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Study of Physico-chemical Parameters of Ground Water Quality: A Geographical Analysis of Varanasi District

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Abstract

The quality of ground water is deteriorating very drastically during recent decades due to industrialization and urbanization. This is the serious problem now a day required immediate attention for the appraisal of the quality of water for drinking /domestic purposes. To assess the quality, 55 ground water samples were collected from the different places of the study area. The drinking water quality analysis have been made through the assessment pH, EC, Chloride, Total Hardness, Sodium, Potassium, Calcium, Magnesium, Sulphate, Nitrate and Fluoride. A systematic calculation of the water samples has also been carried out between different analysed physic- chemical parameters of study area. This work has been carried out mainly with objectives to know the water quality characteristics and the status of ground water quality condition for drinking water suitability of the area under study.

Keywords*: drinking water standards, potable, physico-chemical parameter.*

Introduction

The history of man has always been marked by an intimate relationship with water; it is well known that the earliest Palaeolithic implements of human existence have been traced in the river gravels. This situation clarifies the essential need of water even for the most primitive man. While it is true that the water is the basis of all life and an absolute necessity for all varied activities like domestic, agricultural and industrial for which no substitute can be devised one can seldom fully aware of this implications of this truth and of the countless direct and indirect ways in which we have to depend on water even in the modern scientific era (Bilas, 1981). Along with

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all the intensive activities in promoting hydrology and water resources, there has been a tremendous increase and expansion in the scientific and technological knowledge about water, and there is great need for an authoritative compilation of such knowledge. Since water is related to so many things in nature as well as in human society, this knowledge is extremely broad and interdisciplinary (Chow, 1964). Rain water is the fundamental source of all types of water sources on the earth surface in which groundwater source of the water on the earth is a major source of drinking water. All ancient civilization developed in the valley of different river basin in the different part of the world. Due to modern civilization, industrialisation, urbanisation and rapidly increase in population has lead to fast degradation of ground water quality. The water is basic resource essential for the survival of mankind on earth and it is the greatest gift of nature (Abebe, 2013).

Water is the most important natural resource in the shaping of the land and regulating the ecosystems. It is one of the most important compounds that profoundly influence human life and all types of ecosystems. Groundwater is used for domestic and industrial water supply and also for irrigation purposes. In the last few decades, there have been a tremendous increase in the demand for fresh water due to rapid growth of population. According to WHO, about 80 percent of all the diseases in human beings are caused by water. Once the groundwater is contaminated, its quality cannot be restored back easily, therefore we need to protect it for our child and humanity. The samples were collected from shallow and deep ground water sources for the present studies.

Though the concentration of physico-chemical elements is useful for human body but it should be in under a specific maximum permissible limits. The study was conducted to know the physico- chemical properties of ground water and its impact on human health. The greater part of the soluble constituents in ground water comes from soluble minerals in soils and under lying sedimentary formations. The more common soluble constituents include calcium, sodium, bicarbonate and sulphate ions. Another common constituent is chloride ion derived from intruded brackish water, connate water, evapo-transpiration, concentrating salts and sewage wastes water. Nitrate can be a natural constituent but high concentrations often suggest a source of pollution. Water quality standards are needed to determine whether ground water of a certain quality is suitable for its intended use (Khadse, 2015). Over the 80 per cent sewage in developing countries is discharged untreated directly into water bodies (WHO, 2008). Planning and conservation of water resources should therefore involve the conjunctive use of surface and ground water resources (Rai, 1993). It has been observed that the pollution of water in the study area is increased due to human population, industrialization, use of fertilizers in agriculture and other man made activities like dying factory for carpet manufacturing. Water parameters such as temperature, turbidity, nutrients, hardness, alkalinity, etc. are some important factors that determines the growth of living organisms in the water body (Smitha, 2013). Hence, water quality assessment involves the analysis of physico-chemical, biological and microbiological parameters that reflect the biotic and abiotic status of the ecosystem.

Table 1: Water standards and recommending agencies.

S. No.	Parameters	Standards	Recommended Agency
1	pH	6.5-8.5	ICMR/BIS
2	Magnesium (mg/l)	30	ICMR/BIS
3	Calcium (mg/l)	75	ICMR/BIS
4	Sulphate (mg/l)	150	ICMR/BIS
5	Chloride (mg/l)	250	ICMR
6	Nitrate (mg/l)	45	ICMR/BIS
7	Electrical Conductivity (EC µS/cm at 25°C)	300	ICMR
8	Total Hardness (mg/l)	300	BIS
9	Sodium (mg/l)	-	
10	Potassium (mg/l)	-	
11	Iron (mg/l)	0.3	BIS
12	Fluoride (mg/l)	1	BIS
13	Copper (mg/l)	0.05	BIS
14	Manganese (mg/l)	0.10	BIS
15	Zink (mg/l)	5	BIS

Source: Drinking Water Standards of BIS,1993 (IS: 10500: 1991) and ICMR, 1975.

Study area

Varanasi district, extending between the latitudes 25^0 10' 30" to 25^0 35' 15" N and longitude 82^0 40' 50" to 83^0 12' 18" E which are rounded by Bhadohi district west side, Jaunpur north and north- west, Ghazipur is in the north and north- east, Chandauli in the east and Mirzapur district in the south (Fig.1). The district is characterized with alluvial formations and plain topographic features. The general slope of the tract of Varanasi district is from west to

east. The topography is modified by the existing rivers and streams. River Ganga forms its natural boundary in the east and south -east while northern boundary is marked by the river Gomti. Geologically the study area is characterized by quaternary alluvium consisting of older and younger alluvium. On the basis of relief variations, geology and drainage characteristics, the study area has been divided in to three physiographic divisions:

1. Upper Ganga - Varuna Plain
2. Varuna -Gomti interfluves and
3. Ganga -Varuna interfluves.

Generally physiographic division of an area is based on drainage and relief characteristics which help in the assessment of surface and groundwater. The Government of India has established Central Ground Water Board in every District to monitor the quality and quantity of ground water and in some extent surface water for planning purposes. The appraisal of water resources, Central Ground Water Board has established number of ground water monitoring stations in Varanasi district to monitor the water level behaviour in space and time. In general, ground water is mainly controlled by drainage, topography and lithological

behaviour. In study area, it occurs under phreatic condition at shallow depths of fractures and granular zones under at deeper depths (Gautam, 2013).

Administratively, the district comprises two tehsils namely, Varanasi and Pindara, which are further divided in to Baragaon, Pindara, Cholapur, Chiraigaon, Harahua, Sevapuri. Araziline and Kashi Vidyapeeth development blocks. The southern and southern- eastern part of Harahua development block has extended in Varanasi tehsil but major part of this block is extended in Pindara tehsil. Total study area is 1535 km² (total rural area 1371.22 km² and total urban area aequired 163. 78 km²) and having 2395 person/km² density of population in the study area (Census of India, 2011).

Hydrogeological setup

Exploratory drilling data of C.G.W.B. and state tube-wells Department show that the ground water occurs in two distinct formations:

1. Shallow ground water body which occurs principally in clay and

   kankar beds of back swamp deposits and

2. Deep or main ground water body which occurs in thick sands of the meander belt deposits.

These two water bodies are hydraulically distinct. The back swamp deposits are thick but are likely to be interconnected when they are comparatively thin. The shallow ground water in back swamp deposits is generally unconfined and its static water level is only few meters.

Objectives

Two objectives have taken for this present research work:

1. To know the water quality characteristics of study area and
2. To analyse the status of ground water quality for drinking purpose.

Materials and methods

This research paper is based on the secondary data collected from the Executive Engineer, Department of Ground Water Division, Varanasi. Water samples have been analysed for 15 parameters i.e. pH, EC, Chloride, Total Hardness, Sodium, Potassium, Calcium, Magnesium, Iron, Sulphate, Nitrate, Fluoride, Manganese, Zink and Copper as per the standard procedures of Bureau of Indian Standards, Indian Council for Medical Research and Standards of drinking water quality recommended by World Health Organization. The water samples were collected from 55 site to represent the significant part of the study area (Table 2& Fig.2). This research work and data has been analysed with the help of MS Office 2013 and Arc GIS 10.1 Software.

Table 2: Sampling sites of study area, District Varanasi.

Sl. No.	Location	Source	Latitude	Longitude
1	Ralupur	Dugwell	25.42625	83.05613
2	Ramna Village	Handpump	25.40258	83.01945
3	Ramna Village	Handpump	25.40137	83.18563
4	Suswahi Village	Handpump	25.43608	83.63225
5	Suswahi village	Tubewell	25.43608	83.63225
6	Suswahi	Dugwell	25.4317	83.63225

7	Vinay Kumar Singh, Suswahi village	Shallow Tubewell	25.43170	83.63225
8	Inside Parag Marg Ramnagar	Deep Tubewell	25.43170	83.63225
9	Ajab parag admn building	dug well	25.42018	83.10188
10	Inside Parag milk dairy	Deep Tubewell	25.40113	83.10382
11	Khokar	Handpump	25.40022	83.10447
12	Pvt well, Patanwa	Dugwell	25.40102	83.10447
13	Neel kamal factory crossing	Handpump	25.41202	83.10658
14	Ramnagar phase-II	effulent	25.42792	83.15993
15	Bheeti , ramnagar	Handpump	25.42418	83.07917
16	Bheeti , ramnagar	effulent	25.42418	83.07917
17	JPPL printer Chandpur	Deep Tubewell	25.42418	83.07917
18	Shivdaspur	Shallow Tubewell	25.50477	83.60250
19	Post offive chandpur	Handpump	25.50782	83.58903
20	Pawan udhoug , chandpur	Shallow Tubewell	25.51065	83.54850
21	Pawan udhoug , chandpur	Deep Tubewell	25.51065	83.54850
22	Teen ghnva chandpur	Dugwell	25.52065	83.54850
23	Golden phool ind area chandpur	Shallow Tubewell	25.50468	83.59418
24	Madaula	Handpump	25.51468	83.59418
25	Collector farm Gt road crossing	Dug cum bore	25.50797	83.58535
26	Yadav katara GT road chandpur	Handpump	25.50668	83.58792
27	Suswahi, pvt well	dug well	25.43185	83.54585
28	Dinanath patel house , GT road chandpur	dug well	25.50722	83.58843
29	Benarai hub centre	Tubewell	25.51722	83.58843
30	Shiv mandir shivpur	Handpump	25.60598	83.55825
31	BHEL campus varanasi	Tubewell	25.58960	83.54818
32	Ganeshpur Pokhra Pr school	Handpump	25.62063	83.55543
33	Madhuram Bread factory Ganeshpur Torana	Tubewell	25.61565	83.56118
34	Old post office Shivpur	Dug well	25.59230	83.59832
35	Primary school Shivpur	Handpump	25.59158	83.60205
36	Moon Garden SHIVPUR	Handpump	25.59868	83.60572
37	Family Bread fectory shivpur	Tubewell	25.60843	83.55797
38	Umang Agra Karkhiyawan	Tubewell	25.90673	83.32517
39	Durga Agro.	Handpump	25.95673	83.32015

40	Durga Agro.	Tubewell	25.95673	83.32015
41	Mahabodhi Int. college Sarnath	Handpump	25.63183	83.04593
42	Behind fort. Ramnagar	Handpump	25.45190	83.04243
43	Sulabh complex sarnath	Handpump	25.63277	83.04508
44	Near Chinter Temple Gate	Handpump	25.63178	83.04835
45	Bheeti Ramnagar Opp Balgirh central jail	Handpump	25.43290	83.05490
46	Bheeti Ramnagar Opp Balgirh central jail	dug well	25.43290	83.05490
47	Ralupur below ganga bridge	dug well	25.43007	83.05183
48	Behind fort Ramnagar	Handpump	25.45190	83.04243
49	Main fort chouraha ramnagar	Handpump	25.45530	83.05037
50	Nagar palika Ramnagar	Tubewell	25.45530	83.05038
51	Krishi Dal Mandi	dug well	25.45332	83.05090
52	Pancho Shivalaya Raod crossing	Handpump	25.65398	83.42505
53	Ayurvedic Hospital Rameshwar	Handpump	25.64190	83.42315
54	Temple gate rameshwar	Handpump	25.64557	83.42468
55	Ramgopal chaurasi expradhan Ramnagar	Handpump	-	-

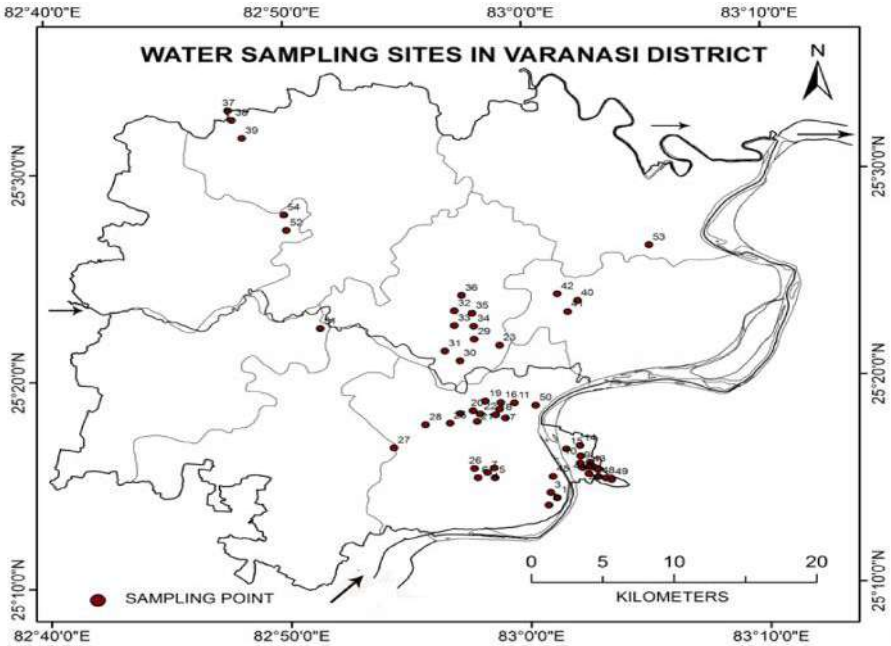

Fig. 1

Results and discussion

The pH value of water samples of Varanasi District was ranging from 7.1 to 8, which is under the permissible limit of Bureau of Indian Standards (BIS). It is under permissive limit for drinking as well as domestic and other purpose. The value of pH, SO4 and Zink were found of total 100 percent samples within permissible limit. The 96.36 percent values of chloride and copper samples have been found under the permissible limit. The very poor condition of drinking water due to magnesium (Mg) value, which was found between 14.59 to 124.03 mg/l (63.63 percent value of Mg is out of permissible limit) and this value of magnesium is haphazardly distribute in the study area (Table 3& Fig.3).

Table 3: Physico-chemical parameters of ground water of district Varanasi (2016).

S.N.	Parameter/ Unit	Within permissible Limit			Out of permissible Limit			Observed Range
		Value	No. of Samples	%	Value	No. of Samples	%	Minimum to Maximum
1	pH	<=8.5	55	100	> 8.5	00	00	7.1 - 8
2	EC at 25°C (µs/cm)	-			-			506 - 2990
3	Cl (mg/l)	<= 250	53	96.36	>250	2	3.63	7.092 -375.876
4	F (mg/l)	<= 1.0	33	60	>1.0	22	40	0.21 - 4.5
5	NO3 (mg/l)	<= 45	44	80	> 45	11	20	0.45 - 393
6	SO4 (mg/l)	<= 200	55	100	>200	00	00	1.6 - 163
7	TH (mg/l)	<= 300	25	45.45	>300	30	54.55	190 - 710
8	Ca (mg/l)	<= 75	37	67.27	>75	18	32.72	28.056 - 144
9	Mg (mg/l)	<= 30	20	36.36	>30	35	63.63	14.59 -124.03
10	Na (mg/l)	-			-			19 - 415
11	K (mg/l)	-			-			1.1 - 23
12	Cu (mg/l)	<= 0.05	53	96.36	>0.05	2	3.63	0.0034-0.0676
13	Fe (mg/l)	<= 0.3	32	58.18	>0.3	23	41.81	0.0895 -2.068
14	Mn (mg/l)	<= 0.1	28	50.90	>0.1	27	49.09	0.0104 -0.2651
15	Zn (mg/l)	<= 5	55	100	>5	00	00	0.0031 - 1.664

Source: Maximum permissible limit are set by W.H.O., I.S.I., I.C.M.R., Government of India.

The 124.03 mg/l maximum value of Mg recorded at Suswahi in Kashi Vidyapeeth development block. The BIS allows maximum permissible limit of manganese in drinking water is 0.1 mg/l. In the study area near about 50 percent samples of Mn value is also out of permissible limit which is not good for drinking purpose. Only in 41. 81 percent of samples

having iron is under the permissible limit according to BIS, which is good for domestic purpose. Total hardness was ranging from 190 - 710 mg/l in study area. The Hardness in water is 300 mg/l recommended as standard value for potable water. There were found only 36.36 percent value within permissible limit. Calcium is ranging between 28.06 - 144 mg/l and 18 locations value are of the out of permissible limits (Fig.3). BIS allows 75 mg/l calcium in drinking water. The 40 percent samples (24 samples) in study area were ranging out of maximum permissible limits due to excess fluoride may lead to tooth decay and kidney disease. 60 percent samples of fluoride were found within maximum permissible limit and it is good for drinking purposes.

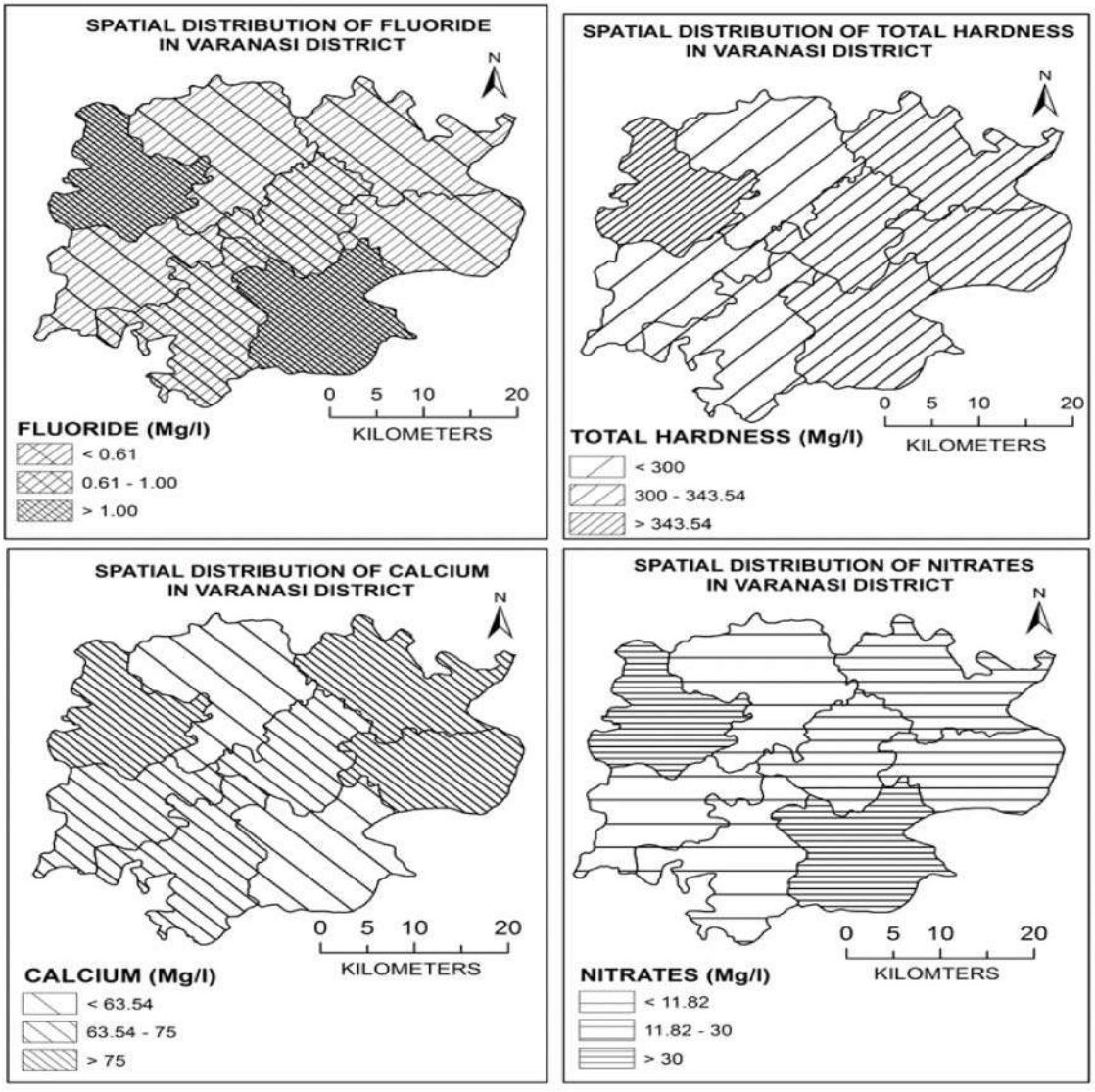

Fig. 2

The Electrical conductivity was ranging from 506 - 2990 µ s/cm and 94.54 percent samples for the EC within maximum permissible limit. The Sulphate values were ranging between 1.6 - 163 mg/l. All the samples of Sulphate have been found within maximum permissible limit. Values of Potassium were ranging from 1.1 - 23 mg/l and 98.18 percent samples were within maximum permissible limit and only 1.81 percent was found out of maximum permissible limit. Fluoride contents were ranging from 0.21 - 4.5 mg/l and 38.18 percent samples were found more than maximum permissible limit. Nitrate value was ranging from 0.45 - 393 mg/l and 3.63 percent samples out of maximum permissible limit. Chloride content was ranging from 7 - 376 mg/l and 100 percent samples were found within maximum permissible limit. Other all characteristics of drinking water are found normally good in conditions at all locations.

Conclusion

The study carried out in the Varanasi district on ground water samples confirm that the pH level of ground water was within limit at all 55 sampling stations. In 94.54 percent samples were having Electrical Conductivity within maximum permissible limit. The 40 percent samples (24 samples) in study area were ranging out of maximum permissible limits due to excess fluoride may lead to tooth decay and kidney disease. 60 percent samples of fluoride were found within maximum permissible limit and it is good for drinking purpose. In most of the district of the country suffering from the very poor drinking water quality due to industrialization, population pressure, urbanization, and most important things that is lack of awareness about our natural resources. The problems of ground water depletion and quality deterioration has appeared in last few years. Overall, the result reflects that the ground water is safe and potable in the entire district except few places/area where some precautionary measures required.

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People's Response on Land, Water and Biomass Development in Upper Kosi Watershed, Almora

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Abstract

Land, water and biomass form the core of eco-development more specifically in watershed development. The watershed variables i.e. land, water and biomass do not operate individually rather they are interconnected. The emphasis on trio becomes much more important when it concerns with the rural economy as the triple F: food, fodder and fuel, the basic ingredients of livelihood depends on it. Increasing populations in the study area and consequent exploitation of the resources of the region is definitely bearing an impact on the fragile ecosystem of the study area. Present paper is an attempt to explain the people's perception of land, water and biomass development in Upper Kosi watershed, district Almora, Uttarakhand.

Keywords*: watershed, fragile, biomass, eco-development*

Introduction

The traditional resource use structure in Himalaya has changed considerably during the recent past, mainly owing to the growth of population and demand of natural resources in the region. This transformation in resource use practices is particularly significant in the more populated tracts of Himalaya. As a result, cultivated land, forests, pastures have been deteriorated, depleted and significantly leading to degraded and non-productive lands. These rapid land use changes have not only disrupted the fragile ecological equilibrium in the mountains through indiscriminate deforestation, degradation of land and disruption of the hydrological cycle, but also have significant and irreversible adverse impacts on the rural economy, society, livelihood and life quality of mountain communities (Tiwari , 2008).

The area typifies a situation in which there is scarcity of water. The Kosi is the major river in the region. Hydrologically the upper Kosi watershed is a typical mountainous system.

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Besides this river, the area is criss-crossed by several small rivulets constituting the drainage network of the main river and their tributaries. Precipitation takes the form of rain, sleet and hail in the valleys and lower reaches. Like most rivers the river Kosi too is known for its flash floods causing erosion, damage of crops, but this is not exactly the basic water problem of the study area. In the study area, there are many gads and gadheras which earlier used to flaunt an abundance of water throughout the year. As a consequence, a variety of water harvesting structure arose within different socio-ecological settings, mainly for domestic use. After independence various government interventions were down to provide water to remote villages have led to a decline in the creation and management of traditional water harvesting structures affecting huge areas adversely.

Through the ages, these mountain forest biomass in the Upper Kosi watershed have been valued more for the direct subsistence and economic benefits - timber, fodder and fuel wood and as spiritual and recreational non-material enrichments to culture and wellbeing. The people of the area are least involved in any management and decision making to ensure sustainable utilization and conservation practices moreover the consequences of any devastation in these forests provides threats to the stability and protection of these stakeholders.

Objectives

The main objectives of the present study is to know the Current condition of natural resources and investigate Problems responsible for the degradation of natural resources by perception analysis in the study area.

Data base and methodology

The study is totally based on primary data collection method. A multi stage cluster sampling was adopted for the selection of the respondent. Sampling was down in to three sub-regions respectively valley region, mid altitude region and high altitude region (Krishnaswami, 1999; Scoones and Thomson, 2000). From each region, four villages were selected for the study. Moreover, the household were selected randomly and considered as the ultimate sampling unit of inquiry. The total sampling size was 500. The sample size based on judgment sampling method (purposive sampling method) which is a non-probability sampling method based on researcher's own judgment about the representative population.

Profile of study area

The Upper Kosi watershed is situated in Almora district and extending from 290 33' 10"N to 290 52' 25" N and 790 30' 28"E to 790 44' 55" E covering an area of 462.81 km2. The whole region is mountainous with successive mountain range and river valley. The altitude varies between 1,000m to 2,750m above mean sea level. In the north, the study area is separated by Birrachuwakot Dhar mountain from the Gomti river basin. This range is higher in the northwestern part i.e. above 2520 meters in elevation, and acts as the source of the Kosi River. Towards the north east, the demarcation range includes the upper parts of the Kausani reserved forest and follows 1800 meters contour approximately up to jogipatal and finally joins Binasar (2050 mts). It is bordered in the west by Ranikhet Tehsil, in the south by the Nanital District, in the east by the Lamgada block of district Almora and in the

north by Garun town of Bageshwar district (Fig. 1). There are two development blocks in the watershed Hawalbagh and Takula covering 234 revenue villages and a small north - west part of Almora city.

Case study of sample villages

In order to accumulate a real picture twelve villages were selected on the basis of location and accessibility in the region (Fig. 1). Whole area is divided into three zone i.e. high, middle and low. After this four villages were selected from each zone and in which two villages are situated near the road and two villages are located in the interior part of the watershed. Respondents were asked various questions regarding the appearance and their feeling about the local environment. Their responses and priorities may be useful for successful implementation of resource conservation in the region.

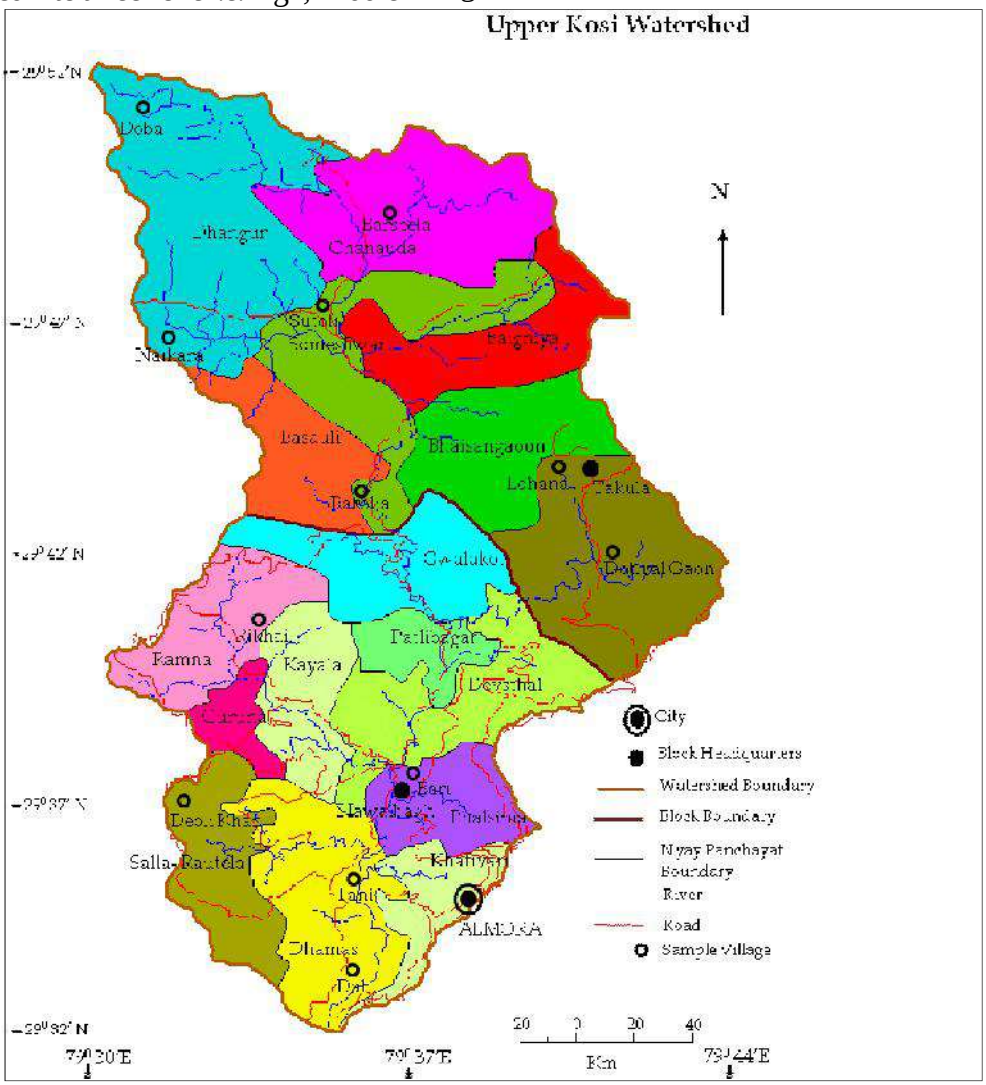

Fig. 1

In all sample villages of the study area sex ratio is favorable except in Bari village (806 females/1000 male). The highest sex ratio is found in Rekhai village (1346 female/1000 males). Out of total 12 villages, 9 villages are dominated by Kshatriyas, 2 by Brahmins and 1 by Schedule caste. Table 1 clearly shows that in 9 villages over all literacy is more than 80% while in 3 villages it is 44.45 percent (Deoli Khan), 69.05 percent (Parolia) and 57.09 percent (Naikara). The main source of livelihood of the people in the area is agriculture. Table 2 shows that the net shown area is the most significant of all land use categories e.g. in Lohana (42.5 ha.), Sutoli (35.1 ha.), Dal (28.6 ha.), Parolia (28.1 ha.), Barseela (24.8ha.) etc.

Table 1: Socio-Economic and Demographic Characteristics of Sample Villages

Characteristic	High Altitude Villages				Mid Altitude Villages				Low Altitude Villages			
	Doba	Deoli Khan	Dotial Gaon	Naikara	Lohana	Sutoli	Rekhai	Parolia	Tani	Dal	Bari	arseela
Total Population	386	891	860	268	243	149	251	559	59	531	56	91
Male	185	411	390	125	110	65	107	253	28	261	31	35
Female	201	480	470	143	133	84	144	306	31	270	25	56
Sex Ratio	1086	1168	1205	1144	1209	1292	1346	1209	1107	1034	806	1600
Caste (%)												
Brahmin	18.22	16.57	19.92	34.45	15.69	20.43	9.2	8.2	47.91	22.34	21.68	28.65
Kshatriya	67.45	69	46.56	52.34	38.48	58.45	67.89	35.54	23.89	53.67	49.82	47.9
Schdule Cast	14.33	14.43	33.52	13.21	45.83	21.12	22.91	56.26	28.2	23.99	28.5	23.45
Literacy (%)	86.79	44.44	89.07	57.09	87.24	85.23	86.45	69.05	86.44	85.88	87.5	87.91
Male	98.1	98.25	93.77	85.58	95.92	81.82	95.56	94.06	96	91.28	87.09	85.71
female	83.05	63.56	68.76	50.39	73.68	52.78	73.68	65.45	50	59.66	72.73	72
Agriculture	85.45	89.79	82.45	80.1	79.45	83.79	90.34	88	78.34	85.45	89.21	83.76
Non-agriculture	14.55	10.21	17.55	19.9	20.55	16.21	9.66	12	21.66	14.55	10.79	16.24
Household Income	58,000	55,000	56,000	61,000	63,500	54,448	64,778	68,540	78,809	75,567	59,605	58,256

Source: Field Based survey, 2013

Table 2: Land Resource Utilization Pattern in Sample Village (in ha.)

Land Use Category	High Altitude Villages				Mid Altitude Villages				Low Altitude Villages			
	Doba Khan	Deoli Gaon	Dotial	Naikara	Lohana	Sutoli	Rekhai	Parolia	Tani	Dal	Bari	Barseela
Forest	16	0	20	10	15	0	15.6	0	5.8	0	15.8	0
Irrigated land	3	0	2.8	4	61.5	5.2	0	5.2	0	0	0	4.7
Unirrigated land	21	15	300	6.5	0	4.8	17.1	46	5.7	46.3	4.6	11.4
Net shown area	15	2	1.5	0	42.5	35.1	2.7	28.1	6.5	28.6	0.6	24.8
Cultivable Westland	15	2	80	15	0	2.8	7.8	11.7	1.1	0.7	3.3	23.8
Land-holding/ HH (in ha)	.32.	.38	.43	.46	.45	.39	.69	.78	.44	.58	.72	.66

Source: Field Based survey, 2013

The proportion of forest land is highest in Dotial Gaon (20 ha.) followed by Doba (16 ha.), Bari (15.8 ha.) and Rekhai (15.6 ha.). The average land holding size ranges between 0.32 ha. (Doba) to 0.78 ha. (Parolia) per household. Thus, the sample villages reveal that the biophysical as well as socio-economic characteristics varies among the villages of different ecological regions.

Resource utilization perception

Responses on need of environmental resource management, most of the respondents laid emphasis on the necessity and importance of resource management (81.6 %) while very few have show indifference nature (2.66%). The highest rate of awareness (81.6%) was recorded in the high altitude village followed by low altitude village (80%) and mid altitude village (78.66%). It reveals that people of high altitude villages are more conscious about their resource management than the people of low altitude and mid altitude villages (Table 3). The reason might be that high altitude villages solely depend upon natural resources for their daily need in comparison to low altitude and mid altitude regions. Nevertheless, over 16 percent of population is still unaware and about 2.4 percent showed indifferent attitude towards the need and importance of resource management in the area.

Table 4 exhibits that 37.33 percent respondents in mid altitude and 25.6 percent respondents in high altitude villages feel that available environmental resources are fully utilized in the area, while 60.8 percent, 54.67 percent and 52.44 percent of respondents in the high altitude, mid altitude and low altitude villages respectively perceived that resource are not utilized properly. It is also notable that about 13.6 percent of respondents have no clear idea.

Table 3: Awareness on Resource Management, 2013

Sub Region	Respondents							
	Aware	%	Unaware	%	Indifferent	%	Total	%
High Altitude	102	81.6	20	16	3	2.4	125	100
Mid Altitude	118	78.66	28	18.66	4	2.66	150	100
Low Altitude	180	80	40	17.77	5	2.23	225	100

Source: Field Based survey, 2013

Table 4: Perception about full Utilization of Resources in the Watershed

SubRegion	Perception in percentage							
	Yes	%	No	%	No Response	%	Total	%
High Altitude	32	25.6	76	60.8	17	13.6	125	100
Mid Altitude	56	37.33	82	54.67	12	8	150	100
Low Altitude	84	37.33	118	52.44	23	10.23	225	100

Source: Field Based survey, 2013

Table 5 presents the factors that are mainly responsible for low level of resource utilization in the area. 46.23 percent of respondents stated that backwardness is accountable for low level of resource utilization while 34.22 percent, 22.56 percent and 6.74 percent answers that inappropriate government policy, lack of adequate people's participation and growing insecurity are responsible for low level of resource utilization in the area respectively. Nearly 46 percent respondents in the high altitude perceived inaccessible rugged terrain and socio-economic backwardness are the main reason for resource management of the area, while more than 32 percent respondents in the low altitude village blames government policy.

Table 5: Cause of Low Level of Resource Utilization in the Watershed

Sub Region	Perceived Factors (in %)				
	Lack of People's Participation	Govt. Policy	Backwardness	insecurity	No Response
High Altitude	21.45	23.48	46.23	6.74	2.1
Mid Altitude	22.56	34.22	36.78	4.47	1.97
Low Altitude	21.34	32.98	37.55	2.34	5.79

Source: Field Based survey, 2013

Perception on benefit from resource conservation

The majority of the respondents reported that the benefit from environmental resources management will make easy to collect the fuel, fodder and forage (F3). The highest (17.33%) proportion of respondents stated that fodder/ fuel collection is most important benefit in the

low altitude followed by high altitude (14.4%) and mid altitude (10 %) villages. The second benefit is the protection of bio resources in forest and farm land ecosystems. The percentage share of respondents in this category varied from 11.2 percent in high altitude area to 14.67 percent in low altitude area (Table 6). Equally, the third benefit perceived by the respondents is increasing in land productivity. In this regard, the low altitude area stands first (14.22%) followed by high altitude area (8%) and mid altitude area (5.33%) while the other benefits are income generations, control of soil erosion, water resource conservation, causing rainfall and control of incidence of floods/ landslides etc.

Table 6: Benefits from Resource Conservation in the Watershed

Perceived benefits	Respondents							
	Ridge Villages		Mid Villages		Valley Villages		Key Informants	
	No.	%	No.	%	No.	%	No.	%
Land productivity increase	10	8.0	8	5.33	32	14.22	6	8.10
Regular rainfall	23	18.4	14	9.33	12	5.33	5	6.76
Bio-resource protection	14	11.2	21	14.00	33	14.67	8	10.81
Soil erosion control	11	8.8	17	11.33	6	2.67	9	12.16
Water resource conservation	14	11.2	16	10.66	10	4.44	7	9.47
Easy to get F3	18	14.4	15	10.00	39	17.33	8	10.82
Flood/ land slide control	6	4.8	41	27.33	79	35.11	14	18.92
Income generation	19	15.2	7	4.67	8	3.56	6	8.10
No response	10	8.0	11	7.35	6	2.67	11	14.86
Total	125	100.00	150	100.00	225	100.00	74	100.00

Source: Field Based survey, 2013

benefits perceived by 3.56 percent, 2.67 percent, 4.44 percent, 5.33 percent and 35.11 percent of respondents respectively. However, more than 2.5 percent of respondents have indifferent attitude on the benefit of resource development. On the other hand, 10.81 percent of key informants reported bio-resource protection, 8.10 percent income generation, 10.82 percent F3 supply, 12.16 percent control of soil erosion, 18.92 percent flood control, 9.47 percent of water resource conservation and 8.10 percent productivity increase are the main benefits from the current ongoing environmental resource utilization and conservation programmes in the area.

Deforestation

Decline in the forest area is one of the severe threats to the environment in the region. Since many decades, the process of ongoing deforestation has lead to the deterioration of environment across the region. Over exploitation of the forest for meeting basic needs and the failure of government policies are the fundamental causes for rapid deforestation. For the last 5 decades, forest resource has continually been decreasing annually by 1000 ha.

Table 7 illustrates factors responsible for rapid deforestation perceived by respondents in the area. All the factors are mutually interrelated to each other. About 18.67 percent of respondents considered over-exploitation of forest for fuel, fodder and forage (F3) are the main factor responsible for massive deforestation in the area while 7.99 percent of respondents felt that uncontrolled grazing and foraging as the second important causative factor accountable for the depletion of forest in the area. Likewise, more than 12.23 percent of respondents felt that the expansion/extension of cultivated land and felling of forest by the contractors for the commercial purpose accelerate the rate of deforestation in the area.

Table 7: Causative Factors of Deforestation (%) in the Watershed

Factors	Respondents = 500			
	High Altitude 125	Mid Altitude 150	Low Altitude 225	Key Informants 74
Conservation in to Cultivated Land	5.71	11.23	12.23	11.56
Hill Slop Cutting/ Land Slide	16.67	8.98	2.34	6.90
Construction Work	3.20	8.65	11.23	9.34
Over Exploitation of F3	18.99	14.10	18.67	15.78
Extraction of Timber by Outsiders	3.45	11.34	13.33	11.29
Freely Extraction of herbal plant	10.49	2.44	4.78	4.67
Overgrazing and Foraging	3.90	15.28	7.99	10.50
Temporal Changes in Forest Policy	12.89	5.30	11.33	8.89
Inadequate Peoples Participation	11.24	14.59	6.44	14.55
Firing	9.50	6.85	10.34	6.52
No Response	3.96	1.24	1.32	

Source: Field Based survey, 2013

However, perception varies at village level. In high altitude village respondent felt that overexploitation to fulfill the need of F3 (18.9%) as well as hill slope cutting, landslide (16.67%) and extraction of herbal plant (10.49%) are major causes for deforestation. In the low altitude region, the major causes are cultivated land (12.23%), construction work (11.23%) and extraction of timber by outsiders (13.33%).

However, the situation in mid altitude village is slightly different. In mid altitude region where the majority of respondents stated that the Overgrazing / Foraging (15.28%) , inadequate peoples participation (15.49%), subsequent failure of people's support to the government officials are major factor responsible for rapid deforestation in the area. It is pertinent to note that the deforestation in the region is being a result of a complex chain of events, involving a number of different agents and causes in each locality at point in time. At

present, land clearing for agriculture, cattle rearing, infrastructure development, growing human requirements, improper technology, temporal change in forest policy are the main agent which accelerate the process of deforestation in the study area.

Table 8 presents the environmental effects of deforestation in the study area. Overall 20.56 percent of respondents stated that scarcity of F3 is the main ill effect of deforestation followed by erratic rainfall (18.89%), fertility decline (16.77%), incidence of flood and drought (13.27%), water source depletion (12.22%), intensive soil erosion (10.5%) and extension of bio-species (7.79%). In high altitude region, the major threat is F3 scarcity (22.89%) followed by fertility decline (17.23%), intensive soil erosion and water source depletion. In the mid altitude village 21.23 percent of respondents felt that F3 scarcity is the main effect followed by fertility decline (19.98%), water source depletion (18.22%), intensive soil erosion (16.78 %) etc. On the other hand, during the FGDs it was found that due to deforestation, flood and drought is main threat in the region.

Table 8: Perceived Effects of Deforestation in the Watershed

Perceived Effect	Respondents = 500			Key
	High altitude	Mid Altitude	Low altitude	informants
Intensive Soil Erosion	15.67	16.78	10.50	11.11
Fertility Decline	17.23	19.98	16.77	16.78
Erratic Rainfall	12.45	9.99	18.89	13.29
F3 Scarcity	22.89	21.23	20.56	14.86
Incidence of flood and Drought	12.33	9.78	13.27	21.21
Water Source Depletion	13.67	18.22	12.22	11.21
Extension of Bio-Species	5.76	4.02	7.79	11.54

Source: Field Based survey 2013

It is apparent that most of the respondents considered that deforestation and land degradation are interrelated, the impacts are indivisible, and the crises of fuel, fodder and forages increases day by day. Table 9 exhibits the time and distance covered by the people to collect fuel and fodder. During the survey it was found that the time and distance increases tremendously in last twenty five years. The time increases up to 1.5hr to 2 hr. and distance up to 2 to 2.5 km in the region.

Table 9: Time Spent in Collecting Fuel and Fodder Wood in the Watershed

Sub Division	25Years ago		Present	
	Distance (km.)	Time (hours)	Distance (km)	Time (hours)
High Altitude	4.0	5.0	7.5	7.0
Mid Altitude	3.5	4.0	5.5	5.6
Low Altitude	2.8	3.5	5.0	5.0

Source: Field Based survey 2013

Soil erosion

Loss of top soil is another serious environmental problem prevailing in the area. Ever increasing demand of land for cultivation, cattle rearing and area under non agriculture accelerate the soil erosion in the area. The slope, topography, geology and climatic variation in time and space are also seemed equally responsible for the excessive soil erosion. Recently on the name of development several construction works are going on which further intensified soil erosion (Table 10). There is prominent difference in perception level of respondents regarding soil erosion in the area.

Table 10: Causes of Soil Erosion in watershed

Perceived Factors	Respondents					
	High Altitude		Mid Altitude		Low Altitude	
	No	Percent	No	Percent	No	Percent
Deforestation	29	23.2	54	36.0	82	36.44
High Run off	12	9.6	8	5.33	18	8.0
Construction Work	16	12.8	19	12.67	40	17.78
Hill Slope Cutting	28	22.4	34	22.67	26	11.56
Overgrazing	30	24.00	23	15.33	25	11.11
Flooding	10	8.00	12	8.00	34	15.11

Source: Field Based survey 2013

About 24 percent of respondents in the high altitude region felt that overgrazing is the main reason of soil erosion in the area. While in mid altitude and low altitude area about 36 percent and 36.44 percent considered deforestation is the main cause for massive soil erosion respectively. Likewise, 22.67 percent and 12.67 percent respondents in the mid altitude region felt that hill slope cutting and construction work is responsible for excessive soil erosion in the area.

It is evident from the table 11 that the anthropogenic activities are highly responsible for rigorous soil erosion in the entire area. While gathering information regarding effect of soil erosion, 43.53 percent of the respondent stated that decline in productivity, loss of vegetation cover (36%) and siltation / sedimentation (20.44%) are the main consequence of soil erosion in the region.

There is a difference in the opinion in all the zones. More than 40.89 percent of respondents stated that intensity of drought is the main reason followed by loss of soil fertility (34.67%), overflow and siltation (14.22%) and extinction of organic matter (10.22%) leads to decline of land productivity tremendously over the region (Table 12).

Table 11: Effects of Soil Erosion and Land Slide in the Watershed

Perceived Factors	Respondents					
	High Altitude		Mid Altitude		Low Altitude	
	No	Percent	No	Percent	No	Percent
Loss of Vegetation Cover	54	43.2	52	34.67	81	36.00
Decline in Productivity	59	47.2	82	54.66	98	43.56
Siltation and Sedimentation	12	9.6	16	10.67	46	20.44

Source: Field Based survey 2013

Table 12: Causes of Productivity Decline in the Watershed

Perceived Factors	Respondents					
	High Altitude		Mid Altitude		Low Altitude	
	No	Percent	No	Percent	No	Percent
Loss of soil Fertility	34	27.2	62	41.33	78	34.67
Increasing Intensity of Drought	22	17.6	42	28.00	92	40.89
Overflow and Siltation	24	19.2	28	18.67	32	14.22
Extinction of Organic Matter	45	36.0	18	12.00	23	10.22

Source: Field Based survey 2013

It was noted that most of respondents are well aware about the environmental problems such as causes and consequences of soil erosion, productivity decline, environmental deterioration etc. persist in the region.

Water resource depletion

Over the decade due to massive deforestation throughout the region, water resource depleting rapidly. Several water springs, gads, gadheras and naulas are drying up causing massive water scarcity in the region. While getting the perception regarding the main cause of water resource degradation in the region it was found that in all the zones respondent felt that drying up of springs is the major cause of water resource degradation in the region followed by inadequate water supply (21.78%), depletion of water quality (18.67%), problem of water leakages (15.56%) are the main cause of water resource degradation in the region (Table 13).

Majority of the people in the study area are aware of the causes and consequences of present ongoing environmental changes and of the opinion that necessary steps should to be taken for resource conservation. The deforestation, soil erosion, growing scarcity of fuel, fodder and water are serious environmental threats prevailing in the area. The perception analysis also brings out the fact of their awareness about the existing problems and measures for natural resource management with people's participation which will certainly lead to ecological regeneration and slow down the rate of environmental degradation.

Table 13: Perceived Problems of Water Resources in the Watershed

Perceived Factors	Respondents					
	High Altitude		Mid Altitude		Low Altitude	
	No	Percent	No	Percent	No	Percent
Drying up of Water Springs	38	30.4	46	30.67	68	30.22
Depletion of Water Quality	16	12.8	24	16.00	42	18.67
Over Flow (Flooding)	7	5.6	3	2.00	18	8.00
Inadequate Water Supply	32	25.6	44	29.33	49	21.78
Problem of Water Leakages	18	14.4	28	18.67	35	15.56
Inter community conflicts	14	11.2	5	3.33	13	5.78

Source: Field Based survey, 2013

Conclusion

For long land, water and forest biomass managements have been tried but separately, The peoples participation and collective actions are critical ingredients for management programs as it involves the trio of sustainability, equity and participation. Integrated watershed management ensures equitable access to livelihood resources and active peoples' involvement in securing and nurturing the ecological, economic, and social well-being of the habitat. It is very clear from the perception study that the Upper Kosi watershed requires a holistic plan wherein the trio of forestland, pastureland and crop land ought to be symbiotic in relationship providing a platform for maximum synergy in managing land water and forest biomass of the region. It is pertinent that the forestland, pastureland and cropland must have a symbiotic relationship amongst each other. With increasing population both human and bovine, the stress upon the existing pasture and forest land increases as they are converted into cropland, so it is important that a healthy relationship between the trio of watershed management be in symbiotic state.

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Analyzing Population Density Gradient in Asansol City, West Bengal

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Abstract

Though urban centres represent spaces of high population clusters, yet they show variations in spatial patterns of their population density. An understanding of the dynamics of spatial pattern of urban population density can provide deep insight about their social-spatial structure as well as their spatial policy and planning requirements. The urban density gradient is an important model for mapping and measuring urban population density. It has also been profitably used for predicting changes in the spatial pattern of population density within an individual city, which through light on the shifting functional importance of different parts of the city. On the basis of 2001 and 2011 Indian Census data, the paper maps and measures changes in spatial patterns and lapse rate of population density across 50 wards of Asansol city of West Bengal, India. The study point towards the straightening of the concave shape slope of population density gradient due to increase in population density of wards located adjacent to the centre of the city. It also indicates towards the emergence of multi-centered population density peaks within the municipal boundary of the city. Finally, the study points out that the future population growth is expected to take place in wards surrounding the centre of the city in view of relatively low population density. The study correlates changes in population density with ward-level changes in population engaged in various economic activities during the same time interval. Finally, it suggests that, even though changes in population density in the city exhibit explicit spatial patterns, there is no evidence to suggest that these changes have taken place in response to planned territorial development of the city.

Keywords: *Population density, urban density gradient, lapse rate of population density, urban density functions, urban development.*

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Introduction

Urban centres are spaces of large clusters of population of varying size and density. Yet, they are characterized by uneven distribution of population. Population density is an important technique of measuring uneven population distribution in any geographical space. The pattern of population density within individual urban spaces, far from being uniform, exhibits diverse spatial arrangements. The most popular pattern of urban population distribution is the decreasing density of population with increasing distance from the centre of cities towards their administrative boundaries. This type of spatial pattern of distribution of population in urban spaces is best captured by density gradient. The density gradient concept has been treated as a statement concerning the population density averaged over locations equidistant from the centres (Papageorgiou 1971, pp. 121). The urban density gradient, alternatively known as spatial density function, is also applied to understand the changing structural and functional characteristics of different parts of urban space. The population density-distance relationship is a useful device for understanding the nature of urban areas (Kemper and Schmenner 1974). It provides a useful characterization of urban structure and of its evolution when taken at different time intervals (Mahmassani, et. al., 1988, pp. 234). Needless to say, that an understanding about the changing spatial pattern of urban population density may be helpful in the development of policy and planning of urban transport, housing, water supply, sanitation, health, education, entertainment, etc.

India is experiencing rapid urbanization. According to 2011 Census, about 32 per cent of India's population lives in urban areas as compared to only 15 per cent in 1961. According to the UN (2014) estimates, by 2050 about half of India's population would be living in urban areas. Asansol city is also experiencing rapid growth comparable to other Indian cities. The UN Habitat (State of World cities - 2012-13) observes that the Asansol Urban Agglomeration is the fastest growing urban sprawl of West Bengal. The report also states that, with a population growth rate of 4.06 per cent per annum, the city grew at a much faster rate during early 1990s. However, since then its growth rate has declined considerably and is expected to grow at 2.06 to 2.07 percent during 2015-2025. But this growth rate will be higher than the growth rate of the largest urban agglomeration of West Bengal, i.e. Kolkata which will grow at the rate of 1.73 per annum during this period. By 2025, the Asansol Urban Agglomeration will have population of 1.9 million.

The Asansol Municipal Corporation (AMC) constitutes the hub of Asansol Urban Agglomeration (AUA). Therefore, the fast rising AUA will have definite consequences on the spatial distribution of population in Asansol city. As per 2011 Census, the city has population density of 4435 persons per sq. km. However, there are marked variations in the spatial pattern of population density. The most densely populated ward has a density of 102997 persons per sq km while the least densely populated ward has 700 persons per sq km. As a matter of fact, as many as 4 wards of the city have lower population density than the population density of West Bengal state (1028 persons per sq km). The unevenness in the spatial distribution of population of the city is required

to be considered in the planning of the AMC as well as AUA. In view of this, the paper examines the spatial pattern and trends of population density in Asansol city using GIS and Census data of 2001 and 2011. This study may be helpful to city planners and administrators in the process of rationally allocating its scarce resources and facilities.

Literature on population density gradient

The density gradient concept was first introduced in 1951 by Cohn Clark. Clark was interested in how population densities in a variety of cities varied with distance from the city centre (Kemper and Schmenner 1974: 412). Since then a plethora of literature has been produced on urban population gradient in the developed as well as developing world. Most of these studies pertain to measuring and mapping patterns and trends of density gradient as well as locating forces responsible for changes in density gradient in the urban centres. These studies suggest that patterns of population density functions vary across cities. The spatial pattern of population density of cities is affected by their geographical location, size and shape, population density, pattern of transport network, income distribution, social composition, etc. For example, larger urban areas tend to have flatter density functions than small urban ones. Similarly, studies suggest that the rise in population size and income also plays important roles on density gradient. According to Mills and Ohta (1976), density functions of cities flattened as both population and income rose in both the US and Japan. Studies from the developed countries indicate that high income urban territories experience more decentralised development compared to low income urban areas. Further, improvements in transportation network within cities and of cities with hinterlands also effect on urban density gradient. Generally, improvement in transportation facilities leads to decentralisation of urban centres. For example, Muth (1969) has observed that in the United States urban areas with large numbers of car registrations had flat population density functions. He also found out that population density in large urban areas is more decentralized compared to smaller urban centres. Mills and Tan (1980) are of the view that in the urban centres of the developed world, flattening population density functions are best-documented trends.

McDonald and Bowman (1976), after testing 10 different functional forms, including the negative exponential, quadratic, higher order polynomials and evaluating their performance on the bases of several criteria, concluded that other forms outperformed the negative exponential in describing the urban density patterns in several cities. Anderson (1985) in his study illustrated the use of cubic splines to the study of urban population density functions by applying this method on data from the Detroit Metropolitan Area. Muth (1961) empirically proved that density gradients among metropolitan areas have three sets of factors- the nature and cost of commuting transportation available to CBD workers; the spatial distribution of employment and shopping centres; and preferences for housing in various parts of the city (Mills 1969, pp. 26). Griffith (1981) identified various factors which operate systematic spatially differentiated population density patterns throughout the metropolitan region. He empirically proved that 'multi-centered population density' develop in extremely large urban place, such as Los Angeles, Chicago and New York.

Berry et al. (1963) identified a steeper gradient in Asian cities than in cities in the United States. This difference is attributed to relatively greater advances in transportation technology found in the United States than in Asia. Mills and Tan (1980) empirically proved that the density gradient is also a function of household income. Alonso (1964) and Muth (1969) worked on the locational equilibrium of the households and suggested that the residential locational decision is characterized by a balance between increasing commuting costs and relatively cheaper and more space farther away from the city centre, on the one hand, and decreasing commuting costs and relatively more expensive and less space nearer the city centre, on the other (cited by Kahimbaara 1986). A recent study suggests that the population density gradient of Dhaka city has gradually flattened due to a combination of historical and economic factors (Khatun, et.al. 2015).

Objectives

This paper aims to analyse patterns and trends of population density of Asansol city. The following are its main objectives.

- To analyse variations in spatial patterns of population density in Asansol city.
- To measure gradient of population density in Asansol city.
- To analyse changes in population density gradient in the city between 2001 and 2011 and provide explanation for these changes.

Database and methods

The study is based on Census of India data of 2001 and 2011. Ward level data pertaining to geographical area, population and other socio-economic attributions of population have been taken from Statistical Handbook of Barddhaman district (Census of India, 2001 and 2011).

The study uses statistical tests and graphical illustrations to measure and map spatial patterns of population density and its lapse rate during two Census years and trends of change between 2001 and 2011. The ward map of the city was collected from Asansol Municipal Corporation. The ward and city boundaries of map were digitized by using Arc GIS 10.1 software. Population data for each ward (including population density data for the Census years 2001 and 2011) were joined with ward boundary shape files.

To measure the distance from the 'core' to each ward, central point of each polygon has been derived with "feature to point" option in Arc GIS. A straight-line distance was measured on map from centre of the core of the city (ward 15) to center of each polygon. Ward number 15, having the highest population density as per 2001 as well as 2011 Census, has been considered as the 'core' of the city.

To fulfil the second objective, a scatter diagram has been plotted; where X axis represents the distance from the 'core' in kilometre and Y axis represents the population density per sq km. Four mathematical functions have been tested to determine most ideal function to representing lapse rate of population density. After calculation of various functions, exponential function has been found to be the "best-fit" to express population density gradient. Later, trend line has been added with the help of exponential function.

Spatial variations in population density of

the city has been graphically represented with the help of centroids of administrative units and isopodens (which are basically contour lines joining points having equal population density). Together they are known as population density surface. It is represented on a three-dimensional surface (latitude, longitude and population density). It eliminates the effect of Modifiable Area Unit Problem (Openshaw, 1983). Thus, it is expressed as D = f (x, y, z); where, x = longitude, y = latitude, z = population density. Using Wang and Zhou (1999) technique, a raster model of population density has been created by using IDW interpolation algorithm in Arc GIS, followed by conversion of raster model into contours (i.e. isopodens).

To provide explanations for variations in negative and positive changes in population density of different wards, a rank correlation between two variables, i.e. change in total number of persons and change in total number of non-working population changed between 2001 and 2011, has been calculated. Rank correlation between net population change and net population density change between two points of time has also been calculated.

The study area

Asansol city (860 53' 11" E to 870 2' 40" E and 230 45' 00" N to 230 37' 56" N) is located on the left bank of the Damodar river in the West Bengal state of India. The city, located in the mineral rich Damodar basin, owes its origin to initiation of coal mining during the first half of the 19th century and subsequent development of railway line to capture the lucrative business of coal transportation during the decades of 1850s and 1860s. Later on, many institutions were started in Asansol city by the Britishers. Presently, Asansol Urban Agglomeration is the second largest urbanized region in West Bengal after the Kolkata Metropolitan Area (Master plan, 2025). Asansol Municipal Corporation, with an area of 127.273 sq km and population of 5,64,491 persons (2011 Census), has population density of 4,431 persons per sq km.

Analysis and discussion

Asansol city constitute 50 wards of varying geographical size and demographic characteristics. Table 1 provides statistical details of smallest and largest wards of the city in terms of their geographical size, population size and population density. It is obvious that extreme gaps are found between the smallest and the largest wards in terms of their geographical area, population size and density. There is no change in the geographical size and shape of its wards between 2001 and 2011. However, the gap between wards with minimum and maximum population size has increased from 23,335 persons in 2001 to 30,239 persons in 2011. This increase in gap is entirely due to increase in the population size of the most populous ward, which has experienced a net gain of 6865 persons. On the other hand, the least populous ward has experienced a marginal decline in its total population. This indicates towards lopsided development in the city.

Compared to the increase in the gap between the most populous and the least populous wards, the gap between the most densely and least densely populated wards have become bigger. The gap between the most densely and least densely populated ward has increased from about 85,876 persons per sq. km. in 2001 to 1,02,297 persons per sq. km. in 2011. The increase in population density gap

is almost entirely due to increase in population density of the most densely populated ward which has experienced a net gain of about 16,543 persons per sq. km. On the other hand, the least populous ward of the city has experienced only a marginal increase in its population density (i.e. about 123 persons per sq. km.). The above analysis indicates that the most populous as well as the most densely populated wards are still experiencing maximum increase in population. This clearly points out towards steepening of the population density gradient between 2001 and 2011.

Table 1. Basic Statistics of Asansol city

	Area (Km2)	Population 2001	Density 2001	Population 2011 (per sq. km.)	Density 2011 (per sq. km.)
Minimum (wards)	0.062838	3065	577.80	3026	700.37
Maximum (wards)	19.5553	26400	86454.47	33265	102997.27
Total (Asansol city)	127.874	475439	715640.58	563917	804035.69
Mean (wards)	2.55748	9508.78	14312.811	11278.34	16080.71
Standard Deviation	4.13219	4035.732	16358.4	5649.334	17731.481

Source: Computed by the author

An important technique of showing demographic characteristic of the city is the population density gradient. The population density gradient demonstrates an inverse relationship between distance and population density relative to the city centre. A density function can be denoted as: Dr = f (r); where, Dr is the population density at distance r from the city centre, and f is a function of r. In this paper, we have followed the methodology adopted by Khatun, et al (2015) for the study of population density gradient of Dhaka city. In this regard, four functions have been tested, i.e. (1) Linear (2) Exponential (3) Logarithmic, and (4) Polynomial. Results of the tests are presented in Table 2 and Table 3.

Table 2. The fit of various functions for the density gradient in 2001

	Type of Function	Equation	R2 value
1.	Exponential	Y= 30259e-0.452x	0.5521
2.	Linear	Y = - 4630.7x + 27745	0.2871
3.	Logarithmic	Y = -12238ln(x) + 23742	0.4454
4.	Second Order Polynomial	Y = 908.83x2- 11121x + 35669	0.3469

Table 3. The fit of various functions for the density gradient in 2011

	Type of Function	Equation	R2 value
1.	Exponential	Y = 34146e-0.447x	0.5384
2.	Linear	Y = - 4923.4x + 30352	0.2771
3.	Logarithmic	Y = -12979ln (x) + 26081	0.4264
4.	Second Order Polynomial	Y = 806.52x2 - 10651x + 37299	0.3126

The equation and R2 value by types of functions for the year 2001 and 2011 are shown in Table 2 and Table 3, respectively. By comparing the R2 values of various functions for the year 2001 and 2011, it is clear that the highest R2 values are represented by the exponential function. These figures show declining trend of population density with increasing distance from the most densely populated ward of the city. However, the decline is not at all steep in case of both the years. In high population density belt, the gradient of the curve is moderately steep while the gradient is low in medium density belts. However, the gradient is almost flat in the low-density belt. Though there is not much of difference in the exponential function of population density curve for the years 2001 and 2011, one can see the concave slope getting slightly shallower in the year 2011 due to increase in population density of some wards surrounding the most densely ward of the city.

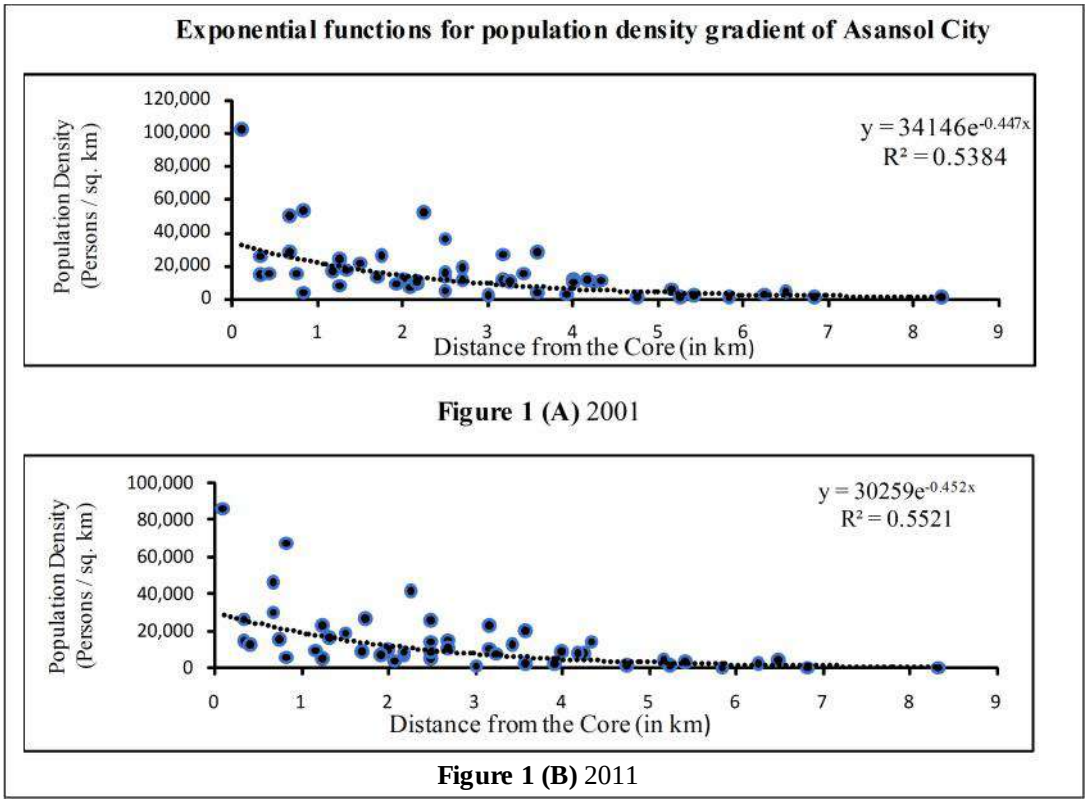

Figure 1 (A) 2001

Figure 1 (B) 2011

Generally, cities across the globe show inverse relationship of population density and distance from their centres though the degree of relationship varies considerably. Figures 2 and 3 are showing correlation between changes in population density with increasing distance from the core of Asansol city. Ward number 15 reported highest population density in the year 2001 as well as 2011. Hence, it has been considered the main core of the city. Figures 1 (A) and 1 (B) reveal that the population density is decreasing with increasing distance from ward number 15.

The deviation from the normal population density can be considered as an important measure of spatial pattern of urban population density. The data clearly indicate towards deviations in the population density of Asansol city from its mean population density. Figure 2 (A) is showing number of wards having greater and lesser population density compared to the mean population density of the city which was 14,312 persons per sq. km. in 2001. As many as 18 wards had higher population density than the mean population density of the city (ward nos. 4, 7, 8, 10, 11, 12, 13, 14, 15, 17, 26, 27, 28, 29, 39, 40, 41, and 44). Ward number 15 had highest population density (86,454 persons per sq. km.). Most of the highly dense populated wards are situated in the core of the city and alongside the Grand Trunk Road (GT Road). Another belt of densely populated wards (ward nos. 39, 40 and 44) are located in the southern part of the city along the Burnpur road and railway line. Interestingly, these wards also have high proportion of slum population. Ward no. 44 has a factory, residential colony and offices of Indian Iron and Steel Company (IISCO), which is again densely populated. The remaining 32 wards have less population density than the average population density of the city. Among these, ward no. 37 is the least densely populated with only 577 persons per sq km. This is amongst the largest wards of the city with geographical area of 19.5 sq. km.

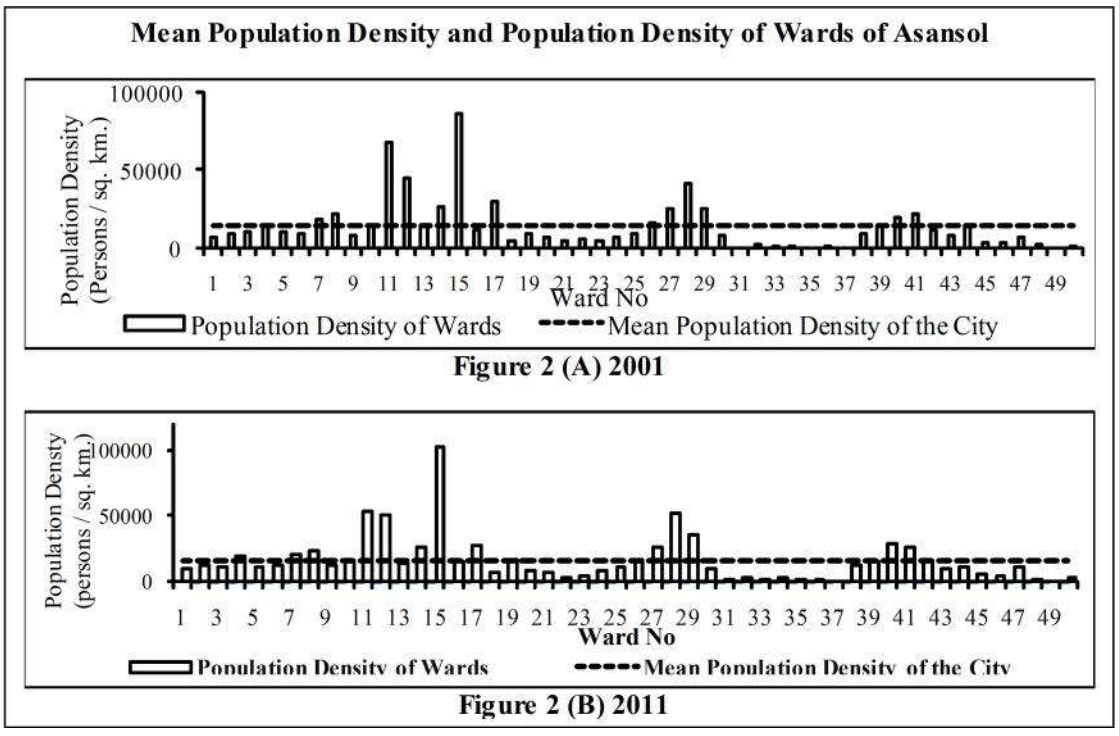

Figure 2 (A) 2001

Figure 2 (B) 2011

Figure 2 (B) is showing the number of wards having greater and lesser population density compared to the mean population density of the city in 2011. The mean population density of the city is 16,080 persons per sq. km. There are 15 wards (ward nos. 4, 7, 8, 11, 12, 14, 15, 17, 19, 26, 27, 28, 29, 40 and 41) which have greater population density compared to the mean population density of the city. The remaining 34 wards have lesser population density than the mean population density of the city.

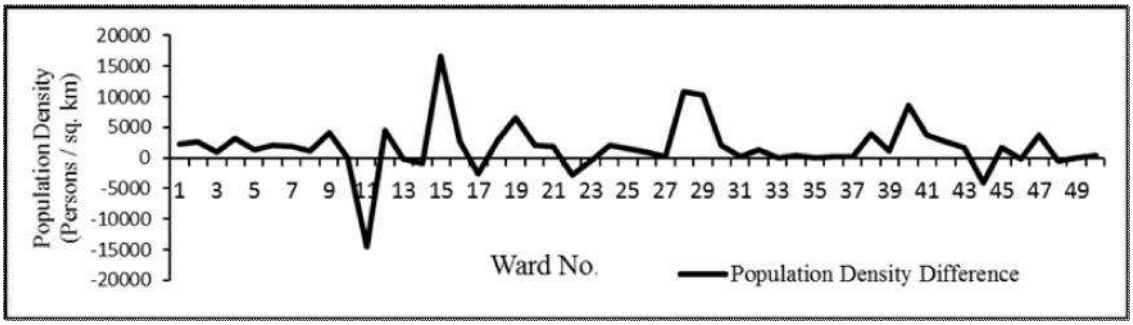

Figure 3: Ward wise differences in population density between 2001 and 2011

Differences in population density of wards over a period of time can be considered as an important indicator of the changing relative importance of wards within the city and therefore a matter of city policy and planning too. Further, Figure 3 is showing differences in population density of all the 50 wards of city between 2001 and 2011. It is quite astonishing to note that as many as ten wards (ward nos. 11, 13, 14, 17, 22, 23, 44, 46, 48 and 49) have reported negative change in population density during this time period. Among these, ward no. 11 has reported highest decline in density (i.e. 14,513 persons per sq. km.). On the other hand, ward no. 15 (the most densely populated ward) witnessed the highest (16,542 persons per sq. km.) gain in population. Interestingly, its geographical size is very small (0.063 sq. km.) and almost the entire area is used for residential purpose.

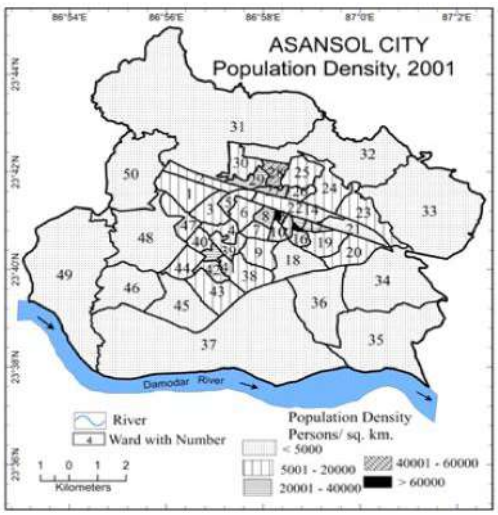

Figure 4 (A)

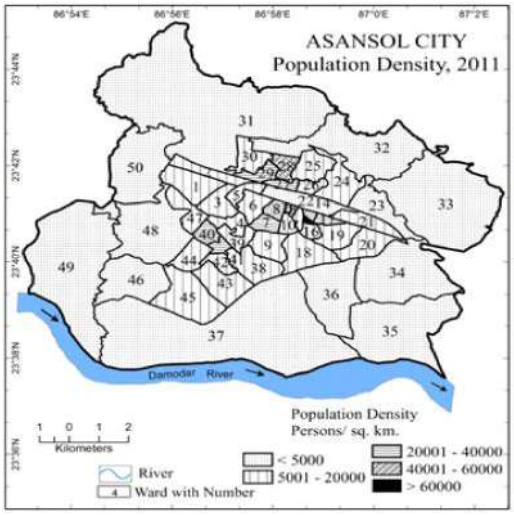

Figure 4 (B)

The micro-level study of urban population density throws light on the relative importance of its various localities. Figure 4 (A) is showing the population density of the city as per 2001 Census data. It is apparent that the most densely populated wards are in the central part of the city. On the other hand, wards located at greater distance from the centre of the city have lower population density. Figure 4 (B) is showing population density of wards as per 2011 Census. The spatial pattern of population density is almost similar to that of 2001.

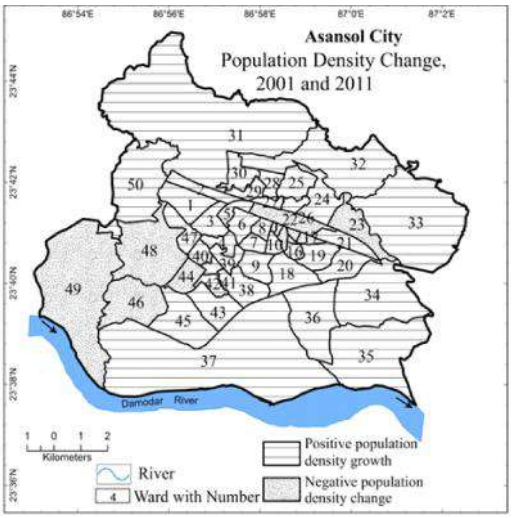

Figure 5

However, two divergences can be observed among the most densely populated wards (> 60,000 persons per sq. km.). The total number of most densely populated wards has been decline in 2011. For example, ward no. 11 reports decline in absolute population and hence population density. There is no significant change in patterns of population density in wards located in the periphery of the city. However, some wards have moved up in terms of their population density while others have relegated.

The changes in spatial pattern of population density of city over a period of time can be considered as critically important from the point of view of its spatial policy and planning. Figure 5 is showing negative and positive changes in population density growth between 2001 and 2011. Most of the wards (40 wards) have experienced positive growth of population density while one fifth of the wards have evidenced decline in population. Interestingly, wards reporting population decline are found in two geographically contiguous belts. First belt of six wards are located in the centre of the city. All these wards touch the Grand Trunk Road (popularly known as GT Road) and they are characterized by preponderance of commercial and business population. The second belt of four wards is located in the south-western part of the city along the Damodar River. Three of these wards (nos. 46, 47 and 48) are predominantly industrial while one is dominated by agricultural activities (ward no. 49).

Figure 6 (A) is showing ward-wise distribution of net population increase. Six wards, located just outside the core of the city, reported large addition of population (> 5000 persons). These wards have high proportion of open land, agricultural land and slums. On the other hand, wards reporting lowest increase in net population are located either in the centre of the city or along its periphery.

It is worth noting that increase in absolute number of population at ward levels does not take into account the geographical size of wards. Therefore, it does not reflect the demographic pressure in real sense. Figure 6 (B) report that the maximum increase in population density has taken place in ward no. 15 which is located in the centre of the city. Four

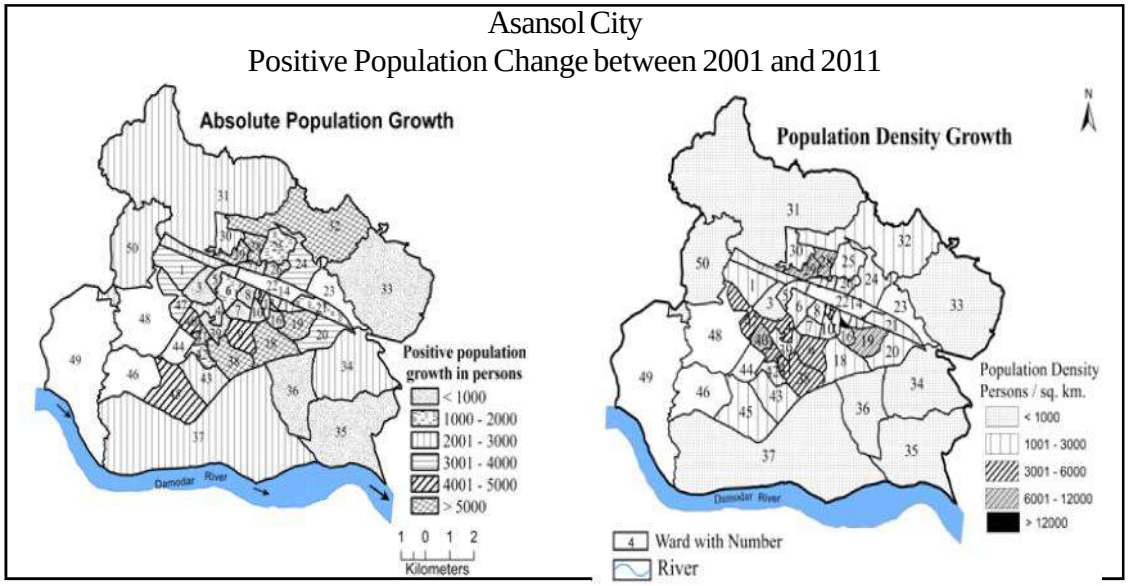

Figure 6 (A) Figure 6 (B)

wards surrounding core of the city have experienced high increase in population density. On the other hand, least increase in population has taken place in wards mostly located in the periphery of the city. Interestingly, these wards have comparatively larger geographical size and more open land. Wards showing maximum or minimum absolute increase in population are not necessarily the same wards which have experienced maximum and minimum density increase, respectively.

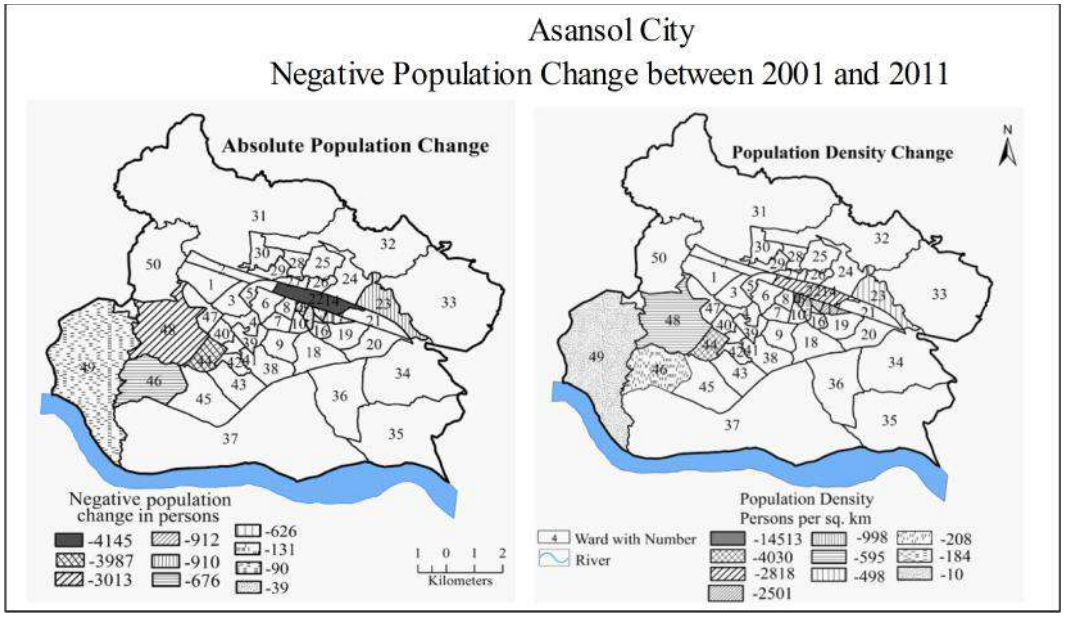

Figure 7 (A) Figure 7 (B)

An interesting trend reported by the Census data is decline in the net population of some of the wards of the city. Figure 7 (A) is showing ward-wise decline in population between 2001 and 2011. Altogether ten wards have experienced net loss of population during this period. While most wards (seven wards) have experienced marginal decline in population, three wards have experienced substantial decline. Ward 22, located in the heart of the city, has experienced maximum decline. Ward nos. 44 and 48, located outside the core area of the city, have also experienced significant population decline.

Figure 7 (B) shows that the decline in absolute number of population does not take into consideration the geographical size of wards. Therefore, it does not reflect ward level increase or decrease of demographic pressure in true sense. In view of this, in figure 10 (B) is showing ward-wise decline in population density over this period. This figure suggests that ward no.11 has lost maximum population per sq km (14,513 persons per sq km) followed by ward nos. 44, 22, 17.

Table 4: Ranking of wards experiencing absolute population loss and population density loss, 2001- 2011

Ward No	Raking of Wards	
	Absolute population decline	Population density decline
Ward no. 11	4	1
Ward no. 13	10	9
Ward no. 14	8	5
Ward no. 17	7	4
Ward no. 22	1	3

Ward No	Raking of Wards	
	Absolute population decline	Population density decline
Ward no. 23	5	7
Ward no. 44	2	2
Ward no. 46	6	8
Ward no. 48	3	6
Ward no. 49	9	10

Source: Computed from Primary Census Abstracts of Bardhhaman District, 2001 and 2011

A comparative study of wards experiencing absolute population loss and density loss (per square km) is shown in Table 4. It shows that except ward no. 44 located in the slightly peripheral area, all other wards showing maximum decline in population density are located near the centre of the city.

Thus, the decline in the population in ten wards of the city could be a matter of research for both academicians and city planners. The study also tried to see if this trend is in any way related to some other demographic trends in the city. It was found that all these ten wards have reported net decline in non-working population as well. It may be possible that households which are poorer and having large size of dependent population might have moved out of these wards. But, this is just a speculation. It needs further research with the help of micro-level data.

Rank correlation carried out to find whether there are some kind of relationships between population change and changes in non-working population at ward level shows very high

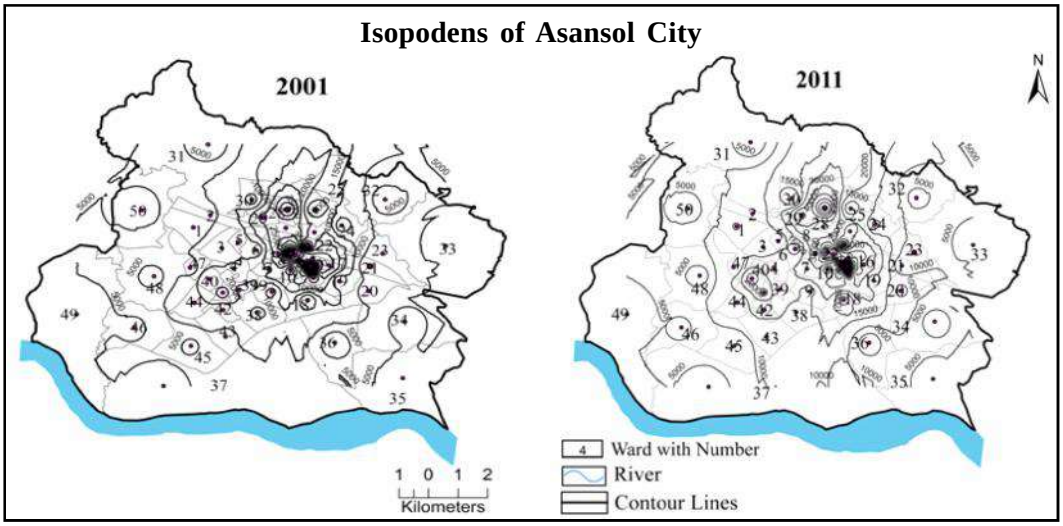

Figure 8 (A) Figure 8 (B)

(0.97) degree of correlation. That means, changes in population of wards could largely be explained by changes in non-working population. Most of the wards showing population decrease have also experienced decrease in non-working population and vice versa. But, the reason for decline of non-working population is not known.

The concentration of population in specific localities of a city reflects their relative socio-economic significance. In Figure 8 (A) is showing population density gradient of the city as per 2011 data. The patterns of isopodens depict two population density peaks of first order located in the centre of the city along the Grand Trunk Road (GT Road). Another density peak of secondary importance in visible in ward no. 12. The patterns of isopodens also indicates that population density is decreasing with increasing distance from the city. The peripheral zone has a density of 5,000 persons per sq. km. However, in the north-western part of the city, the rate of decline of population density is quite low. Here, even the peripheral wards have population density of as high as 20,000 persons per sq. km. indicating that the city has more intensely grown towards the north-western periphery.

Figure 8 (B) shows that in the year 2011 the highest population density peaks of first order have consolidated their primacy while the second highest density peak has declined marginally. The second order population density peak located in ward no. 12 has consolidated its position. Another second order density peak can also be observed emerging in ward no. 28.

An important technique to map the changing pattern of population density of a city is to find the pattern of spatial changes in population density of the city. To map these changes, isopodens depicting population density change between 2001 and 2011 have been drawn in Figure 9. The map is revealing a belt of maximum density change in the centre of the city with two peaks. Another belt of high density change with two medium size peaks is visible in ward nos. 28 and 29. Two more peaks of population density change of third order are visible in ward nos. 40 and 44.

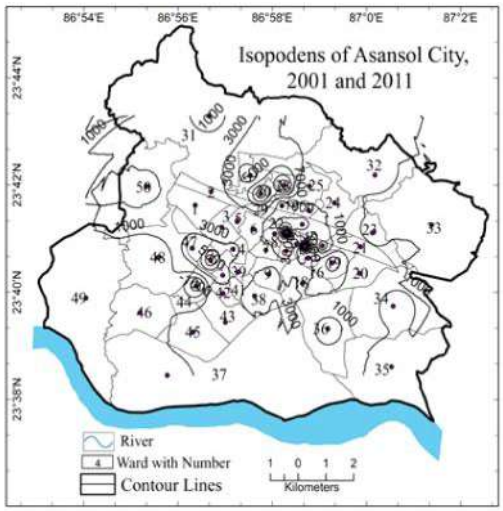

Figure 9

Conclusion

Analysis of population density of the city reveals some interesting patterns and trends. The study suggests that the city shows spatial variations in population density as well as temporal changes in population density. Spatial variations in change in population density are both positive as well as negative. The gap in population density between some of the highest and lowest wards is considerably large, which has increased from 2001 to 2011. The maximum population increase has taken place in wards located in the centre of the city. A demographic corridor of high population density can be seen emerging in the north- western part of the city. As evident from the exponential functions, the population density gradient of Asansol City is quite low. Moreover, the concave shape slope of population density gradient has become shallower due to increase in population density of wards located nearby the centre of the city. Further, multi-centered population density peaks can be seen emerging in the transitory belt of the city. Lastly, the future population growth is expected to take place in wards located in areas surrounding the centre of the city in view of their low population density. The population density of wards located in the periphery is expected to grow at slower pace due to distance from the core. These trends are purely based on changing patterns of population density in the city between 2001 and 2011.

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Voting Behaviour in Assembly Election of Varanasi: A Geographical Analysis

Rohit Kumar[1] and Arun K. Singh[2]

Abstract

This study focuses on voting behaviour of the electorates in two consecutive assembly elections of Varanasi district. Mapping the voting behaviour pattern is one of the great significance for an electoral geographer as it depicts the level of political awareness, consciousness and socio-economic development of that area. Voting behaviour is not confined to the examination of voting statistics, records and computation of electoral shifts and swings, it also involves an analysis of individual's psychological processes (perception, emotion and motivation) and their influence on political decision.

In this paper the main objective is to examine the voting behaviour pattern and to study the factors responsible for the spatial changes in voting pattern as well as voting behaviour from one constituency to another in the two consecutive assembly elections of 2012 and 2017.The study is based on secondary data collected from the Election Commission of India and other published and unpublished sources.

Keywords*: electoral geography, voting behaviour, pattern, constituency, voters.*

Introduction

Free and fair elections on regular interval are the lifeline of democracy. In India, which is one of the largest democratic country, the elections are regularly held in every five years at three level as national level (parliamentary elections), State level(assembly elections) and local level (Panchayati Raj Institutions, self-governing bodies under State Governments).Voting is very popular and important phenomena in electoral system. Voting is a means of expressing the voters' approval or disapproval of government decisions, policies and programmes,

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the policies and programmes of various political parties and qualities of candidates who are engaged in electoral process for being the representatives of people. In other words, Voting refers to the function of electing representatives by casting votes in elections. Palmer (1976) has pointed out that voting is the most common and the most widely discussed form of political participation related to the electoral process. Singh and Sinha (2014) discuss the situation which inspire and influence the voters to exercise their right to vote in favour or against a particular candidate is called voting behaviour. Plano and Riggs (1973) had pointed out that "Voting Behaviour is a field of study concerned with the ways in which people tend to vote in public elections and reasons why they vote as they do". Voting behaviour is not confined to the examination of voting statistics, records and computation of electoral shifts and swings. It also involves an analysis of individual psychological processes (perception, emotion and motivation) and their relation to political action as well as of institutional patterns, such as the communication process and their impact. Identification of the spatial patterns and trends of voter turnout can be used as effective tools to assess the level of political awareness in the regions. Voting turnout is measured as the percentage of registered voters in each constituency who actually exercise their voting right at the time of election. The study of political participation is important because it can potentially lend insight into the extent of citizen support for a political system (Dixit 1988). A higher voting turnout in the elections held in recent years, indicate greater participation of people in assembly elections. The increasing voting turnout is also an indicator of growing interest of people in politics now compared to the past.

Varanasi district is divided into two parliamentary constituencies and eight assembly constituencies of which three assembly constituencies' fall in the municipal area. Whole city constituencies have been dominated by Bhartiya Janta Party (BJP) for a long time. The voting turnout under the district, varies from one constituency to another, and party wise vote share also fluctuates from one constituency to another. Assembly election of 2012 had indicated the variation of vote share and wining position of overall parties. There were five major parties; Indian National Congress (INC), Bhartiya Janta Party (BJP), Bahujan Samaj Party (BSP) Samajwadi Party (SP) and Apna Dal (AD) and a large number of small parties contesting against each other. Assembly election of 2017 illustrated the different pattern of party performance, voting turnout and the vote share of the parties. During 2017 election, except Bahujan Samaj Party (BSP), the major parties have made alliance with each other; Samajwadi Party (SP) - Indian National Congress (INC) and Bhartiya Janta Party (BJP) - Apna Dal (AD), Suheldev Bhartiya Samaj Party (SBSP). The average voting turnout in the district was 57.4 Per cent in 2012 assembly elections, 61.6 per cent in 2017. The increasing voting turnout in 2017 assembly election, over the previous assembly election derived to conclusion that the people of the district are gradually being more aware about their responsibility, rights and the value of their votes.

Objectives

This paper is being written keeping in mind the following objectives

- To examine the patterns of voting behaviour, for two consecutive assembly elections (2012-2017) in Varanasi

district.

- To identify the causes, which are responsible for rapidly increasing base of Bhartiya Janta Party in Varanasi district in 2017.

Data base and methodology

The paper is based on secondary sources of data taken from the official reports of the Election Commission of India, periodicals and magazines, journals and other government and non-government sources. The Electoral data (voting data) have been taken from Election Commission of India, Election Commission of Uttar Pradesh and other sources where the data are available. Cartographic maps have been prepared using QGIS and Arc GIS softwares. Newspapers have been referred for local issues in the district which are playing important role in the assembly elections.

Study area

Varanasi is one of the eastern districts of Uttar Pradesh, which is political and cultural control point of Purvanchal region, most diversified from socio-economic, cultural and geographical point of view, which are determinants of political attitude and voting behaviour. Each group has its own political perception, behaviour, identity and attitude. It falls in Middle Ganga Plain and covers an area of 1535.0 sq. km. Located between 25015' to 25034' North Latitude and 82050'to 83015' East longitude, the region is bounded by Sant Ravidas Nagar (Bhadohi) district in the west, Jaunpur in the north and west, Ghazipur in the north-east, Chandauli district from the east and Mirzapur district from the south. The sacred river Ganga flows across the district in semi-circular shape. The district comprises three tehsils Varanasi, Raja Taalab and Pindara, 702 Gram Sabhas and 1295 villages in the district. In Census 2011 the district covered 5 statutory Towns and 34 census towns. Though agriculture is the mainstay, animal husbandry plays significant role as it supplements the income of farmers. The district has a good industrial base with infrastructure. Varanasi has long been famous for Handicrafts works. Even in ancient time the art of weaving, elegant silk fibres with thread of Gold and Silver was at its boom. Silk weaving industries, Jari and Jardozi works have great demand in the international market.

Result and discussion

Analysis of voting pattern always focuses on the determinants of why people vote and how do they arrive at the decision they make. During the time of election, generally it is a norm that voters vote on the basis of their political loyalty and affinity. The local, regional and national elections differ from the point of issues

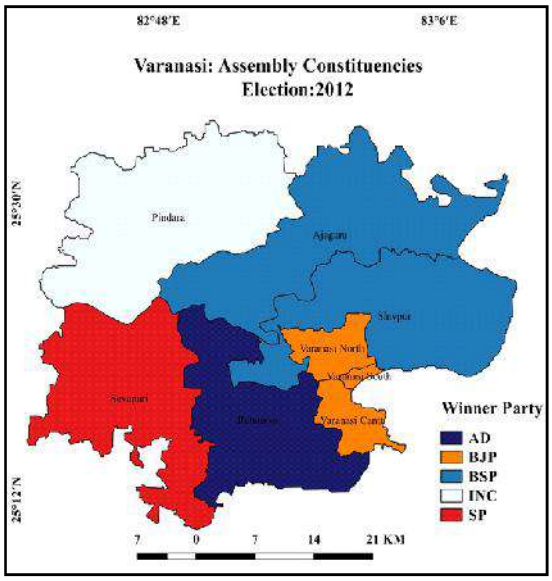


Fig. 1

base, and the preference of voters differs from one level to another level of elections. The voters tend to elect those candidates who seem more capable to contribute in providing basic amenities and development.

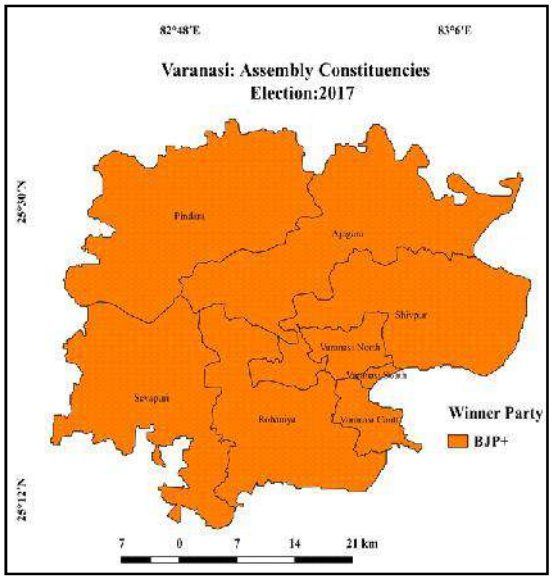


Fig. 2

The winning position of the major parties in the district, reveals the constituency wise spatial as well as temporal variation. In 2012, assembly election Bhartiya Janta Party (BJP) had won three seats Varanasi North, Varanasi South and Varanasi Cantt out of eight assembly seats. Bhaujan Samaj Party (BSP) had won two assembly seats (Ajagara and Shivpur) in which one seat was reserved for Schedule Caste and each one seat was won by Samajwadi party (SP), Indian National Congress (INC) and Apna Dal (AD) (Fig.1). The assembly election of 2017, showed the different result. All the major parties had contested election with pre poll alliance excluding Bhaujan Samaj Party (BSP). Bhartiya Janta Party (BJP) had made alliance with Apna Dal (AD), Suheldev Bhartiya Samaj Party (SBSP) and Samajwadi Party (SP) with Indian National Congress (INC). (Fig. 2). The last parliamentary election (2014) result was in favour of BJP and its alliance because it has clean sweep the entire rival parties and setup the monopoly in all the constituencies of the district

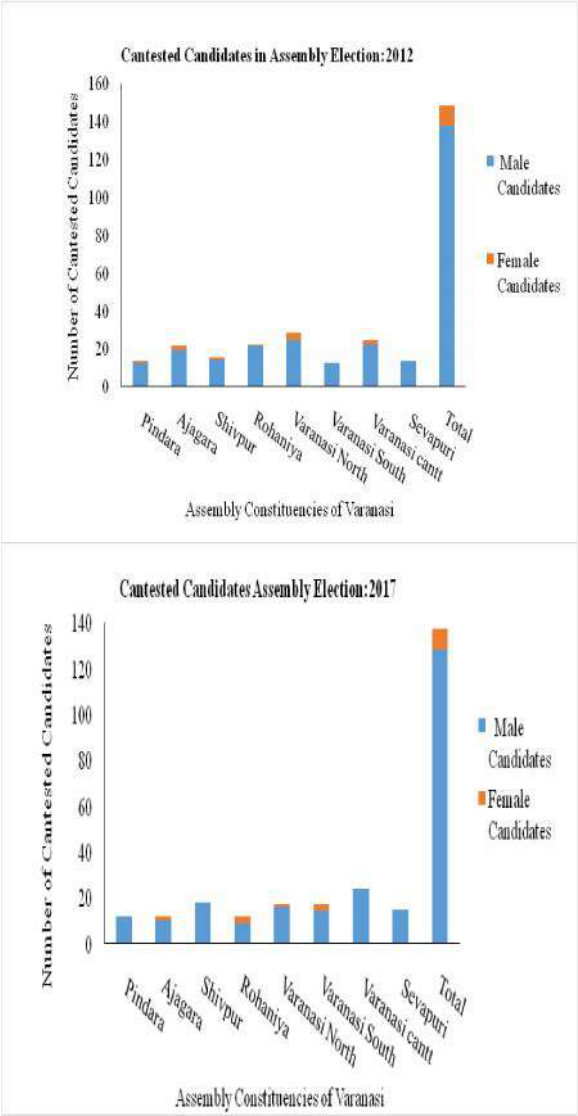


Fig.3 (A, B)

The number of contestants were varying from one constituency to other and one election to other in the district. We find a decrease in the total number of contesting candidates for

the last two consecutive elections148 in 2012 and 127 in 2017 at the district level and the same is true in the four constituency level. The main reason for declining contestants was pre-election alliance of the major parties in the district. (Fig.3.A,B)

Table.1: Voter turnout in per cent in Varanasi district 2012-17

S.N.	Name of Constituency	Election 2012			Election 2017			Swing from 2012-2017		
		Voter Turnout Turnout	Male Voter Turnout	Female Voter	Voter Turnout Turnout	Male Voter Turnout	Female Voter	Voter Turnout	Male Voter Turn out	Female Voter Turn out
1	Pindara	56.29	51.43	62.20	59.67	54.14	65.96	3.38	2.71	3.76
2	Ajagara	59.98	57.44	63.10	65.26	62.25	68.48	5.28	4.81	5.38
3	Shivpur	62.80	62.58	62.09	66.77	66.38	66.91	3.97	3.80	4.82
4	Rohaniya	60.24	61.19	59.10	61.64	61.60	61.28	1.40	0.41	2.18
5	Varanasi North	52.17	55.88	47.54	59.20	60.63	57.12	7.09	4.75	9.58
6	Varanasi South	55.38	61.96	47.14	63.58	66.42	59.82	8.20	4.46	12.68
7	Varanasi Cantt	51.65	55.11	47.29	55.20	54.79	53.91	3.55	-0.32	6.22
8	Sevapuri	62.09	59.22	65.66	64.85	61.92	68.01	2.76	-0.17	3.23
9	Average	57.36	57.92	56.54	61.61	60.75	60.40	4.25	2.83	3.86

Source: www.eci.nic/ accessed on 21. 07. 2017

There is an increase of 4.25 per cent in the voter turnout at district level and the same is true at constituency level in 2017. However a slight decrease between 2012-2017 (-0.17 per cent) in male voter turnout is reported in Varanasi Cantt. The possible reasons of increased voter turnout are the outcome of Election Commission role which has conducted various exercises and activities like cricket match, street plays, rallies and awareness campaign for more than one month to increase the polling percentage. But due to pre poll alliance of the major parties, the turnout has slightly increased because cadre voters of the parties had not enthused to use their franchised in the election. (Table: 1)

The high turnout in rural constituencies compare to urban counterparts and female to the male, has changed the traditional perception that 'large number of urban people participate in political activities comparison to rural one, and male are more active than female in political activities. The possible reasons highly female participation in voting are, major contested electoral parties had been raised a lot of woman related sensitive issues during the election campaign, as woman insecurity, domestic violence and crime against women, and promised to solve these major problems, and

ensured them a range of women welfare, empowerment and education related schemes and programmes would be launched after come into the power. Bhartiya Janta Party had promised security for women and announced Anti-Romio squad to rid girls from the bane eve testing, ruling Samajwadi party offered free bicycle for school going girls as well as dedicated helpline rebate public transport for woman. Bahujan Samaj Party made a pitch for providing better safety for woman through an improved and assured law and order situation in the state (Economic Times, 09 March, 2017). The main reason for high turnout in rural constituencies compare to urban counterparts about half strength of urban voters preferred to stay indoors while rural folk enjoyed the voting. (Times of India, 23 February, 2017)

Table.2: Vote margin, swing and secure vote in per cent between winning and leading candidates from 2012 to 2017

S.N.	Name of constituency secured	Election 2012			Election 2017			Vote
		Winning candidate Vote secured	Leading candidate Vote	Vote Margin	Winner candidate Vote secured	Leading candidate Vote secured	Vote Margin	Over all swing 2012-17
1	Pindara	29.31	24.20	5.11	44.97	26.68	18.29	13.18
2	Ajagara	32.35	31.23	1.12	38.52	28.70	9.82	8.70
3	Shivpur	36.45	19.59	6.86	48.64	24.75	23.89	17.03
4	Rohaniya	30.22	21.03	9.19	51.77	26.91	24.86	15.67
5	Varanasi North	26.49	25.20	1.29	51.20	31.12	20.08	18.79
6	Varanasi South	38.22	29.09	9.13	51.89	42.23	9.66	0.53
7	Varanasi Cantt	32.05	24.94	7.11	58.46	31.42	27.04	19.93
8	Sevapuri	31.87	20.71	11.16	50.48	26.47	24.01	12.85

Source: www.eci.nic accessed on 21. 07. 2017

The margin of vote per cent between winning and leading candidates fluctuate from one constituency to another as well as from one election to other. The margin of vote percentage of winning candidates has increased over a period of time (2012 to 2017). Whereas in 2012 the highest margin of vote between winning and leading candidates was in Sevapuri constituency 11.16 per cent, and the lowest was in Varanasi North 1.29 per cent, it has rapidly increased in 2017 and was highest in Varanasi Cantt 27.04 per cent and the lowest was recorded in Varanasi South 9.66 per cent. The highest total votes were secured by winning candidates in Varanasi south 32.05 per cent and lowest in Shivpur 26.45 per cent in 2012 whereas in 2017 maximum votes have been secured by winner candidate in Varanasi Cantt 58.46 percent and minimum was in Ajgara 38.52 per cent (Table: 2).

The performance of major parties has

shown variation in two consecutive elections i.e. 2012 and 2017, from one constituency to other in Varanasi. The average vote share of major parties during 2012 had varied from one political party to other. The average vote share of Bahujan samaj Party (BSP), was 20.68 per cent, Samajwadi Party (SP) 20.18 per cent, Indian National Congress (INC) 18.68 per cent, Bhartiya Janta Party (BJP) 16.6 per cent and Apna Dal (AD) 11.33 per cent in Varanasi. In 2012 assembly election, Bahujan Samaj Party had secured maximum vote share in Ajagara constituency 32.35 per cent. This constituency is reserved for Schedule Caste candidates and the lowest share of the party was in Varanasi south 5.84 Per cent. In five constituencies the party had secured vote share more than average, and rest of the three constituencies it has not secured equal to the average vote share (20.68 per cent) in Varanasi. Samajwadi Party which had secured absolute majority in U.P. election in 2012, the vote share performance was not much better than Bahujan samaj Party (BSP) in the district. The average vote share of Samajwadi Party (SP) was 20.18 per cent which was slightly (0.50 per cent) less than Bahujan Samaj Party (BSP). The highest vote share of Samajwadi Party (SP) was in Sevapuri 31.87 per cent and lowest in Varanasi south 9.67 per cent. In four constituencies the party vote share had crossed the average vote share and remaining four constituencies it had not reached to the average (20.18 per cent) vote share in the district.

Indian National Congress which is the oldest political party of India, the average vote share of the party was 18.38 per cent in Varanasi district in 2012. The highest vote share of the party was in Pindara constituency

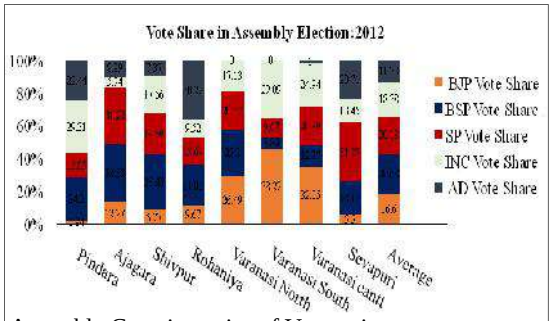
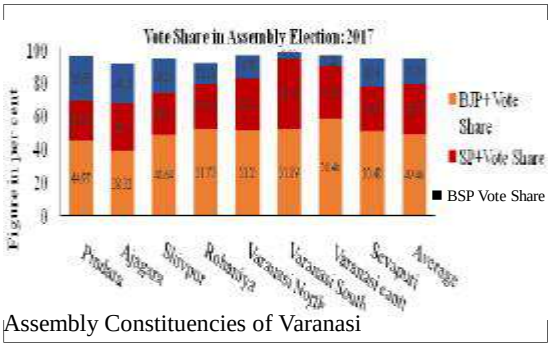


Fig.4

29.31 per cent and lowest was in Ajagara constituency 5.94 per cent. In three constituencies the party had secured above the average vote share and rest of five constituencies the vote share of the party could not reach equal to average 18.38 per cent vote share in the district. (Table.5)The average vote share of Bhartiya Janta Party (BJP) was 16.60 per cent in Varanasi district. The highest vote share of the party was in Varanasi south constituency 38.22 per cent and lowest in Pindara constituency 1.84 per cent. In three constituencies, which are urban dominant, the vote share of the party was high as the average vote share, and remaining under five constituencies the party could not secure the average vote share (16.60 per cent) in the district. Apna Dal which had emerged as the major party in the district since 2012, contested only six assembly seats out of eight in the district, the average vote share of the party in Varanasi was 11.33 per cent. The highest vote share of the party was in Rohaniya constituency 30.22 per cent and lowest in Varanasi Cantt constituency 1.00 per cent. In three constituencies the party had secured vote share above the average, and rest of three constituencies the party had not reached to average 11.33 per cent vote share in the district (The party had contested only in six assembly seats) Fig.4



Assembly Constituencies of Varanasi

Fig. 5

The strategy of contesting election of major parties, during 2017 assembly election has been completely changed. Other than Bahujan Samaj Party (BSP), all the major parties (Samajwadi Party, Indian National Congress, Bhartiya Janta Party, and Apna Dal) have made pre poll alliance on the basis of assembly seats agreement. Samajwadi party (SP) alliance with Indian National Congress (INC), Bhartiya Janta Party (BJP) has made partnership with small regional parties, Apna Dal (AD) and Suheldev Bhartiya Samaj Party (SBSP). The vote share of Bhartiya Janta Party (BJP) and its alliance (+) has rapidly increased as compared to previous assembly election. The average vote share of Bhartiya Janta party (BJP+) has reached 49.46 per cent in the Varanasi district. This figure shows about 7.00 per cent high if compared with the state average vote share of the party. The party and its alliance, secured highest vote share in the Varanasi city and its surrounding area. In city, all the three constituencies Bhartiya Janta Party (BJP) vote share was more than 50 per cent, and the share declined as we move from urban areas to rural one. In reserved constituency, Ajagara, the vote share of the party and its alliance is lowest. The maximum vote share of the party has been found in Varanasi Cantt. 58.46 per cent, and minimum in Ajagara constituency 38.32 per cent. Under five constituencies Bhartiya Janta Party (BJP+) have secured above to average vote share, and rest of three it has not secured equal to the average vote share 49.46 percent in the district. The second pre poll alliance was made between Samajwadi party (SP) and Indian National Congress (INC). Samajwadi party (SP) was in the power with absolute majority in Uttar Pradesh for the last five years (2012-17), but the performance of Samajwadi party (SP) was not as per expectation in Varanasi district in last election 2012. In 2017 assembly election, the average vote share of Samajwadi party (SP) and its alliance (+) was (20.18 per cent) in the district which was less than half of Bhartiya Janta Party (BJP+) and its alliance parties. The highest vote share of the Samajwadi Party (SP+) and its alliance was 31.87 per cent in sevapuri and lowest was in Varanasi south 9.67 per cent. The vote share in four constituencies out of eight, was below and rest of four constituencies, it has reached above the average vote share (20.18 per cent) in the district. Bahujan Samaj party (BSP) which has fray in 2017 assembly election without alliance, the average vote share of the party has recorded 15.73 per cent in the district, and it has declined 4.95 per cent comparison to previous election. Bahujan Samaj party (BSP) which is known as Schedule Caste dominant party, could not secured highest vote share in reserved constituency in 2017 assembly election. The highest vote share of the party was in Pindara constituency 26.68 percent and the lowest was in Varanasi south 3.32 per cent. Under four constituencies out of eight the vote share of the party was above and remaining four constituencies the vote share was below to the average 15.73 per cent vote share in the district. (Fig.5)

Reasons of increasing support base of Bhartiya Janta Party

Bhartiya Janta Party, the ruling party increased their influence in rural areas in 2017 assembly election. During 2012 assembly election, the party had won only three seats out of eight that too in the urban areas and the average vote share of the party was 1.43 per cent, while in 2017 the influence of Bhartiya Janta Party (BJP) has rapidly expanded. The party vote share, performance, seats and margin of votes between winner and leading candidates have massively improved. There are several reasons why and how the party has succeeded to expanse its influence in the rural areas.

Campaign Strategy The campaigning strategy of Bhartiya Janta Party (BJP) was successful in managing the votes in favour of party and their candidates. These strategies include door to door campaign, roadshow and election rallies by top party leaders which has direct bearing on the voting behaviour of the people.

Modi Upsurge In Varanasi, a part of voters have not been in favour of representative or party, most of them votes for Modi, the slogan was famous in the district, in 2014 parliamentary election and 2017 assembly election, Har Har Modi, Ghar Ghar Modi.

Social Engineering Bhartiya Janta Party (BJP) has done some social engineering working on caste line as is evident in selection of the candidates, state party leadership (party president) and chose of rally spots and, the party has set target on the large vote banks from non-Yadav Other Backword Class (OBC) to non- Jatav Dalit in the district. The party tried to attract whole backward, Dalit, and marginalized people in its favour. The party expanded its base in the rural areas and linked its affiliation with the farmers, labours, and other rural poor people. To expand support among the Other Backword Class (OBC), the party alliance Suheldev Bhartiya Samaj Party (SBSP) and Apna Dal (AD), and had selected party state President Keshav Prasad Maurya during assembly election. These are the example of social engineering of BJP and for this reason party succeeded to increase their influence in the District.

Anti-incumbency wave, internal conflict amongst Samajwadi Party leaders and leadership crisis in Indian National Congress Pre poll alliance has become a common feature in contemporary Indian political system. However, in case of U.P. election 2017 the alliance with Samajwadi Party (SP) and Indian National Congress (INC) proved to be fatal because of anti - incumbency factor internal conflict in Samajwadi Party (SP) for power politics and weak leadership and weakening party base of Indian National Congress (INC) even grass root level workers of both the parties now each other with suspicious eyes. The core voters of both parties, Samajwadi Party (SP) and Indian National Congress (INC) were not comfortable with each other due to coalition. The core voters who were not satisfy with the alliance, move to Bhartiya Janta Party (BJP) and exercised votes against their core party Samajwadi Party (SP) and Indian National Congress (INC) and in favour of Bhartiya Janta Party (BJP)

Raising sentimental issues The leaders of Bhartiya Janta Party (BJP) have raised some emotive and sentimental issues like kabristan-saamsan, uncut power supply during festival and triple talaqs are some of the fundamental issues which influenced non cadre-voters,

Nationalism The party has succeed to convince the voters in his favour on the basis of nationalism and try to conveyed their contribution of nation building since 2014 and try to link some issues with nation favours like Surgical strike, demonetization.

None of the Above (NOTA)

One new option has been included during 2017 assembly election procedure - NOTA (none of these above).This option has provided more liberal choice in exercising the vote of voters, after mention this option, the rights of voters have been increased and if no candidates or representative are favourable according to voters, they can pressed NOTA and neglect all contestant under the constituency. The option has inspired the voters to use their right to exercise the votes, which has playing the significance role to increasing the voting turnout.

Table.3: NOTA votes 2017

S.N	Name of the constituency	Number of NOTA Votes	NOTA Votes (in per cent)
1	Pindara	2,889	1.43
2	Ajagara	2,350	1.08
3	Shivpur	812	0.36
4	Rohaniya	2,190	0.95
5	Varanasi North	1,114	0.49
6	Varanasi South	457	0.26
7	Varanasi Cantt	758	0.33
8	Sevapuri	1,626	0.79
9	Total	12,201	0.71

Source: www.eci.nic accessed on 21. 07. 2017

In Varanasi, 12201 voters have opted NOTA which was a very small proportion of total voters whom have used their right to exercise vote, it was 0.71 per cent of total voting turnout of the district. The amount of NOTA votes have been indicate spatial variation in the district, but it has not reached more than 1.50 per cent in any constituency of the total voting turnout in the constituency. The highest proportion of the NOTA was pressed in Pindara constituency, in this constituency 2889 voters have chosen NOTA option which was 1.43 percent of total voting turnouts of the constituency. The lowest amount of NOTA users was in Varanasi south constituency, in this constituency 457 voters have been pressed NOTA button of the voting machine which was 0.26 per cent of total turnout of the constituency.

Conclusion

Analysis of the electoral data reveals that voter turnout of Varanasi has slightly (4.25 Percent) increased as compared to previous assembly election 2012, while constituency wise turnout pattern illustrated different picture. Increased voting turnout is the outcome of Elec-

tion Commission role which has conducted various exercises and activities like cricket match, street plays, rallies and awareness campaign for more than one month to increase the polling percentage. Besides the Commission's role, other agencies like Media, Street play, intense Campaign and roadshow of the party leaders had played significant role in creating awareness and motivating the voters to exercise their democratic right. The increasing voting turnout in the election is the witness of people coming out of the four walls to use their voting right on polling day to elect their representative. This type of zeal and zest leads to an evolvement of a functional and real democracy and powerful country. The high voting turnout in reserved constituency reveals that the people who belong to socially isolated groups are also equally conscious to use their voting right. The high voting turnout in rural constituencies as compared to the urban constituencies and female high voting turnout comparison the male, further strengthens the view that the traditional perception, that 'urban people participate in political activities comparison the rural one, and male are more active than female in political activities' has changed and the present picture indicate contrary condition of the tradition. During the parliamentary election 2014 and after that, the attitude and behaviour of voters have been changed during use the right of exercising vote, through passes of time. They are gradually inclined and exercised their votes in favour of development, local issues, anti-incumbency, employment etc. instead of castes, communal, class, neighbourhood, relatives etc. The voter away for emotionality, propaganda, gift(money, liquor, clothes etc), now they are gradually become rational, and hope to forthcoming government as such policies which are support to remove the problems, unemployment, make strong unity of country and democracy ,make the easy life to live everyone. Increasing voting turnout reveal that, not only the behaviour of voters have been changed but also they were illustrated highly eager to use their franchised. 2017 assembly election is witnessed of that thing and provide the adequate evidence to prove whole thing.

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Matrimony, Marriage and Migration in Mithila Region, India: An Exploratory Geographical Study of Saurath *Sabha*

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Abstract

Marriage migration is important migration type in the patriarchal societies. The system of matrimony is considered crucial in the institution of marriage and associated negotiations. They together form significant social and cultural academic research issue particularly in India. This paper is a brief attempt to look into Saurath Sabha, which lies in linguistic region known as Mithila, popularly known for organizing matrimony fairs actively participated by Maithila Brahmins and Karna Kayasthas. Though this tradition is continuing since more than 700 years, due to contemporary impacts, decline in participation in the Sabha and loss of its charm is noticed in recent time. The analysis and discussion attempted are based mainly on literary sources.

Keywords*: marriage, matrimony, migration, Panji, Panjikar.*

Introduction

Women's independent work participation and work related migration is a reality today even in Indian like developing society; however, marriage migration is one of the most important type of migration taking place presently. It has been noted by scholars that marriage migration is by far the largest form of migration especially in India and is close to universal for women in rural areas (cf. Fulford, 2015). The various aspects of marriage migration generally discussed in literature are: (a) how, given specific rules of marriage and (post-marital) residence, the institution of marriage may itself entail women's migration; (b) how marriage can be used as an individual and family strategy to facilitate migration, and conversely, how mi-

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gration may become an important factor in the making of marriages; (c) the fluid boundaries between matchmaking and trafficking in the context of migration; (d) the political economy of marriage transactions; and finally, more broadly, (e) the impact of intra- and transnational migration on the institution of marriage, family relations and kinship networks (cf. Palriwala and Uberoi, 2005).

A woman leaves her natal house on marriage to take up residence in the home of her husband and his patrilineal kin under the rule of patrivirilocality. Additionally, marriage rules might specify certain principles of territorial exogamy, that is, not only marriage outside a particular kin grouping (such as the lineage or clan), but also outside circumscribed spatial boundaries like the village (ibid.).

The idea of descent group gets resonated in Indian context where a system of gotra[1] is very important in determining whom a person can marry and whom can not. In Northern Indian caste endogamy, clan exogamy and the rule that a person must not marry in his patrifamily and must avoid marriage with Sapinda[2], literally 'agnate', kin is ensured. Another an-

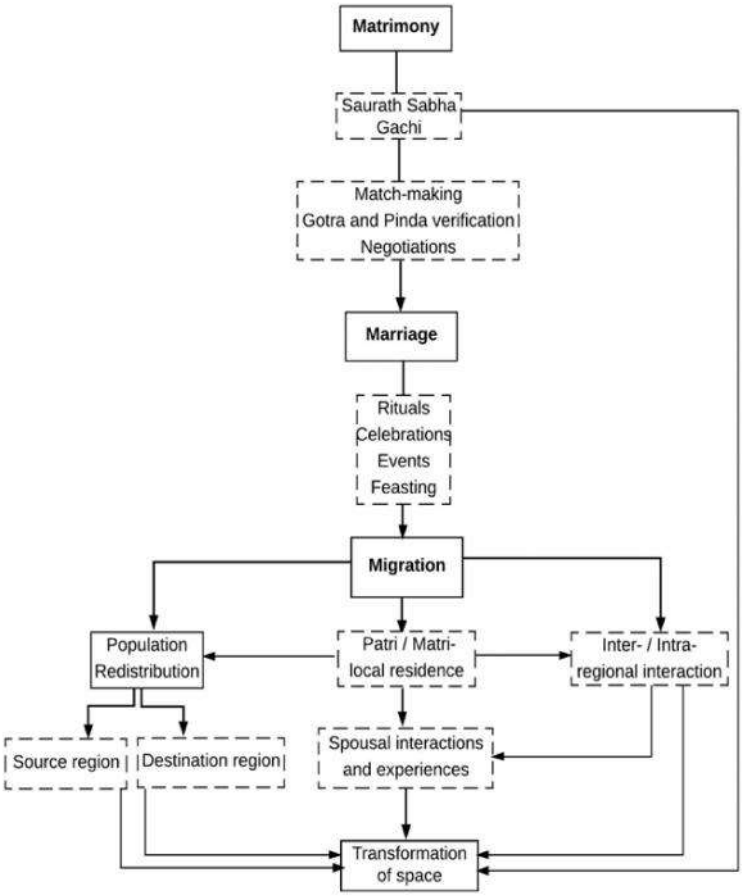

Fig. 1: Matrimony, marriage, migration and their consequences: A generalisation.

cient rule is avoiding marriage to a person who is removed by less than seven degrees from father and five degrees from the mother. Thus, the traditional notion of migration, which states that men migrate for work first and then women follow, stands challenged now (Ghosh, 2017).

The process of acculturation and Sanskritization[3] leaves a deep impact on migrants and the area where they migrate. Migration waves have locations in terms of origin and destination and are therefore of geographical interest. Geographical space is transformed, developed and ultimately is the result of the society which makes influences over it (cf. Fig. 1). Cultural practices determine the form of landscape. Some places become sacred while others a market because society makes them so. Similarly, Saurath, which is under study in this paper, was once a land where a number of trees were present and people congregated here; thus, known popularly as "Saurath Sabha Gachi". Presently, it is the mirror of cultural practices regarding matrimonial decisions, which are prevalent since many hundred years.

Objective and methodology

This paper is exploratory attempt to describe the role of Saurath sabha in the matrimonial alliances and to what degree does it affect the migration in Mithila region from the geographical point of view. It also tries to highlight the migration by Maithila Brahmins and Karna Kayasthas in the region. The paper is based on qualitative method based on data and information retrieved from literary sources. The location map of the stuy area has been prepared using ArcGis 10.5 by geo-referencing tools. The following analysis and discussion are organised into four major sections, viz. study area, Maithila matrimonial alliances and Saurath Sabha, Panji, Panjikar and Panji-prabandh, and migration from Mithila.

Study area

Mithila region is identified as a linguistic region in which Maithili[4] is the predominant language. It is located between 25º28" N and 26º52" N latitude and 84º56" E and 86 º 46" E longitudes (Fig. 2). The region is bound on the north by the Himalayas, and on the south west and east by the Ganga, Gandak and the Kosi (Kaushiki) river, respectively (Choudhary, 2010). It is also known as Videha and Tirabhukti or Tirhut and claims a very ancient origin (Rekha, 2011). Presently, it comprises the modern districts of Madhubani, Darbhanga, Samastipur, Vaishali, Muzaffarpur, Champaran, Monghyr, Saharsa and Purnea in the state of Bihar and about 25,800 sq km (or 10,000 square miles) in Nepal cited as far back as 1000-600 CE in the Sathapatha Brahmana as

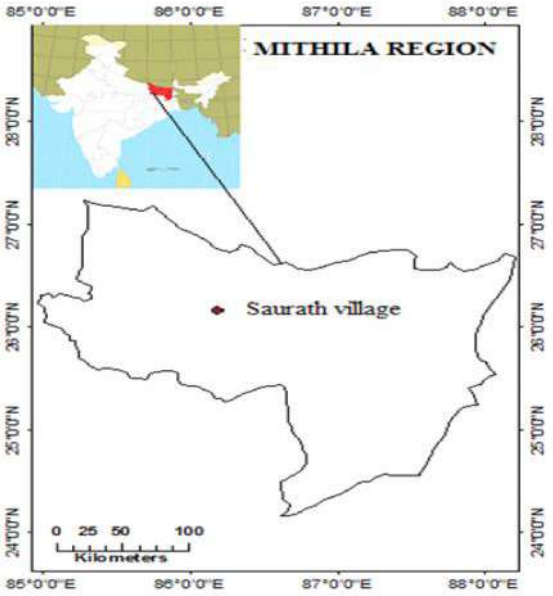

Fig. 2: Location of Saurath village
(Source: Based on Grierson, 1903)

the boundaries of Videha, an older name for Mithila, the kingdom of legendary king Janaka whose daughter Sita was given in marriage to Rama (cf. Brown, 1983).

As mentioned above, the region is identified with Maithili. As a matter of fact, very many important intra-regional variations within Maithili are reported (cf. Chaudhary, 2010) and identified as the following (Fig. 2):

1. Standard Maithili: North Darbhanga district
2. The Southern standard: South Darbhanga, East Muzzaffarpur, North Monghyr, Saharsa and West Purnea
3. The Eastern standard: East Purnea, Maldah and Dinrajpur (also known as Khotta)
4. The Chika Chiki: South Bhagalpur, North Santhal Parganas , South Monghyr
5. The Western standard: West Muzzafarpur and East Champaran
6. Jolahi: Tirhut (generally spoken by weavers)

Maithil matrimonial alliances and Saurath *Sabha*

Saurath is a village in Mithila region known for holding an annual congregation for matrimony. It has the reputation of a matrimonial system and organisation since c. 1298 CE, as per the *Panji* records. It is recognised as the oldest of the *Sabha-Gachis*[5] in the region. The people of Mithila, especially Maithila Brahmins and Karna Kayasthas assemble here for a week to two in the month of *Ashadh* (usually June-July in the Gregorian calendar) to negotiate and settle matrimonial alliances after consulting the genealogical records with the help of *Ghatakas* (marriage-contractors or go-between) and *Panjikars* ('chroniclers'/ 'genealogists').

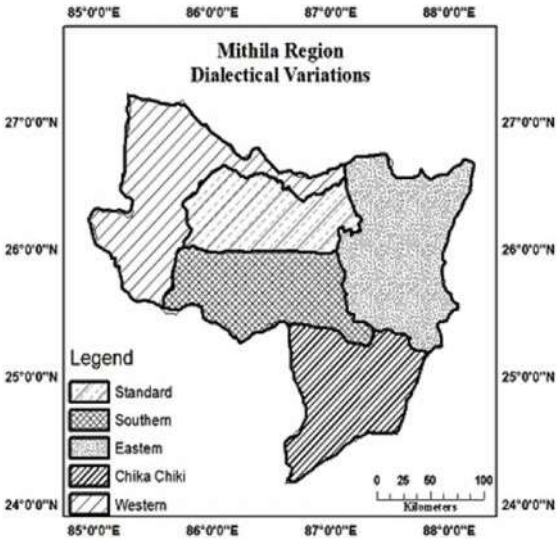

Fig. 3: Major dialectic variations of Maithili (Source: After Grierson, 1903)

'Saurath starts bubbling with activities in *Ashadh* month every year with the arrival of people seeking matrimonial alliances for their sons and daughters. The fascinating sight of the grooms who have to be present in ethnic costume of Mithila worn during special functions namely *dhoti, kurta, tauni* (long scarf), *pagh/ pagadi* (a typical ethnic headgear) in multitude colours, sitting under the benign shade of large overflowing trees with their elders, patiently waiting for the prospective bride's relatives to start negotiations, makes one feel as if they are on sale like any other commodity in a market' (Sinha, 1999). It is notable that girls are not allowed to attend the *sabha*. The gathering takes place in 22 bigha[6] land for about ten days under a banyan tree. Hence, locally it is also

known as Saurath *Sabha Gachi*. Maithila Brahmins had begun this process in 1310 CE. Orthodox among them consider marriages settled here as the best. A number of 'scientific' reasons are enumerated by the organisers behind this kind of *sabha*. On the initial days of the Saurath *sabha* there are few negotiations but as the last day approaches the number of negotiations gradually increases.

Saurath is seen as an aesthetic place as well as an important place of pilgrimage. As noted by Sinha (1999), 'The Maithila Brahmins known for their scriptural rigidity and religious feelings assemble in thousands to settle marriage of their sons and grandsons with girls they have never seen'. People participating in Saurath are provided with the facility of *dharmashala* to stay over the period of negotiation. There are drinking water taps and temporary eateries serving refreshments to the visitng people.

To others, it provides a purview of a ten days' annual fair however to the Maithila Brahmins it is a '*sabha*'. During this period the village springs up with the best possible festive look. Even the Government makes special provision for transport facilities. The village is lit up till midnight on some of the days due to prolonged activities. Once the perfect match is found the marriage rituals take place starting from the '*Siddhant*', locally also known as *swajan virjan adhikar patra* ceremony. A congregation like Saurath sabha is a matter of convenience for poor parents who must necessarily otherwise move about long distances entailing avoidable heavy expenses in search of suitable grooms for their daughters.

There was a time when Saurath, as a rural settlement, was seen as a backward place due to lack of road linkage and electricity connection. And, the local people used to live in small hutments. Now, the condition has changed. The hutments have acquired the form of modern *pucca* houses built with brick, cement and concrete. The village is also served with proper electricity at present. Similarly, Saurath *sabha* too has seen transformation over the years. The *sabha* was once a pride of Mithila culture and its entity started gradually declining due to the onslaught of 'modernisation' together with a number of other reasons during recent past. The most important being dowry, as boys are negotiated in terms of a fixed dowry according to their educational qualification and employment status. Then the highly qualified youth find it out of their dignity to wait for days to get married to an unknown girl. The family from the bride's side wants qualified boys but majority among the ones who turn up are unemployed and uneducated. Thus, it was reported that mass migration, intervention of middlemen, dowry demands and general apathy have contributed to the falling popularity of the *sabha*. 'The *sabha* has now become a congregation of the poor and the illiterate Brahmins only' (Sinha, 1999). The Telegraph (13 July 2016 Jamshedpur) reported, 'Only poor and middle class people assemble here that too from neighbouring areas...'. Thus, people are said to be reluctant to attend the *sabha* and continue the centuries'old traditional culture of matrimonial alliance.

This has now become a severe problem from the perspectives of the bride's father and family side. For years, the Saurath *sabha* had been organized but due to waning interest among the people and the negative aspects it was discontinued for about seven years, said

by one of the organisers Shri Premchandra Jha. In 2015, a group of people united to revive the institution of the Saurath sabha and organize it again. Chalu Saurath ('Let's Go Saurath') is the name of the annual movement aimed at promoting the revival of this system through inspiring the people and generating awareness among them to participate and keep this socio-cultural institution alive. Since 2015 the number of participating people has started growing. With a lot of effort of the organisers, about hundred marriages were negotiated in 2017. In 2018 also an increase in the participation is expected for which the awareness drive has already begun. In tune with the changing times, the record keeping is being digitized and the process of negotiation has also taken a new form.

Panji, Panjikars and panji-prabandh

Panji: Panji ('Chronicle') is a genealogical record. This system of record keeping was created to guard against the possibility of marrying a girl who may not be marriageable according to the Shastras which prohibit the marriage of a person in the same gotra, i.e., sagotriya and sapindas (cf. Chaudhary, 2010). Maithila Brahmins claim that their ancestors were well aware of the 'cross fertilization' theory. It is an important document prepared since c. Saka 1235 (1313 CE) during the reign of Harisimhadeva (c. 1303-1326 CE). The prevailing panji-pratha which continues till today, provides an insight into clan migrations as well in rural settlements of Mithila (Mandal, 1981). Along with genealogies, it also enlightens us on the socio- religious condition of the people during the period. Thus, it has immense value as historical record of the region and its people.

Panjikars: The Panjikars, most important functionaries in Saurath sabha, along with other functionaries, make the registration process possible through the verification of different levels of genealogical documentation. The Panjikars who maintain the family data/information of each Maithila Brahmin play an important role in traditional match making which ensures 'purity' of blood and considerable cross-fertilization to have better progeny.

Panji-prabandha: Panji-Prabandha literally means 'record keeping' which initially had to do with the kings of Mithila and other important people of the region. Later its scope broadened to refer to writing down of the genealogies of all the upper castes in Mithila. Panjikars began to record each family's ancestors for six generations to avoid incest. In the genealogical records, the name of ancestors is enlisted; however, the names of grooms and brides are not revealed. This system became popular with passage of time especially among the Brahmins and Karna Kayasthas of Mithila (cf. Rekha 2011). Panjikars have details of fifteen generations compiled in alphabetic order.

Some scholars believe that the institution of Panji-prabandh proved to be fundamental to Maithila society. It became such a cultural tradition which attempted to homogenise the Maithila society and create a national society. Some contend that it has been the means of preserving the distinct character of Maithila culture of maintaining blood purity and social harmony (cf. Jha, 1974; Jha, 2003).

Jha (1974) has made an attempt to bring out the idea of Panji-prabandh in Mithila for which he is well recognised. He explains how in Panji-prabandh Brahmins of Mithila were

recorded under nineteen gotras and further it was subdivided into one hundred and eighty mool. A mool is actually the earliest known village where the beejee-purush (i.e., the earliest known man from whom lineage of the family could be traced) resided. Thirty six moolas out of one of the one hundred were precisely ordered in the sense that Brahmins affiliated to any one of these mools have only one corresponding gotra. Hence, these thirty six moolas were called vyavasthit amoolas. Rest of the moolas were not precisely ordered and Brahmins affiliated to anyone of these are generally found of different gotras and called avyavasthita moola. Hence, these moolas were called vyavasthita (Jha, 1974). Further categorization of the shrotriyas took place when marriages outside the fold of vyavasthita moolas occurred. Those who had no connections with avyavashtita moola and maintained purity were called avadata, rest were known as laukit or the ones who suffered degradation from avadat. However intermarriages among them and outside the fold of shrotriyas effected the disappearance of avadat and only laukit holders remain.

Migration from Mithila

The history of Mithila in the early medieval period is the history of constant warfare and invasions from outside, which led to a chaotic situation and wide-spread poverty. The priests in general lived from hand to mouth. Therefore, instances of migration of Maithila priests to different parts of the world like Vietnam, Burma, Combodia, Tibet and other places are reported. A large number of Tibetan students flocked at Nalanda in Magadh and Vikramshila in the eastern part of Mithila. It is also evident from the identification of Siddhas with Maithilas. Whatever the birthplace of Bauddhas and the Siddhas, there is no dispute on the fact that most of them lived for long in the monastery of Vikramasila, spoke the language of Mithila and used the then script of Mithila. And, as such it is safe to call them Maithila (Jha, 2010). Similarly, in another context also the same idea is found demonstrated, "A majority of the manuscripts found in Tibet are in early Maithili script differently called by different scholars as proto-Magadhi or proto-Bengali. This clearly proves that the vast majority of these refugee priests came from Mithila, i.e., Campa and Tirbhukti. This was perhaps the largest group migration of the Maithila priests (ibid.).

As far as the migration of the Maithila Brahmin priests is concerned, we find that they migrated to Bengal in good numbers. Migration of the Maithila Brahmins in the region of Santhal Parganas started taking place since c. 10th century CE. In order to understand the process of Sanskritization and acculturation through the ages, the migration of Brahmins which also took place from Mithila in different directions needs to be studied. They were respected wherever they went and made their mark in several fields-administration, scholarship, priesthood, etc. (cf. Jha, 1991).

We do not have much reference about the mula grama ('place of origin') of the Maithilas of this area in the Panji-prabandh also. As per the Panji-prabandh, many families of the Maithila Brahmins migrated to Bengal and other parts of the country, whose genealogical

records could not find a place in the celebrated Panji for want of positive information. Maithilas came in the 17th century to seek assistance from the king of Gidhaur[7] and secured his favour on condition that they will act as pujaris ('priests') of Baidyanath temple. The second view is that the Maithilas came here in search of employment. They found Baidyanath temple and ample land for agriculture. They started cultivation and worship of Lord Baidyanath. Even to this day, some of the Maithilas of Athganwa are cultivators and the Maithila priests either have kinsmen or landed property in these eight villages. The migration of Maithila Brahmins in this region started a new era for this land. The process of acculturation and Sanskritization left deep impact on both the Maithila Brahmins and the local traditions of this area. The Kayasthas who came probably from Karnat Kingdom of south India are known as 'Karna Kayasthas' (ibid.). They have settled in Mithila over the years and have also taken part in Saurath sabha for matrimonial alliances.

The contemporary scenario well reveals that the rural people have become more mobile in the recent years, with deteriorating employment prospects locally and emerging opportunities elsewhere. With the exception of the poorest of the poor, the largest landowners and successful businessmen, nearly all others including medium farmers and forward castes are migrating. While the most educated and wealthy (usually upper caste but not always) migrate for secure and well-paid jobs on a more permanent basis, the vast majority of migrants go for periods ranging from 3 to 9 months (Deshingkar, 2006). The choice of destination is strongly determined by social networks people from a particular caste and village have and they tend to go to the same destination and into similar occupations. Distance and transport facilities are not as important in determining the choice of destination. The attractions of city life have become a major factor in shaping migration decisions, especially for young people and this explains in part the high migration rates among the better offs. There is no doubt that migration and remittances have improved the standard of living of thousands of families in the poorest districts of Bihar. In the case of the poorest unskilled labourers, migration helps to earn incomes and improve food security.

The present migration pattern, the most important reason of migration from rural areas is rural economic stress, manifested generally in absence of economic opportunities and amenities. The portion of income sent back to families is called remittance. This helps the ones who stay in the place of origin of migrants to improve the living standards and meet their basic needs. Akbar (2012) has mentioned the choice of destination for seeking employment from Saurath. From his study of total 596 households, 134 individuals have migrated. Table 2 below shows that majority have migrated to big cities although a number of cities were reported by his respondents. Delhi has appeared as the most preferred than any other city as Hindi is used by the masses with which the people of Saurath are also well conversant.

Table 2: Geographical Dispersion of migrants from Saurath village

Destination	No. of persons	%
Bihar	9	6.72
Delhi (including NCR)	72	53.49
Gujarat	6	4.48
Himachal Pradesh	1	0.75
Hyderabad	1	0.75
Jharkhand	1	0.75
Kolkata	4	2.99
Mumbai	21	15.67
Punjab	5	3.73
Others	14	10.45
Total	134	100.00

(Source: After Akbar, 2012)

However, in the present study area there is a usual outward flow of migration from rural Bihar is generally to urban areas which provide (better) job opportunities. It is well documented in academic circles and media too has been reporting this phenomenon from time to time: 'Migration to urban cities from Mithila has become a worrying phenomenon. Owing to better livelihood opportunities, migration from Mithila to cities like Delhi has become common. I observed that many people from Mithila itself don't know the intricate details of their native place or have forgotten them over the years. The disconnect is such that now they do not even converse in their native language' (Narayanan, 2016). This report published in a newspaper indicates to a massive cultural change taking place which is basically induced by economic factors.

Marriage migration: There is a different type of movement from village which involves 'change in usual place of residence' due to marriage. As mentioned in the introductory section, it is the migration of women caused by marriage, usually called as 'marriage migration'. This is perhaps the most common and constant cause of migration of women from rural areas particularly. The nature of marriage migration varies from society to society depending upon associated customs and traditions. In a society where village endogamy may be common, there may not be marriage migration. Also there are societies where post-marriage location is matri-local due to which husband has to migrate rather than the wife after marriage.

Saurath sabha, instrumental in the matrimonial alliances in the region, is also an important source of information about the migration taking place due to marriage in the Mithila region, as the panjikars in the Saurath sabha maintain a detailed information about the grooms enrolled for marriage and also their jobs to look for prospective wife. From the sabha, one gets the information that marriage is geographically endogamous in character. However in search of employment, education and a better standard of living people are moving outside their native. The grooms having a proper urban livelihood and a good salary are preferred. Women are not allowed to take employment elsewhere but they are allowed to participate in farming and making Mithila paintings which provide them status and identity recognised in the country and beyond.

Conclusion

Saurath sabha is a unique identity of Mithila, known for its rich indigenous culture along with the unique traditional matrimonial practice flourished over a long period of time. Hence, it is necessary today to reassess the deterioration

of Saurath sabha and its neglect. The organisers are trying to revive it and update and maintain the genealogical records and other details in digital form keeping in view the technological changes and people's need. The region has an old history of migration to different parts of the country and beyond. Though the youth contemporarily make migration decisions in search of education and employment opportunities in big cities and elsewhere; marriage in Mithila through Saurath sabha is still prevalent. Inconsistency in this regard cannot be denied. Decay of any socio-cultural tradition is well attested by several historical evidences; nevertheless corrective measures could always be taken to preserve a sound cultural practice in this case by both the youth and elders of Mithila to retain the 'scientific' system of marriage. Creating awareness among the youth about the importance and necessity of this social institution is crucial at present. The preliminary findings of this brief exercise open up vistas for comprehensive future research.

Notes

1. Gotra ('patrilineal clan') is a very important concept in the Indian caste system, especially in marriage affairs.
2. Sapinda relationship with reference to any person extends as far as the third generation (inclusive) in the line of ascent through the mother, and the fifth (inclusive) in the line of ascent through the father. For details see, <https://en.wikipedia.org/wiki/Sapinda>; and, Hindu Marriage Act, 1955).
3. 'Sanskritization' is a term used by Srinivas to denote status emulation employed by (lower) castes as a means to upward mobility (see, Srinivas, M.N. 1952. Religion and Society among Coorgs of South India. Clarendon Press, Oxford).
4. Maithili is an Indo-Aryan language recognised as a regional language of India and one among the twenty-two languages included in the Eighth Schedule of the Indian Constitution
5. Sabha Gachi ('congregation in orchard') is organised for the sole purpose of matrimonial negotiations. Initially this marriage congregation was organised at Sambhaul village and after around 100 years, its venue was shifted to Saurath village.
6. Bigha is a traditional unit of measurement of land area but not standard one as it varies regionally.
7. Gidhaur State, was one of the Princely States in India before the Partition, which falls in today's Jamui District of Bihar.

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Claims of Rights to Urban Space: A Comparison of Ghettoised and Non-ghettoised Muslim Residents of Kolkata

Ahala Saha[1]

Abstract

Most research pursuits on people following Islam and inhabiting cities in India have taken the researcher to urban slums. These clearly are not mere coincidences but outcomes of very deep-rooted and persistent deprivations, so much so that these economic deprivations today have become characteristic of Muslims in Indian cities. Urban poor Muslims in India mostly live in areas that are poverty stricken and dirt filled city spaces. Also, they are ghettos. However, there are poor Muslims in Indian cities who live outside ghettos, in a mix with others. This study argues that those who live within ghettos have stronger voices as compared to those who do not. Ghettos therefore are those city spaces that ensure greater freedom and lesser hesitations. However, this is not to undermine the fact that ghettos are spaces of deprivation and evidences of denial of the right to the city.

Keywords*: Muslim ghettos, right to the city.*

Introduction

In an attempt to develop a philosophy of the city, it has been explored as a heritage of the past and therefore in a position to explain complications arising out of social realities (Lefebvre, 1996). The identity of a 'city', is interestingly intertwined with the entity of 'society' through a network of relations, like the private property relations as explained by Karl Marx, the structures of legitimate domination as opined by Weber or the division of labour as per the ideas of Durkheim (Holton, 1986). The Chicago school's popular concentric zonation and its labelling as equilibrium and anything otherwise as disequilibrium actually confined the poor to quarters designated for them and their out migration is interpreted as an abnormality of sorts (Harvey, 1972). Therefore, ghettoisation, undoubtedly is a discriminatory process. However, the dynamics within the same can be otherwise as well, this paper ar-

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gues. Also, it is important to conceptualise problems as solutions and solutions as problems (Harvey, 1972).

Space and place can thus become much more than passive stages on which social relations are enacted upon, they are in fact active participants 'in the complex constitution and articulation of social relations. In this sense, identity politics become identity politics of place...The significance of communal places as sites of struggles and negotiations of social identities/boundaries and power relations…are simultaneously struggles for and negotiations over identity, social boundaries and material reproduction and that the appropriation and control space is central to this process...The outcome of these struggles led to a reconfiguration of the places in questions and to the formation of new alliances' (Holton, 1986, p. 10).

Muslims are one of the most urbanised and populous religious groups inhabiting Indian cities. And this association is very long. History has made them an integral part of Indian cities. They saw a time of glory, achievements and comfort precisely during the Mughal times. The pre and post independence periods saw a sharp decline in their economic status and more. (Recently, they are in the process of re-emergence in the form a middle-class). The Hindus who shared neighbourhoods with them moved out to better localities since they could largely afford them. This led to the natural formation of not just Muslim dominated but Muslim specific neighbourhoods in India and they were further concretised during incidences of the post independence communal violence (Jaffrelot and Gayer, 2012). So much so that they have come to be called as Muslim ghettos in popular literature though there is a lot of debate on the use of this term so loaded. The older residents harbour a feeling of topophillia owing to their age long associations with their cities of stay. Currently migrants also comprise a fair section in these ghettos which are poorly served neighbourhoods with meagre amenities. Sometimes, this is an advantage since it helps one among the community members to contest and get elected from the area and alter things towards the benefit of the community. Kolkata, which form the site of the current analysis, is no exception to these pan Indian trends. There are distinct Muslim neighbourhoods, whether they can be called ghettos or not is another question. In fact, 'fully-fledged Muslim ghettos' concretised in cities where communal violence reached an exceptional level like in Ahmedabad and Mumbai. But the impact of these events was so strong that they were felt in other cities as well especially those that housed a significant share of Muslim population, Kolkata being an example (Jaffrelot and Gayer, 2012).

It is by virtue of these processes through history that the urban identities get characterised and confer characters to the city spaces through both usage and belongingness to the same. The engagement is largely with the everyday use, participation, production and reproduction of urban spaces and that is precisely why both material and non material aspects of a city, its imageries and imaginations become important because it is these denials that urge a section to claim substantive citizenship rights beyond the larger realm of formal rights, thereby venturing into the domain called the right to the city, which essentially is ones spatial claims to ones city of inhabitancy. However, right to the city is not an end in itself. It is

precisely a tool to empower the 'city'zens. A right to the city does not only mean a right on all that already currently exists in a city, its resources and services but over and above this, it must also mean the right to transform the city, shape it according to ones desires, to be able to create and recreate it and to be able to give it a character. The right to the city is therefore an antibody to be created against exploitation and exclusion of any kind.

As far as Muslims in Indian cities are concerned, there exists a sense of nostalgia and very positive affiliations in the minds of many since they are aware of their contributions in making the city and giving it a character that it has today. On the other hand, they also have this information that most of their residences are poverty stricken slums which are dirt filled and bear impressions extremely negative in the minds of their fellow city mates. Therefore, the low status Muslims might just have the right to formal citizenship to themselves, but what they lack and desperately ask for is the right to substantive citizenship. For the Indian Muslims therefore, it is not the question of establishing rights but one of 're'-claiming them. In this research, the attempt has been made to analyse the role of ghettos in determining rights by juxtaposing the two entities of urban space and right to the city as claimed by urban Indian Muslims of lower economic strata as observed in the Indian city of Kolkata.

Research questions

- Do Muslim ghettos play a role in asserting one's rights to the city?
- Which human identity dominates in asserting one's rights to the city - economic or ethnic?

Objectives

- To compare the rights and denials as claimed and experienced by a deprived community that lives within ghettos and another that is the dominant majority in the city.
- To compare the rights and denials as claimed and experienced by members of a deprived community that lives within ghettos and members of the same that lives outside, like a mix with the overall city population.

Database

Data has been collected from slum areas of the city of Kolkata during 2014-15 as a part of my doctoral research fieldwork. Two Muslim ghettos have been covered with 50 samples from each, thereby making a total of 100 Muslim individuals who are currently existing in a ghettoised manner and from the other city slums with mixed population, 58 were covered purely by chance, thereby in a way justifying their prominent existence in slum areas.

Methodology

The overall methodology is a field based mixed approach, in the sense that established conceptual understandings of ghettos and rights are analysed, criticised or accepted as per observations from the field. Therefore, the city of Kolkata in India has been used as a site for observation. Choropleth mapping has been done using the Location Quotient method to show concentration and Binary Logistic Regressions have been run to understand relative probabilities of categorical variables.

Discussion

Denial and clustering: Ghetto

There is little disagreement in the existing literature on the inhabitation of Indian urban Muslims in neighbourhoods that are poverty stricken city spaces. In fact, it is the persis-

tence of denial and continuous clustering that led to the formation of very compact and segregated neighbourhoods called ghettoes. However, frequent religious riots have contributed if not initiated the process of urban segregation and ghetto formation in the Indian case (Chatterjee, 2015). Strictly, the term ghetto refers to a walled space of existence, essentially outside the main city. However, this is not true for Indian cities. The Muslim areas are very much within the city, sometimes towards its centre, yet the ghettoisation is most profound and clear, as is the case with the Muslims of Hyderabad, who are still stuck to the old city (Vithal, 2002), Muslims from Delhi's Chandi Chowk among others. However, in the case of Kolkata, peripheralisation is clearly distinctive. Park Circus, Tangra, Tiljala, Topsia, Beniapukur and others together form a huge chunk of Muslim domination towards the eastern margin of the city (figure 1), forming a 'Muslim area' in popular lingo.

Ghetto and further denial: Conflict

The combined effects of 'civic neglect by the state', 'discriminatory treatment of its agencies' coupled with an ever increasing insecurity among urban Indian Muslims have lead to their 'marginalisation' (Jamil, 2011). Most of their other behavioural patterns like child bearing, labour market participations, educational attainments and the likes are treated as both explanations to and outcomes of the same (Robinson, 2007). Inaccessibilities (by Indian

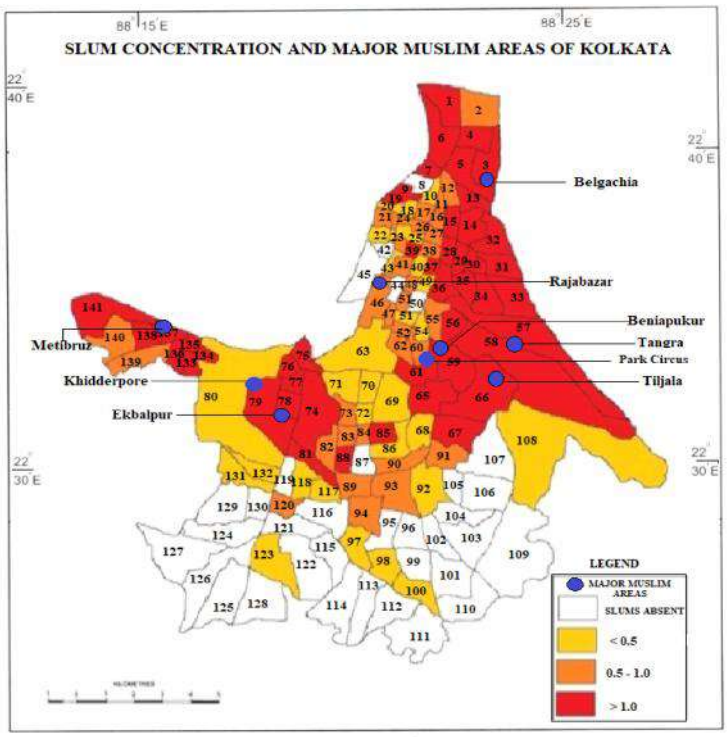

Figure 1: Showing coinciding locations of high slum concentration and major Muslim areas

urban Muslims) to resources are not mere inaccessibilities, but roots of (religious) conflict. Most historic tensions that have erupted in this world have been outcomes of differential control over resources. Therefore, it is indeed appropriate to ask what is so particular about certain neighbourhoods that they become sites of struggle? They explain in the course of their study that Hindu-Muslim conflicts within Indian cities 'is conditional on city-level demographics', 'living arrangements', 'residential segregations', 'economic shocks' and the likes (Field et al, 2008). Thus, it is essentially about the geography of communally-segregated inhabitations that spell denials initially and conflicts finally.

Narratives from Kolkata: Overall denials

In the city of Kolkata the overall analysis of people practising Islam and inhabiting slums reveal the following: Firstly, deeper denials emerge when an individual is simultaneously poor and a Muslim. Secondly, accessibilities, political participation, developmental perceptions are all guided by this overlap in identities. Thirdly, this overlap, very interestingly is both-sided, in the sense that, if a Muslim individual is poor, it is problematic and if a poor individual is a Muslim, it is also problematic. Fifthly, there are other overlaps - like, if one is a Non Bengali (speaking a language different from that of the majority, thus implying cultural differences) and a Muslim, it is relatively more problematic as compared to a situation where one is a Bengali-Muslim. Lastly, there also exists a triple overlap leading to triple denials, that is, if one is a Muslim, poor and a woman.

Kolkata, also appears to be a city where a concretised consciousness of denials to religious rights to the city is not very profound, at least not out rightly, as compared to a few other cities in India, so much so that Kolkata has been designated to be safer for Muslims as compared to the northern and western Indian cities and argues the presence of an over three decade long left rule in the region as a justification for the same (Chatterjee, 2015).

However, the repeated concentrations of Muslim residents of the city within categories of attainments and accessibilities that spells denial or relatively less accessibility as compared to their Hindu counterparts needs to be addressed. Also, it is important to ask therefore, whether being a Muslim is a reason for denial or being poor? If being poor is the primary reason for denials, then denials should not be attributed to religious identities. However, it is also important to differentiate between religious rights - that is, rights pertaining to practice, propagation and expression of religion and rights that pertain to a religious community but not in the context of one's religion. If denials pertaining to the former are more derogatory, then the latter deeper.

Spatial identities and identities of space: Kolkata muslims

The ghetto as a spatial unit qualifies for a very intriguing site for geographical enquiry. It is born out of persistent denials, in the sense that if denials did not persist, communities would probably not have clustered; individuals forming these communities would have probably felt free to reside in any part of the city, thereby dissipating ghettos even if they had been initiated purely out of cultural and ethnic preferences. People rising along the class ladder in due course of time are seen to move out of their ghettoised existences as soon as they can afford it. The fact that ghettos exist bear testimony to the fact that denials exist.

However, it is existence within ghettos that confer voices to the voiceless; in the sense that the ghettos (at least in case of the Muslim ghettos of Kolkata) help in concretising claims to that very segment of the city space and the city at large through the same. Right to the city, is a sense of claim that essentially emerges out of the right to inhabitation and ghettoised inhabitations create that sense of place, that feeling of topophilia, which in turn becomes instrumental in claiming rights to the city at large, which otherwise is absent or scarce, implied through the very act of ghetto formation. Hence, people inhabiting ghettos feel more empowered as compared to those belonging to the same community (Muslims in this case) but scattered across the city. A ghetto therefore evolves from being a space of deprivation at its initiation to become one of empowerment eventually, having emerged from being a space of cultural expression to one of political assertion. The assertion and the empowerment possibly find more ground through the very processes of deprivation and denial.

Ghettos are involuntarily created units of space (Marcuse, 1997). This idea is possibly true only up to a certain point in time. After which, ghettos become units of voluntary refuge. Whether the act of refuge itself can be claimed to be one by choice is an extremely debated idea however. Marcuse also explains people inhabiting ghettos as those distinct from their surrounding, which is also true up to a certain point in time only, given the fact that one community, most often in reality, does not remain confined to its respective ghettos always, in fact it tries to break away as early as possible, thereby breaking away from the associated shaming of inhabitation. Those that retain themselves within ghettos are the ones that translate its geographies into spaces of assertion implying their prolonged existence within the same, thereby adding a new shade to the already existing complexities and diversities of the entity.

Ghettoisation has been repeatedly argued as a process of oppression and differentiation between those within and outside the same (Marcuse, 1997), which is also assumedly implicative of the differences between the community that is ghettoised and the 'others' meaning those who are non members of this concerned community. However, in case of Indian cities, taking the Kolkata case for instance, it can be said with enough conviction that Muslims do form ghettos in Kolkata, but the community is not confined to ghettos alone. There are Muslims living outside, like a mix with the overall population of the city. Therefore, a simultaneous differentiation is also generated between Muslims inhabiting ghettos and those who do not, besides Muslims and non Muslims at large. Having said this, it is important to incorporate the idea that there does prevail the process of 'othering' both among and within communities (Jamil, 2011). She explains, in the context of the Muslims of Delhi, as to how they fail to articulate their belongingness either to the city or the community or both. In this research therefore, an attempt has been made to compare the rights to the city as claimed by ghettoised Muslims and Muslims generally inhabiting Kolkata and not essentially between Muslims and non Muslims, given the assumption that Muslims as a community have a lesser share to the right to the city as compared to their majority Hindu counterpart thereby acknowledging the different degrees of othering that is prevalent. This research is thus organically drawn towards exploring the role of ghettos, as units of city space in determining one's rights to the same.

Table 1: Probabilities of perceptions: variations by communal identities and location

Indicator	Overall perception of Hindus Expected (B)	Overall perception of Muslims Expected (B)	Perception of Muslims inhabiting Ghettos Expected (B)	Perception of Muslims outside Ghettos Expected (B)
Feeling of hesitation	1.000	1.780	1.000	2.720
Feeling free to protest	1.000	0.709	1.000	0.830
Feeling of peace	1.000	1.063	1.000	0.219
Enthusiasm to bring about change	1.000	1.306	1.000	0.264
Likelihood to get discriminated against	1.000	0.780	1.000	5.603
Likelihood to leave the city	1.000	0.739	1.000	1.566

Source: Calculated by author using data from field survey

On considering the city as a whole, controlling for the ghetto as a determinant of human behaviour and the Hindus as the reference for the Muslims as they are the overwhelming majority in Kolkata, one observes the realities that the Muslims in the city have a greater probability to feel hesitant and a lesser to protest freely. However, apart from these two expected outcomes of marginalisation, the Muslims, on the contrary show greater probabilities to feel peaceful and enthusiastic to bring about positive changes within their city of inhabitation and they reveal a lesser chance to face discrimination and likelihood to leave the city. These outcomes are against the stereotypical expectations and tend to convince one on the absence of denials and deprivations based on religion. It creates an illusion of prevailing social justice.

Clarity emerges when a ghetto and non ghetto wise explanation is sought. Muslims living outside ghettos are lesser likely to feel free to protest, much lesser likely to feel at peace or bring about a positive change in the city and more likely to leave the city, twice more likely to harbour a feeling of hesitation and five times more likely to get discriminated against. Therefore, the ghettos clearly emerge as a shield, a refuge, a comfort, a voice.

Conclusion

This research thus explains how ghettos not only become sites of human right movements through a prolonged process of deprivation but they naturally are a source of empowerment for its inhabitants, in the most subtle and unconscious of ways. The Muslim ghettos in Indian cities are evidences of both economic and communal segregations, geographically, they are either cores or peripheries or both. The latter is true for the city of Kolkata, which is one with relatively more communal balance. However, the very initiation and retention of

ghettos is itself evident of the absence of rights to the overall city space. Yet, these ghettos succeed in conferring voice to its voiceless population and emerge as sites of enhanced freedom and reduced hesitations in terms of everyday life. Having said that, it should be clarified that this work is not directed towards the celebration of ghettos, it definitely acknowledges the discrimination and the pain they inhabit.

An urban set up demands more dependency of an individual on groups and/or communities given the crowd inhabiting urban areas (Writh, 1938) more so in Indian cities, as compared to other individuals. He writes 'urbanites meet one another in highly segmental role(s)'. A prolonged existence within a particular ethno-cultural neighbourhood dilutes the process of neighbouring (Writh, 1938), which possibly works the opposite for Muslims from lower economic backgrounds inhabiting Indian cities like Kolkata. For them, sustained segmentations have lead to concretisation of consciousness and right to their city. The everyday life stories of people who have inhabited these ghettos for generations now have in a way become an evidence of this voice (Seabrook and Siddiqui, 2011). However, the presence of a voice is not coincident with the absence of denials, in fact it re-asserts the same.

Therefore there is need to explore into domains of counter theories, without losing contact with ground realities, in fact drawing evidence from the same (Harvey, 1972). However, the principal purpose of social research is the concretisation of a strong social consciousness and critical thinking and attempting to interpret problems as solutions.

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Importance of Women in Decision Making at Family Level in Patna Metropolitan City

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Abstract

The study is undertaken to analyze the importance of women's in decision making at family level in Patna City (Bihar, India) regarding the freedom of movement, family matters, to purchase home assets and family planning etc. This study examines the factors (particularly the independent variables) that might affect women's decision making power at the household level. The Women decision making index (WDMI) has been determined to ascertain the women's socio-economic status.In the present work two types of data such as Primary and Secondary both data have been used.The study reveals that most of the women (50%) are found to have equal status in the family with regard to taking various decisions. Along with, some background socio- economic characteristics such as women's educational levels and employment status appeared as an important factor, contributing to women's empowerment.

Keywords*: socio-economic characteristics, empowerment, decision making, freedom, home assets and family planning.*

Introduction

Women play a great role in overall development and progress of the nation. But their participation in different fields either directly or indirectly is still behind in many aspects. In most cases, women are considered inferior to men, and their life is restricted within the four walls of the house. For taking any decision, less power is given to women, as they have the right to take decisions regarding various items, as that of the men. Women's status in a society gets reflected by their legal rights, educational standards, health status, employment position, and decision making. They play an important role in the families and communities (Jha,

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2005).Women empowerment is giving legitimate power or authority to perform the tasks. If women are empowered, they would be able to participate in the planning and decision making task and contribute to the development programs and activities individually (Mahapatra, 2006). Those social, cultural and religious attitudes have resulted in discriminatory laws and practices against women which prevent them in performing their due role in societies and economies. In traditional and developing societies the discrimination against women from cradle to grave have often constrained them towards attainment of education, income earning capabilities, economic self-sufficiency and thus their status in the societies.Women play a crucial role in the economic welfare of the family and perform different tasks depending on their socio-economic structure, number of members in the family, the nature of professions they are involved in and many other factors (Reddy and Narayan, 1987).The decision making power related to social obligations which include decisions regarding age at marriage, mate selection, dowry, expenditure on marriage and education of children also showed relatively high role of women. According to Barkat (2008) study on "Women empowerment: A key to Human Development." organized the empowerment of women that could only be achieved if their economic and social status is improved. This could be possible only by adopting definite social and economic policies with a view of total development of women and to make them realize that they have the potential to be strong human beings. Rao and Rao, (1991) feel that in women Indian modernized families have greater autonomy and greater share in family decision making and authority. Working mother's participation in decision making process increases by the fact that they contribute their resources to the functioning of the family. She has more privilege and more voice with regard to money matters at home. Sharma (2007) in her study on "Status of Women in India" women empowerment is associated with women's struggle for social justice and equality. It is a process aimed at changing the nature and direction of systematic process that marginalize women and other disadvantaged section of the society. Empowerment is a way of acquiring the ability and opportunity to participation in decision making and implementation and influencing the decision with proper knowledge of self-esteem and self-confidence.

Literature review

Development of indicators that may be applicable to all women is quite difficult,because there is an existence of economic inequality due to poverty that can influence empowerment by limiting opportunities to invest money. Hence, decision making regarding investment and consumption is an important component of empowerment. There are two sets purports to measure women's extent of control over their environment. The first one is measuring their decision-making in household and their freedom of movement. The second set is measuring women's attitudes towards gender equality. Belief in the ideal of gender equality in roles and rights in society, as well as in the home is an essential element of empowerment (Schuler and Rottach, 2010).Women empowerment is a condition in which women hold equal educational, legal, and political rights to those of male citizens. Additionally, women are free to work to choose any career, enjoy economic rights to own of property. Further more, bodily rights - the rights to control their own health and fer-

tility is also included in it. They can and accuse those who involve in domestic violence, harassment, rape or in any other violations. Legal rights of women such as employment or educational preferences in areas where women have historically lacked access are also included under the paradigm of empowerment.(Zuhur2003). Women's decision-making authority is related to the setting in which they live, for example, urban women have more freedom in domestic decisions, whereas rural women have very less freedom to say in household affairs. They are mostly decided by their husbands and other family members. (Mahmood 2002). Women hold low decision-making power in their families. They hold domestic decision-making power in control on unnatural abortions and in egalitarian decision-making related to their health of children. Although they hold domestic decision-making power related to education of children and familial decision making power related to marriage of their children. They hold non-specific decision-making power for participation in local government and male decision-making power in choice for income generating activity. But they also hold decision-making power for visiting to their relatives (Jan and Akhtar, 2008).

As a patriarchal society, there is a high level of gender inequality in women's participation in domestic decision-making, reproductive choices and fertility attitudes. It may provide further vision into family structure behaviour that has a great significance to achieving gender equality. There are many women who are taking on all the responsibilities of the financial and social organisation of the household, along with productive and reproductive tasks as a single handed. In both matrilineal and patrilineal households, there are limitations on women capabilities due to the narrow understandings of women's work. Women's have less control, and authority over the economic decisions e.g. income, sale or transfer of land and ownership land due to the lack of acknowledgement (Arun, 1999).

Objectives

i. To explore the socio- economic status of women in the study area.

ii. To analyze the involvement of women in decision making process at the family.

Database and methodology

In the present work two types of data have been used Primary and Secondary data. The source of primary data is questionnaire schedule with sampled respondents and field observations. While the secondary information was gathered from the documents brought out by a number of books, records, journals, National and International Reports, reviews, websites and Government and Non-Governmental Organizations (NGOs), 2001 and 2011 Census hand book of the Patna Metropolitan City, district year book and some information from Patna Municipal Corporation. This study focuses on geographical, religion, linguistic and regional characteristics of population in Patna city. In depth interview of women (500) have been taken to know their real life situation and quantitative tools are used to explain the status of women. The study area has been divided into 72 wards, which is further re-arranged into 4 circles, namely- New Capital, Bankipur, Kankarbagh and Patna city (District Gazette 2007) which incidentally occupy the Western, Central, Southern and Eastern parts. Selected samples are classified into four groups for study

purpose on the basis of religions, social groups, age group, education and occupation.

Method and techniques of analysis

As per need of objectives data is processed and analyzed through Microsoft excel 7 and SPSS 20 software and interpreted with statistical tools like percentages, average and women decision making index. In analyzing the women decision making index for study, the importance of women's in decision making at family level, in 4 selected points i.e., freedom of movement, family matters, to purchase home assets, and family planning a four point rating scale is developed and design with four kinds of response (always, often, sometime and never) ranging from high participation to no participation in family decision making. The corresponding scores assigned for each response are 4, 3, 2 and 1, respectively. This family decision making participation score of a respondent in 4 selected points could range from 1 to 16.

Study area

Patna, the capital of Bihar, is situated on the southern bank of the sacred river Ganga. It is located between $25^0$35' and $25^0$38' North latitudes and between $85^0$5' and $85^0$16' East longitudes and has a mean elevation of 53 m above the mean sea level. Patna is bounded in the west by river Son, holy river Ganga in the north, the flood plain of river Punpun lie on the south and the low lying area, near the confluence of river Punpun and Ganga near Fatuha fall on the east. It is one of the most important historical cities of India and is situated along the natural levee of the river Ganga in the middle Ganga plain. A typical tropical city of northern India, Patna is famous for its glorious past, especially the period of Magadh and the Mauryan rule. Patna is hot and humid in summer and cold in winters. The climate of Patna varies from 43 - 30 °C during the summers and 21.4 - 5 °C during the winters. The rainfall in the city is 1,100 mm during the months of June to September. It receives medium to heavy rainfall in the monsoon season. Relative humidity can go up to 100% during the winter. According to 2011 provisional census data, the city had a population of 1,683,200 (before expansion of the city limits) within the corporation limits, with 894,158 males and 789,042 females. The sex ratio of 882 females per 1,000 males was lower than the national average of 944. The overall literacy rate is 84.71%, with the male literacy rate being 87.71% and the female literacy rate being 81.33%.The city is divided into 72 municipal wards that come under the Patna Municipal Corporation. For every ward present in the city there is a ward councilors that are chosen by this body. All the existing wards in Patna have been divided into four different circles, each administered by an officer who is selected by the State Government. Patna Municipal Corporation has an area of 109.218Sq.kms that is divided into four zones namely New Capital circle (western), Kankarbagh circle (Southern), Bankipore circle (Central) and Patna city circle (Eastern).

Table1.Socio Economic Profile of the Respondents

Sl No	Respondents	Per cent
1	Age Group	
	below 30	18.8
	30-40	43.0
	40-50	17.6
	Above 50	20.6
	Total	100.0

2	Religion	
	Hindu	66.2
	Muslim	19.0
	Sikh	12.0
	Christian	2.8
	Total	100.0
3	Social Group	
	General	36.5
	OBC	36.0
	SC	24.8
	ST	2.7
	Total	100.0
4	Education	
	Illiterate	3.6
	Primary	10.6
	Middle	14.6
	High school	19.0
	Intermediate	16.4
	Graduation	25.8
	Others	10.0
	Total	100.0
5	Occupation	
	Un-employed	55.6
	Employed in, organized Sector	12.2
	Employed, in unorganized Sector	32.2
	Total	100.0
6	Income	
	Below 15000	45.5
	15000-30000	32.0
	Above 30000	22.5
	Total	100.0

Source: Based on field-based survey, 2014

The city is linear and shaped like sword with the handle in the west and points to the east. It is the administrative headquarters of the district, the division and the state. It provides shelters to local administration, judiciary, and legislature and is headquarters of educational, health, commercial and several other professional services.

Results and discussion

This section purports to highlight women's decision making powers in the households in our area of study. Decision making power of women in households is one of the important indicators of women empowerment. Table 1 shows the socio-economic profile of the women respondents considered in this study. The distribution of the respondents by age indicates that out of 500 respondents, 18.8% are in the age group of below 30, 43% in the age group of 30-40, 17.6%in the age group of 40-50 and 20.6% in the age group of 50 years and above. In religion wise distribution of respondents, majority of them (66.2%) are Hindu followed by 19% Muslim, 12% Sikh and 2.8% Christian. In social group wise 36.5% respondents are general, 36% otherbackward class(OBC), 24.8% schedule caste(SC) and 2.7% schedule tribes(ST).Thus, the sample has more number of general castes followed by other backward, schedule caste and schedule tribes. In education group, out of all the respondents 3.6% respondents are found illiterate, 10.6% respondents have received primary education, 14.6% middle, 19.0% high school, 16.4% intermediate,25.8% graduation, and only 10 % have some professional degree and diploma. The data reveals that occupational status of respondents, 55.6% are unemployed group and they are mainly housewives and stu-

dents. 12.2%are working in organized sector. In this group most respondents belonged to government schools, office and other places, 32.2% are working in unorganized sector and they are mainly public school teachers, employed in small scale industries, shopkeepers, beauty parlor workers,vendors and maid servants etc.Income of therespondents is one of the important parameter to know their economic status. This helps us to know about their living standard for the study.We have tried to divide the income level into three categories. From the total 222 respondents belonging to the employment category,45.5% respondents havebelow Rs.15000 monthly income, 32% between Rs.15000 and 30000 and 22.5%above Rs.30000 monthly income.

Table2.Decision making power of the Respondents in percent

Decision making power	Never	Sometimes	Often	Always	Total
Freedom of Movement	8.0	18.0	42.6	26.4	100
Family Matters	21.6	40.0	34.8	3.6	100
To Purchase Home Assets	2.8	37.6	49.4	12.2	100
Family Planning	8.4	28.2	61.2	2.2	100

Source: Based on field-based survey, 2014

Table 2 shows the determinants of women's decision making power in the study area, which is assessed through the freedom of movement, family matters, to purchase home assets and family planning. The data show freedoms of movement of women. It is seen that 8% respondents don't take any decision to freedom of movement, 18% sometimes take decision to freedom of movement, 42.6% often take decision and among them majority are employed in organized sector and 26.4% always take decision related to freedom of movementdue to improved economic independency and literacy. Decision making concerning family matters 21.6% respondents never take decision, 40% sometimes take decision mainly from unorganized sector, 34.8% often take decision related majority being unemployed while 3.6% always take decision who are employed in unorganized sector which indicate that women status are improved but their position in family is not equal to male person. The decision making related to purchase of home assets reveals that 2.8% respondents don't take decision related to purchase of home assets, 36.7% sometime take decision in which majority are from organized sector, 49.6% often take decision employed in unorganized sector and 12.2% always take decision employed in unorganized sector. It has been observed that the families have given preference to women in the purchase of home assets matters. The decision making related to matters of family planning 8.4% respondents never take decision, 28.6% sometimes take decision in which maximum are from unorganized sectors, 61.2% respondents often take decision regarding the family planning matters, but some of them have not taken decision due to illiteracy and her family mentality.

Women decision making index

This study examines the factors (particu-

larly the independent variables) that might affect women's decision making power at the household level. In order to assess overall influence of the independent variables on women decision power, the study developed a percentage value. The decision making index has been determined to evaluate the percentage value applying all independent variable which is as follows:

WDMI =Actual score of the level of awareness of each respondent*100/ Highest score for each respondent

Where,

WDMI= Women decision making index as the level of empowerment.

Women decision making index (WDMI) is used to ascertain women's socio-economic status. The present study is carried out to assess decision making for freedom of movement, family matters, to purchase home assets and family planning. Each factor has been given scores. These have been given score starting from 1 to 4, respectively. The scores in each category for each respondent are summed up to get the total score of the respondents. The highest score is the index indicating better status of women. The highest score for each parameter are as follows; for freedom of movement 4, family matters 4, to purchase home assets 4 and family planning 4. Therefore maximum total score would be 16 (4 + 4 + 4 + 4 = 16). Now for each respondent, it is important to find out the index corresponding to the total score, i.e. 16. In percentage for example if a respondents had a total score of 9, her WDMI would be (9/16) *100 = 56.25% likewise, WDMI index has been computed for 500 respondents. The average value of women decision making index (WDMI) has been calculated across the zone for individual variable and finally composite index is developed to measure the spatial variation in empowerment status.

Table 3 and Figure 2 show status of decision making of women. The status of 37.87% respondents from eastern zone is high as compared with other zones. This zone is mainly inhabited by the administrative staff and business people, so most of the respondents are educated, work outside and some of them are working inside home in reputed self-jobs. The family members are educated so they respect women and her participation in decision. Consequently, women decision making index in the family is high.

Table 3: Women Decision Making Index by Zone in percent

Zone	High status	Medium Status	Low status	Total
Eastern Zone	37.87	38.63	23.48	100
Central Zone	28.57	44.89	26.53	100
Western Zone	27.86	42.62	29.50	100
Southern Zone	27.58	50.57	21.83	100
Total	30.60	43.40	26.00	100

Source: Based on field-based survey, 2014

Majority of respondents in southern zone enjoy medium status as they are educated but their status is not equal to male family member. 29.50% respondents of western zone belonged to low in comparison with other zone due to illiteracy as this area is newly developed. Besides, some of parts are located in peri-urban area and women are not well educated and their status is not equal to male dominated family structure.

Conclusion

From the study, it is clear that now a days family is not only concerned with men but also with women. In the family affairs both the husband and wife are having equally important responsibilities.We have observed that the decision making power of the respondents according to their education has been related to freedom of movement, family matters, home assets and family planning. But education does not influence the matter to purchase home assets. According to economic independency, women are working and earn income and their decision making power is better in comparison with unemployed respondents. We have analyzed that the level of education of women is a step indirection of holistic development of the family community and society atlarge. There is a link between the empowerment of women and their education and economic status.

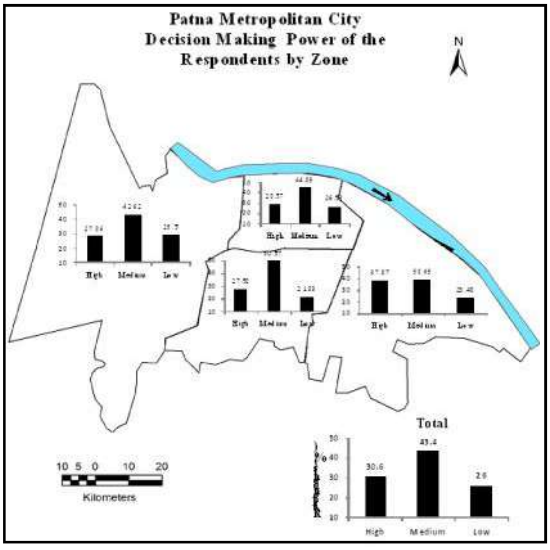

Figure: 2 Decision Making powers of the Respondents by zone

The empowerment of women is not an easy task. It requires much time and consistent effort to empower women. However, legislative measures adopted by the government help women to some extent but they are not able to get full benefit from such legislation due to lack of awareness and consciousness about their rights, interests and benefits provided in the existing laws. Development programs under the government help women to supplement their day to day needs and requirements. But most of them are target-based involving lengthy procedure for loan disbursement, high transaction cost, lack of supervision and monitoring. Since credit requirement of the urban poor are not solved through the formal sources directly, there emerge the need for an informal credit supply through SHGs as self-help groups played an important role in supplying credit. But access to credit does not automatically lead to empowerment as women face wider disadvantages and inequalities in access of information, social networks and other resources in order to be successful in business and life. After going through the whole work, it is observed that the study area is not more developed in comparison to India's others metropolitan city. Women status cannot be upgrade unless women come with and help to self - empower themselves. There is a need to formulate reducing feminized poverty, promoting education of women, and prevention and elimination of violence against women.

In the last, for a balance development, the ground level development actions should be focused towards changing the social attitude and practices prevalent in the society which are highly biased against women. This can be initiated by working with the women at the root level and focusing on increasing women's access and control over resources and increasing their control over decision making. Team work by people is the key to eradicating this menace. People must come forward to help in rooting out such social evils. Law enforcing agencies cannot work alone. When the people are dynamic in their drive against crimes, the police cannot remain a mute spectator though they are supposed to be the protectors of citizens. They will be forced to dispense their bounden duties. Youth should be motivated to be socially responsible and protect women. This is the need of the hour. Everyone must think of changing society.

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Regional Development and Disparities in Jaunpur District, Uttar Pradesh

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Abstract

Regional development is concerned with uniform growth and overall development of any area according to its potentialities and capabilities. Regional disparity is the outcome of imbalanced regional development that varies from region to region depending upon socio-cultural, economic and demographic characteristics.This paper attempts to deal with the analysis of regional development and disparities in Jaunpur district of Uttar Pradesh.The study area is situated in Eastern Uttar Pradesh of the Middle Ganga Plain.The study is exclusively based on secondary data collected at block level from different offices.The data were tabulated and analyzed using statistical methods like mean, standard deviation (SD), Z score and inter correlation matrix. Micro Soft excel and Arc GIS 10.2 software have been used for computation and cartographic presentation.There are 38 variables selected from four sectors (social, agricultural, infrastructural and industrial) to measure the regional disparities in the levels of development. The analysis reveals that Dharmapur and Sikrara blocks hold top position in high level of development while Shahganj block is at the bottem in terms of low level of development.The geographical factors like terrain condition, quality of soil, drainage, water logging, transport network and urban centers have been observed to hold major impact in the level of development in district.

Keywords*: regional development, disparity, z score,composite index.*

Introduction

The concept of regional development is multi-dimensional and multilevel. It includes the integrated performance in agricultural, social, infrastructural and industrial sectors of any region. Murty (2000) defines regional development as uniform growth and fullest develop-

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ment of any area according to its potentialities and capabilities. Regional disparity is the outcome of unbalanced regional development that varies from region to region depending upon socio-cultural, economic and demographic characteristic (Kundu and Mondal, 2012). It denotes the failure of a region to exploit the development potential of its initial resources endowments. It's latent comparative and absolute resources advantage, relative to another comparable region, therefore comprised by factors which are not only natural but human also (Sharma, 2015). A question of regional development arises because of inter-regional disparities in income, earning, capacities, quality of life etc. Many of these differences may be the consequences of the decision of the past, availability of natural endowments or even exogenous factors (Misra, 2002). In India during last few decades, the issues related to regional disparities and its multidimensional characteristics have been marked with tremendous challenges. The Government of India after independence realized the importance of balanced regional development and so numerous steps were under taken for the development of the backward regions. According to the socio-economic development index, the southern region of the country has been observed highly and systematically developed in comparison to the central and northern regions (Banerjee and Ahluwalia, 2003; Ohlan, 2012). After independence the government of India has launched various plans and policies regarding regional development for different regions but in spite of all the efforts, disparities amongst regions are still very common and can be found at various levels such as state, district, block and village.This paper attempts to deal with the analysis of regional development and disparities in Jaunpur district of Eastern Uttar Pradesh.

Mitra(1961), with the help of 63 variables divided India into 7 regions, 31 sub regions and 89 divisions by using Kendal's ranking method.On the basis of 21 variables Banerjee and Ahluwalia (2003) find the disparities in the level of development in major states of India with the help of Z score method. They find that in 2001, state of Kerala, Maharashtra, Tamilnadu, Gujarat, Punjab are highly developed while Karnataka, Andhra Pradesh, Haryana, West Bengal, Himanchal Pradesh, Rajasthan and Madhya Pradesh are moderately developed and Uttar Pradesh, Bihar, Orissa, Assam and Jammu and Kashmir are less developed.Antonyrajan (2003) has chosen 39 variables for analyzing the regional disparity and national development of Sri Lanka at the time phase of pre and post liberalization. His analysis shows that disparity across the district has been declined in the post liberation period as nearly more than half of the indicators used in this study marked with temporal changes. Mohanty (2009) examined the regional disparity in agriculture development of Maharashtra on the basis of 8 variables. He observed that the disparities in agricultural development are very common in last three decades in western Maharastra, Konkarn, Marathwada and Vidarbha. Kundu and Mondal (2012) used 14 variables for analyzing the spatial pattern in the level of development and inter block disparity in Murshidabad

district of West Bengal. They adopted simple statistical technique of deprivation index and marked a wide range of interregional disparity. Sadaf and Munir (2012) have used 22 variables for analyzing the spatial variation in the level of development in Faizabad district using Z score. Raman and Kumari(2012) analyzed district and regional level disparities in agricultural development in Uttar Pradesh on the basis on 13 agricultural variables. They used UNDP methodology to standardize various indicators for agricultural attainment in the state for two point of time, i.e. 1990-91 and 2008-09. Singh (2013) analyzed the village level temporal and regional development pattern of block Akhnoor (Jammu and Kashmir) by selecting14 variables related to infrastructure, agriculture, education and demography. He has used composite index of development for showing the overall development and found that there has been much improvement in literacy and demography but moderate and negligible development in infrastructure and agriculture respectively during period 1981 - 2001.Samanta (2014) has analyzed block level imbalance in social development of Pashim Medinipur by using composite index. He has selected 8 indicators of social development. Mishra and Singh (2016) have made an attempt to study the inter-block disparity of Saharsa district by using composite Z score with the help of 24 indicators.

Study area

Jaunpur district (25^0 26' N to 26^0 11'N and 82^0 8' E to 83^0 5' E) is situated in Eastern Uttar Pradesh of the Middle Ganga Plain. Total area of the district is 4038 km^2 having population of 44,94, 204 persons (Census 2011). There are eight rivers which flow in the district namely Gomati, Sai,Varuna, Basuhi, Pili,Tambura, Mongar and Gangi. The Gomati and Sai Rivers flow in middle part of the district (Fig. 1). Physiographically Jaunpur is divided into five part such as Gomati new alluvium, Sai new alluvium, northern tract, central tract (between Gomati and SaiRiver) and southern tract (between Sai and VarunaRiver). The surface of district is about flat and some undulation is seen in the part of riverine areas. The slope of the district is towards the south east and relief varies from 77 metres to 89 metres from mean sea level. The district is covered by mainly two type of soils like loam (Domat) and clay (Matiyar). The loamy soil is found in Jaunpur, Kerakat and some parts of Shahganj Tahsil. Clay soil is found in Shahganj, Machhalishahar and Kerakat Tahsil.

The glory of the study area may be accounted due to master stream River Gomati (known as Adi Ganaga) and its peaceful banks which had attracteds the major pious ground for the meditations and contemplations of Sages, Rishis and Maharshis (like Maharishi Jamdagni and Parashuram) at Jaunpur city from where the sounds of the Vedmantras emanated (District Census Handbook 2011). The district has been glorified with very rich and developed education and it was called as *Shiraj- E Hind* (city of great scholars) during English period. In spite of its very rich historical and cultural background, the regional disparities may be observed in the level of socio- economic development due to spatial variation in geographical factors as well as the unequal participation in the process of plan implementation.

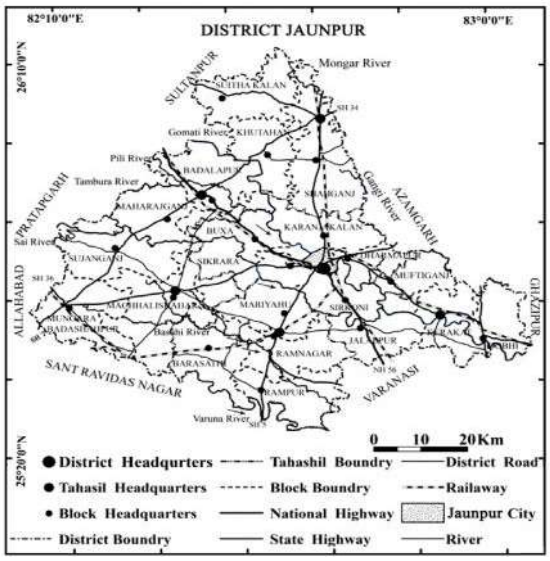

Figure 1

Objectives

The major objectives of the study are as follows:

1. To measure the level of development in Jaunpur District.
2. To analyze the inter block disparities in the level of development and their spatial pattern.

Data base and methodology

The present study is exclusively based on secondary data collected from the different government offices like Primary Census Abstract of Uttar Pradesh (2011), District Census Handbook, Agriculture Report from Krishi Bhavan, Zila Sankhikiya Patrika from Vikas Bhavan and different websites. The data were tabulated and analyzed by using statistical methods, like mean, standard deviation (SD) and inter correlation matrix. Mean and SD have been used for dividing the blocks into three categories, i.e., high (above mean + ½ SD), medium (Mean + ½ SD to Mean- ½ SD) and low (Below mean - ½ SD) levels of development. Inter correlation matrix have been used for analyzing the inter relationship among variables of social, infrastructural, agricultural and industrial development with each other. Micro Soft excel and Arc GIS 10.2 software have been used for computation and cartographic presentation in regional variation of development. Measure of the level of development and disparities have been attempted with the help of Z score as given below:

$$Zij = \frac{(Xi-X)}{SD}$$

Where,

Zij = Standard score of the i^{th} variable of j^{th} block

Xi= Original value of i^{th} variable in j^{th} block

X = Means value of i^{th} variable

SD= Standard division of i^{th} variable

Further composite standard score has been computed to show the regional disparities in the levels of development of the blocks by using the following formula:

$$CSS = \frac{(\Sigma Zj)}{N}$$

Where,

CSS= Composite standard score

Zj= Z-score of all variables of j^{th} blocks

N= Total number ofvariables

Variables for analyzing the levels of development

This Study attempts to measure the level of regional development based on the activities and opportunity in social, infrastructural, agricultural and industrial sectors which play very significant role in the process of develop-

ment. There are 38 variables selected judicially from these sectors to measure the regional disparities in the levels of development in Jaunpur District. These Variables are broadly divided into four major groups of indicators such as:

A. Social variables :(X1)Population density, (X2) Percentage of decadal population growth rate, (X3) Sex ratio,(X4) Literacy rate,(X5) Female literacy, (X6) Work participation rate,(X7)Percentage of non-agriculture workers, (X8) No. of primary school/10000 population, (X9) No. of inter college/10000 population, (X10) No of degree college/10000 population, (X11)No of college of vocationaleducation/10000 population,(X12) No. of primary health centres /10000 population and (X13) No. of maternity and child welfare centres/10000 population.

B. Agriculture variables: (X14) Percentage of agriculture laborers to total workers, (X15) Percentage of cultivators to total workers, (X16) Percentage of net irrigated area (NIA) to net sown area (NSA), (X17) Percentage of NSA to total area, (X18) Percentage of cultivable area to total area, (X19)Length of canal /100 ha NSA, (X20) No. of govt.tube well/100 ha NSA,(X21) No. of pump sets/100 ha NSA, (X22) No. of advance harrow/ 100 ha NSA, (X23)No. of advance thresher/100 ha NSA, (X24)No. of sprayer machine/100 ha NSA, (X25) No. of sowing Machine /100 ha NSA, (X26) No. of tractor/100 ha NSA, (X27) Agricultural productivity and (X28)Land use efficiency.

C. Infrastructural variables :(X29) Percentage of villages connected with transport & communication network, (X30) Percentage of villages having bank facility, (X31) Percentages of villages having agriculture credit societies, (X32) Percentage of villages connected by metalled road, (X33) Length of metalled road/10000 population, (X34) Percentage of village having power supply and (X37) No. of post office/10000 population.

D. Industrial variables: (X36) No of small industries/ 100 ha, (X37) Percentage of industrial workers to total workers and (X38) No. of khadi industries/ 100 ha.

Analysis and discussion

The identification of backward blocks stands as prime concern of present investigation so that these blocks could be taken into consideration for upgrading their status to remove regional disparity.The blocks that are highly developed in terms of social, economic and demographic factors can be considered for maintaining their status, obtaining optimum-land use and increase agricultural efficiency (Joshi and Dubey, 1979).

Social development

Social development reflects the quality of life and standard of living of human being. It has many causes ranging from historical to present status in literacy,work participation rate, density,sex ratio,population growth rate, numbers of various type of educational bodies, health services and other such amenities. In order to explain the prevalent inter block

disparities in social development, the blocks of study area have been divided into three categories like high, moderate and low level of development (Fig2, Table 1).

Table: 1 Level of Social Development

Category	Z score	Blocks	Covered area	Remark
High	Above 0.23	10	43.17 %	Highest (0.70) in
Medium	-0.21 to 0.23	4	20.08 %	Muftiganj and lowest in
Low	Below -0.21	7	36.75 %	Shahganj(-1.14)
Source: Computed by authors				

Highly developed areas (43.17 per cent covered area of the district) consist of ten blocks namely Muftiganj, Mahrajganj, Jalalpur, Sujanganj, Sikrara, Barsathi, Mariyahu, Baksha, Kerakat and Dharmapur. Number of primary schools, senior secondary schools, maternity and child welfare centres etc. are available in better position in these blocks. Muftiganj has scored highest Z value (0.70) in social development because of good literacy rate and education facilities. Moderately developed area having the range score of -0.21 to 0.23 includes four blocks. These blocks are endowed with moderate condition in some facilities such as primary and secondary schools, sex ratio, population density, family welfare centres and work participation rate etc., but facilities like intercollege, growth rate, total literacy rate, PHCand FWC are mostly in low position. In medium category, Dobhi has got highest value and Machhalishahar scored lowest values.Less developed area encompassing seven blocks namely Mungra Badshahpur, Karanjakala, Khuthan, Rampur, and Suithakala, Sirkoni and Shahganjhave scored less than -0.21. These development blocks have shown meager position in majority of the social indicators especially education and health facilities.Shahganj has been accounted for lowest value in social development (-1.14).

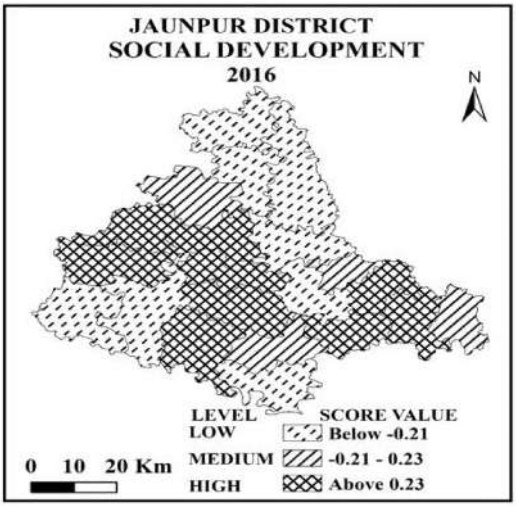

Figure 2

Agricultural development

Agriculture is an important economic activity that manifests a deep relationship between natural and human resources. The growth of agriculture is prerequisite for overall development of Indian economy (Sharma, 2014). It is the prime sources of food, raw material for agro-based industries as well as mode of employment for the rural people (Mishra and Singh, 2016). The district has been divided into three categories for comparing the agricultural development based on 10 indicators (Fig 3, Table 2).

Highly developed areas consist of four blocks namely Dharmapur, Suithakala, Dobhi and Karanjakala. These blocks are characterized by high percentage of net irrigated area and agricultural mechanization. Dharmapur (1.05) scored highest Z score value with the development of highest net irrigated area,

Table: 2 Level of Agriculture Development

Category	Z score	Blocks	Covered area	Remark
High	Above 0.16	4	15.55 %	Highest(1.05) in
Medium	-0.17 to 0.16	8	35.71 %	Dharmapurand lowest in
Low	Below -0.17	9	48.74 %	Mungra Badshahpur(-0.40)

Source: Computed by authors

NSA, length of canal, better agricultural mechanization etc. Moderately developed areas occupy score values between- 0.17 to 0.16. These type of blocks have shown moderate percentage of net shown area, irrigated area and agricultural mechanization. Because of such facts Sikrara, Muftiganj, Shahganj, Sirkoni, Khuthan, Kerakat, Jalalpur and Ramnagar blocks have been categorized into moderate level of developments. Low-developed area (48.74 per cent covered area of the district) with index value below -0.17 consists of nine blocks namely Baksha, Barsathi, Rampur, Mariyahu, Mahrajganj, Machhali-shahar, Badlapur, Sujanganj and Mungra Badshahpur. The index value in this category is least due to lower level of share in net sown area, low percentage of cultivated area to total area etc.

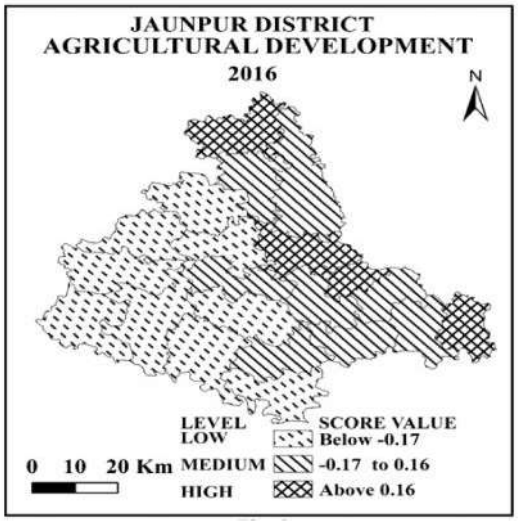

Figure 3

Infrastructural development

Availability of infrastructure facilities is very important for socio-economic development. These facilities include banks, transport and communication, agricultural credit societies, approach by metalled road and power supply facility etc. In order to explain the existing inter block disparities in infrastructure development, the blocks of study area have been divided into three categories (Fig 4, Table 3).

Table: 3 Level of Infrastructural Development

Category	Z score	Blocks	Covered area	Remark
High	Above 0.23	7	31.42 %	Highest (0.73) in
Medium	-0.22 to 0.23	10	46.79 %	Mahrajganj and lowest in
Low	Below -0.22	4	21.80 %	Sirkoni(-1.22)

Source: Computed by authors

Mahrajganj, Ramnagar, Sikrara, Badlapur, Karanjakala,Khuthan and Kerakat are the blocks with high level of infrastructural development due to better transport and communication facilities, agricultural credit societies, approaches by metalled road and power supply facility. These blocks achieve the score value above 0.23 and Mahrajganj (0.73) is the most developed block in this category because of higher value in respect of length of road, approaches by metalled road, post office, power supply etc.Moderately developed category (-0.22 to 0.23) covers 46.79 percent of total district area. Ten blocks have been categorized under this group namely Dharmapur, Sujanganj, Suithakala, Baksha, Muftiganj, Mariyahu, Mungra Badshahpur, Machhalishahar, Rampur and Dobhi. These Blocks have moderate condition in transport and communication, banks, and percentage share of villages having power supply facility etc. Four blockslikeBarsathi, Jalalpur, Shahganj and Sirkoni have registered under less developed because of their lower score (below -0.22). Such blocks occupy negative score values in almost all the parameters.

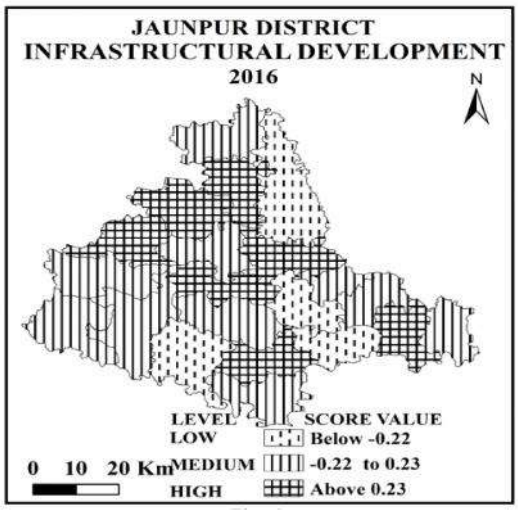

Figure 4

Industrial development

Industries play a crucial role in providing employment and upgrading economic development (Mishra and Singh, 2016). Regional disparities in the level of industrial development have been examined on the basis of three variables. In order to explain the existing inter-block industrial disparities the district has been divided into three levels of development (Fig5, Table 4).

High level of industrial development has been marked in two blocks namely Sirkoni and Dharmapur. These blocks are accounted for better condition due to their nearest association with Jaunpur city. These blocks have occupied high Z score value (above 0.28) because of higher number of small industries and khadi industries, good connectivity by means of transportation and industrial workers. The moderate level of development (59.48 per cent covered area of the district) is noticed in southern part of Jaunpur district include Karanjakala,

Baksha, Jalalpur, Mariyahu, Kerakat, Muftiganj, Ramnagar, value from- 0.28 to 0.28 Machhalishahr, Badlapur, Suithakala, Khuthan, Mahrajganj, Shahganj blocks have been observed under low level of industrial development. These blocks are characterized by low level of industrial activities, less participation of industrial workers and minimum number of small and khadi industries.

Table: 4 Level of Industrial Development

Category	Z score	Blocks	Covered area	Remark
High	Above 0.28	2	6.11 %	Highest (1.89) in Sirkoni
Medium	-0.28 to 0.28	13	59.48 %	and lowest in Shahganj
Low	Below -0.28	6	34.41 %	(-0.93)

Source: Computed by authors

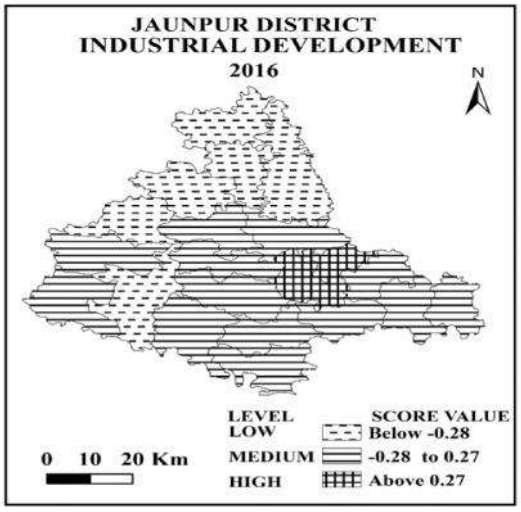

Figure 5

Measurement of overall development

Measurement of overall level of development has been obtainedby combining the score of all the four groups of indicators.The assessment of development in different major groups of indicator as explained above brought out the fact that any one aspect may not be sufficient to get the correct picture for different blocks. Some blocks may have high level of socio-economic development while the other blocks may have better performance in other aspect. Therefore the analysis of four sectors is needed to be analyzed further to find out the spatial pattern of overall development. To assess and evaluate the spatial variation in the level of development, the coefficient score values were obtained by adding the average score values of all four major groups and dividing the results by number of groups.On the basis of coefficient values, the district as a whole has been divided into three categories of high, medium and low level of overall development. (Fig. 6, Table 5 and Table 6).

Highly developed area

The highly developed area covers 22.55 per cent of total district area and consists six blocks namely Dharmapur, Sikrara, Muftiganj, Ramnagar, Kerakat and Karanjakala. These blocks have good transportation connectivity and better amenities like good number of schools, post offices, banking facilities, electric facility, high literacy rate, health facilities etc. These blocks have been marked with positive coefficient value in majority of variables. Dharmapur and Sikrara blocks have been observed at the top of highly development blocks by recording their coefficient value as 0.54 and 0.24 respectively because of their spatial location in the periphery of Jaunpur city. These

two blocks account for high positive values in 24 variables like literacy, commercial education, PHC, metalled road, credit society agriculture facilities etc.

Moderately developed area

Moderately developed blocks cover 47.65 per cent of total area. The ten blocks namely Mahrajganj, Dobhi, Baksha, Sirkoni, Mariyahu, Suithakala, Khuthan, Sujanganj, Jalalpur and Badlapur with the index range from -0.11 to 0.11 fall under this category. These blocks have registered negative values in one or more indicators. The moderate distribution of various socio-economic indicators such as number of primary health centers, higher secondary schools, source of irrigation, total road length, electricity, mean of transport and communications facility etc., while low sex ratio,

Table: 5 Composite Z score Values and Level of Overall Development

BLOCK	Z Score Values				CS	Coefficient	Level of development
	ZS	ZA	ZI	ZIn			
Suithakala	-0.4	0.59	0.1	-0.54	-0.3	-0.06	Medium
Shahganj	-1.14	0.09	-0.8	-0.93	-3.48	-0.7	Low
Khuthan	-0.33	0.04	0.29	-0.57	-0.71	-0.14	Low
Karanjakala	-0.33	0.23	0.31	0.25	0.58	0.12	High
Badlapur	-0.10	-0.27	0.35	-0.32	-0.42	-0.08	Medium
Mahrajganj	0.53	-0.24	0.73	-0.57	0.56	0.11	Medium
Baksha	0.28	-0.18	0.06	0.22	0.49	0.1	Medium
Sujanganj	0.37	-0.27	0.14	-0.27	-0.05	-0.01	Medium
M.Badshahpur	-0.23	-0.4	-0.09	-0.18	-1.12	-0.22	Low
Machhalishahar	-0.21	-0.25	-0.12	-0.3	-1.09	-0.22	Low
Mariyahu	0.33	-0.23	-0.08	0.12	0.19	0.04	Medium
Barsathi	0.35	-0.21	-0.36	-0.03	-0.31	-0.06	Medium
Sikrara	0.35	0.14	0.49	-0.02	1.21	0.24	High
Dharmapur	0.23	1.05	0.15	0.73	2.69	0.54	High
Ramnagar	-0.01	-0.14	0.69	0.04	0.73	0.15	High
Rampur	-0.35	-0.22	-0.13	0.03	-0.85	-0.17	Low
Muftiganj	0.70	0.1	-0.04	0.11	1.1	0.22	High
Jalalpur	0.40	-0.14	-0.53	0.16	-0.13	-0.03	Medium
Kerakat	0.27	-0.05	0.24	0.12	0.72	0.14	High
Dobhi	0.18	0.24	-0.13	0.03	0.39	0.08	Medium
Sirkoni	-0.70	0.04	-1.20	1.89	0.04	0.01	Medium

Source: Computed by authors

(ZS- Z Score Value of Social Indicators, ZA- Z Score Value of Agricultural Indicators,ZIn- Z Score Value of Infrastructural-Indicators, In- Z Score Value of Industrial Indicators, CS- Coefficient Score Value)

less number of inter college, technical college, pump set, khadi and small industry, post offices, transport, irrigation, and tractor facilities are in moderate position. Sirkoni block is although associated with Jaunpur city but it could not come under highly developed area like Dharmapur, Karanjakala and Sikrara blocks which are located in the periphery of Jaunpur city. The heavy population pressure, poor road inter connection and undulating terrain condition are responsible factors to bring out this block under modern category. It has lower sex ratio, poor education and health facilities in respect to its population and NSA, NIA also in moderate position.

Table: 6 Level of overall development

Category	Z score	Blocks	Covered area	Remark
High	Above 0.11	6	22.55	Higher (0.54) in
Medium	-0.11 to 0.11	10	47.65	Dharmapur and lower in
Low	Below -0.11	5	29.80	Shahganj(-0.70)

Source: Computed by authors

Low developed area

The low developed blocks cover 29.80 per cent area of district and achieve the value below -0.11. The five blocks fall in this category namely Khuthan, Rampur, Machhalishahar, Mungra Badshahpur and Shahganj. These blocks are basically spread over south western part of the study area and only

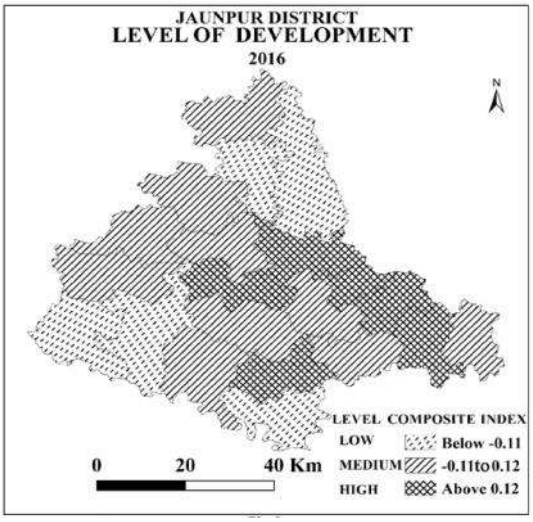

Figure 6

Shahganj and Khuthan block find in north part of district. The reasons responsible for low development are mainly related to lower number of higher educational facilities, medical facility, less credit societies, commercial banks and poor power supply facilities. These blocks are located far away from Jaunpur city where transport network facilities are not in proper condition. Shahganj block is noticed under low developed blocks because of its negative values in 29 variables out of 38. This block have high density of population, high population growth rate, low sex ratio, low literacy rate, less educationfacilities, poor industrial and infrastructural facilities.

Correlation matrix of variables

Correlation matrix shows the inter-correlation among all the variables of all the group of indicators. The indicators of social development are noted with high positive correlation with the indicators of agricultural and infrastructural development.The positive cor-

Table 7: Intercorrelation Matrix.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38
X1	1.00																																					
X2	-0.01	1.00																																				
X3	0.48	0.69	1.00																																			
X4	-0.40	0.20	-0.21	1.00																																		
X5	-0.46	0.01	-0.29	0.85	1.00																																	
X6	0.25	0.15	0.06	-0.36	-0.55	1.00																																
X7	-0.12	0.56	0.56	0.39	0.19	-0.15	1.00																															
X8	0.32	0.43	0.55	0.07	-0.05	0.34	0.44	1.00																														
X9	0.28	0.22	0.35	0.19	0.06	0.24	0.49	0.67	1.00																													
X10	-0.13	0.05	-0.07	0.48	0.39	-0.15	0.08	0.25	0.31	1.00																												
X11	-0.63	-0.24	-0.46	0.35	0.37	-0.35	0.13	-0.46	-0.27	0.06	1.00																											
X12	0.28	0.33	0.54	-0.05	0.16	-0.04	0.12	0.67	0.28	0.09	-0.43	1.00																										
X13	0.40	0.31	0.56	-0.04	0.06	0.04	0.15	0.60	0.16	-0.15	-0.38	0.85	1.00																									
X14	-0.29	-0.32	-0.57	0.21	0.32	-0.28	-0.62	-0.52	-0.62	0.20	0.30	-0.23	-0.29	1.00																								
X15	-0.12	0.56	0.56	0.39	0.19	-0.15	0.99	0.44	0.49	0.08	0.13	0.12	0.15	-0.62	1.00																							
X16	0.31	-0.36	0.06	-0.51	-0.47	0.37	-0.23	0.26	0.24	0.09	-0.11	0.11	0.07	-0.09	-0.23	1.00																						
X17	-0.17	0.31	0.33	0.44	0.25	-0.14	0.67	0.65	0.39	0.39	0.08	0.32	0.31	-0.25	0.67	0.12	1.00																					
X18	-0.03	0.35	0.35	0.32	0.23	-0.15	0.29	0.44	0.30	0.39	-0.17	0.40	0.33	0.01	0.29	0.03	0.61	1.00																				
X19	0.57	-0.14	0.12	-0.70	-0.58	0.42	-0.59	0.08	-0.28	-0.40	-0.59	0.20	0.29	0.01	-0.59	0.32	-0.49	-0.26	1.00																			
X20	-0.17	0.26	0.06	-0.12	-0.03	0.01	-0.22	-0.24	-0.28	-0.02	-0.04	0.16	0.04	0.34	-0.22	-0.02	-0.26	-0.06	-0.03	1.00																		
X21	-0.19	-0.44	-0.43	0.12	0.33	-0.05	-0.10	-0.11	0.08	-0.01	0.35	0.00	-0.03	-0.09	-0.10	-0.19	-0.18	-0.22	-0.11	-0.48	1.00																	
X22	-0.47	0.02	-0.26	0.35	0.64	-0.13	-0.02	-0.11	0.03	0.15	0.38	0.27	0.09	0.23	-0.02	-0.27	-0.09	0.05	-0.40	0.32	0.54	1.00																
X23	-0.26	-0.53	-0.57	-0.38	-0.07	0.08	-0.51	-0.58	-0.27	-0.24	0.31	-0.35	-0.47	0.16	-0.51	0.05	-0.70	-0.55	0.15	0.02	0.61	0.40	1.00															
X24	-0.43	-0.39	-0.53	-0.20	0.12	-0.04	-0.35	-0.58	-0.21	-0.17	0.42	-0.28	-0.42	0.14	-0.35	-0.09	-0.60	-0.42	-0.08	0.14	0.61	0.61	0.95	1.00														
X25	-0.47	0.02	-0.25	0.35	0.64	-0.13	-0.01	-0.11	0.04	0.15	0.38	0.27	0.10	0.22	-0.01	-0.28	-0.08	0.06	-0.40	0.32	0.54	0.99	0.39	0.60	1.00													
X26	-0.47	0.02	-0.25	0.36	0.65	-0.13	-0.01	-0.11	0.04	0.15	0.38	0.27	0.10	0.22	-0.01	-0.28	-0.08	0.06	-0.41	0.32	0.54	0.99	0.39	0.60	0.99	1.00												
X27	0.41	-0.58	-0.15	-0.30	-0.36	0.04	-0.22	-0.10	-0.11	0.02	0.02	-0.33	-0.24	0.16	-0.22	0.41	-0.04	-0.24	0.24	-0.48	0.10	-0.47	0.08	-0.16	-0.47	-0.48	1.00											
X28	0.12	-0.15	-0.26	-0.47	-0.34	0.22	-0.56	-0.57	-0.43	-0.49	-0.11	-0.38	-0.35	0.15	-0.56	-0.18	-0.92	-0.70	0.53	0.16	0.09	-0.08	0.63	0.50	-0.09	-0.09	0.03	1.00										
X29	0.43	0.06	0.15	0.02	0.11	0.29	-0.07	0.47	0.30	-0.12	-0.27	0.60	0.65	-0.22	-0.07	0.02	0.03	-0.01	0.25	-0.18	0.44	0.29	-0.04	-0.08	0.30	0.30	-0.02	-0.06	1.00									
X30	0.23	-0.11	0.01	0.09	0.18	0.17	0.00	0.37	0.41	0.15	-0.50	0.40	0.18	-0.22	0.00	0.14	0.05	-0.02	0.11	0.01	0.02	0.03	-0.11	-0.14	0.04	0.03	-0.13	-0.07	0.33	1.00								
X31	-0.08	0.12	-0.06	0.05	-0.18	0.38	0.19	0.37	0.26	0.14	-0.12	-0.08	-0.17	-0.30	0.19	-0.15	0.21	-0.17	-0.04	-0.22	0.08	-0.15	-0.09	-0.14	-0.16	-0.16	0.04	-0.07	0.03	0.16	1.00							
X32	0.03	0.31	0.23	-0.17	-0.25	0.53	0.34	0.58	0.41	-0.34	-0.30	0.19	0.15	-0.51	0.34	0.16	0.27	0.05	0.14	-0.13	-0.15	-0.13	-0.14	-0.15	-0.13	-0.13	-0.24	-0.09	0.12	0.28	0.48	1.00						
X33	0.09	0.38	0.00	0.10	0.01	-0.12	0.07	0.22	0.20	0.35	0.01	0.24	0.08	-0.08	0.07	0.56	0.49	0.42	-0.15	0.16	0.09	0.01	-0.05	0.06	0.01	0.01	0.24	0.61	0.07	0.23	0.03	0.05	1.00					
X34	-0.12	0.25	0.13	0.03	0.02	0.30	0.44	0.54	0.53	-0.16	0.03	0.25	0.17	-0.58	0.44	-0.03	0.36	0.05	-0.19	-0.35	0.39	0.24	0.08	0.13	0.25	0.24	-0.23	-0.23	0.43	0.09	0.50	0.71	0.04	1.00				
X35	-0.32	0.12	-0.32	0.42	0.24	0.00	-0.15	-0.37	-0.34	0.22	0.26	-0.41	-0.38	0.43	-0.15	-0.41	-0.22	-0.01	-0.10	-0.01	0.00	0.01	0.01	0.02	0.01	0.01	-0.10	0.29	-0.26	-0.09	-0.05	-0.35	-0.40	-0.43	1.00			
X36	0.07	0.51	0.17	0.18	-0.04	0.43	-0.01	0.23	-0.11	0.06	-0.24	0.02	0.07	0.31	-0.01	-0.15	0.07	0.10	0.16	0.26	-0.47	-0.08	-0.42	-0.44	-0.08	-0.07	-0.04	0.06	0.05	-0.05	0.19	0.22	-0.46	-0.11	0.39	1.00		
X37	-0.35	-0.05	-0.07	0.12	0.02	-0.34	0.33	-0.39	0.05	-0.07	0.60	-0.41	-0.34	-0.18	0.33	-0.16	0.08	0.10	-0.59	-0.06	0.17	0.09	0.15	0.29	0.09	0.09	-0.13	-0.15	-0.36	-0.48	-0.08	-0.24	0.14	0.09	0.01	-0.55	1.00	
X38	-0.46	0.06	-0.13	0.38	0.44	-0.55	0.27	-0.43	-0.08	0.11	0.60	-0.26	-0.31	0.26	0.27	-0.21	0.04	0.21	-0.64	0.32	-0.07	0.39	0.08	0.29	0.40	0.40	-0.32	-0.18	-0.50	-0.35	-0.47	-0.27	-0.04	-0.20	0.14	-0.21	0.57	1.00

Source: Computed by authors

relation of female literacy with agricultural mechanization shows that the literate female are more conscious to use the technology in agricultural works for increasing the crop production. The education facilities are positively correlated with bank, post offices and transport communication facilities. There are normal positively correlation between indicators of infrastructure and agriculture development. For example cultivators, NSA,NIA have established positive correlation with agriculture societies and banking services. The industrial development and agricultural development are negatively correlated because the industries are mainly established in urban areas and their peripheries which reduce the availability of labour and cultivable land (Table7).

Conclusion

The above discussion shows that Z score method is very suitable for measuring the level of development and its spatial variation. In view of the social development, Muftiganj block has been found as highly developed block while Shahganj is accounted as the lowest developed block. Likewise in agricultural development, Dharmapur is marked with highest score and Mugara Badshahpur is accounted with lowest score. The highest level of infrastructural development has been observed in Mahrajganj block where as lowest level is marked in Sirkoni block. Industrial development is found highest in Sirkoni block and lowest in Shahganj. As regards the overall level of development six blocks namely Dharmapur, Sikrara, Muftiganj, Ramnagar, Kerakat and Karanjakala blocks fall in high level and six blocks like Khuthan, Rampur, Machhalishahar, Mungra Badshahpur and Shahganj account under low level of development. The remaining nine blocks come under medium level of development. The urban centres like Jaunpur city as district headquarters and Kerakat, Badlapur and Mariyahu as block headquarters have been found to put measure control in the development of the district. The blocks which are associated with these centres have been marked with either high or medium level of development. In exception, the two urban centres like Shahganj and Machhalishahar (Tahasil headquarters) could not show their impacts in the development of associated blocks. The country side blocks of these two centres may be marked with unfavorable terrain conditions, water logging and waste land development problems. Because of such facts the infrastructural facilities and other factors of development could not spread beyond the limits of these centres. The blocks marked with low level of development suffer with many problems like poor soil quality, water logging, agricultural labors, poor transportation facilities and electric supply. The blocks designated under high and medium levels of development are found in and around of Gomati-Sai doab because of good soil, better facilities of transport, urban market, education, electric supply etc. The government authorities should take care of the problems related to the blocks coming under low level of development so that the regional disparities in the level of development could be minimized.

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Spatial Disparity in Status and performance of Health Care Services in Bardhaman District, W.B.

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Abstract

This paper attempts to find out the spatial variation in status and performance of health care services in Bardhaman district of West Bengal. In so doing, two important indices are considered, namely, Health Input Index (HII) and Health Output Index (HOI) to evaluate the status and performance of various health care services respectively across the study area. To explore the interrelationships between both indices among the blocks Spearman's correlation and coefficient of variation analysis are carried out. The study summaries that the correlation is positive between Health Input (HII) and output Index (HOI).

Keywords*: health care services, health input index, health output index,*

Introduction

Health is an essential input for the development of human resource and quality of life, in turn, social and economic development of the nation. Health is defined as 'a state of complete physical, mental and social wellbeing and not merely the absence of diseases or infirmity (WHO, 1948). Health is regarded a priority for sustained development interventions at individual, community and national levels. It is also an index of social development Since health is influenced by a number of factors such as adequate food, housing, basic sanitation, healthy lifestyle, protection against environmental hazards and communicable diseases, the frontiers of health extent beyond the narrow limits of medical care (Park and Park, 1991). It is, thus, clear that 'Health Care' implies more than medical care. It embraces a multitude of services provided to individuals or communities by agents of the health care services or restoring health. The problems of health care facilities and their utilization are complex and their solution depends upon proper assessment of spatial distribution of health care facilities in a spa-

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tial unit. In geographical study of health care facilities, analysis of spatial distribution of healthcare delivery system and their utilization are of great significance. It helps in finding the gaps in providing primary healthcare services and suggesting measures so that people may get basic health care services at door step.

A number of research works have been done in geography and other disciplines to analyze spatial pattern of health care facilities and services in India, but those have not covered all areas of the rural and urban societies. It makes difficult to analyze health care facilities and services in regard to religion, gender, age and according to poor and richer classes of the society. The great benefit of health care facilities and services are taken by upper and middle strata of the society but the poor and lower classes, whose sources of income are meager, do not capable to use medical facilities and services unless they are crippled by disease themselves. In the Alma Ata declaration, community participation is considered a means of health care services delivery system as well as a critical element in planning (WHO, Report, 1978). Mishra, (2007) discussed health "as a harmonious equilibrium between man and his environment". Vann Newkrik and Anthony Damico (2014) studied on 'the Affordable Care Act and Insurance Coverage in Rural Areas' which reveals that the rural population in India has a large proportion of low-income people who can potentially benefit by the Affordable Care Act to receive health insurance coverage. However, nearly two-third of uninsured rural individuals lives in a state which has not expanded Medicaid, which means that these rural individuals have fewer affordable health insurance choices. Study of Garg and Nagpal (2014) showed that public health sector in India is heterogeneous and varied in quality. Innovative and effective public-private initiatives are feasible and successful in contemporary India. India's government has a key and responsible stewardship role in regulating the networking and monitoring of the public-private collaborations. The private sector has a moral and social responsibility to the poor also, and they can meet this with innovative community based healthcare insurance schemes.

The analysis of spatial disparity in availability and performance of health Care Services is carried out in Bardhaman District of West Bengal which lies between $22^0$56' N to $23^0$53' N latitude and $86^0$48' E to $88^0$25'E longitude. Birlbhum and Murshodaba distriets barder the north of Bardhaman district while, Hooghly and Bankura border it South. The district is bounded by Nadia in the east and by the state of Jharkhand in the west.

The district comprises of six subdivisions and thirty-five blocks. The district extends over an area of about 7024 km2 having a population of 7723663 (District Statistical Handbook, 2011). The average population density is 1100 persons per km^2.

Objective and methodology

The objective of the study is to unfold spatial disparity in status of health care services as well as their performance in Bardhaman Dis-

trict. The study envisages data from secondary sources, i.e. Bureaes of Applied Economics and Statistics Government of west Bengal, District Statistical Handbook, Bardhaman (2010-11, 2014). The collected data related to various health parameters have been classified into two broad groups, i.e. Health Input Index (HII) and Health Output Index (HOI). The parameters related to HII in the health care system are doctor-population ratio, medical institution-population ratio, bed-population ratio and sub-centre population ratio, while those related to performance HOI of health care services are death rate and delivery rate. The score of indicator for each unit is standardized using the fallowing formula (WHO, 2014):

$$I^S = \frac{I - \min^*(I)}{\max(I) - \min^*(I)},$$

where I is the value of an indicator for a unit, max (I) is maximum value of I of the indicator over all unit, min* (I) is the minimum value of I over all units (chosen value is 0.001 i.e., less than minimum of observed distribution of the index) and Is is the computed standardized value (SV) of I and satisfies $0 < I^s < 1$.

The scores of indicators of HII and HOI are amalgamated by calculating geometric mean of the values of I^s for each unit as follows (WHO, 2014):

$$HII \text{ or } HOI = \left(\prod_{i=1}^{j} I_i^S\right)^{\frac{1}{j}},$$

where j is the number of standardized indicators, and the HII/HOI is computed by multiplying the value of Is together for each unit and raising the product to the j^{th} root. Further, to analyze the correlation between HII and HOI Spearman's rho is computed where a positive /negative sign of the Spearman's rho value is indication of positive / negative relationship shared by the variables involved and to analyze the disparity in distributional sense (HII and HOI), coefficient of variation is computed.

Disparity in health care services

To analyze the disparity in health care services, medical institution, beds, doctors and Sub-centre in ratio of population are taken to calculate HII (Table-1).The blocks of Bardhaman can be subdivided into four categories on the basis of HII result (Fig.1). Very high category (above 0.08 index) includes Salanpur, Andal, Asansol (MC), Raniganj (M), Durgapur (MC), Bardhaman-I, Memari-I, Katwa-I, Kalna-I blocks, while high category (0.05 to 0.08) includes Barabani, kulti (M), Jamuria, Mangalkote, Kalna-II, Galsi-I, Kanksa, Raina-I, Raina-II, Ausgram-II, Ausgram-I, Bhatar, Kalna-II blocks which shows a better performance regarding health related parameters. Jamuria(M), Faridpur Durgapur, Ketugram-II, Memari-II, Katwa-II, Jamalpur, Khandaghosh, Ketugram-I, Purbasthali-I, Purbasthali-II blocks fall in moderate (0.03 to 0.05) category where the condition is not up to the mark and remaining blocks of Bardhaman, Pandabeswar, Bardhaman-II, Galsi-II, Monteswar constitutes low (below 0.03) category whose performance really needs some careful attention.

Table - 1, Health Input Index, 2011

Blocks	M.I. per thou-sand	SV (MI)	Beds per thousa.	SV (beds)	Doctors per thousa.	SV Doctors	WC and SC per thousa.	SV WC amd SC	HII
Salanpur	0.044	0.101	1.727	0.142	0.191	0.066	0.083	0.289	0.129
Barabani	0.054	0.131	0.317	0.023	0.063	0.020	0.144	0.513	0.075
Raniganj	0.196	0.581	2.873	0.240	0.413	0.145	0.196	0.701	0.345
Jamuria	0.044	0.099	0.469	0.036	0.097	0.032	0.124	0.437	0.084
Kulti (M)	0.037	0.079	1.048	0.085	0.172	0.059	0.010	0.025	0.056
Asansol (M.C)	0.113	0.318	3.331	0.278	0.422	0.148	0.004	0.003	0.083
Jamuria (M)	0.030	0.057	0.169	0.011	0.023	0.006	0.169	0.603	0.039
Galsi-I	0.034	0.068	0.304	0.022	0.040	0.012	0.155	0.549	0.056
Andal	0.065	0.165	0.912	0.073	0.124	0.042	0.278	0.996	0.150
Faridpur-Durgapur	0.028	0.049	0.255	0.018	0.037	0.011	0.142	0.503	0.047
Pandabeswar	0.013	0.003	0.040	0.011	0.006	0.001	0.150	0.532	0.002
Kanksa	0.052	0.127	0.257	0.018	0.026	0.007	0.171	0.610	0.056
Durgapur (M.C)	0.072	0.190	1.963	0.163	0.368	0.129	0.012	0.032	0.106
Bardhaman-I	0.328	0.996	11.839	0.999	2.808	0.999	0.133	0.471	0.827
Bardhaman-II	0.035	0.073	0.115	0.006	0.028	0.008	0.151	0.535	0.037
Ausgram-I	0.037	0.078	0.327	0.024	0.056	0.017	0.196	0.700	0.069
Ausgram-II	0.044	0.099	0.286	0.020	0.051	0.016	0.146	0.519	0.064
Bhatar	0.038	0.080	0.355	0.026	0.042	0.013	0.160	0.570	0.063
Galsi-II	0.022	0.030	0.216	0.014	0.022	0.005	0.179	0.637	0.036
Memari-I	0.045	0.103	0.433	0.033	0.050	0.015	0.156	0.554	0.074
Memari-II	0.029	0.053	0.235	0.016	0.036	0.011	0.154	0.548	0.048
Jamalpur	0.024	0.037	0.176	0.011	0.032	0.009	0.156	0.553	0.039
Raina-I	0.042	0.095	0.190	0.012	0.036	0.011	0.159	0.566	0.052
Raina-II	0.043	0.098	0.283	0.020	0.058	0.018	0.152	0.542	0.067
Khandaghosh	0.023	0.034	0.170	0.011	0.023	0.006	0.152	0.541	0.033
Mongalkote	0.025	0.041	0.346	0.025	0.042	0.013	0.162	0.576	0.053
Ketugram-I	0.020	0.025	0.191	0.012	0.034	0.010	0.164	0.584	0.037
Ketugram-II	0.028	0.048	0.233	0.016	0.028	0.007	0.168	0.597	0.044
Katwa-I	0.085	0.230	1.827	0.151	0.243	0.084	0.164	0.583	0.203
Katwa-II	0.024	0.038	0.207	0.014	0.033	0.009	0.166	0.590	0.042

Purbasthali-I	0.021	0.029	0.240	0.016	0.021	0.005	0.125	0.443	0.033
Purbasthali-II	0.026	0.044	0.196	0.013	0.026	0.007	0.138	0.489	0.038
Kalna-I	0.110	0.307	2.102	0.174	0.125	0.042	0.115	0.406	0.174
Kalna-II	0.032	0.062	0.260	0.018	0.045	0.014	0.169	0.601	0.056
Monteswar	0.018	0.019	0.173	0.011	0.023	0.006	0.149	0.531	0.029

Source: Calculated by Authors from Bureau of Applied Economics and statistics, Government of West Bangal. District Statistical Hand book Bardhaman, 2010-2011

M.I (Medical institutions), Beds per thousand (Number of beds per thousand population), Doctors per thousand (Number of hospital doctors per thousand population), Wc and Sc (family welfare centers and sub-centers per thousand population). HII (Health Input Index)

In terms of medical institution-population ratio significant block level disparities exist. Some of the blocks such as Bardhaman-I (SV=0.999), (Asansol (MC) (SV=0.318), Raniganj (0.581), Katwa (0.230) stands in the higher footing. Salanpur (0.101), Barabani (0.131), Andal (0.165), Kanksa (0.127), Durgapur (MC) (0.190), Memari-1 (0.103) are developed in this regard . On the other hand, Raina-I (0.095), Khandoghosh (0.034), Ketugram-I (0.025), Durgapur Faridpur (0.049) have poor medical facilities. The condition of the Bardhaman district regarding the bed-population ratio is unsatisfactory. Bardhaman-I (0.999), Salanpur (0.142), Raniganj (0.240), Durgapur (MC) (0.163), Asansol (MC) (0.278), Katwa-I (0.151), Kalna-I (0.174), Memari-II (0.016) enjoy better health care facilities in term of bed-population ratio. Other blocks like Mongalkote (0.025), Ketugram-I (0.012), Raina-I (0.012), Raina-II (0.020), Jamuria (0.036), Galsi-II (0.014), Bhatar (0.026), Kalna-II (0.018), have extremely poor condition. Considering the case of Bardhaman district in terms of doctor-population ratio, except Bardhaman-I (0.999) the overall condition of the blocks is gloomy. Surprisingly, Asansol (MC) (0.148), Raniganj (0.145), Andal (0.042), Katwa-I (0.084) fail to provide handly number of doctors to her people. The performance of Ausgram-I (0.700), Jamuria (M) (0.603), Raniganj (M) (0.701), Barabani (0.513), Ausgram-II (0.519), Katwa-I (0.5837), Ketugram-II (0.584), Ketugram-I (0.576), Jamalpur (0.553), Manteswar (0.531) blocks, regarding Sub-centre-Population Ratio, stand higher. The performance of rest of the blocks, in terms of sub-centre population ratio, is up to the mark as it is basic structure of rural health care. Asansol (MC), Durgapur MC, Andal and Pandabeswar, Raniganj, Jamuria, Baraban, Kulti blocks had a developed service tradition of collieries and industrial units. Beside, pottery works of clay, lime-works and bricks and tile works grew rapidly in the Asansol and Durgapur Belt. These rapidly growing urban centres are associated with industrialization and employment opportunities that results in increased income levels of urban residents. Asansol sub-division had 86.85% of the total workers engaged in secondary and tertiary activities, 5.24% cultivators, 6.15% agricultural workers and 1.75 engaged as household industrial workers (District Stastical Hand book Bardhaman 2010-2011). In Durgapur sub-di-

vision, 72.69% workers were engaged in secondary and tertiary sector and 7.89%, 17.27% and 2.15% workers were engaged in cultivation, agricultural labour and household industries respectively (District Stastical Hand book Bardhaman 2010-2011) while Bardhaman-I, Raina, Bhatar, Ausgram, Kalna, Katwa enjoyed municipal facilities. They had better educational opportunities, infrastructural development and better health facilities. Percentage of literacy rate in Bardhaman (M), Kalna (M), Katwa (M), Raina, Bhatar and Ausgram were 84.60%, 84.40%, 81.50%, 75.20%, 75.20% and 62.50% respectively (District statistical Handbook,2011). Education is positively associated with health as well as health care utilization, as knowledge creates awareness about health and health care utilization. Rest of the blocks of Bardhaman district namely Memari, Jamalpur, Khandaghosh, Ketugram had lagged behind in terms of education, infrastructure and health facilities. So, impact of occupation, urbanization and literacy makes a difference in the access to health care facilities.

Disparity in the performance of health care services

On the basis of HOI the blocks of Bardhaman district can be categorized into four categories very high, high, low and very low levels (Fig.2). Asansol (MC) (HOI =0.385), Raniganj (0.972), Barabani (0.350), Galsi-I (0.412), Jamuria (M) (0.361), Andal (0.532), Pandabeswar (0.450), Kanksa (0.338), Ausgram-II (0.347) and Ketugram-II (0.359) obtained very High Health output Index (Above = 0.34). It actually shows the greater pull force of urban centers as most of the people attracted here and tried to avail health care facilities of collieries and the industries. Memari-I (0.344), Jamalpur (0.285), Raina-II (0.308), Khandaghosh (0.337), Katwa-I (0.306), Purbasthali-I (0.299), Purbasthali-II (0.337) had high HOI value (0.28 to 0.34). These blocks stands for the production and productivity in agricultural and horticultural sector. In terms of public health care, agricultural belt does fairly good due to better quality water and environment. They are ecologically rich. Availability of drinking water is sufficient in these districts. On the other hand, Bardhaman-II (0.251), Ausgram-I (0.255), Bhatar (0.269), Galsi-II (0.241), Mongalkote (0.280), katwa-II (0.270), Kalna-I (0.266) had Low HOI (0.24 to 0.28). Under Bardhaman sub-division, 20.01 percent of total workers were engaged as cultivator, 33.27 % as agricultural labour and 2.91% as household industrial worker and only 30.07% were engaged in secondary and tertiary activities. The same picture was observed in the blocks under Kalna and Katwa sub-division (District Stastical Hand book Bardhaman 2010-2011).

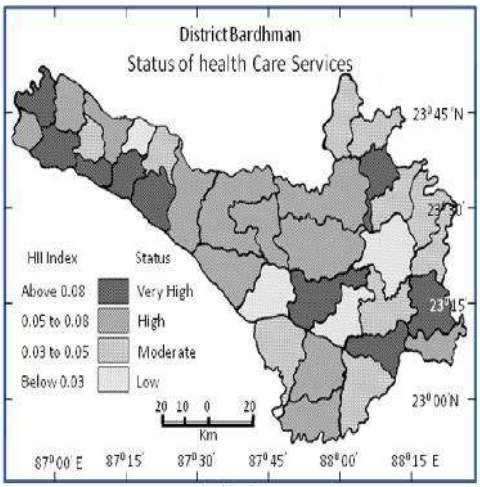

Figure 1

So, agriculture had to carry more people that it normally can. They lag much behind. Percentage of female literacy rate in Bardhaman-II, Ausgram-I, Bhatar is 58.00%, 52.80%, 54.90% respectively (District statistical Handbook, 2010-2011). On an average female literacy rate is quite low. Salanpur (0.156),

Jamuria (0.204), Kulti (M) (0.210), Faridpur-Durgapur (0.285), Durgapur (0.258), Bardhaman-I (0.070), Memari-II (0.162), Ketugram-I (0.237), Kalna-II (0.236), Monteswar (0.089) had very low HOI value (below 0.24). These Coal-related industrial activities have the permanent health hazards as caused by the harmful by-products of mining and industrial active ties in these blocks. Heavy pollution in environment, presence of toxic gases, occasional landslides etc. make local inhabitants more vulnerable to diseases and ill health.

Table - 2 : Health Output Index, 2011

Blocks	Delivery Rate	SV (Delivery)	Adult Death Rate	SV (Adult Death)	HOI
Salanpur	1.272	0.026	0.001	0.916	0.156
Barabani	0.573	0.144	0.002	0.847	0.350
Raniganj	0.593	0.990	0.001	0.955	0.972
Jamuria	0.849	0.050	0.003	0.821	0.204
Kulti (M)	0.712	0.047	0.001	0.936	0.210
Asansol (M.C)	0.260	0.166	0.002	0.893	0.385
Jamuria (M)	0.680	0.147	0.002	0.885	0.361
Galsi-I	0.824	0.201	0.003	0.844	0.412
Andal	0.908	0.359	0.004	0.786	0.532
Faridpur- Durgapur	0.960	0.093	0.002	0.869	0.285
Pandabeswar	0.844	0.270	0.005	0.749	0.450
Kanksa	0.448	0.135	0.003	0.845	0.338
Durgapur (M.C)	0.560	0.073	0.002	0.906	0.258
Bardhaman-I	0.830	0.111	0.020	0.044	0.070
Bardhaman-II	0.513	0.089	0.006	0.707	0.251
Ausgram-I	0.893	0.090	0.005	0.719	0.255
Ausgram-II	0.651	0.145	0.003	0.829	0.347
Bhatar	0.786	0.082	0.002	0.879	0.269
Galsi-II	1.178	0.075	0.004	0.770	0.241
Memari-I	0.718	0.130	0.001	0.907	0.344
Memari-II	0.904	0.030	0.002	0.875	0.162
Jamalpur	1.031	0.090	0.001	0.898	0.285
Raina-I	0.548	0.083	0.005	0.749	0.249
Raina-II	0.686	0.107	0.002	0.886	0.308
Khandaghosh	0.984	0.130	0.002	0.873	0.337

Mongalkote	1.298	0.086	0.001	0.907	0.280
Ketugram-I	1.485	0.061	0.001	0.909	0.237
Ketugram-II	0.906	0.140	0.001	0.919	0.359
Katwa-I	0.885	0.105	0.002	0.885	0.306
Katwa-II	1.088	0.084	0.002	0.866	0.270
Purbasthali-I	1.150	0.099	0.001	0.902	0.299
Purbasthali-II	0.866	0.126	0.001	0.899	0.337
Kalna-I	0.567	0.078	0.002	0.906	0.266
Kalna-II	0.894	0.060	0.001	0.920	0.236
Monteswar	1.516	0.009	0.003	0.885	0.089

Source: Source: Calculated by Authors from Bureoue of Applied Economics and Statistics, crovernment og West Bangal. District Statistical Hand book Bardhaman, 2010-2011

SV(Standardized Value), HOI (Health Output Index).

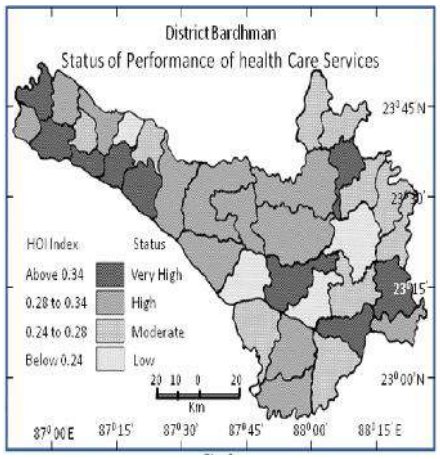

Figure 2

Correlation between input and output indices of Health care services

Table-3 shows the Spearman's rho value for HII and HOI across the sub- groups which are classified on the basis of the rankings of the blocks. HII based correlation shows that blocks are ranked on the basis of input and then correlated with output index, while in HOI based correlation shows that blocks are ranked on the basis of output index and thereafter correlated with input index. The values clearly indicate that under both types of ranking (i.e. input and output based) direction of movement is similar, however, magnitudes are different. Blocks belonging to "very low" and "low" category unexpectedly depict a negative correlation between HII and HOI. On the other hand, those in the group "high" and "very high" depict a positive correlation which is a trivial outcome.

Table-3: Correlation between HII and HOI

SPEARMAN'S Rank Correlation				
Level	HII	Name of the Block HII	HOI	Name of the Block (HOI)
Very Low	-0.14	Bardhaman, Pandabeswar, Bardhaman-I, Galsi-II	-0.43	Salanpur, Jamuria, Kulti, Faridpur-Durgapur, Durgapur, Bardhaman-I, Memari-I, Ketugram-I, Kalna-II, Monteswar

Low	-0.22	Jamuria (M), Faridpur Durgapur,Ketugram-II, Memari-II,Katwa-II, Jamalpur,Khandaghosh, Ketugram-I, Purbasthali-I, Purbasthali-II	-0.06	Bardhaman-II, Ausgram-I, Bhatar, Galsi-II, Mongalkote, Katwa-II, Kalna-I
High	0.70	Barabani, Kulti (M), jamuria, Mangalkote, Kalna-II, Galsi-I, Kanksa, Raina-I, Raina-II, Ausgram-II , Ausgram-I, Bhatar, Kalna-II	0.26	Memari-I, Jamalpur, Raina-II, Khandaghosh, Katwa-I, Purbasthali-I, Purbasthali-II
Very High	0.19	Salanpur, Andal, Asansol (MC),Raniganj (M), Durgapur (MC),Bardhaman -I, Kalna-I, Katwa-I, Kalna-I	0.42	Asansol (MC), Raniganj, Barabani, Galsi-I, Jamuria (M), Andal, Pandabeswar, Kanksa, Ausgram-II, Ketugram-II

Source: Calculated by Authors.

Table- 4: Coefficient of Variation

Index Group/ Measures	Health Input Index (HII)				Health Output Index (HOI)			
	Very Low	Low	High	Very High	Very Low	Low	High	Very High
Coefficient Of Variation Within Group (CV-WG)	0.36	0.12	0.13	1.01	0.36	0.05	0.06	0.44
Group Mean Index Value (G-MIV)	0.03	0.04	0.06	0.23	0.17	0.26	0.32	0.47
Coefficient of Variation Across Group (CV-AG)	1.47				0.48			
All Blocks Mean Index Value (ALL-MIV)	0.09				0.30			

Source: Calculated by Authors.

Table-4 summarizes various measures of disparity both within the group and across the group, where groups are classified according to rankings in terms of HII and HOI. The observations are interesting to note since the sub groups under the heads HII and HOI are independently classified based on their HII and HOI ranking, but it follows the same pattern of change. Let us first consider within group disparity measured by CV-WG. The blocks in the top bracket in terms of both input and output was burdened with relatively higher disparity (i.e., 1.01 and 0.44 respectively for HII and HOI), while the blocks, classified under the moderate group had relatively lower inequality i.e., 0.12 and 0.05 respectively). This arrow towards the possibility that medical services were highly concentrated within few blocks among others within the same classification i.e. "very high", therefore the resultant output was also high within these specific blocks. However, the rest of the blocks were deprived of such medical services. It has been found that HII is more unevenly distributed than HOI perhaps due to a very high concentration of hospitals, beds, doctors etc. in few particular blocks while the majority of blocks lagged behind. Also, uniformity in HOI is not due to lower disparity within the high values of the index, but due to lower disparity within the lower value of the HOI that constitutes more than ninety percent of total values. The mean index values across groups have been measured by G-MIV. Using simple arithmetic efficiency of inputs can be measured by taking the ratio of G-MIV of HOI to G-MIV of HII (i.e,. on an average output index obtained from the application of unit input index). The results are ordered in groups like, Very Low, Low, High and Very High. This clearly indicates that the groups that are relatively worse in terms of absolute average input and output index are more efficient in terms of utilization of the scarce or limited inputs. On the other hand, it is contradictory to note that blocks, with higher absolute average index value are the worst performer in efficiency units, therefore, its abundant inputs are underutilized. The overall distribution of health input and the resultant health output across the Bardhaman district is measured by CV-AG.

Conclusion

The paper explored that medical services were highly concentrated within Asansol (MC), Raniganj (M), Durgapur (MC), Andal, Bardhaman-I, Memari-I, Katwa-I, Kalna-I, Barabani, Kulti (M), Jamuria, Salanpur blocks due to greater pace of urbanization, health awareness among common people and infrastructural attainment. The blocks deprived of medical services like pandabeswar, Bardhaman-II, Galsi-II, Faridpur Durgapur, Katwa-II, Jamalpur, Khandaghosh need proper planning strategies and perfect implementation to overcome the discrepancies of health care system in Bardhaman district. It is also interesting to note that blocks with high Health Input Index such as Salanpur, Durgapur, Kulti (M), Jamuria, Andal, performing worse. This clearly indicates that these blocks underutilized its abundant input. The study reveals that better health awareness among common people and socio-economic reforms are required for the development of health care system.

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Book Review

Malay Mukhopadhyay

Tales within a River by Saswati Roy, 2016; 102 pp.: ISBN 978- 93-82441-78-1, INR 200 (hard cover), Sopan, Kolkata

Rivers are source of life and human civilization on this Earth and so is our concern reflected in academic response (Law, 1944; Misra, 1970). Remarks of Dutta (2001) are notable, "River is an apt metaphor for life. It is born, wends its way through the landscape of consciousness, and dies to mingle in the sea of eternity. Constant change is the rule of life and a river is constantly changing; the water it carries is never the same, the face it presents is always different. Unlike hills and mountains it is not inert and immobile; there is life and dynamism in its flow. Sometimes it is placid, sometimes enraged. And, like life itself, its death is a beginning in the most sublime sense, a recurrent and cyclic regeneration of generations, a looking forward to a future which leaves behind yet embraces the past".

Personification of rivers is quite old in ancient Indian tradition. One finds many such stories in the Indian mythology. I am reminded of the famous episode in Mahābhārat in which Bhishma's father Shantanu married river goddess Ganga. Many more narratives of similar type could be found where natural entities like rivers are personified and described in relationship with human beings. Looking at it philosophically, one may interpret them together as an integrative viewpoint where human beings are treated very much as part of nature so much sō that they are described communicating with nature, like rivers, mountains, birds and so on, especially in the ancient oriental cultures. Such narratives have also been reported in other ancient societies and cultures too.

Rivers' economic and extra-economic services and values are well known to the contemporary societies. Scholars believe that the Mother Earth which nurtures life on this planet and gives us food and water and a variety of natural resources, rivers contribute as grandmother in her making. Hence, they are our great grandmothers (cf. Sahriday 2003). They are intertwined with human life. There fore, rivers have rightly been termed as 'life-lines' draining the Earth and quenching the thirsts of its inhabitants since time immemorial. And, they continue to do so.

No experience or narrative is complete without reference to rivers especially in India. The landscape of (West) Bengal --the land drained by many rivers, is an example of rivers sourcing/ nurturing life. No wonder rivers have acquired not only the status of mother but a divine entity as well. Worship of rivers by common people at auspicious and special occasions is evidence to this fact. The image worship of Ganga and Yamuna rivers is higher example of same kind. One may compare the similar status of rivers like Godavari, Narmada, etc. by whose banks similar *mahotasavas* ('grand scale festivals') are organised.

Professor Mukhopadhyay, a trained geographer and amateur litterateur, who has authored the present book in the form of a novel, has been working on rivers since long. In one of his co-authored books, a remark is worth quoting here, "River is a part of man's daily life. So, the problems related to river as well as the recent changing hydro morphological characteristics of the river due to human interferences have great impact on ecological system (Mukhopadhyay, Mukhopadhyay and Pal 2010). The present book is a continuation of the author's passionate concern for the rivers in which he attempts to relate a river's life with human, a female, life. It is the story of river Mayurakshi--literally, 'peacock eyed' -- named (see, p. 24) due to its 'crystal clear water of the dry season'. The river originates near Punasi village, in Trikut Hills (Santhal Pargana) around 16 km from Deoghar (Jharkhand) and covers a distance of 250 km traversing through Jharkhand and West Bengal before it meets Hugli/Hooghly (or, Bhagirathi). Though it is mainly a rainfed river, it causes massive devastation through floods for which embankments were constructed which too are breached and washed away by it. Therefore, it was dammed to control flood, Land use its water for irrigation and power generation. It is fed by Brahmani, Dwarka, Bakreshwar and Kopai rivers. Thus, a source of life and livelihood for many thousands people.

In this backdrop, the whole story in the book is woven comparing rivers and human genetics on scientific lines (pp. 15-16). The novel actually starts at p. 15 with the story of Shiblal Sharma, husband of Malati who is pregnant and gives birth to Mayurakshi River personified as Bijli in the story, known by several other local names. Rest of the narrative is about the life course of this river, how people are attached and interact with her. And, the most serious part is the pains and pangs of a harassed river due to modern interventions and taming based on science/technology and the neglect of natural dimensions of it. Scholars term them 'abuses' due to 'a poor understanding of what constitutes a river' (cf. Iyer, 2015). It leads to crises and conflicts (Singh, 2008; 2011).

By using of local terms--*Marang Buru* (a santhal god, p. 18), *haat* (p.18), *makai* (p. 17), *chullah* (p. 20), *ekka-doka*, *kith-kith* (folk games), etc. and local sayings like 'wheat sowing associated with son birth, and maize with daughter's (pp. 21-22) and so on, the author has tried to bring in a dash of typical local/regional culture. A reader may find a subtle colour of Santhal Pargana's rural landscape painted throughout. As indicated earlier, the author looks at the river issue in an unique blend of two interests--geographic/scientific and literary narration--which have resulted into an appropriate product in the form of this novel, originally written in Bangla/ Bengali and later translated into English by an young geographer. This is why the geographical essence not only remains intact but its fragrance becomes heady.

The book is foreworded by (Late) Professor Subhash Chandra Mukhopadhyaya, one of the internationally known Indian fluvial geomorphologists, popularly called as 'SCM' sir by colleagues, admirers and his students,; and, Dr Kalyan Rudra, a trained geographer, known as 'the Riverrman'(of West Bengal), both eminent personalities; and, Prof. Dipankar Roy, Professor of English at Visva-Bharati, Santiniketan. To me the book appears a soulful rendering of a river's

agony written interestingly with a fresh approach in which science merges well with the beauty of literature. The final message is don't dam the river for short sighted, short term benefits; set them free, let them flow…

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