Research Article

Settlement Changes And Its Impact Analysis Through Lulc Of Lakhanpur & Rakhera Mouza In Hura C.D Block Of Purulia District

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Abstract:

Population is the most vital agent to modify the physical landscape into cultural landscape all over the world irrespective of time and space at varying rates depending upon the level of development and their understanding and negotiations with the nature. People of the study area have been experiencing a gradual wave of migration from adjoining rural Mouzas towards the NH314 for better livelihood and amenities. Physical landscapes of the study area have been influenced mainly due to havoc pressure of population where migration plays a key role. The paper has focused on LULC change due to population dynamics and the reflection in their changing tastes and lifestyles. Lakhanpur and Rakhera Mouzas of Hura C.D Block have been selected for the case study. The study is based on the census data of 1991-2011 population, Satellite imagery of 1980-2020, field investigation (2019-20121). Arc GIS platform (10.8) has been used to classify Maps and satellite imagery & various suitable statistical methods have also been used to get the real picture of the study area.
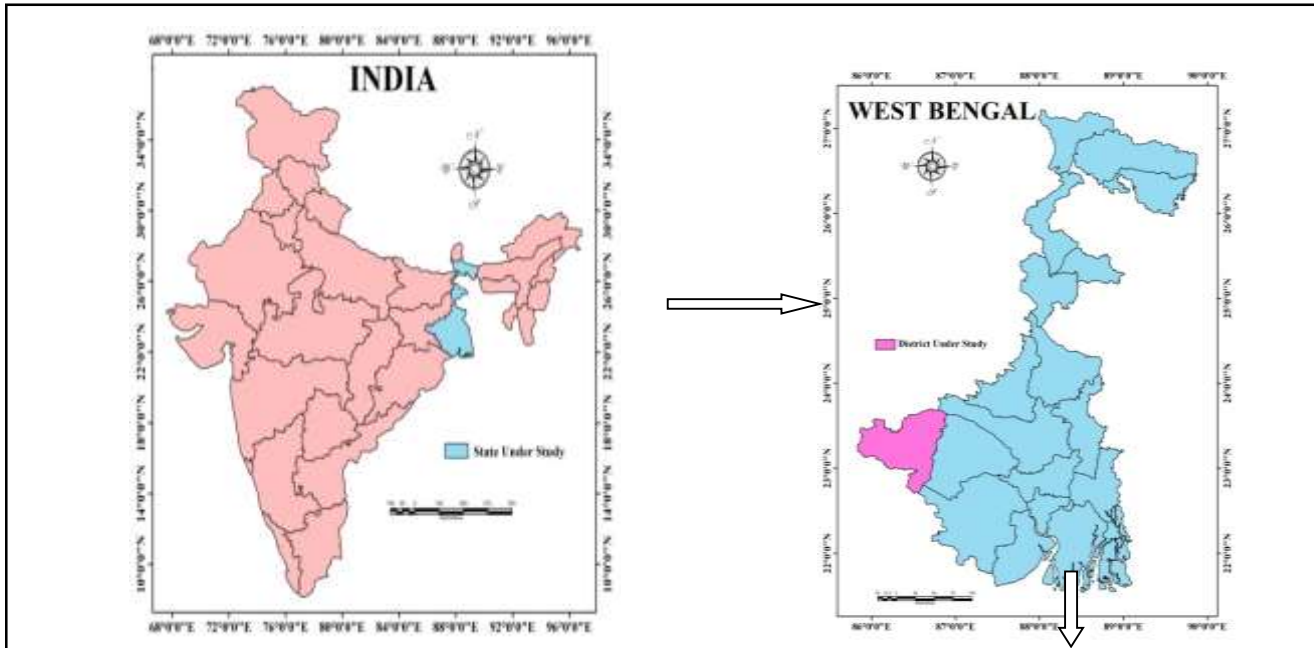
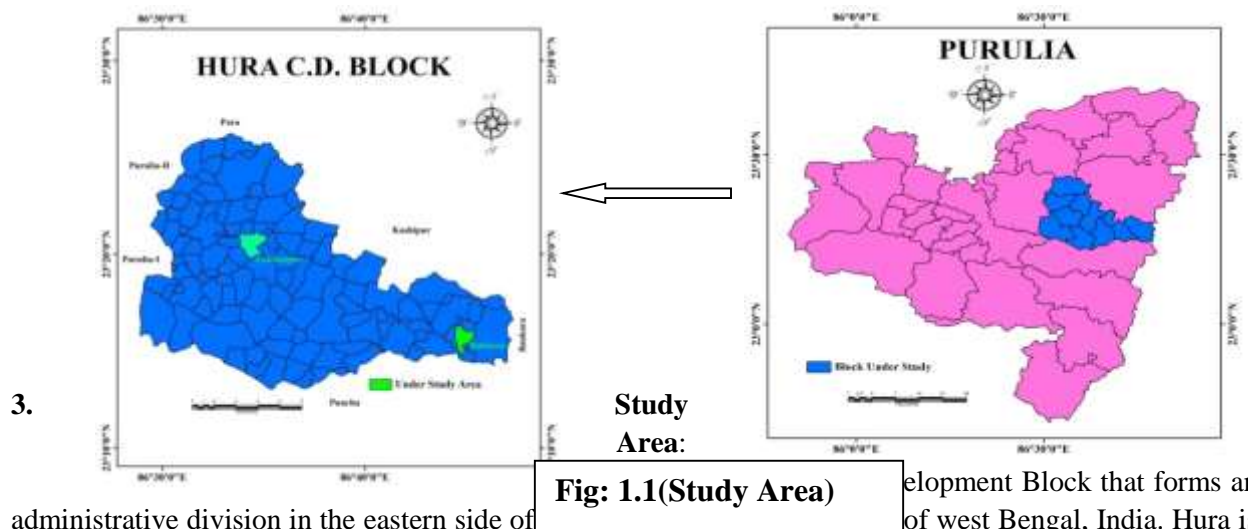**Key words**: LULC, Migration, Settlement change

1. INTRODUCTION

Population is the most vital agent to modify the physical landscape into cultural landscape all over the world irrespective of time and space at varying rates depending upon the level of development and their understanding and negotiations with the nature (Nandi & Mistri,2019).People of the study area have been experiencing a gradual wave of migration from adjoining rural Mouzas towards the NH314 (previously NH 60A) for better livelihood and amenities(Majhi Gope & Mistri,2021) Physical landscapes of the study area have been influenced mainly due to havoc pressure of population where migration plays a key role (Sarkar, 2017). That is why, Population of those Mouzas have been increased than other Mouzas.(Majhi gope & Mistri,2021) So, physical landscape of the study area has been converted into cultural landscape with the colorful current of human civilization mainly due to human needs and demand. (De & Dey, 2015). Sometimes, LULC of the study area have been influenced mainly due to government policies e.g. PMGAY, PMGSY etc.(Dadush & Niebhur, 2016) LULC of the selected Mouzas have been changed mainly due to

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attraction and reflection of socio economic availability people of those Mouzas. People of the study area have been engaged with multidimensional socio economic activities to attain better standard of living and livelihood. So, daily earning people of the study area have developed and removed lack of economy. (Thuku, 2013) That is why; People of the study area have constructed new settlements towards the NH314 mainly due to get better communication, education, social security and others facilities. Settlement areas of the selected Mouzas have been developed and increased where communication system plays a vital role. During survey it is observed that for few years various types of kindergarten both English and Bengali medium have been established in this area along with variety of business and small scale industries for the growing demands. Other interesting things are to notice that old buildings and enterprises have been modernized by addition and subtractions and communication system has also improved. On the other hand, fallow lands of the study area have been converted into agricultural land and sometimes, converted into settlement due to population growth and development (Mistri & Nandi, 2019).The paper has been focused on LULC change due to population dynamics and the reflection in their changing tastes and lifestyles. Lakhanpur and Rakhera Mouzas of Hura C.D Block have been selected for the case study. The study based on the census data of 1991-2011 population, satellite imagery of 1980-2020, field investigation (2019-20121). Arc GIS (10.8) has been used to classify Maps and satellite imagery & also used various suitable mathematical methods to get real picture of the study.

2. Objectives: The main objectives of this paper is to find out settlement changes and its impact of Rakhera and Lakhanpur Mouza

Fig: 1.1(Study Area)

3. **Study Area**: elopment Block that forms an administrative division in the eastern side of of west Bengal, India. Hura is the easternmost C.D Block of Purulia District, sharing the C.D Blocks boundaries with Puncha C.D Block in the south , in the northern part Para C.D Block, north eastern part Kashipur, Purulia-II in the west and in the south west part is shared by Purulia-I . Eastern part also adjoins with Bankura district. The geographical location of this study area is 23°18' N and 86°39' E. Its average elevation is 167 m. Hura C.D Block is covered as an area of about 382.21km^2(Hunday et al 1967). Rakhera Mouza is in the east and Lakhanpur Mouza is in the north western side of Hura C.D Block having been selected for the case study.

This rural unit contains a Police Station a Panchayat Samity, 10 Gram Panchayats, 107 Gram Sansads (village councils), 116 Mouzas and 111 inhabited villages..

Purulia district is an undulating hilly tract and Hura C.D Block is no different. This area is formed by granite gneiss and it also the part of Chhotonagpur plateau. The Kangsabati River flows through the boundary between Hura and Punch C.D Block in the north. Darkeswar River originated from Tilaboni hill and Silabati River originated from Silabati highland of Hura C.D Block. Different types of trees are seen like *Sal, Butea monospermous*, Phoenix dactylifera, Asian palmyra plam etc. NH314 has crossed through Hura C.D Block from Purulia to Bankura. NH314 has also crossed on Lakhanpur and Rakhera Mouza of Hura C.D Block that are selected for the case study.

4. Database and methodology: This study basically stands on Primary and secondary data. Populations of 1991-2011 Data have been collected from District Census Handbook of Purulia. Satellite images of the selected Mouzas have been collected from USGS Earth explorer from 1980-2020 and verified by the field investigated from 2019-2021. Mouza maps of the study area have been collected from Land & Land Reforms and Refugee Relief and Rehabilitation Department, Govt. of West Bengal to get the actual area of various LULC changes of the selected Mouzas. Satellite images of the Lakhanpur & Rakhera Mouzas have been classified into four classes: those are **settlement, Agricultural Land, Fallow land and Pond (water bodies)**. Map and satellite images of the study area have been made and classified by Arc GIS Platform (10.8). Different cartographic techniques and statistical formulas have been used to fulfil the study and to get actual causes behind settlement changes and other LULC changes of the selected Mouzas. Followings formulas have been used to fulfill the study:-

Population Density:-

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Dp= N/A
Where, Dp is the density of population, N is the total population as a number of people and is the land area covered by that population

$$PR = \frac{(V_{Present} - V_{Past})}{V_{Past}} \times 100$$

Growth Rate:-

Where, PR = Percent Rate, $V_{Present}$ = Present or Future Value and VPast = Past or Present Value.

5. Result and Discussion:

Table-1: Population Density, Age Sex Ratio and Growth Rate of the Selected Mouzas

Name the Mouza	Population Density (Persons / sq. km.)			Age sex Ratio (females per 1000 males)			Growth Rate (%)	
	1991	2001	2011	1991	2001	2011	1991-2001	2001-2011
Rakhera	737	768	951	987	1039	968	4.27	23.74
Lakhanpur	747	710	841	972	967	1031	-4.96	18.45

Table: 1.1(Source census of India 1991, 2001 &2011)

Population density of Rakhera Mouza have been seen 733 person/sq.km in 1991 where 768 in 2001 and 951 in 2011. Population density of Rakhera Mouza has been increased with time. Because, People have migrated nearer Mouza Dhadkigora to the Rakhera Mouza for living and better livelihood after 1991.It has been realized through field investigation(2019-2021).On the other hand, population growth rate of Rakhera Mouza has been seen 4.27% from 1991-2001, where 23.74% from 2001-2011. Population Growth rate of Rakhera Mouza has been increased rapidly with time. People of nearer Mouza Dhadkigora have migrated to the Rakhera Mouza mainly due to Communication opportunities (NH314), social security, and educational facilities and to get a better social life and livelihood. On the other hand, population density of Lakhanpur Mouza have been seen 747 person/sq.km in 1991 where 710 in 2001 and 841 in 2011. Population density of Lakhanpur Mouza has a little decreased in 2001, because, Death rate of Lakhanpur Mouza have been increased in 2001(field survey,2020). That is why such a change has been taken place. Population density of Lakhanpur Mouza has been increased in 2011. Being the main reason for such changes, People migrated to the Lakhanpur Mouza from adjacent Mouzas and outside of Mouzas mainly due to get better standard of living, communication (NH314), education and to get a better standard life and life style.
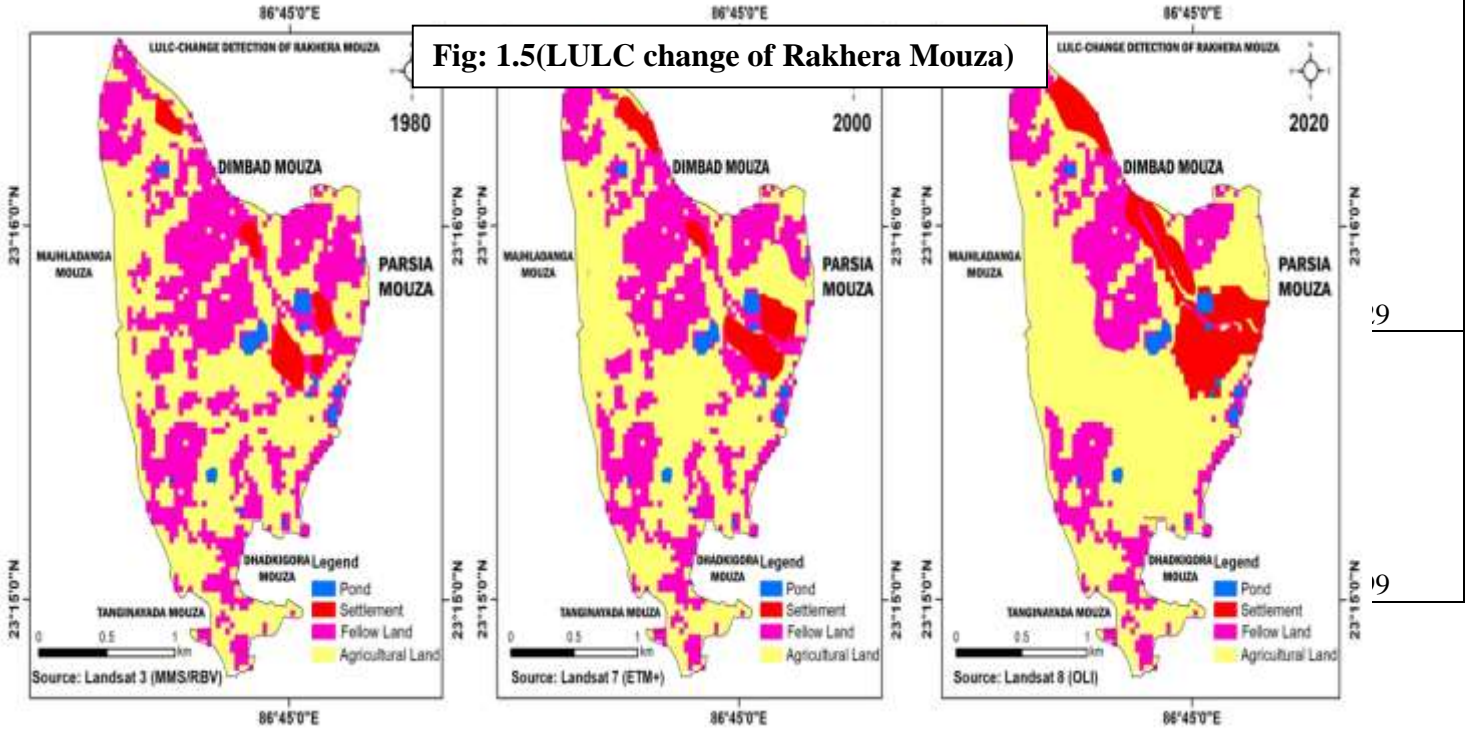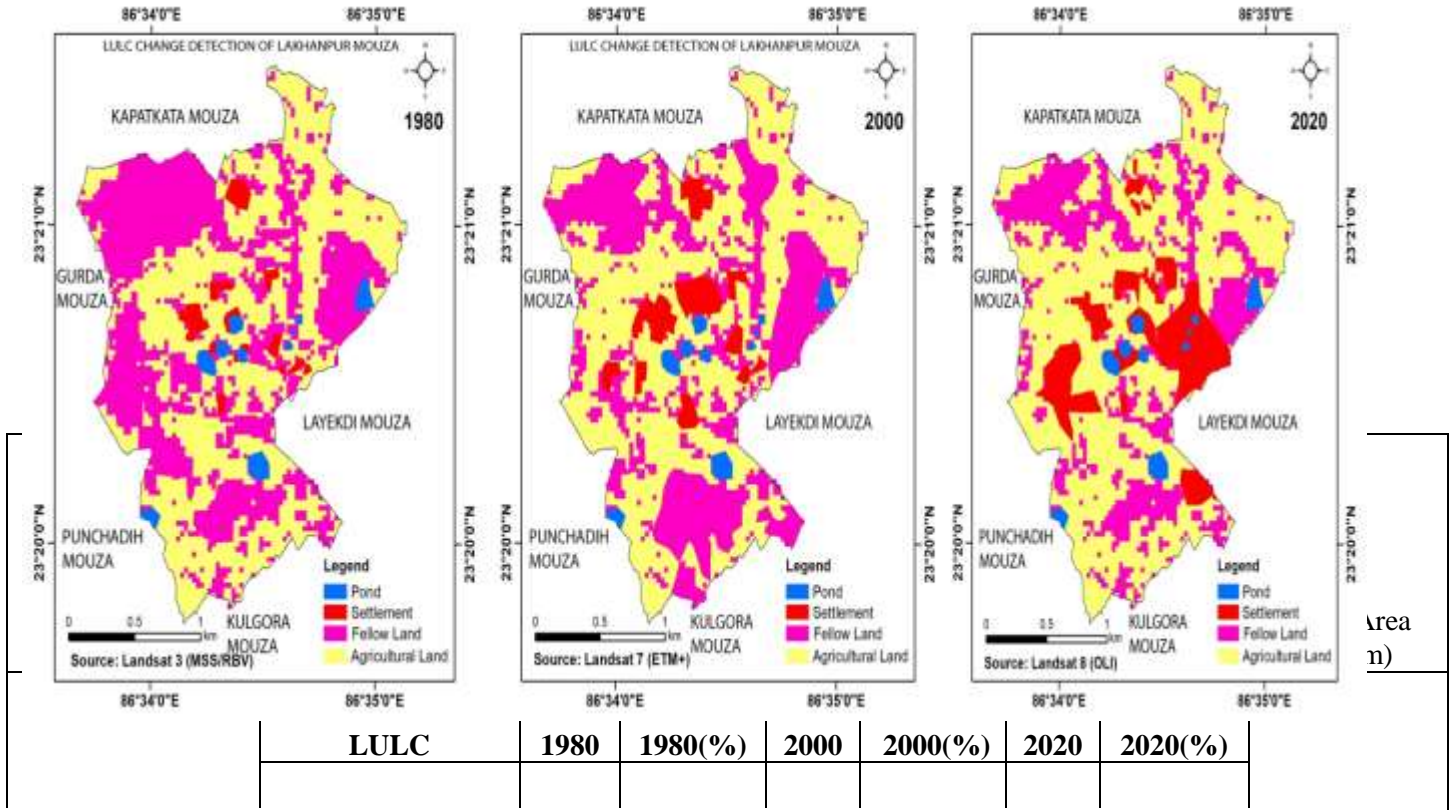
Population Growth rate of Lakhanpur Mouza have been observed radical changes where population growth rate (-4.96) % during 1991-2001, 18.45% during 2001-2011. Through field investigation, it has been realized that People migrated to the NH314 mainly due to get better standard of living, communication, education and others facilities as the various service centers have developed there.

Mouza)

Settlem **Fig: 1.3(Rakhera Mouza)** area/water bodies area*100

Total Area

Table:1.2(LULC changes of Lakhanpur& Rakhera Mouza)

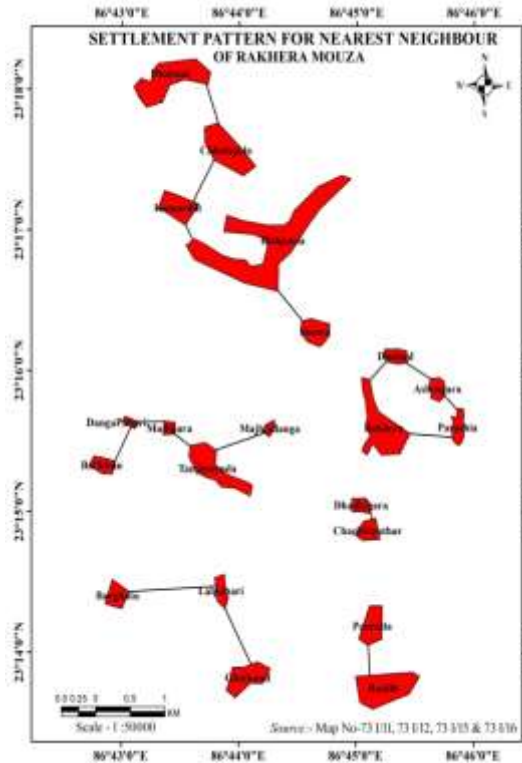**Fig: 1.4(LULC change of Lakhanpur Mouza)**

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LULC	1980	1980(%)	2000	2000(%)	2020	2020(%)

Fig: 1.5(LULC change of Rakhera Mouza)

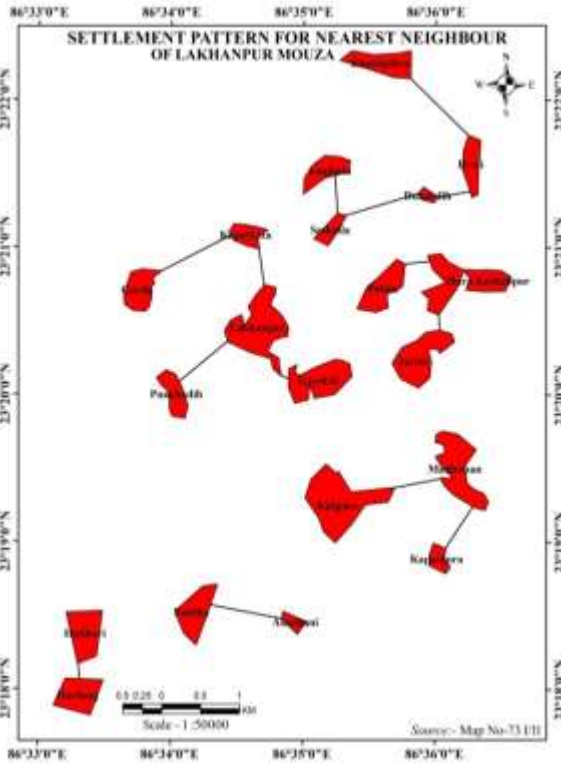|		0.17	5.69	0.21	7.03	0.38	12.70	
	Settlements							

LULC change is a global phenomena, LULC have been changed on globe with the progressive current and changing perspectives of human civilization. History has witnessed this change, somewhere at a slower pace and somewhere at a faster pace. Lakhanpur & Rakhera Mouzas have witnessed such kinds of changes. Fallow land area of Lakhanpur mouza have been detected 37.06 % in 1980,where 24.95% In 2000 and 21.45% 2020.On the other hand, agricultural Land area of Lakhanpur mouza have been detected 52.92% in 1980, where 62.24%in 2000 and 59.67% in 2020. Settlement area of Lakhanpur mouza have been detected 6.29% in 1980, where 8.15% in 2000 and 14.21%in 2020. Pond or Water body areas of Lakhanpur mouza have been detected 3.73% in 1980 where 4.66% in 2000 and 4.67 % in 2020 . Fallow land areas of Laknanpur mouza have been converted into agricultural land and sometimes converted into settlement area and slidely in water bodies with the prograssive time.It has been realized through field investigation and satelite image area analysis . Migration of population plays a key role behind this change and some times changing tastes people of the study area.Fallow land areas of Rakhera Mouza have been detected 56.52 in 1980, where 49.49% in 2000 and 27.43% in 2020.

On the other hand, agricultural land area of Rakhera mouza have been detected 32.78R% in 1980, where 38.47% in 2000 and 54.86% in 2020. Settlement areas of Rakhera mouza have been detected 5.69% in 1980,where 7.03% in 2000 and 12.70% in 2020.On the otherhand , Pond or Water bodiy areas have been detected 5.01% in 1980, where 5.01% in 2000 and 5.01% in 2020%. It is very intersting to note that water body areas of Rakhera Mouza are seen still and there is no change. Fallow land areas of Lakhanpur and Rakhera mouza have been decreased with time mainly due to intensity of various cultutural activities because people of the study area have been using fallow land for multiple purposes. So, people of the study area have changed their tastes and idelogies under the influence of globalization at micro level.Their dresses, building plans, nature of jobs, landuse pattern and practices have been changed at a very higher rate since the later part of the last decade though at different rates at different places (Field Survey-2019-2021).

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| Fig: 1.6 nearest Neighbor of Rakhera Mouza | Fig: 1.7 nearest Neighbor of Lakhanpur Mouza |

Name of No. of Settlement	Nearest Settlement Name and No.	Distance in cm.	Map Scale	Distance in Km.
1.Khairipihra	Deuli(2)	2.07		1.03
2.Deuli	Dukardih(3)	0.84		0.42
3.Dukardih	Satkalla(4)	1.92		0.96
4.Satkalla	Amghata(5)	0.94		0.47
5.Amghata	Satkalla(4)	0.94		0.47
6.Gurda	Kapatkata(7)	2.00		1.00
7.Kapatkata	Lakhanpur(8)	2.00		1.00
8.Lakhanpur	Layekdi(10)	0.18		0.09
9.Punchadih	Lakhanpur(8)	1.57		0.78
10.Layekdi	Lakhanpur(8)	0.18		0.09
11.Palma	Hura Keshabpur(12)	0.62	1: 50000 (2cm to 1Km.)	0.31
12.Hura Keshabpur	Jortar(13)	0.38		0.19
13.Jortar	Hura Keshabpur(12)	0.38		0.19
14.Kulgora	Madhuban(15)	1.18		0.59
15.Madhuban	Kulgora(14)	1.18		0.59
16.Kapasgora	Madhuban(16)	1.30		0.65

17.Asanbani	Nadiha(18)	1.95		0.98
18.Nadiha	Asanbani(17)	1.95		0.98
19.Hatibari	Hurlung(20)	0.38		0.19
20.Hurlung	Hatibari(19)	0.38		0.19
Total				11.18

Table: 1.3(Nearest Neighbor Analysis of Lakhanpur)

Calculation of nearest neighbor of Lakhanpur Mouza

Rn=do/de

do= mean distance

Or,$\sum$ distance /n{$\sum$ distance=11.18,n=20}Or, 11.18/20 =0.559

de=1/2$\sqrt{}$ N/A (sq.km)

=1/2$\sqrt{}$20/124.4

=1/2$\sqrt{}$0.160

1/0.8=1.25   Rn=do/de=0.559/1.25=0.44 (High Concentration)

Name of No. of Settlement	Nearest Settlement Name and No.	Distance in cm.	Map Scale	Distance in Km.
1.Dhabani	Chholagola(2)	1.06		0.53
2.Chholagola	Kumardih(3)	1.25		0.62
3.Kumardih	Bishpuria(4)	0.86		0.43
4.Bishpuria	Sinara(5)	1.04		0.52
5.Sinara	Bishpuria(4)	1.04		0.52
6.Dimbad	Rakhera(9)	0.68		0.34
7.Ashragara	Dimbad(6)	0.78		0.39
8.Parashia	Ashragara(7)	0.50		0.25
9.Rakhera	.Parashia(8)	1.23		0.61
10.Dhadkigara	Chachhipathar(10)	0.20	1: 50000 (2cm to 1Km.)	0.10
11.Chachhipathar	Dhadkigara(11)	0.20		0.10
12.Majhladanga	Tanginoyada(13)	1.45		0.72
13.Tanginoyada	Mudipara(14)	0.54		0.27
14.Mudipara	Dangapahari(15)	0.73		0.37

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15.Dangapahari	Balikhun(16)	1.03		0.52
16.Balikhun	Dangapahari(15)	1.03		0.52
17.Barghutu	Lalpahari(18)	2.57		1.29
18.Lalpahari	GholKund(19)	1.55		0.78
19.GholKund	Lalpahari(18)	1.55		0.78
20.Panruda	.Raidih(21)	0.79		0.40
21.Raidih	Panruda(20)	0.79		0.40
Total				10.45

Table: 1.4(Nearest Neighbor Analysis of Rakhera Mouza)

Calculation of nearest neighbor of Rakhera Mouza

Rn=do/de

do= mean distance. Or,$\sum$ distance /n{$\sum$ distance=10.45,n=21}, or=10.45/21=0.497

de= mean expected distance

de=1/2$\sqrt{}$ N/A(sq.km) =1/2$\sqrt{}$21/130.65 =1/2$\sqrt{}$0.160 = 1/0.8=1.25

Rn=do/de=0.497/1.25=0.397 (High Concentration)

Nearest Neighbor analysis of Rakhera Mouza has been calculated to understand settlement pattern and settlement character around it. Twenty Settlement of Hura C.D Block have been taken nearer Rakhera Mouza to analyze nearest Neighbor, those are Dhabani, Cholagora ,Kumardih, Bishpuria,Sinara,Dimbad,Ashragara,Parashia,,Dhadkigora,Chachhipathar,Majhladanga,Tanginoyada,Mud ipara,Dangaphari,Balikhun,Barghutu,Lalpahari,Gholkund,Panruda,Raidih. Rn value have been calculated and got 0.397, this means high settlement concentration.

On the other hand, Nearest Neighbor Analysis of Lakhanpur Mouza has been detected to understand settlements pattern and settlements characteristics around it. Nineteen settlement of Hura C.D Block have been taken nearer Lakhanpur Mouza to analyze nearest Neighbor, those are Kairipihara, Deuli,Dukardih, Satkalla,Amghata,Gurda,Kapatkata, Punchadih, Layekdi,Palma, Hura Keshabpur,Jortar,Kulgora,Madhuban,Kapasgora,Asanbani,Nadiha,Hatibari and Hurlung. Rn value have been calculated and got 0.44, this means that the settlements are of high concentration. People of nearer Lakhanpur Mouza and Rakhera Mouza have been got amenities from different sources in terms of socio economic, socio cultural, communication and physical landscape for inhabitation. That is why, settlement character of the areas are high concentration

Rn Value	Settlement Character
0.00-0.09	Absolute Concentration
0.10-0.50	High concentration

0.51-0.99	Clustered pattern
1.00-1.19	Random pattern
1.20-1.49	Approaching uniform
1.50-2.14	Dispersed pattern
2.15	Perfect Hexagon
Above 2.15	Highly Dispersed

Source:(Asique Ahmed,2012)

It hopes that settlement Character of those Mouzas will be become in Absolute Concentration Settlement pattern with progressive current of time and with the Socio economic and socio cultural development. Physical landscape of the study area has been converted into cultural landscape and that is why gaps among the settlements are reducing day after day.

6. CONCLUSION

From the above study it is very much clear that the settlement expansion is more pronounced in Lakhanpur than that of Rakhera mouza. This is because of the availability and the better facilities in that area. Another imporatnt thing is to be noted that the areas of fallow land have been decreasing in both the mouzas for a certain period of time. Areas of agricultural land of the Rakhera mouza have been seen in an increasing trend in comparison with the past mainly due to population growth. It is observed that people now become more interested in agricultural activities than before,

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