this approach of agricultural development was very much limited to few western and southern region of the nation. The state like Bihar, characterized with deep poverty and backwardness, remained far away of both the institutional and technological transformation even in the era of liberal economic policy which consequently resulted into a deprived agricultural condition of the state. This paper tends to examine the present condition of agricultural base and its impact on rural development in a community development block of Bihar. Present study reveals the fact that there is significant effect of institutional and technological transformation policies of the government towards improvement of agricultural bases which in result directly affect the status and level of Rural Development in the state and study area. The study recommends that by improving the condition of agricultural bases the level of rural development can be achieved faster and stable.*

Keywords: *Agricultural Base, Agricultural Development, Rural Development, Micro-level, Land Holdings, Land Use, Farm Technology.*

Introduction

In the 1950s, Indian agriculture was backward in the sense that output per worker and output per unit of land area were low. There were regional variations in agro-climatic conditions, spread of irrigation and varying extent of market penetration in different areas. Nonetheless, most parts of rural India had unequal land ownership patterns in which a major part of cultivated land was controlled by a few large landowners. Tenancy was widespread and crop-share rents were the major form of rent, especially in the East and the South of the country. Availability of institutional credit was insufficient in rural areas and most cultivators had no option but to go to the local money-lenders for credit. In many parts of rural India, particularly in northern India, inheritance pattern led to continuation of the subdivision of holdings (the average size of holding was well within 2 hectares) (Vaidyanathan, 2000). These conditions discouraged and prevented investment in agriculture by all classes. Due to poor farm technology and infrastructure the agricultural farm were low yielding and cultivation practices primitive. This inhibited the growth of Indian agriculture before the rise of Green Revolution.

Indian agricultural development can be looked at from two different perspectives i.e., institutional and technological. The institutional approach, mainly typified by land reforms and changing agrarian relations, was the strategy adopted way back in the mid-fifties just after independence. Land reforms, as an engine of agricultural development, registered limited success and by passing of time it became only a matter of politics at both the national and the state level. Moreover, on the background of rapidly growing population it was realized that in the absence of further scope for increasing the area under cultivation, advances in productivity remained the only means of stepping up food-grain production in the country. As a result technological approach to agricultural development, popularly known as the "Green Revolution" was adopted in the mid-sixties, which made a decisive impact on agricultural production and productivity. But, this approach of agricultural development was very much limited to few western and southern region of the nation (Hazell, 2002). The state like Bihar, characterized with deep poverty and backwardness, remained far away of both the institutional and technological transformation even in the era of liberal economic policy which consequently resulted into a deprived agricultural condition of the state. This paper tends to examine the present condition of agricultural base and its impact on rural development in a community development block of Bihar. By this study, it can also be analysed whether there is any effect of institutional and technological transformation policies of the government towards agricultural improvement in the state or not? The paper deals with different aspects of agricultural base like: land holdings, land use pattern and their changes, irrigation, development of farm technology and status of livestock in the Raghopur Block. The present study works on the hypothesis that "by improving the condition of agricultural bases the level of rural development can be achieved faster and stable."

Objectives of the Study

The present study is based on two-fold objectives:

A. To examine the present condition of agricultural base and its impact on rural development in the study area, and
B. To analyze, whether there is any effect of institutional and technological transformation policies of the government towards agricultural improvement or not?

The Study Area

The study area is one of the eleven blocks of district-Supaul, situated in the Kosi plain of north Bihar stretching from 26º 29' 68" N to 26º 30' 34" N and 86º 83' 37" E to 86º 84' 24" E (Fig. 1) and known for its backwardness and flood vulnerability. The Block consists of eighteen Panchayats and 58 Villages with an area of 21167 hectares (211.67 Sq. Km). The area comprises 215643 persons (2011) of which male populations share 51.54 per cent. In 2011, the average density of population was 10 persons per hectare (Census of India, 2011).

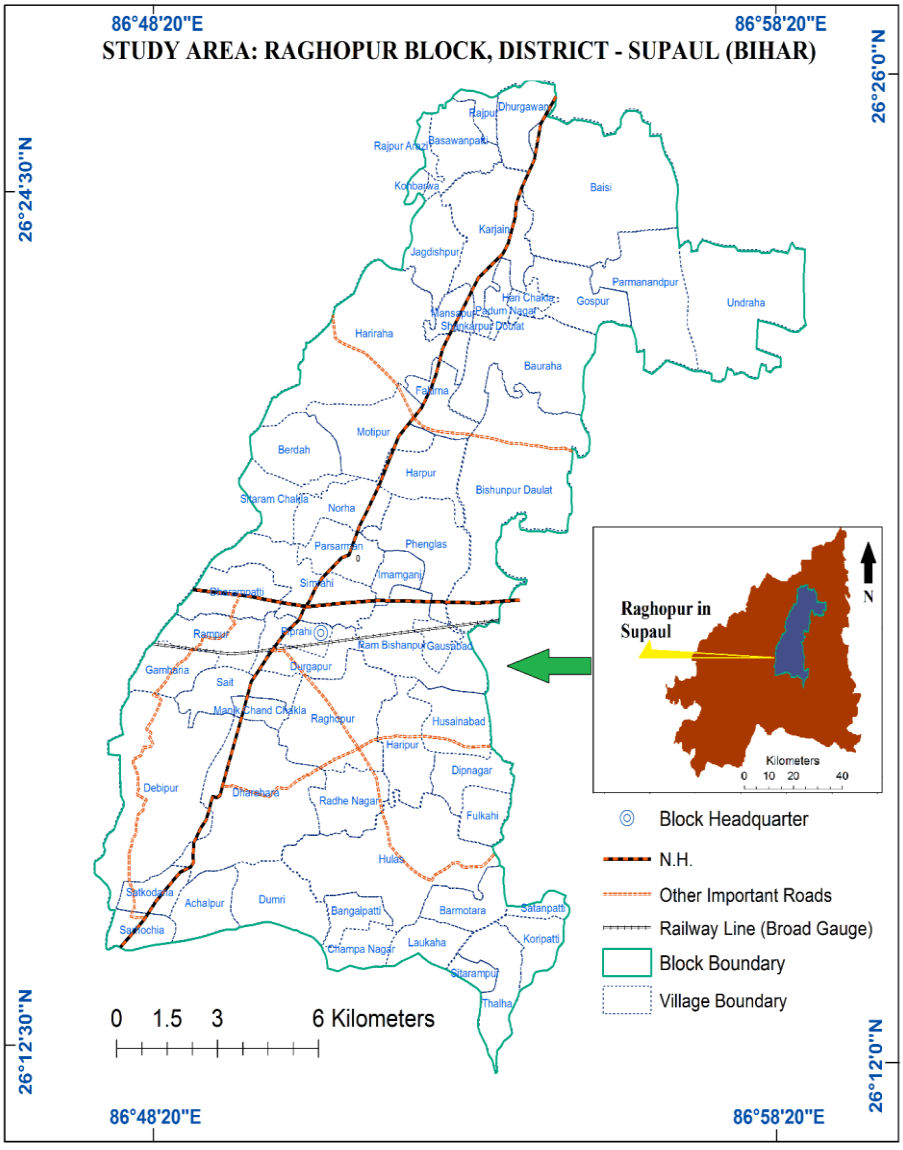

Fig. 1: Location Map of the Study Area

Analysis

For the study of rural development and their aspects it is very essential to understand status and growth of different major bases responsible for rural development. There are different bases which effect the rural development out of which a major base that is agricultural base has been analysed in the terms of its recent status as well as its growth in last decade (2001 to 2011). The basic information regarding the bases has been collected from Village Directory of Census of India-2001 and 2011. It has been analysed to understand the significant aspects related to agriculture that is land holdings, land use pattern and change, irrigation, farm technology and livestock in the study area.

Agricultural Bases and their Development

Agriculture is the backbone of rural economy in India and hence this block is completely dependent on rural economy or livelihood. More than 75 percent of working population is engaged in agricultural activities (Census data, 2011). The status of agriculture here determines the level of rural development. In the same way, agriculture is highly dependent over the availability and level of agricultural bases, viz., number and size of land holdings, land use pattern, irrigation, farm technology and others. Better the condition of these bases of agriculture, better will be the agricultural development because these bases directly affect both the productivity as well as food production.

A. Land Holdings

Small land holdings are the biggest characteristics of rural livelihood due to massive population pressure (Vaidyanathan, 2000). Land holdings are inversely proportional to number of population per unit area. Higher the density of an area, smaller will be the number and size of the holdings.

A.1. Number of Land Holdings according to their size and categories

Total landholdings of the Raghopur Block have been classified into five types according to the size of holdings, i.e., marginal, small, semi-medium, medium and large (Table 1). The size and category wise distribution of land holdings in the block is reflected through the Table 1 (2010-11). About 94 percent of the total land holdings are of marginal size, whereas the medium and large sized holdings are almost absent in the block. Similarly, only about 3 percent of total holdings are under the hand of most deprived Scheduled Castes (SCs) population which covers 14.5 percent of total population in the block (Kumar and Sharma, 2014). Significantly, the number and size of land holdings are decreasing year by year due to fragmentation of the families (a social transformation in rural areas, particularly in villages).

Table 1: Number of Land Holdings according to their size, Raghopur Block, 2010-11

Size of holdings (Acre)	Category wise number of holdings							
	SCs	In %	Institutional	In %	Others	In %	Total	In %
Marginal (< 2.47)	858	2.96	8	0.03	28162	97.02	29028	94.04
Small (2.47 - 4.93)	NIL	NIL	8	0.64	1239	99.36	1247	4.04
Semi-medium (4.94 - 9.87)	NIL	NIL	6	1.32	448	98.68	454	1.47
Medium (9.88 - 24.70)	NIL	NIL	2	1.43	138	98.57	140	0.45
Large (> 24.70)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	858	2.78	24	0.08	29987	97.14	30869	100

Source: Agricultural Survey 2010-11, Raghopur Block, District-Supaul

{Note: 2.47 acres = 1 ha (hectare)}

A.2. Area of Land Holdings according to their size and categories, 2010-11

Like the distribution of number of land holdings, the area of land holdings is also differently distributed among the categories and types of land holding in the Raghopur Block (Table 2). The highest proportion of area is marginal (about 75 %), whereas the lowest proportion is held under medium holdings (5.28 %).

Table 2: Area of Land Holdings according to their size, Raghopur Block, 2010-11

Size of holdings (Acre)	Categorywisearea of holdings							
	SCs	In %	Institutional	In %	Others	In %	Total	In %
Marginal (< 2.47)	623.12	2.23	9.63	0.03	27271.95	97.73	27904.7	74.52
Small (2.47 - 4.93)	NIL	NIL	29.19	0.64	4522.36	99.36	4551.55	12.15
Semi-medium (4.94 - 9.87)	NIL	NIL	38.24	1.27	2974.5	98.73	3012.74	8.05
Medium (9.88 - 24.70)	NIL	NIL	30.04	1.52	1947.86	98.48	1977.9	5.28
Large (> 24.70)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	623.12	1.66	107.1	0.29	36716.67	98.05	37446.89	100

Source: Agricultural Survey 2010-11, Raghopur Block, District-Supaul

{Note: 2.47 acres = 1 ha (hectare)}

Only 2.78 percent of total area of land holdings is owned by SCs population, which uncover the fact that the distribution of land holdings is very uneven and are mostly shared by the few

ISSN (Online): 3107-6165

elite groups in the study area (Raghopur Block) and thus, this is the prime reason of paralyzed rural livelihood or economy and hazy glimpses of rural development.

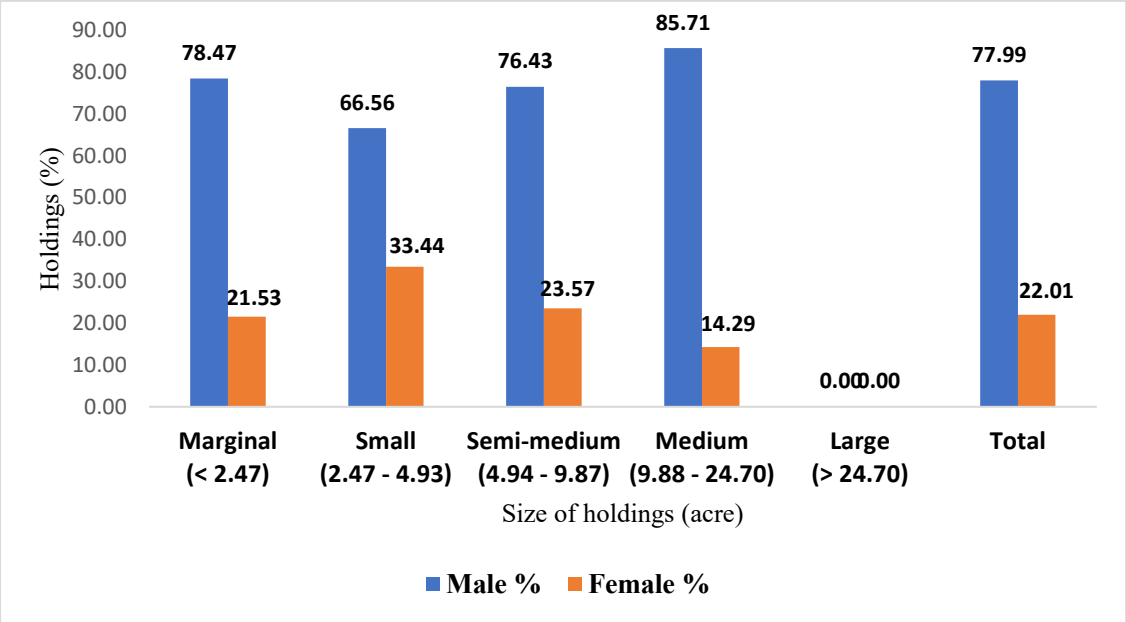

Fig.2: Male-Female Ratio in Number of Land Holdings of Raghopur, 2010-11

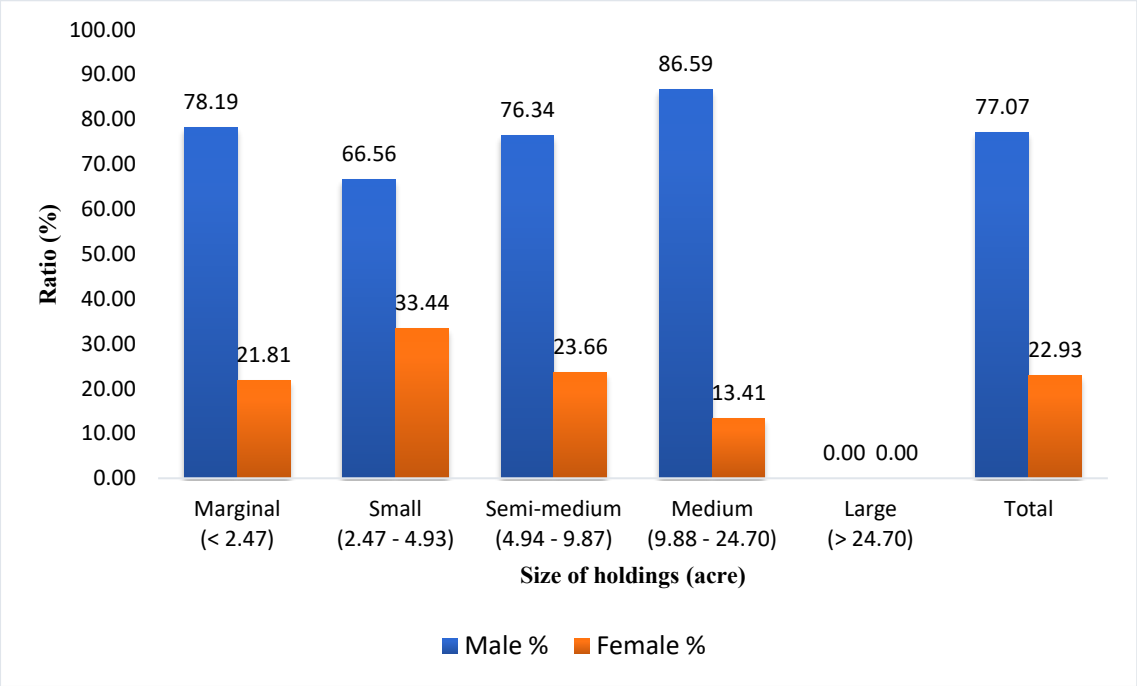

Fig. 3: Male-Female Ratio in Area of Land Holdings, Raghopur, 2020-11

c. Male – Female Difference in terms of Land Holdings

In terms of the distribution of both the number and the size of holdings between male and female, wide disparities exist in the block (Figures 2 and 3). In this male driven society, about 78 percent of land holdings (in terms of both numbers and areas) are owned by males, whereas, only 22 percent of land ownership is shared by the females (Figures 2 and 3). It is very clear from the analysis that the gender wise distribution of land holdings is neither very satisfactory and nor healthy for the society as well as agricultural prosperity. It also indicates that the distribution is very uneven which reflects that there is need of radical land reform policy for un-biased land distribution among the poor and non-poor. The intensive agricultural development policy as well as availability of basic infrastructures and facilities requires by the administrators and NGOs.

B. General Land Use and its change

B.1. Land Use Pattern

The land use pattern is an outcome of the interaction of the physical and cultural environment of any place or region. It is the fact, that there is nothing older than the man-land relationship in the history of mankind. Man from very beginning of nomadic life has been utilizing the land resources for their development. The structure of land use in any region is continuous process of evaluation through interplay of ecological, technological and institutional influences (Subramaniam, 1979). Social scientists and land managers define land use broadly to include the social and economic purposes and contexts for and within which lands are managed such as subsistence versus commercial agriculture, rented versus owned or private vs. public land (Turner, 2002 as cited in Erika et el. 2005). Land use is the term that is used to describe human uses of land, or immediate actions modifying or converting land cover (de Sherbinin, 2002). The proper utilization of the land is the economic backbone of the region and the use of the land is determined by the geographical conditions, socio-economic structure, and availabilities of natural resources and determines the socio-economic conditions and land use pattern of the region. For an example, if high proportion of land of an area is used for subsistence agricultural practices than, it determines the fact that the area must be a rural area and has comparatively poor socio-economic conditions. The Raghopur Block is the best example, where about 73 percent of the total land is used for agricultural purposes in 2011 (Table 3).

The study of land-use and its classification has received great impetus especially after the year of 1930 when intensive land utilization survey in Great Britain was held by L.D. Stamp (Stamp, 1962).To analyze the land-use pattern of the Raghopur block, it has been classified into four major types that are: forest, total uncultivable land, total cultivable wasteland, and total arable land or net sown area. The arable land shares about 73 % of total land while the forest shares just insignificant (0.16 %) (Table-3). The uncultivable land is about 20%, while cultivable wasteland is only 7.28 %, which reflects very low potential for future arable land expansion. Therefore,

Table 3: General Land Use of Raghopur Block, 2011

Sl.No.	Types of Land Use	Area (ha)	Area (%)
1	Forest	34.17	0.16
2	Total Uncultivable Land	4119.05	19.46
2.i.	Area under Non-Agricultural Uses	3801.66	92.29
2.ii.	Barren and Uncultivable Land	317.39	7.71
3	Total Cultivable Wasteland	1540.66	7.28
3.i.	Permanent Pastures & Other Grazing Land	0.66	0.04
3.ii.	Land Under Miscellaneous Tree Crops etc.	271.71	17.64
3.iii.	Culturable waste Land	111.3	7.22
3.iv.	Fallow Land other than Current Fallows	492.95	32
3.v.	Current Fallows	664.04	43.1
4	Total Arable Land (Net Area Sown)	15473.62	73.1
4.i.	Total Unirrigated Land	4420.95	28.57
4.ii.	Total Irrigated Land	11052.67	71.43
4.ii.a	*Irrigation by Canal*	*7224.67*	*65.37*
4.ii.b	*Irrigation by Wells/Hand pump*	*1274.1*	*11.53*
4.ii.c	*Irrigation by Tanks or Pond*	*262.3*	*2.37*
4.ii.d	*Other Sources (Tube wells and Motor pump)*	*2291.6*	*20.73*
	Total Land Use (1+2+3+4)	21, 167.50	100

Source: Based on Village Directory, Census of India, 2011.

the only scope for agricultural development is the vertical expansion, i.e., increasing the intensity of agricultural land by supporting agricultural infrastructures like cost effective irrigation, use of HYV seeds, improving farm technology and extension works.

B.1.i. The Uncultivable Land

Uncultivable lands are such lands which never can be used for the cultivation. This category of land consists of human settlements, water bodies, transport and communication networks, canal and other barren lands (Stamp, 1962). Total uncultivable land of the block is about 4119 ha, which is about 20 percent of total land of the block (Table 3). About 92% of the uncultivable land is under non-agricultural uses, i.e., settlement, water bodies, etc., whereas about 8 % land area is barren. The spatial pattern of uncultivable land is unequal in the block (Fig. 4 A). Bauraha is the only panchayat where the percentage of uncultivable land is more than 35%, while, BisanpurDaulat, Simrahi, Vayasi, Parmanadpur, Motipur and Dharahara are the six panchayats where this type of land shares about 20% to 35% and remaining eleven panchayats (61% of total panchayats) of the block have less than 20% of their total land under this category (Fig. 4 A).

B.1.ii. The Cultivable Wasteland

Such lands have potentiality to be cultivated but due to some reasons they are not being used for this purpose in the present. With the application of new techniques, such land can bring under cultivation in future and may be more beneficial for the increasing demand of continuous growing population. The cultivable wasteland include bushes, gardens, pasture, fallow lands, scrubs, etc. (Stamp, 1962).This land occupies about 7.28% of total area of the Raghopur Block (Table 3) of which about 43% land comes under current fallows. Rambishanpur is the only panchayat which has more than 20% land under this category, while, Bisanpur Daulat, Finglas, Simrahi, Haripur and Champa Nagar Panchayats share between 10% to 20% of their total land (Fig. 4 B). Twelve panchayats of the block (67% of the total panchayats) have less than 10 percent of their total land under cultivable wasteland due to increasing pressure of population as well as fragmentation of families and plots. The irrigation is main reason for such fallow lands

B.1.iii. The Arable Land or Net Sown Area

Arable land occupies the largest area of the block, i.e., 15473.62 ha (73%in 2011). Out of this about 71% is irrigated and remaining live in the hope of rainfall (Table 3). Because, the block is dominated by agricultural activities and agriculture is the prime hope of rural economy, the area under arable land is highly relevant. Due to increase in population and emergence of other non-agricultural activities, the area under arable land is continuously falling, viz., it was 16353.84 ha (2001) which reduced to 15473.62 ha (2011). The spatial distribution of arable land is also uneven in the villages and panchayats (Fig. 4 C). Karjain, Hariraha, Piprahi, Raghopur, Devipur, Haripur, Hulas and Dumri panchayats share about 44% of the total panchayats whose more than 75 percent of total land is under arable (2011), while only two panchayats (Bauraha and Bisanpur Daulat) are such where the share of arable land is less than 60 percent. The remaining eight panchayats share 60% to 75 % of their total land in 2011 (Fig. 4 C). The spatial distribution of irrigated land is not very unequal (Fig. 5). Only Hariraha and Raghopur are two panchayats where less than 55% of their total arable land is irrigated (2011) while nine panchayats (50% of the total panchayats) have more than 70% of their total arable land (net sown area) is under irrigation (Fig.5).

B.2. Changes in Land Use

Land Use and Land Cover dynamics is the result of complex interactions between several biophysical and socio-economic conditions which may occur at various temporal and spatial scales (Reid et al., 2000). Though, natural processes also contribute to changes in land cover, the major driving force is human induced land uses (Allen and Barnes, 1985). Due to increase in population and little change in economic activities, the change occurred in the land use of Raghopur Block during 2001 to 2011. During this period, the area under arable land is mostly affected with the loss of 880.22 ha (4.16 %) of land (Table 4). The major share covered by the fallow lands (specially the new fallows). The significant change of 757.34 ha (3.58 %) have been seen under the cultivable wasteland. This is mainly caused due to the migration of landholders as well as agricultural labours (especially male labours) for other alternative source

ISSN (Online): 3107-6165

of livelihood. Due to increasing settlements and associated land the uncultivable land slightly increase by 0.42 % (Table 4).

Table 4: Change in Land Use, Raghopur (2001 – 2011)

Sl. No.	Types of Land Use	Land Use (%)		Change (%)
		2001	2011	
1	Forest	0	0.16	0.16
2	Uncultivable Land	19.04	19.46	0.42
3	Cultivable wasteland	3.7	7.28	3.58
4	Arable Land	77.26	73.1	-4.16

Source: Based on V.D. data, Raghopur (2001 and 2011).

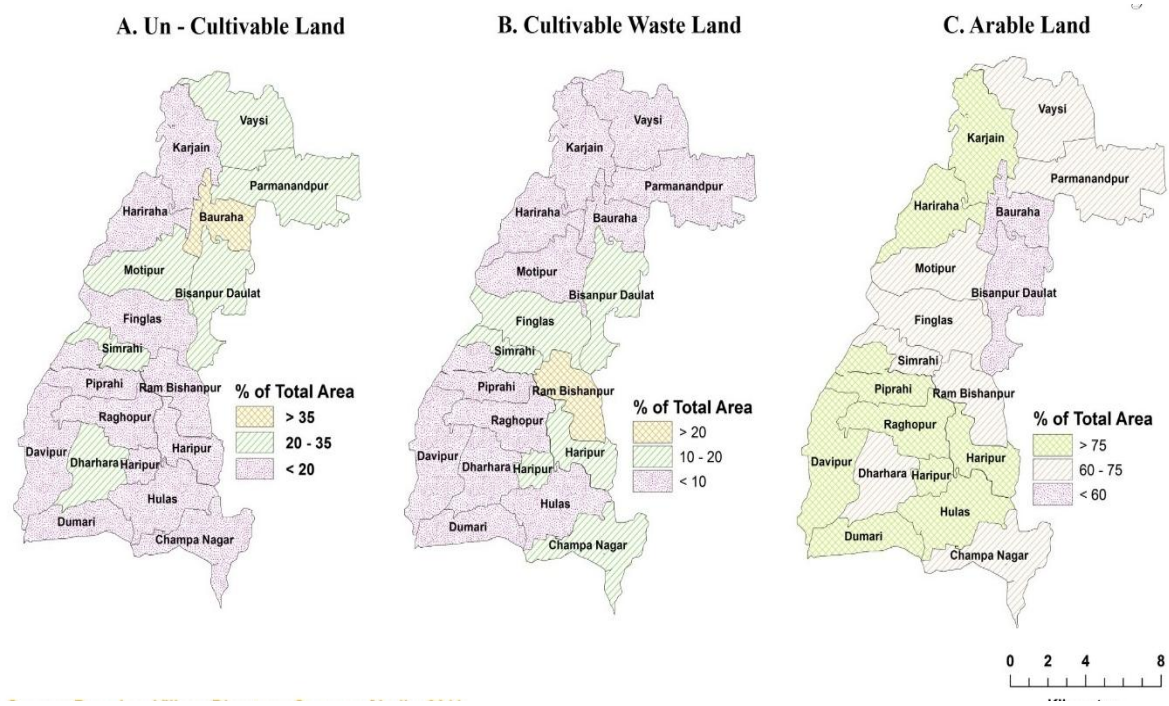

Fig. 4: Land Use Pattern of the Study area, 2011

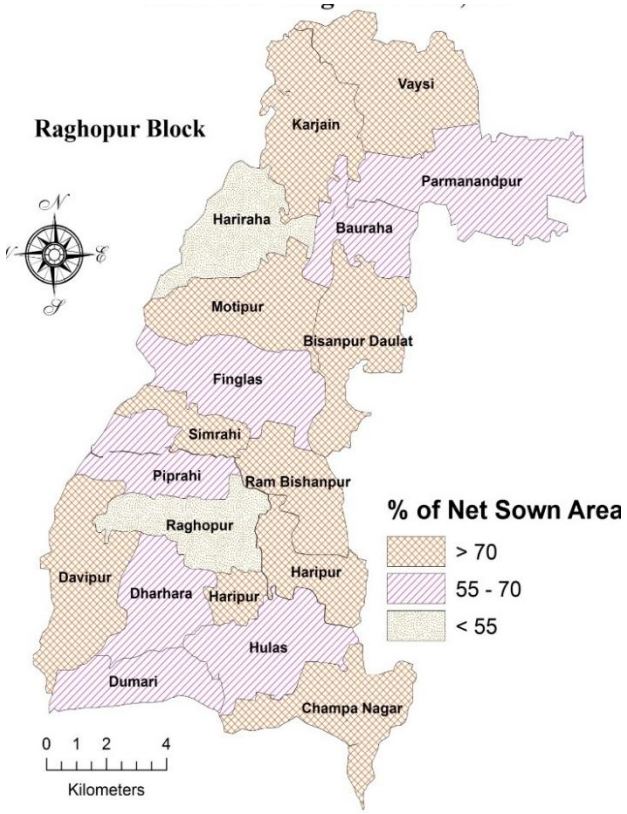

Fig. 5: Pattern of Irrigated Land of the Study area, 2011

C. Irrigational Sources and their distribution

Irrigation brings significant change in agricultural development where rainfall is very uncertain and uneven. Irrigational facilities are just average in this block. About 71 percent of the arable land is irrigated in the block (2011), which was only 64 percent, in 2001 (V.D, Census of India 2001 and 2011). It shows that there is some improvement in the sources of irrigation. Out of the total irrigated land 65 percent is under canal irrigation. There is 4.59 % increase in canal irrigation between the years 2001 to 2011 (Figure 6). It happens due to Kosi Project (the canal provided under the scheme). The advance source of irrigation i.e., tube wells and motor pumps share 21 % of total irrigation with tremendous increase of 14.11 % (during 2001-2011). This cause into the fall in traditional source of irrigation i.e., wells and hand pumps by 21.07 % (figure 6).

ISSN (Online): 3107-6165

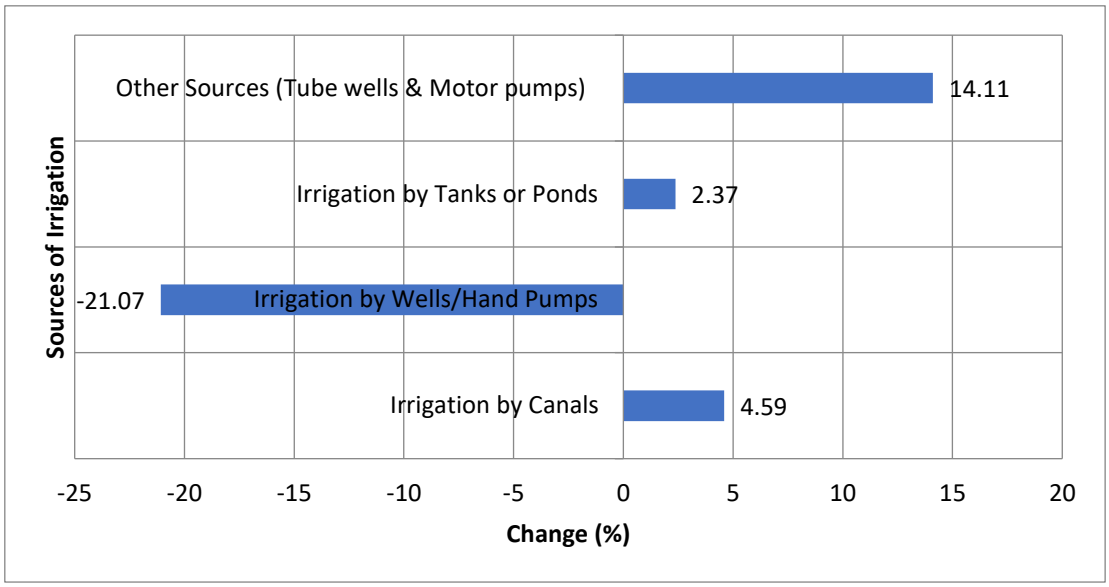

Fig. 6: Changing Trend of Irrigated Area under Various Sources, Raghopur

D. Farm Technology

The farm technology and their uses are poor because of high poverty, social deprivation and poor accessibility to government aids and efforts. However, in last few years due to increase in share-based farming as well as comparatively easy access of loans and subsidies by the government consequently improving insignificantly the farm technology in the block. Now, the farmers are using a few tools of farming (tractors, HYV seeds, chemical fertilizers, pesticides, harvesters etc.) on rent or subsidy basis to increase the agricultural production and hence the improvement in their economic condition can be observed to a limited. However, the intensity of their use is very low. In improving the agricultural skill among the farmers and better agricultural practices, Krishi Vigyan Kendra (Raghopur) is playing an important role.

E. Livestock Status

After crop farming livestock is the second significant base of rural economy. But, the condition of livestock rising is not good in the block. The quality of livestock (especially bovine livestock) is very poor in term of their productivity. It is due to inefficiency (economic and land) of livestock holders in providing the sufficient nutritional fodders to their livestock. Like crop farming, livestock rising is also subsistence in nature. One major reason is the poor economic condition and lack of government efforts. 78.05 % of total livestock (69713) are bovine in the block. The bovine livestock may be divided into: (i) milch stocks and (ii) drought stocks. Of total bovine livestock 82.72% are milch stocks (She-buffalo: 60% and Cow: 40%) in Raghopur. The drought stocks are used for ploughing at a minimum scale in the present time due to more use of modern technology (tractors and harvesters) in the block. Ovine stocks (goats and sheep) share about 20.23% of the total stocks, while piggery accounts only 1.72% which is mostly domesticated by scheduled castes households.

Conclusion

Raghopur Block is completely dependent on rural economy or livelihood. More than 75 percent of working population is engaged in agricultural activities (Census data, 2011). The status of agriculture here determines the level of rural development. Marginal and Small land holdings is the biggest characteristics of rural livelihood due to massive population pressure. About 94 percent of the total land holdings are of marginal size, whereas the medium and large sized holdings are almost absent in the block. The arable land shares about 73 % of total land while the forest shares just insignificant (0.16 %). The uncultivable land is about 20%, while cultivable wasteland is only 7.28 %, which reflects very low potential for future arable land expansion. Although 71% of total arable land is irrigated in this block but the irrigational infrastructure is not evenly distributed. This study unfolds the fact that this block is far away from the influence of institutional reform (land reform and financial support) as well as technological revolution. The dilapidated agricultural base is one of the major obstacles in rural development of this block. Therefore, with growing population and decreasing size of land holdings the only scope for agricultural development in particular and rural development in general is the vertical expansion, i.e., increasing the intensity of agricultural land by supporting agricultural infrastructures like cost effective irrigation, use of HYV seeds, improving farm technology and extension works. There should be the provision of Primary Agricultural Services and Extension Center at panchayat level so that every aspect of agriculture i.e., from field to finance and production to marketing of the agricultural product can be deal and share from the local farmers for their maximum benefits.

References

Allen, J.C. and Barnes, D.F. "The Causes of deforestation in developing countries." *Annals of the Association of American Geographers,* Vol. 75, 1985, pp. 163-184.

De Sherbinin, A. "Land-use and land-cover change, A CIESIN Thematic Guide." *Palisades, NY (USA) Center for International Earth Science Information Network (CIESIN) of Columbia University*, 2002, Retrieved from *http.//www.co*.

Erika L., Eric F., et al., "A synthesis of information on rapid land-cover change for the period 1981-2000." *Bioscience*, Vol. 55, 2005, pp. 115-124.

Hazell, Peter. "*Green Revolution: Course or Blessing*?" *International Food Policy Research Institute, Policy Brief*, 2002, www.ifpri.org/pubs/ib/ib11.pdf.

Kumar, Ashutosh and Sharma, Parshuram. "Growth and Distribution of Population in Raghopur Block (District – Supaul, Bihar): An Analysis." *National Geographical Journal of India*, Vol. 60, no. 3, 2014, pp.211-224.

PCA Data. *Census of India*, Office of Census, Patna, Bihar. 2011.

Reid, R.S., et el. "Land-use and land-cover dynamics in response to changes in climatic, biological and socio-political forces; the case of southwestern Ethiopia." *Landscape Ecology*, Vol. 15, 2000, pp. 339-355.

Stamp, Laurence Dudley. *The Land of Britain: Its Use and Misuse*, Longmans Publication, London, 1962 (3rd edition)

Subramanian, Chidambaram. *The New Strategy in Indian Agriculture*. Vikas Publication, New Delhi, 1979.

Vaidyanathan, A. "India's Agricultural Development Policy." *Economic and Political Weekly*, Vol. 13, May, 2000.

Village Directory, In CD, *Census of India*, Office of Census, Patna, Bihar, 2001 and 2011.