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CONTENTS

सम्पादकीय

'उत्तर प्रदेश ज्याग्राफीकल जर्नल' का 28वाँ अंक 2023 प्रकाशित करते हुये अपार हर्ष की अनुभूति हो रही है। ब्रह्मावर्त ज्याग्राफीकल सोसाइटी आफ इण्डिया के समस्त सदस्यों के सहयोग से जर्नल को संपूर्ण राष्ट्र में अपार लोकप्रियता प्राप्त हो रही है। जर्नल की गुणवत्ता हेतु आवश्यक है कि समस्त प्राध्यापक एवं शोध छात्र जर्नल में दिये गये दिशा निर्देशों का पालन करते हुये शोध पत्र तैयार कर प्रेषित करें। यदि प्रेषित शोध पत्र जर्नल के प्रारूप के अनुसार नहीं हैं और न ही शोध परक हैं उन पर सम्पादक मंडल विचार नहीं करेगा। अस्वीकृत शोध पत्र पर किसी प्रकार का स्पष्टीकरण नहीं दिया जायेगा। ''उत्तर प्रदेश ज्याग्राफीकल जर्नल'' में शोध पत्र मौलिक, शोध परक, स्तरीय तथा जर्नल के प्रारूप के अनुरूप एवं Peer Review Committee द्वारा अनुशंषित ही सम्मिलित किये जाते हैं।

मुद्रर्ण व्यय तथा डाक व्यय में विगत वर्षों में बहुत अधिक वृद्धि हुयी है। सोसाइटी की आर्थिक स्थिति बहुत सन्तोषजनक नहीं है तथा जर्नल के प्रकाशन में निरन्तर आर्थिक कठिनाई आ रही है। अतः बृह्मावर्त ज्याग्राफीकल सोसाइटी आफ इण्डिया की कार्यकारिणी ने एक जनवरी, 2024 से सोसाइटी की पाँच वर्षीय सदस्यता शुल्क में वृद्धि की है। आशा है कि विगत वर्षों की भाँति आपका सहयोग जर्नल को अनवरत रूप से प्राप्त होता रहेगा।

साभार ।

डा0 जे0 पी0 गुप्त
मुख्य सम्पादक

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FOOD SECURITY AND NUTRITIONAL LEVEL IN THE RURAL AREAS OF PANNA DISTRICT, M.P.

R. P. Mishra

ABSTRACT

Analysis of food security and nutritional level is based on field surveys of eight villages in the Panna district and agricultural food production for the period of 1970-71 to 2020-21. During the last fifty years, this district has been at the top of food insecurity, where per capita per day food availability was extremely low. During 1970-71, food availability was only 206 grams per day per capita, and this district was in the condition of extremely high food deficiency and remained in this category up to the decade 2010-11. However, during 2020-21 the food production figures improved and availability values increased significantly, reaching 685.9 grams. This was the highest in the last seven decades, and the district has entered in a food security condition. The diet of the common rural person is highly grain-oriented, and there is a higher deficiency of vegetables and fruits; therefore, conditions of under nutrition and malnutrition prevailed in the district. The analysis of food security and nutritional level is based on the method developed by FAO and used by Shafi, Sukhatme, Mishra and many others.

Key Words : *Nutritional Level, Availability, Food grain, food security.*

Introduction

Food security is becoming a global problem because of climate change, decreasing food production and increasing the number of persons. It has been a prime concern in developing and underdeveloped countriesbecause they face crises of resources and limited purchasing capacity. Our country is self-sufficient and secure in food resources, but the impact of climate change is now visible, and the increasing number may create problems in the coming decades. There is a direct relationship between food security, food production, market prices, dietary quality and the number of consumers. Food insecurity and high prices are associated with poor dietary quality, disproportionately affecting low-income and vulnerable populations (Headey and Alderman, 2019).Food availability, accessibility and food security are directly associated with income, particularly in low- and middle-income groups of families where food insecurity is prevalent (Herforth and Ahmed, 2013). Three key factors influence food security in developing areas, including (i) the level of agricultural development, (ii) trends in food production, and (iii) population changes. In our country, climatic conditions play a crucial role in determining the cropping pattern, variety of crops, productivity level, overall food production and food security. Moreover, adverse changes in weather conditions, such as heavy rains, droughts, rising temperatures, or hailstorms, can indirectly impact food security. Climate change directly or indirectly impacts domestic agricultural production, affecting crop yields, soil fertility, water-holding capacity, and crop pests and diseases (Gitz, et al., 2016). It also has implications for economic growth, demand for agricultural products, and income distribution. In

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addition, it affects the suitability of the land, potential yield, and the varieties currently being produced (Alagidede, et al., 2015); therefore, climate change is one of the main determinants of food production and food availability in those areas where rain is the primary water source for crops.During the green revolution, agriculture adopted yield-increasing technologies; consequently, food production increased to a great extent. However, sustainability in food security may not improve because the demographic factors remain constantly widening (Mishra, 2006). Population growth has a significant impact on food security, particularly in backward regions of the country; the Bundelkhand region is one such region. Moreover, food security is determined by two primary components, one of which is food production and food availability, and the second is population growth. These two components are dynamic and interrelated, and any change in them during a particular period can affect the food security scenario to a large extent in a region.

Food security is a concept that concerns all people always having access to sufficient and nutritious food (Cafiero, 2014). According to the World Food Summit, "food security exists when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996).Food security has two components- one is the efforts to produce more food from agricultural and non-agricultural sources, and another is to give an assurance of food to the consumers. Food security is a multi-part observable fact resulting from numerous causes (FAO, 2013).There are four dimensions of food security: (i) Availability of food, (ii) Accessibility, (iii) Utilization or consumption, and (iv) Stability.

Availability of food refers to food from domestic production or importof high quality and nutritional content (Chijioke, 2011). It can be calculated considering domestic production, storage, distribution, import, and export. Changes in food production can affect food availability to a large extent. Food availability can improve by increasing productivity and production by using yield-raising techniques in agriculture.

Accessibility is the prime concern of a welfare state, and it refers to the ability of society, families, or individuals to access food in sufficient quantity and good quality. Physical and economic factors, as well as social and political factors, determine food access. Lower levels of development, poverty, low living conditions, low purchasing power, and high commodity prices can affect accessibility in a region. However, the physical availability of food only sometimes guarantees that an individual will have access to it (Ericksen, et al., 2011).

Utilisation or consumption of food indicates the level of sufficiency or insufficiency of food. Insufficient dietary intake can lead to undernutrition and malnutrition in young children, such as stunting, wasting, and being underweight (Hussain, et al., 2022). Food consumption is influenced by various demographic structures, culture and economic factors, including food preparation, nutrition content, health care facilities, women and child care, and the role of women in a family (Negin, et al., 2009).

Stability or sustainability refers to access to sufficient quantities of food for the population, households, or individuals at all times. It considers the risk to food security by taking into account factors such as the requirement of foodstuffs, dependence on food grains, size of landholdings, productivity and production from farmlands, level of agricultural development, purchasing power of a family, age structure of people, male-female structure, economic level, and living standard of a family. It is impacted by domestic food price volatility, shifts in domestic food availability, adverse weather patterns and climate change (FAO, IFAD, and WEP, 2014; Byerlee, et al.,2008).

The Study Area

The Panna district of the Bundelkhand is situated on the picturesque mountain ranges of Vindhyachal, and the Ken river flows through this district. It is located in the north-central part of Madhya Pradesh on a geographical area of 7,135 km^2. Panna has diamond mines, as well as famous for its ancient temples, and Panna tiger reserve.

Ministry of Panchayati Raj named Panna one of the country's 250 most backward districts (out of a total of 640) in the year 2006. It is among the five poorest districts in the state in terms of income, ranks 41st out of 45 districts in human development index (HDI) in Madhya Pradesh.

The district receives an average annual precipitation ranging from 750 to 950 mm, with most precipitation occurring during the monsoon season from June to September. Agriculture is the main economic activity, with more than two-thirds of workers directly engaged in agricultural activities. Population of Panna district was 1.01 million (2011 Census), increasing with 18.67 per cent. The projected population in the year 2022 was 1.34 million (Aadhar uidai.gov.in, 2022) living in six towns and 1011 villages. Average literacy rate was 64.79 (2011), male literacy (74.14%) was much higher than female literacy (54.44%). About 96 per cent population is Hindu, 3.46 per cent Muslim and remaining others. About 87.7 per cent population was living in rural areas and the remaining 12.3 per cent in urban centres.

Objectives

The main objectives of this study is to analyse different dimensions of food security in the range of food production and availability, sources of foodstuffs, dietary pattern, food consumption pattern, nutritional requirements and availability and differentials in consumption pattern. To analyse possible factors that affect food production and availability in the Panna district, a backward district of Madhya Pradesh.

Data used and Research Methodology

This study has utilised both primary and secondary sources of data and information. Primary data have been collected through diet surveys conducted in eight villages of the district, while food production data have been obtained from the Agricultural statistics of Madhya Pradesh. Families of these sample villages were selected according to the family size and economic level. These families are classified into two groups according to family size, i.e. small family (4 members family) and large family (more than 4 members). The families have been again classified into three groups, i.e. HIG, MIG and LIG. In our country, there are three distinct seasons in a year, and the availability of foodstuffs is quite different; therefore, informationhas been collected accordingly.

Food and nutritional availability have been calculated using the food balance sheet method developed by FAO (1949), and used by Shafi (1960), Shukhatme (1962), Mishra (1989), and others. These data have been tabulated and converted into different nutrients based on tables supplied by the National Institute of Nutrition (NIN) and the Indian Council of Medical Research (Gopalan, and others, 2004). This study analyses the quantitative and qualitative food and nutritional consumption aspects. Quantitative food (energy content) is measured in terms of caloric value, while qualitative food measures the value of different nutrients in the available foodstuffs.

Results and Discussion

I. Sources of Foodstuffs and Dietary Pattern

In rural areas, food comes from agricultural sources, including cereals and pulses. People purchase leafy vegetables, fats and oil, and sugar from the nearby market, but due to low limited purchasing power they can purchase these items in a limited quantity. Consequently, cereals and pulses remain significantly in the diet throughout the year.

Seasonwise Availability of Foodstuffs : The rainy season has more moisture content in the atmosphere and higher temperatures, which are helpful for the growth of various leafy and green vegetables; therefore, these vegetables are available in the last two months of the rainy season. The winter season provides the most favourable conditions for the growth of many green and leafy vegetables, roots and tubers and seasonal fruits because of low temperature, proper moisture and availability of water. During the summer season, due to dryness in the atmosphere and the non-availability of water, most vegetables are scarce in rural areas.

II. Food Production and Availability

Agriculture is the primary source of food for the people of the study area, which produces main crops such as wheat, rice, millets, pulses, and soybeans. This fact indicates that food security and the overall economy can be improved by increasing the production of these crops (Byerlee, D., et al., 2008).Among the cereals, wheat and rice are contributing 98.6% of the total cereals production; while Bengal gram, urad, and lentil are contributing 95.3% of the total pulses production in the year 2020-21. These five food crops account for 97.8% of the total food grain production and the remaining food grains include jowar, maize, barley, tur (red gram), and moong (green gram), which contribute only 2.2% of the total food grains in this district.

The Food Balance Sheet method has been used to calculate the net food availability after accounting for factors like seed rate, loss during transport and storage, and wastage (Mishra (1989).The availability of cereals was 503.5 grams, which is lower than the recommended requirement of 460 grams, while the availability of pulses was 142.0 grams, significantly higher than the standard requirement of 40 grams. Therefore, the total food grain availability was 654.6 grams per capita per day in the study area.

Analysis of sustainability is a significant indicator of the trend and level of food security. During the last fifty years, this district has been at the top of food insecurity, where per capita per day food availability was extremely low. The production growth rate was slow, whereas the population growth rate was very high; therefore, this district was facing food crises and is classified in the category of food deficit areas.The food production was low compared to the population of the district, and per capita per day availability of food grains was 206 grams in 1970-71; this was extremely low. Again, the same figure (208 grams) repeated after thirty years 2000-01 (Table 01); this availability of foodgrains was also extremely low, indicating the higher level of insecurity in this district. Moreover, during 2020-21 the food production figures improved and availability reached up to 686 grams. This was the highest in the last seven decades and the district has entered in the food security condition. This may be the impact of agricultural development in this area.

III. Food Consumptions Pattern

In the rural areas, the majority of the population is vegetarian, and cereals and pulses form a major part of their daily diet. Green and leafy vegetablesare scarceduring the summer months. In addition, milk, fats and oils, pulses, sugar, and jaggery are consumed in relatively low quantities, while non-vegetarian foods are virtually absent from the diet of most rural people in the surveyed villages. The locally available wheat, rice and pulsesare staplefoods in the region. Factors influencing the dietary patterns of the people include agricultural products, large family sizes, the limited purchasing power of poor households, and insufficient knowledge of essential nutrition.

The grain oriented diet is deficient in protein, carbohydrates, fat, calcium, vitamin A (carotene), B2 (riboflavin), and vitamin C, leading to under nutrition, malnutrition, and nutritional deficiency diseases (Gopalan, 2004). The survey results indicate that under nutrition is more prevalent

Table 01 : Production And Availability of Foodgrains in Panna District, M.P.

Year	Gross Food grain Production(MT)	Net Food grain Production (Less 16.5%)	Population	PDPC Net Food grain Availability
1970-71	1,00,900	88,287	4,29,077	206
1980-81	2,23,400	1,95,475	5,39,978	362
1990-91	1,91,800	1,67,825	6,87,945	244
2000-01	2,03,400	1,77,975	8,56,558	208
2010-11	2,60,300	2,27,762	10,16,520	224
2020-21	8,84,500	7,73,937	11,28,338	686

Source : Calculated on the basis of Agricultural data and Population.
Note: Projected Population of 2021.

among children, females, and older people in rural areas.

Cereals and pulses constitute nearly two-thirds (65.3%) of the total food consumption, while vegetables are the other important food sources, contributing more than one-third (15.3%) of the diet. The average daily foodstuffs consumption in the study area is lower than the recommended requirement. It is evident from the fact that the average consumption of cereals (90.7 %), milk (21 %), green vegetables (34 %), fats and oil (62.5 %), and sugar (83.3 %) is lower than the requirements (Table 02).

Wheat and rice are the most common and affordable energy source in the area, providing 336-361 calories per 100 grams. They contain 7-10 grams of protein per 100 grams but are poor in mineral content, especially calcium and iron in rice. The per capita per day availability of cereals was 418 grams, which was -9.3 per cent lower than the recommended requirement in the rural areas of Panna district.

Pulses are an essential source of protein, though they have lower-quality of minerals and vitamins; however, germinating pulses can produce significant amounts of vitamin C, and sprouted pulses like green gram and Bengal gram are rich in some vitamins (FAO,1957). The per capita per day availability of pulses was (49 grams), -1.0 per cent lower than the recommended requirement.

Green leafy vegetables are essential for growing and maintaining everyday health due to calcium, iron, vitamins, and other nutrients (McHenry, 1957). Vegetables can be grouped into green and leafy vegetables, root vegetables, and other vegetables. The per capita per dayavailability of green vegetables (17 grams), other vegetables (50 grams), and root vegetables (42 grams) was lower than the recommended requirement (Table 02). Fat and oil provide energy for the body, while sugar and jaggery are used as sweetening agents and to enhance food flavour. The per capita per day availability of Fats and oils was 25 grams, which was -37.5 per cent lower than the recommended requirement.

Seasonal fresh fruits are essential for maintaining body resistance and providing different vitamins and minerals, but availability and consumption have been low in the study area. The

Table 02 : Average Food Consumption in Panna District,M.P.

Foodstuffs	Per capita per Day Requirement (g)	Per capita per Day Consumption (g)	% of Requirement	Surplus/ Deficit (%)	% of Total food
Cereals	460	418	90.7	-9.3	58.4
Pulses	50	49	97.5	-1.0	6.9
Green Vegetables	50	17	34.0	-66.0	2.4
Other Vegetables	60	50	83.3	-16.7	7.0
Roots& Tubers	50	42	84.0	-16.0	5.9
Fats & Oils	40	25	62.5	-37.5	3.5
Sugar& Jaggery	30	25	83.3	-16.7	3.5
Fruits	37	5	13.5	-86.5	0.7
Milk& its Products	100	21	21.0	-79.0	2.2

Source: Calculated on the basis of data collected from Field survey, 2022

per capita per day availability of fruits was only 5 grams, against the recommended minimum requirement of 37 grams; therefore, a deficiency of 86.5 per cent was recorded.

Milk, a source of animal calcium, is essential for the growth and development of the body. It is an excellent complete food for infants and children and a good supplementary food for adults and aged people (NIN, 2020). The per capita per day availability of milk was 21 grams, which was 79 per cent deficiency than the recommended requirement.

The dietary intake of females is lower compared to that of males. In rural areas, it is customary for children to eat first, followed by males, leaving females with inadequate amounts of food. This trend persists even during pregnancy, resulting in insufficient intake of both quantity and quality of food for females. Food security can be achieved by management of land degradation, increasing agricultural productivity, production of climate-resilient crops, proper use of water for irrigation, and use of manures, including promoting sustainable agricultural practices, infrastructure for small farmers, and reducing wastage of food (Rosegrant, et al., 2018).

IV. Nutritional Availability and Consumption

For a healthy life and good immunity, different nutrients are required, such as protein, carbohydrates, calcium, iron, vitamin A (Carotene), vitamin B1 (Thiamin), vitamin B2 (Riboflavin), vitamin B2 (Niacin), and vitamin C; but, survey results reveal that the average diet of people lacks most of the essential nutrients. Rural areas have a common deficiency of protein, fat, carbohydrates, calcium, iron, vitamin A, vitamin B2 and vitamin C in their daily diet (Table 03).

Energy (Calories): The average intake of calories among people in the study area was 2001.9 per capita per day (Table 03), -16.6% lower than the recommended requirement of 2400 calories; this indicates under nutrition, and people may be underweight and, therefore, may have low working capacity. This lower availability and intake may be due to lower food production and the low purchasing power of families (Mishra, 2016).

Proteins: Proteins helps in building and repairing tissues in the body; loss of weight and being underweight are some indications of lower

Table 03 : Nutritional Intake of an Average Person in Panna District, M.P. (Per Capita per day)

Nutrient	Recommended Requirement	Consum-ption	% of reqt.	Surplus/Deficit	
				Quantity	%
Energy	*2400 Cal*	2001.9	83.42	-398	-16.58
Proteins	*60 g*	56.9	95.00	-3	-5.00
Fat& oil	*60 g*	24.7	41.17	-35.3	-58.83
Carbo.	*600 g*	375.3	62.53	-224.8	-37.47
Calcium	*900 mg*	409.6	45.58	-489.8	-54.42
Iron	*29.5 mg*	21.0	71.53	-8.4	-28.47
Vit. A	*2400 IU*	1238.4	51.63	-1160.9	-48.37
Vit. B_1	*1.2 mg*	1.9	158.33	0.7	58.33
Vit. B_2	*1.4 mg*	0.7	50.00	-0.7	-50.00
Vit. B_2	*12.6 mg*	19.9	157.94	7.3	57.94
Vit. C	*40 mg*	23.5	58.75	-16.5	-41.25

Source: Calculated form the data collected form field survey, 2022.

consumption of proteins (NIH,2020). Soybeans, groundnuts, pulses and animal food are rich protein sources. The average protein consumption among people of the region is 56.9 grams per day, which is -5% lower than the recommended minimum requirement of 60 grams.

Fats: There are several functions of fats in the body, which include providing energy and supporting cell growth and development (NIH,2020).The average daily intake of fats and oils among people in the region was 24.7 grams, -58.83 per cent lower than the recommended minimum requirement of 60 grams per day. People consume lower amounts of fat & oils because of the lower production of oilseeds and the poor economic condition of the families, which limits their ability to purchase fats and oil from the market.

Carbohydrates: Most carbohydrates come from sugar, jaggery, fruits, and roots. The average carbohydrate intake of people in the region is 375.3 grams daily, -37.47 % lower than the recommended daily requirement of 600 grams.

Iron: The iron intake was 21.0 mg which is -28.47% lower than the recommended daily requirement of 29.5 mg, and iron deficiency has also been recorded among females. A lower intake of green leafy vegetables is the main reason for lower iron intake in the daily diet.

Calcium: Calcium helps the expected growth of bones and teeth, particularly in children and young people(Sherman and Lanford, 1957). The daily intake of calcium 409.6 was -54.42 per cent lower than the recommended daily requirement of 900 mg, because the people do not consume sufficient quantities of milk, cheese, and other animal foods.

Vitamins: The dietary sources of vitamins include animal-based foods like meat, fish, and dairy products, as well as plant-based foods like fruits, vegetables, and grains (WHO, 2021). The daily intake of vitamins A, B, and C was recorded as deficient during the survey period. The deficiency of vitamins may be due to a lower intake of green vegetables and other foodstuffs which contains vitamins.

Vitamin A *(Carotene)*: This vitamin is necessary for clear vision in dim light; butter, ghee, whole milk, curd, and egg are rich sources of this vitamin (Victoria and Jane Higdon (2016). The availability and consumption of this vitamin was 1238.4 IU which was -48.37 per cent lower than the daily recommended minimum requirement of 2400 IU.

Vitamin B_1 *(Thiamin)*: Outer layers of cereals like wheat, rice and millets are good sources of this vitamin (Sherman and Lanford, 1957). Some common indications of deficiency of this vitamin may cause loss of appetite and numbness in the legs and

hands (WHO, 2007). The availability and consumption of this vitamin was 1.9 mg which was 58.33 per cent higher than the daily recommended minimum requirement of 1.2 mg.

Vitamin B_2 *(Riboflavin)*: Milk and its products and green leafy vegetables are good sources of this vitamin. Soreness of the tongue, cracking at the angles of the mouth, redness and burning sensation in the eyes are common symptoms of a deficiency of this vitamin (McHenry, 1957). The availability and consumption of this vitamin was 0.7 mg which was -50 per cent lower than the daily recommended minimum requirement of 1.4 mg.

Vitamin B_2 *(Niacin)*: Whole cereals, pulses, nuts and meat are good sources of this vitamin. The common indications of deficiency of this vitamin are soreness of the tongue, and pigmented skin (Sherman and Lanford, 1957). The availability and consumption of this vitamin was 19.9 mg which was 57.94 per cent higher than the daily recommended minimum requirement of 12.6 mg.

Vitamin C: Sprouted Bengal gram, green gram, fresh fruits, oranges, grapes, and lime are good sources of this vitamin (FAO, 1957). The availability and consumption of this vitamin was 23.5 mg which was -41.25 per cent lower than the daily recommended minimum requirement of 40 mg.

Thus, on the basis of the above discussion it is concluded that there is a condition of undernutrition and malnutrition in the rural areas of Panna district. The availability of essential nutrients such as calories, proteins, iron, calcium and vitamins is lower than the minimum recommended requirement.

Conclusion

It is concluded that this district comes in the category of food insecurity since 1970-71; however, during 2020-21, the situation has improved, and now this district entered in the food security condition with its per capita per day value of 685.9 grams. There is a deficiency in most of the food items in the study area. When converted the food items into the nutritive values, it is found that there is a deficiency of different nutrients. People of the rural areas are not taking balanced diet, their diet is highly grain oriented and there is a deficiency of many essential food items such as green vegetables, milk, fat & oil, protein-rich food and vitamins oriented food items. Cereals and pulses constitute nearly two-thirds (65.3%) of the total food consumption, while vegetables are the other important food sources, comprising more than one-third (15.3%) of the diet. It is evident from the fact that the average consumption of cereals (90.7 %), milk (21 %), green vegetables (34 %), fats and oil (62.5 %), and sugar (83.3 %) is lower than the requirements. The average calorie intake of people in the study area was 2001.9 per capita per day, 16.6% lower than the recommended requirement of 2400 calories, this deficiency also recorded in the other nutrients, hence this area face the condition of under nutrition and malnutrition.

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ASSESSING CLIMATE RISKS AT THE DISTRICT LEVEL IN BIHAR STATE: IMPLICATIONS FOR ADAPTATION AND RESILIENCE PLANNING

Bijay Kumar Singh & S.S. Verma

ABSTRACT

Climate change has emerged as a challenge for whole world, posing significant risks to India as well, with potentially severe impacts on its population, economy, and environment. Bihar, one of the states of India, is highly disaster-prone due to climate change. Therefore, a, climate risk assessment is essential to understand these risks and to develop appropriate strategies for adaptation and resilience. This paper outlines the process of assessing climate risk and identifies the spatial pattern of vulnerability in Bihar State. The study used historical daily data of rainfall and temperature from the last 30 years (1992-2021) to determine the composite hazards and exposure index to climate change.

The analysis suggest that Bihar is highly vulnerable to climate change, with increasing temperatures, changing rainfall patterns, and more frequent extreme weather events. These changes could have significant impacts on crop yields, water availability, public health, and management of infrastructure, especially in flood and drought-prone areas. The study recommends a range of adaptation measures, including improving water management, promoting climate-resilient agriculture practices, reinforcement of health services and strengthening early warning systems for extreme weather events. The findings of this study can help uniform policy decisions and guide investments in process of climate adaptation in Bihar state and other vulnerable regions facing similar risks in the country too.

Key Words : *Climate change, Composite hazard and exposure Index, Adaptation, Resilience Planning.*

Introduction

Bihar, with 38 districts has a long history of disasters of various types and magnitudes (GoI, 2020). In recent decades, the changing phenomena in climatic variables due to climate change have significantly impacted its population and level of socio-economic development. Almost all districts are vulnerable to major climate-related hazards such as floods, droughts, cyclonic storms, and fires. Cold and heat waves are another major threat to the state (Mohanty and Wadhawan ,2021).

Flood is considered to be the most important disaster in Bihar (fig.01). Around 73 per cent population of Bihar is flood-prone (GoB, 2015)In 2008, more than half of Bihar was submerged under water, with 16 of its districts reeling under the deluge (ibid). That year the state witnessed its worst floods, affecting more than 30 lakh people in about 1,500 villages. In the year 2014, nearly 33,200 people were displaced due to floods. The flood situations of 2016 and 2019 were also serious in the urban areas, again putting at risk to millions of people in the state, followed by several fatalities. Likewise, the 17districts of south Bihar (South of the River Ganga) which account for 25.75 % of the total area, are vulnerable to regular severe droughts owing to receiving less than 730 mm of rainfall (Economic survey of Bihar, 2020-21).

The intensity of climate change has given rise to a new dimension in altering the nature, frequency and magnitude of natural disasters and calamities over the last few decades (Mohanty and

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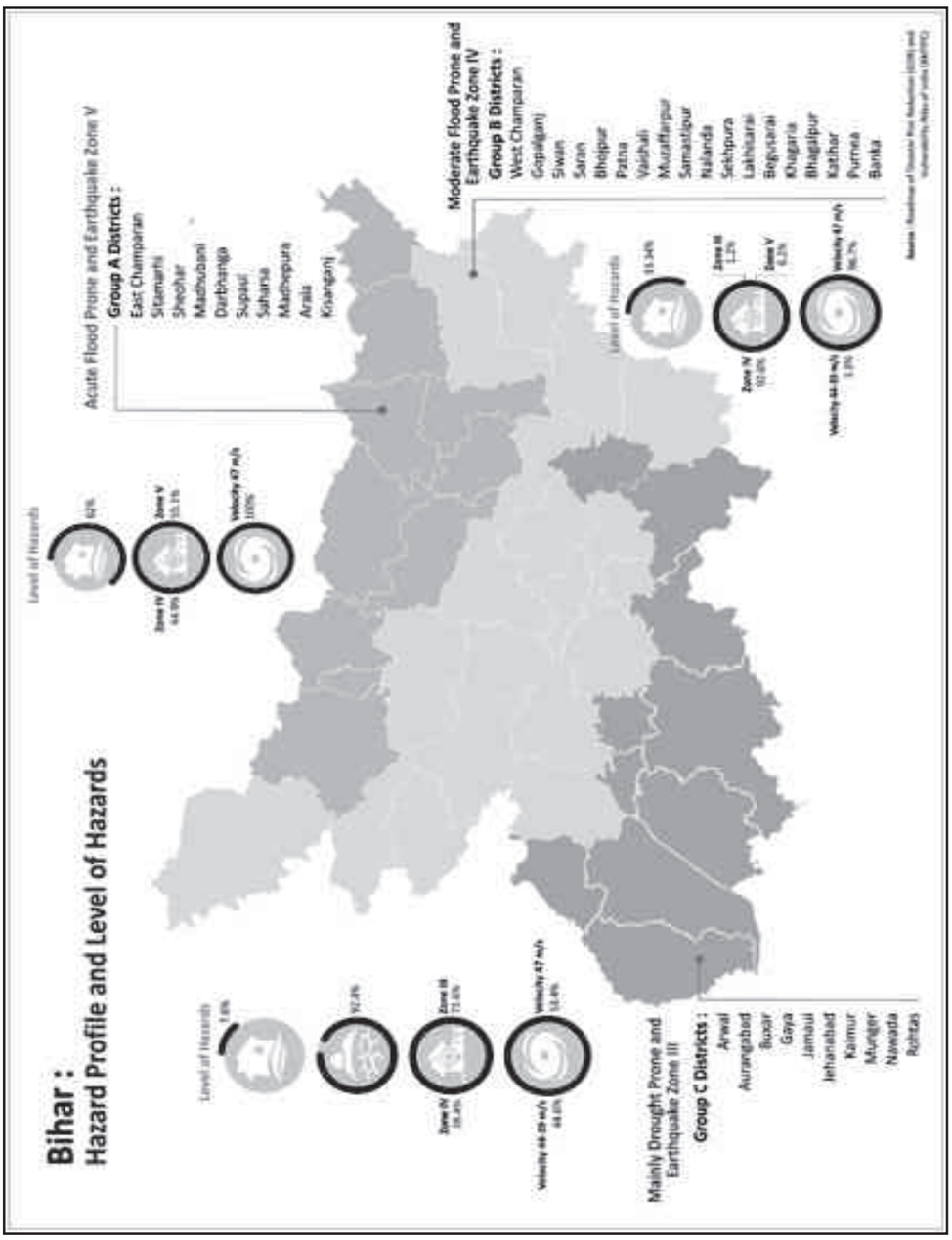
Bihar :
Hazard Profile and Level of Hazards
Acute Flood Prone and Earthquake Zone V
Group A Districts :
East Champaran
Sitamarhi
Sheohar
Madhubani
Darbhanga
Supaul
Saharsa
Madhepura
Araria
Kruanganj
Moderate Flood Prone and Earthquake Zone IV
Group B Districts :
West Champaran
Gopalganj
Siwan
Saran
Bhojpur
Patna
Vaishali
Muzaffarpur
Samastipur
Nalanda
Sekhpura
Lakhisarai
Begusarai
Khagaria
Bhagalpur
Katihar
Purnea
Banka
Mainly Drought Prone and Earthquake Zone III
Group C Districts :
Arwal
Aurangabad
Buxar
Gaya
Jamaui
Jehanabad
Kaimur
Munger
Nawada
Rohtas

Fig. 01

Wadhawan, 2021). The effects of climate change and climate-induced risks in the state are being noticed in the form of a shift in the average temperature and rainfall pattern, as well as an increasing frequency of extreme events like heavy rainfall in a short span of 24 hours, rising average temperature at day and night, rapidly growing the cyclonic storm events, heat waves, and droughts (Vaidya, 2015). In the last few decades, a unique paradox being witnessed in the nature of flood and drought is that due to climate change both these events occur in the same year, and sometimes even in the same district (Gupta et al, 2018). It is projected with high conformity that climatic changes in the state will further increase the vulnerability of the state induced by these patterns of happenings.

Considering the current economic situation and the capacity to respond to minimize the risks of disasters and climate change, it seems that the state is not in a position to combat, withstand or equip itself against the adverse impacts of the climatic shifts which are an increase or decrease in rainfall, a decrease or change in the seasonal and spatial distribution of rain or changing temperature and humidity regimes. There is no doubt, that this will have a wide-range impact on human beings, especially children and women who are differentially impacted by such incidents.

Objectives

With above reference, the objectives of the paper are as follows:

i. to develop the framework of assessment for composite hazard and exposure index, and

ii. to identify different levels vulnerability to climate change at district level, and

iii. to suggest some measures to make the state resilient to the climate change for the socio-economic development of the region

Data & Research Methodology

The study's inferences are based on an analysis of past climate data (1992-2021) at the district level, which aimed to identify the vulnerability of each district in Bihar State. A list of variables related to climatic phenomena, including temperature, precipitation, and extreme weather events, was compiled for all 38 districts in Bihar. The historic daily gridded climate data on rainfall and temperature for all districts over the last 30 years (1992-2021) were obtained from authentic web portals of the Indian Meteorological Department (IMD). A structured and systematic approach is necessary to develop a composite hazard and exposure index at the district level in Bihar to climate risk. For this purpose, the following methodological framework was employed:

A. **Identify Climatic Hazards:** The first step was to identify the climate hazards that are most prevalent in Bihar. This has been done by reviewing daily historical climate data, i.e. of temperature, rainfall and No. of extreme climatic events and consulting with local experts and stakeholders.

B. **Collection of Exposure Data**: The next step was to collect data on the exposure of the population and infrastructure to climate change induced hazards like flood, drought, cyclone, heat wave, heavy rainfall amount and No. of events, etc.

C. **Development of Indicators:** Indicators related to climate change and exposure were developed to measure the intensity and severity of the hazards and the level of exposure of the population and infrastructure.

For the present study following indicators were taken to determining composite hazards and exposure index:

a. **Coefficient of variation of Annual Rainfall (CVR):** The coefficient of variation of annual rainfall (CVR) is a measure of the variability of rainfall over time. It is calculated by dividing the standard deviation of annual rainfall by the mean annual rainfall and expressing it as a percentage. The CVR provides insights into the potential impact of climate change on rainfall patterns, with higher CV indicating greater variability in rainfall.

b. **Frequency of heavy rainfall events (FHR)**: The frequency of heavy rainfall (FHR)

events refers to the number of times heavy rainfall events occur in a given period. It is relevant to understand the impacts of climate change on extreme weather events. The frequency of heavy rainfall (FHR)was calculated by counting the number of heavy rainfall events in a specific time period, such as a year or decade.

c. **Consecutive dry days (CDD):** Consecutive dry days (CDD) refer to the number of consecutive days with no rainfall above a certain threshold. It is relevant to understanding the impacts of climate change on drought conditions. The calculation of Consecutive dry days (CDD)involved identifying stretches of consecutive days without rainfall above the specified threshold, and then determining the duration of the longest such stretch.

d. **Coefficient of variation of maximum temperature (CVT):** The coefficient of variation of maximum temperature (CVT) is a statistical measure used to assess the variability of maximum temperature over time. It is relevant to understand the impacts of climate change on temperature patterns. The calculation of The coefficient of variation of maximum temperature (CVT) involves dividing the standard deviation of maximum temperature by the mean and expressing it as a percentage. Higher CVT indicates greater variability in temperature over time.

e. **Percentage of days when Max. temperature is above 90 percentiles (PDMT):** The percentage of days when the maximum temperature is above the 90th percentile is a measure of the frequency of hot days. It is relevant to understand the impacts of climate change on extreme heat events. The calculation involves identifying the 90th percentile of maximum temperature values and calculating the percentage of days with temperatures above this threshold.

f. **Percentage of area prone to floods (PAPF):** The percentage of area prone to floods is a useful metric to assess the potential impacts of climate change on flood risk. It is calculated by identifying areas with high probability of flooding due to factors such as elevation and land use, and expressing the total area of such regions as a percentage of the total area under consideration.

g. **Cyclonic storm proneness index (CSPI):** The Cyclonic Storm Proneness Index (CSPI) is a measure of the likelihood of a region being affected by a tropical cyclone. It is based on various factors such as sea surface temperature and wind shear which is used for disaster risk reduction and emergency preparedness. The calculation of the Cyclonic Storm Proneness Index (CSPI) involves analysing historical data and statistical modelling to determine the vulnerability of a region to cyclonic storms.

h. **Heat Wave Index (HWI):** The Heat Wave Index (HWI) is a measure of the frequency, duration, and intensity of heat waves over time. It is relevant to understand the impacts of climate change on extreme heat events. The HWI is calculated by analysing temperature data and defining heat waves based on specific thresholds, and then aggregating the heat waves over a given time period.

i. **Frequency of drought events (FDE):** The frequency of drought events (FDE) is a measure of how often droughts occur in a particular region over a specified time period. It is relevant to understand the impacts of climate change on amount of soil moisture, surface/subsurface water availability and agricultural productivity. Its calculation involves identifying periods of below-average precipitation, and assessing the frequency and duration of these events.

D. Normalization of indicators: Normalization of indicators is the process of adjusting values to a common scale in order to facilitate comparison. It is relevant in data analysis to eliminate the effects of scale differences between variables. Normalization has been calculated by subtracting the minimum value and dividing by the range of the data.

E. Calculation of Composite Hazard and Exposure Index (CHEI): The method of calculating the Composite Hazard and Exposure Index (CHEI) involves several steps, including the calculation of individual indicators and the normalization of these indicators. Here is a brief overview of the steps involved, along with an example:

- **Indicator Calculation:** Various indicators are calculated to assess different aspects of hazards and exposure. For example, the coefficient of variation of annual rainfall (CVR) measures rainfall variability, frequency of heavy rainfall events (FHR) assesses extreme rainfall occurrences, and consecutive dry days (CDD) quantifies drought conditions.
- **Normalization of Indicators:** To ensure comparability, indicators are normalized by adjusting their values to a common scale. This is achieved by subtracting the minimum value from each indicator and dividing by the range of the data.
- For instance, let's consider the CVR values for different districts, ranging from 10% to 30%. To normalize these values, we subtract the minimum value (10%) from each value and divide by the range (30% - 10% = 20%). So, if a district has a CVR of 20%, its normalized value would be (20% - 10%) / 20% = 0.5.
- **Composite Index Calculation:** After normalizing the indicators, they are combined to calculate the Composite Hazard and Exposure Index. This is done by summing up the normalized values and dividing them by the total number of indicators considered.

For example, let's assume we have normalized values for four indicators: CVR (0.5), FHR (0.8), and CDD (0.6). To calculate the CHEI, we sum up the normalized values (0.5 + 0.8 + 0.6) and divide by the total number of indicators (3), resulting in a CHEI value of 0.53.The resulting CHEI value represents the overall risk level for a district. Higher CHEI values indicate higher composite risks.

F. Cluster analysis for categorizing districts based on the computed Composite Hazard and Exposure Index (CHEI): The districts in Bihar were categorized as high, moderate, and low hazard and Exposure areas using mean and standard deviation (SD) norms. The categorization is as follows:

High = (Mean + 0.5 SD)< ……... (1)

Moderate = Between (Mean – 0.5 SD) to (Mean + 0.5 SD) ….....…(2)

Low =(Mean – 0.5 SD)> …… (3)

G. Application of Index for Planning: This index can be used to inform the state and district administration to design climate adaptation and disaster risk reduction planning and for their accomplishment. The index can be used to identify areas that are most vulnerable to climate hazards and to prioritize for interventions to reduce the risk to populations and infrastructure.

Results and Analysis

Over the past few decades, climate change has affected Bihar, like many other parts of India, resulting in changes in temperature, precipitation patterns, and extreme weather events like floods and droughts. According to the Indian Meteorological Department (IMD), the average temperature in Bihar has increased by 0.50°C from 1992 to 2021, leading to a shift in crop patterns. Farmers are now opting for crops and varieties that require less water. Bihar has also experienced a rise in extreme weather events, including heavy rainfall, floods, and droughts, causing

loss of life and property. The state government has implemented measures to mitigate the impacts of climate change, such as promoting afforestation and improving water management, through various schemes.

Spatial Pattern of Composite Hazard & Exposure Index (CHEI)

The Composite Hazards and Exposure Index (CHEI) for all 38 districts in the state is calculated by adding up the normalized scores of hazard variables and dividing by the total number of variables selected under the climate hazard category. The state's average CHEI is 0.48. Among the 38 districts, 11 fall under the very high to high category, 14 under the moderate to moderately high category, and 13 under the low to very low category. (Fig 02).

State's average of Climate Hazard and Exposure Index (CHEI) and Categorisation of Districts

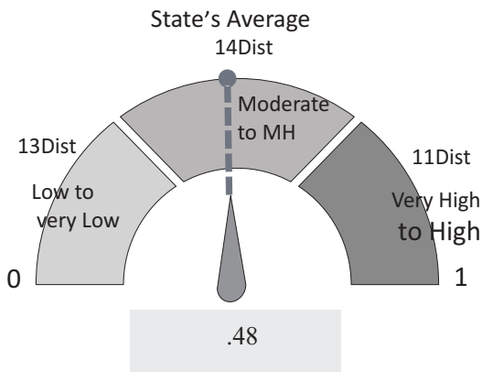

Fig. 02

Sources: Based on Cluster analysis of district wise CHEI

The spatial pattern of the Climate Hazard Exposure Index (CHEI) at the district level suggests that Jamui district (0.35) has the lowest climatic hazard, followed by Banka (0.38) and Kaimur (0.40), while Darbhanga (0.66) has the highest exposure, followed by Sitamarhi (0.61), Patna (0.59), Nalanda (0.58), and Saran (0.57) (Fig 03). The districts of Vaishali, Khagaria, Supaul, Madhubani, West Champaran, Bhagalpur, and Katihar are moderately vulnerable to climate hazards.

Ranking of Districts According to Climate Hazard and Exposure Index (CHEI)

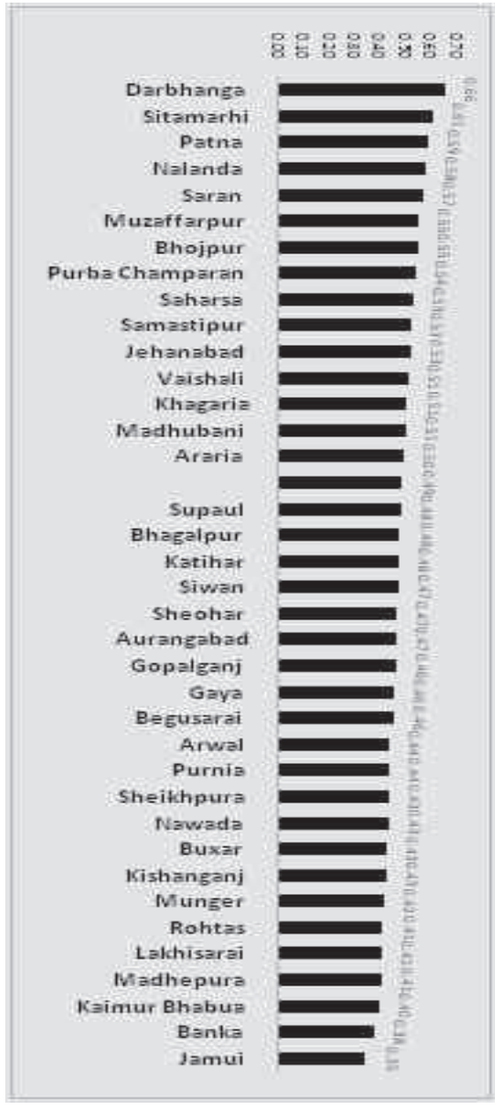

Fig. 03

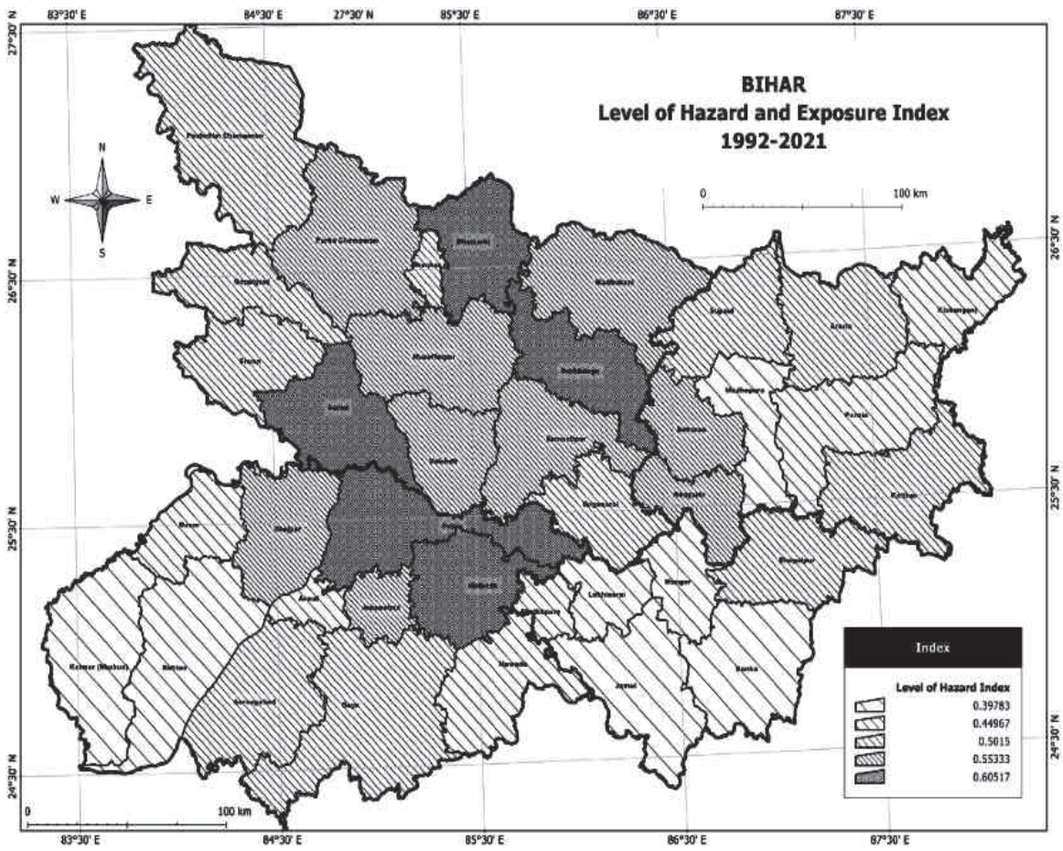

Fig. 04

Sources: Based on District wise CHEI

It is evident from Figure 04 that climate change has altered the traditional boundaries of vulnerability. Districts such as Supaul, Katihar, Araria, Kisanganj, and Purnia were historically recognized as flood-prone and vulnerable areas. However, recent data suggests that the central region of Bihar is increasingly at risk.The increasing risk in the central region can be attributed to several factors, including heavy rainfall events, rising temperatures, gentle topographic slope, high population density (above 1000 persons/km2), poor drainage infrastructure, and a weak governance system. All of these factors contribute to the heightened exposure of its people to the impact of climate change.If this trend of vulnerability continues, the exposure to climate risks will increase, leading to more disasters in the future. The 2019 floods in Patna serve as an example of this phenomenon.

Recommendation For Adaptation And Resilience Planning

From the above analysis of climate risk at district level it is obvious that the state is highly vulnerable to climate risks such as floods, droughts, cyclones, and extreme heat events. Adaptation and resilience planning are crucial to help the district to

cope with these risks and minimize the impacts of climate change. Here are some recommendations and suggestions for adaptation and resilience planning at the district level in Bihar to minimize the consequences of climate risks:

1. **Comprehensive climate risk assessment:** The first step in adaptation planning is to assess the climate risks faced by each the district. This will involve identifying the hazards, the assessment of risk level, and the intensity of vulnerabilities of the community. Based on this assessment, the district can develop a comprehensive plan for managing these risks.
2. **Development and improvement of early warning systems:** Early warning systems can help communities to be prepared for extreme weather events such as floods, droughts, and cyclones. The district can work with participation of local stakeholders for development, improvement and implementation of effective early warning systems that provide timely, speedy and accurate information to communities.
3. **Improved water management:** Bihar is prone to both floods and droughts, which can have a significant impact on water availability and its use. The state/districts administration should focus on improving water management practices, such as rainwater harvesting, augmentation of groundwater recharge and soil moisture storage, and environmental friendly/water-efficient irrigation techniques.
4. **To promote climate-resilient and risk tolerant agriculture:** Agriculture is a significant source of livelihood for many communities in Bihar. The district can promote climate-resilient agricultural practices such as crop diversification, use of drought/inundation-tolerant crops, and improved irrigation techniques.
5. **To enhance infrastructure resilience:** Infrastructure such as roads, bridges, and buildings, drinking/irrigation water have to be damaged during extreme weather events and by the climate change induced natural disasters. The district should focus on enhancing infrastructure resilience by incorporating climate risk considerations into the design, construction, execution and implementation of new infrastructure projects and retrofitting existing infrastructure to make them more climate-resilient.
6. **To increase community awareness and participation:** Effective adaptation planning requires community participation and engagement. The district can work with local stakeholders to raise awareness about climate risks, promote community participation in adaptation planning and execution, and build capacity of the local community to manage/cope with climate risks.
7. **Strengthening the institutional capacity:** The district must strengthen institutional capacity by establishing a dedicated climate change unit to oversee adaptation planning and implementation. The unit should work with other government agencies and stakeholders to ensure that climate considerations are integrated into policy, planning and execution processes.

These are some of the recommendations which may provide a basis to identify the entry point of intervention of adaptation and resilience planning and investment at the district level through the identification of priority sectors and major drivers of vulnerability in Bihar state on climate risks. It is important to note that these recommendations should be tailored to the specific local context of the district and should be developed through a participatory and consultative process involving all relevant stakeholders as process of bottom –up planning method.

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TRAFFIC NOISE POLLUTION AND ITS EFFECT ON HUMAN HEALTH IN RAIPUR CITY

Soumen Mondal and Anusuiya Baghel

ABSTRACT

This paper analyzes the noise pollution level at selected traffic points due to road traffic and their effects on exposed people. The present study based on primary data and monitored noise levels at six major traffic points in October and November in 2020. Raipur city has faced a low ratio of road capacity compared to vehicles and created traffic congestion. During peak hours maximum increased of passenger car units (PCU) at Tatibandh. Two-wheelers and cars share more congestion than other vehicles in city's core area. On working days, noise pollution is more and Noon session is more polluted than other session. The maximum polluted traffic point is Fafadih and the maximum peoples suffer sleep disturbance in the city around every traffic point. Trucks & Lorries generated maximum average noise pollution. Excessive noise has created pollution and adverse effect on human health such as hearing loss, headache, sleep disturbance, etc.

Keywords: *Noise Pollution, Traffic Volume, Human Health.*

Introduction

The term noise simply expressed is an unnecessary sound emitted from the vibrating body and reaching the ear through the nervous system. Generally, noise consists of three elements - Source, transmission, and receiver (Dev& Singh, 2011). Noise has been determined as the combination of frequency (Hertz, Hz) and pressure (Pascal, Pa). Noise level is represented in decibel (dB) units based on the intensity of sound or loudness by the measurement of the noise level meter. The noise travels at speeds of about 740 miles per hour in air through the small wave pressure. According to Central Pollution Control Board (2017) reports the human ear can peak response in 2.5 – 3 kHz. The sound becomes continuous and above the limits of the ears, it is termed noise. Noise from road traffic is the most harmful to the environment as well as human issues, behind air pollution (WHO, 1999). Vehicular noise emission is not only emitted from vehicles horn, it also depends on the road surface, silencer quality, engine quality, driving behavior, tires, vehicular speed, etc.Noise is a serious problem in urban areas as compared to rural areas because more vehicles passing on the road, the establishment of various industries, etc. Traffic can be considered themajor source of noise pollution in any city (Agarwal& Swami, 2009). The Govt. of India recommended a noise limit from various motor vehicles under 1986 Environment (Protection) Rules shall be applicable from 1st January 2003 (CPCB, 2000). The acceptable noise level (table no.01) shows in the daytime is 75 dB in the Industrial area, 65 dB in the commercial area, 55 dB in the residential area, and 50 dB in the silent area (CPCB, 2021). The Long-term average noise level over 55 dB impacts health with the result of an increase in blood pressure, suppression of the central nervous system, change of breathing and heart rates, cardiovascular diseases, hypertension and mental disorders (Munzel, et al., 2014).

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Table 01 : Standard for Noise Pollution in India

Area code	Category of Zone/Area	Noise Limit (dB)	
		Day Time (6 AM– 10 PM)	Night Time (10 PM – 6 AM)
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

Source: Central Pollution Control Board (2017)

Objectives

The prime objectives of this paper is -

1. The present paper assesses the noise pollution level at selected traffic intersection points in Raipur city.
2. To find out the average noise produced by individual vehicles and impacts on human health due to noise pollution.

The Study Area

Raipur city is the capital as well as the metropolitan city of the state of Chhattisgarh in India. The City is located in the heart of the State of Chhattisgarh which is all administrative headquarters are located. This city is also important for commercial, educational, industrial centers, etc. The Raipur city geographical location between 21°11 15 to 21°18' 16 North and 81°32' 32 to 81°42 22 East presents on the location map (fig. 01). The total geographical area of the city covers 139 sq. km and the average elevation is 296 meters above the mean sea level. The city is located along with the Kolkata-Mumbai (National Highway-6) and South-Eastern Central Railway. The city is situated along the eastern bank of Kharun River which is a tributary of the Seonath River. Now the city is known as the smart city of the state and the fastest-growing metropolitan city in India. According to Road Transport Office, the Government of Chhattisgarh (2020) total number of registered motor vehicles in the Raipur districts is

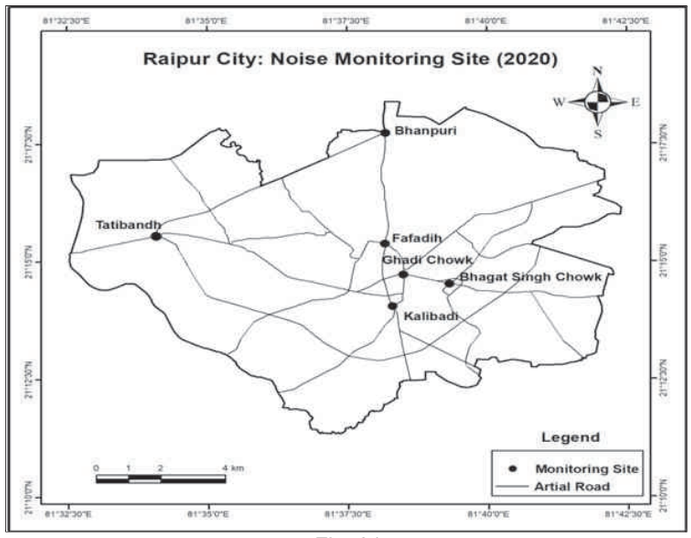

Fig. 01

16,30,704 which is the maximum number of motor vehicles that are two-wheelers and four-wheelers. The total road length of Raipur city is 360.22 km. Based on noise monitoring due to vehicles, six traffic points got selected namely Bhanpuri, Ghadi Chowk, Tatibandh, Fafadih, Kalibadi, and Bhagat Singh Chowk.

Database and Research Methodology

Total registered motor vehicle data was collected from the Ministry of Road Transport and Highway, Chhattisgarh Transport Department. Some other secondary data were collected from State Urban Development Agency, thesis, journals as well as articles, etc. A decibel meter has been used for measuring the noise level at selected traffic

intersection points. The decibel meter converts sound energy into an electrical signal which is shown on display in Decibel (dB) (Munzel, et al., 2014).By counting method due to primary survey, the number of passing vehicles data has been collected from traffic intersection points during peak hours (10 AM-12 PM) and (5-7 PM). Based on passing vehicles during peak hours, 6 traffic points have been selected and measured the vehicular noise pollution in October and November 2020. The noise levels were measured with the help of a digital sound level meter (Model-HTC Instrument SL-1350) at 10 meters distance from selected traffic intersection points. The noised level meter is set at 1.20 meters height from the ground surface. According to CPCB, the vehicular noise levels data were collected during the daytime (6 AM to 10 PM) by the primary survey. The noise level more accurately measured each reading was taken in a gap of 5 minutes, that is 12 readings per hour. The vehicular noise measured a 10 individually in one type of vehicle in different ages. To assess the health issues due to noise pollution by road traffic, a total of 600 people were personally interviewed (100 people from each side) by structured questionnaire around the 200 meters from mentioned traffic points and suggested the decreasing of the noise level.

Results and Discussion

Temporal Variation of Traffic Volume

Transportation is carrying a brighter future for civilization but it also negative impact on the environment and human beings. In the 21st century, transport is one of the most burning issues all over India as well as in Raipur city. The traffic volume studies are determines the number of vehicles moving on roads and different types of roadway vehicles at particular traffic intersection points during a specific time. This period can be represented in minutes, hours or days, etc. Number of traffic during the day time and night time is different due to its public and private demands. According to demands road traffic density more in the daytime than the night time. When the traffic density is maximum it shows the peak time and when traffic density is minimum it shows the lean time. The traffic density on roads indicates mainly air pollution, noise pollution, and negative impacts on health. Temporal variations of traffic volume are different on working and non-working days as well as years. Table no. 02 shows the temporal variation of passenger car units (peak hour) in 2013 and 2020 at selected traffic intersection points in Raipur city. The table no. 02 represents the maximum traffic volumes at Ghadi Chowk (8,996) and the minimum at Tatibandh (3,447) in 2013. Similarly the maximum number of traffic volumes at Ghadi Chowk (11,783) and minimum at Bhanpuri in 2020. The traffic volume continuously increases at six traffic intersection points. But the maximum increase at Tatiband has compared to others in 2013 and 2020. The maximum volume represents Ghadi Chowk in the both years. The average passenger car unit (PCU) is 5,857 in 2013 and 7,934 in 2020 that means previous seven years the growth of PCU is 35.5% in Raipur city. The maximum growth of PCU in peak hours shows at Tatibandh (61.6%) and the minimum at Bhagat Singh Chowk (13.7%). The highest growth

Table 02 : Temporal Variation of Traffic Volume (Peak Hour) in Raipur City

Sl. No	Traffic Points	Passenger Car Unit Peak Hour (2013)	Passenger Car Unit Peak Hour (2020)	Growth of PCU Peak Hour (%)
1	Bhanpuri	3,687	5,243	42.2
2	GhadiChowk	8,996	11,783	31.0
3	Tatibandh	3,447	5,570	61.6
4	Fafadih	8,514	11,107	30.5
5	Kalibadi	4,156	6,691	61.0
6	Bhagat Singh Chowk	6,342	7,210	13.7
	Average	5,857	7,934	35.5

Source: State Urban Development Agency (2013) & Primary Survey (2020)

PCU is at the Tatibandh intersection point because maximum vehicles passed due to directly connected with the industrial area and Durg-Bhilai city which is known as the Industrial capital of the Chhattisgarh state and connected with the Kolkata-Mumbai national highway. Kalibadi is a multi-directional traffic point that shows the second highest growth of PCU due to its directly connected with Central Business District, District Hospital, Raipur Railway Station, Municipal Corporation and bus route with Jagdalpur in the Southern portion and Ambikapur in Northern portion of the state. Bhagat Singh Chowk shows the lowest growth of PCU due to the maximum ministry and CM house of the state around this traffic point which is already a security protected area and vehicular-prohibited area.

Noise Produced by Vehicles

In urban areas, the source of noise pollution is different types like industry, market, social and cultural festival, motor vehicles, daily shop, etc. Vehicles are the main source of noise pollution on road. The vehicular noise emission is not only from the engine, but it also depends on driving behavior,

Table 03 : Noise Produced From Individual Vehicles in Raipur City

Sl. No	Type of Vehicles	Average Noise Produced (dB)
1	Motor Cycles	86.30
2	Buses	86.05
3	Light Motor Vehicles	87.83
4	Cars	85.44
5	Truck & Lorries	95.97
6	Taxis	78.32
7	Mini Bus	83.17
8	Trailers	94.55
9	Tractors	74.45
10	Jeeps	84.69
11	Articulated Vehicles	89.57

Source: Primary Survey (2020)

road surface, tires, silencer, vehicular speed, etc., and various types of vehicles are emitted different noises like vehicular engines and structured horns. Noise generated by vehicles increases with increasing speed from 20 mph. Today diesel trucks are 8 dB louder approximately than automobiles and gasoline-powered trucks. For vehicular speed between 30-60 mph, there is generally a 5 dB increase. The passenger car generates 66 – 72 dB of noise by tire and 75 – 90 dB from the engine at a speed of 60 mph (Hart, F. D., et al., 1970). Table no. 04 shows the different noises produced by different vehicles which represents the average maximum noise producer on road is Truck & Lorries (95.97) and the minimum noise producer is Tractors (74.45). More than 90 dB noise producer vehicles are Truck & Lorries, Trailers and above 80 dB noise producer Motor Cycles, Buses, Light Motor Vehicles, Cars, and Jeeps, etc.

Noise Level at Traffic Points

On working days, the traffic volume is maximum as compared to non-working days. The fluctuation of average noise level (dB) at six traffic points on working and non-working days hasbeen shown in table no. 04. On working days the result stated that Tatibandh traffic points (80.11±5.52) were the maximum noise-polluted place in the morning shift. In the noon shift maximum shows at Fafadih (82.15±5.07) and GhadiChowk (79.95±4.93) in the evening shift. On non-working or holidays stated, the maximum noise-polluted traffic points are Tatibandh

Table 04: Noise Pollution at Various Traffic Intersection Points

Traffic Points	Noise Pollution with Standard Deviation (dB)					
	Morning		Noon		Evening	
	W	N-W	W	N-W	W	N-W
Bhanpuri	77.77±5.70	75.37±4.19	79.49±4.93	76.80±3.58	76.05±4.91	73.48±4.18
Tatibandh	80.11±5.52	77.71±4.75	77.56±5.23	77.36±4.27	75.94±4.61	74.23±3.59
GhadiChowk	78.45±5.05	76.59±4.82	80.93±4.02	80.59±4.23	79.95±4.93	78.16±4.26
Fafadih	79.46±5.33	76.05±4.50	82.15±5.07	79.89±4.16	78.29±3.77	76.22±5.09
Kalibadi	74.92±5.20	72.48±3.22	79.16±4.63	76.47±4.49	77.18±4.57	74.50±3.17
Bhagat Singh	74.05±4.37	70.43±3.60	77.24±4.04	72.39±3.43	76.47±4.29	72.94±4.53

*W= Working Days, N-W= Non-working Days. Source: Primary Survey (2020)

Table 05 : Noise Pollution at Various Traffic Intersection Points

Traffic Points	Noise Pollution (dB)					
	Morning	Noon	Evening	Working	Non-working	Average
Bhanpuri	76.57	78.15	74.77	77.77	75.21	76.49
Tatibandh	78.91	77.46	75.09	77.87	76.43	77.15
GhadiChowk	77.52	80.76	79.06	79.78	78.45	79.11
Fafadih	77.76	81.02	77.26	79.93	77.39	78.68
Kalibadi	73.7	77.82	75.84	77.09	74.48	75.78
Bhagat Singh	72.24	74.81	74.71	75.92	71.92	73.92
Average	76.12	78.34	76.11	78.06	75.64	76.86

Source: Primary Survey (2020)

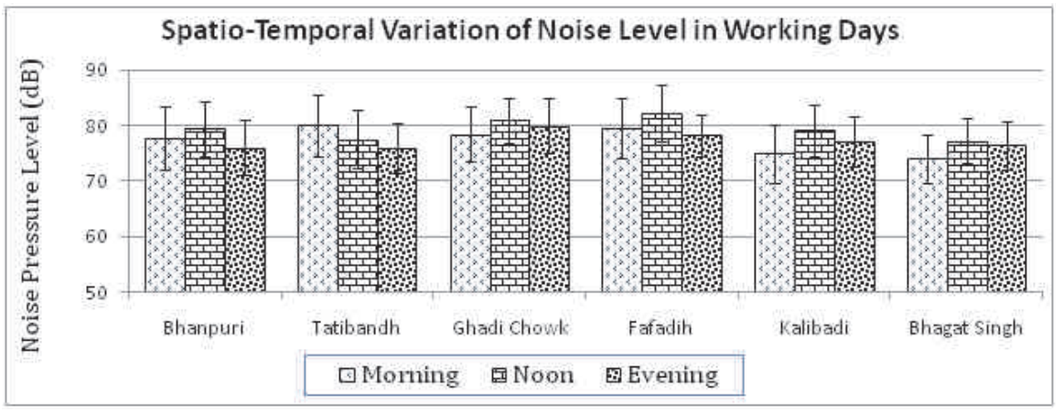

Fig. 02

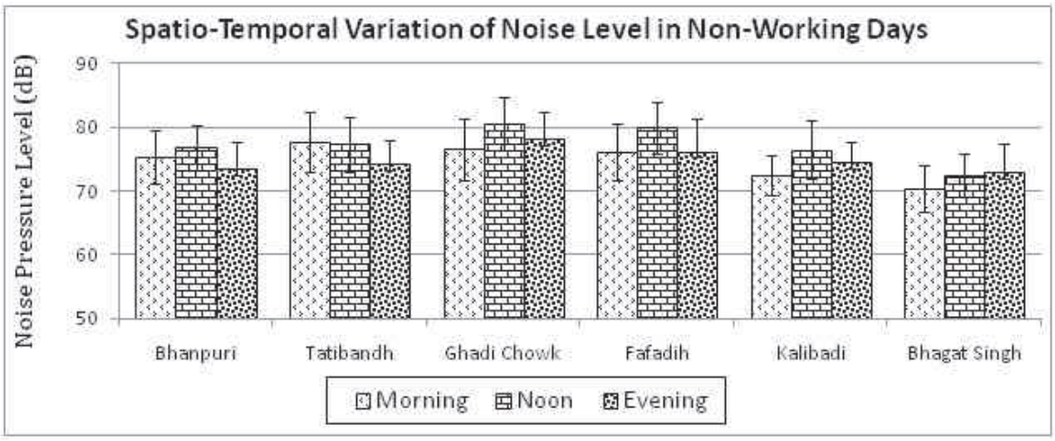

Fig. 03

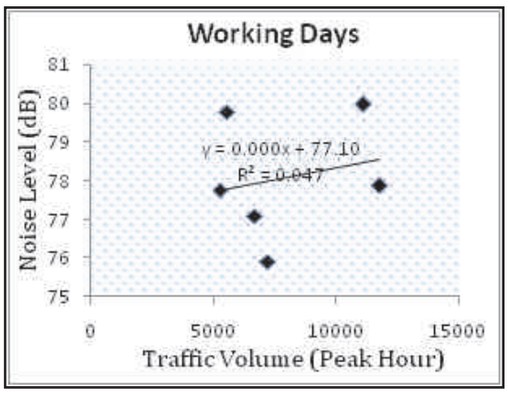

Fig. 04

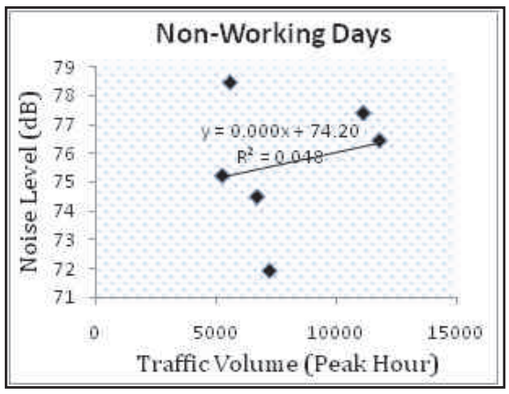

Fig. 05

(77.71±4.75) in the morning shift, Ghadi Chowk in the noon (80.59±4.23) and evening (78.16±4.26) shift. In working and non-working days, lowest average noise-polluted traffic points have been shown at Bhagat Singh Chowk in the morning, noon, and evening shifts. Table no. 05 indicates that Fafadih traffic intersection points is more polluted in working days and GhadiChowk is more polluted in non-working days on the basis of Morning, Noon and Evening. In both days, Bhagat Singh Chowk shows minimum noise level. Based on session wise, the Noon period shows maximum average noise pollution but morning and evening session almost similar in working and non-working days in the Raipur city. The average noise pollution in traffic points is 76.86 dB and maximum in GhadiChowk. The noise pollution at traffic points depends on the traffic volume. Tatibandh shows that maximum noise in the morning due to big commercial vehicles passing whereas the noon shift showing shows at Fafadih &

Ghadi Chowk in the noon and evening shift due to maximum two-wheelers, four-wheelers, and the maximum number of vehicles passing on working and non-working days compare to others traffic points in Raipur city. The maximum standard deviation shows in the morning & evening shifts at Bhanpuri and the noon shift at Tatibandh Traffic points on working days(fig. 02). On non-working days, the maximum standard deviation (SD) traffic point is Ghadi Chowk in the morning, Kalibadi in the noon and Fafadih in the evening (fig. 03). The fig. 04 and fig. 05shows the relationship between traffic volume (X) and noise level (Y) on working and non-working days using the regression line. The working days and non-working days both represent a positive relation between traffic volume (peak hour) and noise level at the above-mentioned traffic points in the daytime. The average noise produced on days is 77.1 decibel (dB) and non-working days are 74.2 (dB). It would show that traffic volume is maximum on working days than on non-working days which impacts noise pollution. On working days, more than average noise pollution at two traffic points and 3 traffic points below average. Similarly, non-working days produced more than average noise pollution at two traffic points and below average at two traffic points in Raipur city. On working and non-working days, the relation between noise level and traffic volume is positively correlated.

Impact of Traffic Noise on Human Health

The study has continued analyzed to public response about noise pollution around the selected traffic points. Health is the most important issue due to road traffic about public perception in Raipur city. A total of 100 people have been interviewed around each traffic point. The study shows 5 types of human health problems Hearing loss, Headache, Annoyance, Sleep disturbance, Heart Problems. The maximum number of people faced sleep disturbance which is maximum at Tatibandh (55) and minimum at Bhagat Singh Chowk (38). The second most problem is Annoyance, which is maximum at Tatibandh (44) and minimum at Bhagat Singh Chowk. But heart problem is a major health issue due to traffic noise on road. The maximum number of population faced at Ghadi Chowk (32). Two traffic points – Ghadi Chowk and Tatibandh faced maximum problems due to noise as compared to others. Ghadi Chowk faced the problem due to the maximum number of passing vehicles near the commercial zone. Tatibandh faced the problem mainly due to the maximum number of trucks & Lorries, Trailers, Articulated vehicles, etc. passing. The six traffic points in Raipur city where found that 46.7% peoples faced sleep disturbance due to vehicular noise pollution.

Conclusion

The human health is a serious threat due to noise pollution in Raipur city, with the rapid growth of urbanization, this city has been overcrowded and congested due to rural-to-urban migration, growth of population, high growth of registered motor vehicles, established market centers, etc. The status of the noise level of the industrial, commercial, and residential areas of the city has been highly polluted at various traffic intersection points due to road transport vehicles, modified silencers use of hydraulic and unnecessary horns. This is, directly and indirectly, an impact on human health. The health issues due to road traffic are very high as compared to other traffic intersection points in Raipur city. Around traffic points, shopkeepers, traffic policemen, and street hawkers faced maximum problems due to road traffic. Furthermore, it is observed that noise pollution is alarmingly increasing day by day. The Govt. of India and Chhattisgarh to take action for urban planning, smart traffic management, more use for public transport, rush driving, unnecessary use of horns, promoting the use of electric vehicles and awareness people for traffic noise against healthy future against the source of noise pollution and its impacts on human beings.

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INVESTIGATING THE SPATIAL VARIATION IN AGRICULTURAL DEVELOPMENT IN SINGRAULI DISTRICT, MADHYA PRADESH

Pawan Kumar Sharma & Kaluram Chouhan

ABSTRACT

Agriculture is the mainstay of the rural economy in India, and it plays a crucial role in food security and rural development. The present study was conducted to examine the spatial variation in agricultural development in Singrauli district, Madhya Pradesh. The study used secondary data sources such as census reports, district-level statistical handbooks, and agricultural department reports. The paper aims to analyse the regional disparities of agricultural development and study the spatial pattern of agricultural development in the study area. The study evaluated the agricultural development through the composite index method of 727 inhabited villages of the district using ten agricultural indicators to calculate the composite index representing the overall level of development or performance of a particular region or system. The results showed that agricultural development in the district is spatially variable and the levels of agricultural development range from very low developed to relatively high developed. The study concludes that spatial variability in agricultural development is due to various factors such as natural resource endowment, socio-economic factors, infrastructure, and government policies. The study's findings highlight the need to address the underlying causes of spatial variability in agricultural development to improve the agricultural sector's overall performance and reduce regional disparities in the study area.

Keywords : *Agriculture, Development, Spatial Variation, Variability, Singrauli District, Madhya Pradesh.*

Introduction

Agriculture is a critical sector for economic growth, particularly in developing countries where the majority of the population depends on agriculture for their livelihoods (World Bank, 2020). Agricultural development is essential for poverty reduction, food security, and overall economic development. However, the levels of agricultural development vary significantly across different regions, even within the same country. Spatial variability in agricultural development can be attributed to various factors such as natural resource endowment, socio-economic factors, infrastructure, and government policies. This paper explores the concept of spatial variability in agricultural development, highlighting the underlying causes and implications for the agriculture sector and rural communities. Agriculture is the backbone of the Indian economy, providing livelihoods to over half of the population and contributing significantly to the country's GDP. In Madhya Pradesh, agriculture is the primary source of income for the rural population, and the state is among the top producers of various crops such as wheat, soybean, and maize. Singrauli district is located in the northern part of Madhya Pradesh and is known for its rich mineral resources. The district is primarily rural, and agriculture is the primary occupation of the people. However, the level of agricultural development in the district is not uniform and varies across different regions. Therefore, the present study aims to examine the spatial variation in agricultural development in Singrauli district, Madhya Pradesh.

Several studies have been conducted to

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examine the spatial variation in agricultural development in India. A study by Kumar, et al. (2017) found that agricultural development in India was not uniform and varied across different regions. The study identified factors such as landholding patterns, irrigation facilities, and cropping patterns that influenced the spatial variation in agricultural development. Another study by Das, et al. (2019) examined the spatial variation in agricultural productivity in West Bengal and found that the availability of irrigation facilities and access to credit were the key determinants of agricultural productivity. A study by P. K. Sharma, et al. (2019) examines the regional disparities in the level of agricultural development in the Bundelkhand region of Madhya Pradesh.

Spatial variability in agricultural development refers to the differences in the levels of agricultural productivity and development across different regions. Several studies have shown that the levels of agricultural development vary significantly across different regions, even within the same country. For instance, a study by Pender, et al. (2019) in Nigeria found that the levels of agricultural productivity varied significantly across different regions, with some regions having higher levels of productivity than others. Similarly, a study by Swinnen and Maertens (2020) in Sub-Saharan Africa showed that the levels of agricultural productivity varied significantly across different countries and regions. The spatial variability in agricultural development can be attributed to various factors, including natural resource endowment, socio-economic factors, infrastructure, and government policies. Natural resource endowments, such as soil fertility, rainfall, and land availability, can significantly affect agricultural productivity and development. For instance, regions with fertile soils and abundant rainfall tend to have higher levels of agricultural productivity than regions with poor soils and erratic rainfall (Mekonnen, et al., 2020).

Socio-economic factors such as education, income, and access to markets can also affect agricultural productivity and development. Regions with high levels of education and income tend to have higher levels of agricultural productivity due to better access to modern technologies, inputs, and markets (Gollin, et al., 2018). Infrastructure, such as roads, electricity, and irrigation, is also critical for agricultural development as it enhances access to markets and reduces production costs. Das and Pal (2019) analyzed the spatial variation in agricultural productivity in West Bengal and found that soil quality, irrigation facilities, and landholding pattern were the major factors that influenced the spatial variation in agricultural productivity. Kumar, et al. (2017) analyzed the spatial analysis of agricultural development in India and found that the availability of irrigation facilities, access to credit and technology, and landholding pattern were the major factors that influenced the spatial variation in agricultural development. Singh, et al. (2018) analyzed the spatial variation in agricultural productivity in Uttar Pradesh and found that soil fertility, irrigation facilities, and landholding pattern were the major factors that influenced the spatial variation in agricultural productivity. Vyas, et al. (2020) analyzed the spatial variation in agricultural development in Rajasthan and found that access to credit and technology, landholding pattern, and cropping pattern were the major factors that influenced the spatial variation in agricultural development.

Government policies also play a crucial role in determining the levels of agricultural development. Policies such as subsidies, trade regulations, and land tenure policies can significantly affect agricultural productivity and development. For instance, policies that provide subsidies for inputs such as fertilizers and seeds can enhance productivity, while policies that restrict trade can limit access to markets and reduce productivity (Swinnen and Maertens, 2020).

The spatial variability in agricultural development has several implications for the agriculture sector and rural communities. Regions with low levels of agricultural productivity and development tend to have high levels of poverty and food insecurity. This can lead to rural-urban migration

as farmers seek better opportunities in urban areas, leading to a decline in agricultural production and food security (Pender, et al., 2019).The spatial variability in agricultural development can also lead to social and economic disparities between regions. Regions with high levels of agricultural productivity and development tend to have better access to infrastructure, education, and health services, leading to better social and economic outcomes.

The Study Area

Singrauli district is located in the north-eastern part of Madhya Pradesh, India. It lies between 23°45'N to 24°23'N latitude and 81°14'E to 82°26'E longitude. The district covers an area of 5,672 km and is divided into three administrative tehsils, namely Singrauli, Deosar, and Chitrangi. There are 744 villages in the district 727 villages are inhabited and 17 villages are uninhabited villages (Census of India, 2011).

The district is bounded by Sonbhadra district of Uttar Pradesh in the north and northeast, Sidhi district of Madhya Pradesh in the east, Shahdol district of Madhya Pradesh in the south, and Sonebhadra district of Uttar Pradesh and Garhwa district of Jharkhand in the west. The district has a predominantly rural economy and depends heavily on agriculture. The district is predominantly rural, and agriculture is the mainstay of the economy. The major crops grown in the district are paddy, wheat, gram, and soybean (Singh & Singh, 2019).

Objectives

1. To study the spatial pattern of agricultural development in the study area.
2. To analyze the regional disparities of agricultural development.

Database and Research Methodology

The data for this study were collected from various sources. The district-level data on agricultural productivity, land use, cropping pattern, and irrigation facilities were obtained from the Department of Agriculture, Madhya Pradesh. The demographic data were obtained from the Census of India, 2011. The study used secondary data sources such as census reports, district-level statistical handbooks, and agricultural department reports. The data were collected for the period 2011-12 to 2020-21.To analyses the spatial variation in agricultural development in the study area. There are 10 agricultural indicators to evaluate the agricultural development through the composite index method (Z- Score method) of each village of the district. The composite index method, also known as the z-score method, is a statistical technique used to combine multiple variables into a single index score. The steps for calculating a composite index using the z-score method are as follows:

- Normalize the data by converting each indicator into a z-score. To calculate the z-score for an indicator, subtract the mean value of the indicator from the actual value, and divide by the standard deviation of the indicator.

Z-score = (Actual value - Mean value) / Standard deviation

- Assign weights to each indicator based on its importance or relevance to the overall objective.
- Multiply each normalized value by its corresponding weight.

Weighted normalized value = Weight x Z-score

- Sum the weighted normalized values for each indicator to get the composite index.

Composite index = Sum of weighted normalized values

- The formula for calculating the composite index using the z-score method is as follows:

$$CI = \Sigma (Wi \times (Xi - M)/\sigma)$$

Where,

CI = Composite index

Wi = Weight assigned to the i^{th} indicator

Xi = Actual value of the i^{th} indicator

M = Mean value of the i^{th} indicator

σ = Standard deviation of the i^{th} indicator

By using this formula, we can calculate a composite index that represents the overall level of

development or performance of a particular region or system, based on multiple indicators. The indicators are adopted from the Census of India, 2011 mentioned in Table 01.

Table 01 : Indicators Used to Measure Levels of Agricultural Development

Variables	*Agricultural Indicators*
X_1	Villages Having Agricultural Credit Societies
X_2	Villages Having Areas Under Non-Agricultural Uses.
X_3	Villages Having Net Area Sown (In Hectares)
X_4	Villages Having No. of Commercial & Co-operative Banks
X_5	Villages Having Agricultural Marketing Society
X_6	Villages Having Net Irrigated Area to The Total Cultivable Area
X_7	Villages Having Cultivable Areas to The Total Area
X_8	Agricultural Density
X_9	Villages Having Mandis / Regular Market
X_{10}	Villages Having Power Supply for Agricultural Use

Source: Census of India, 2011

After the calculation, the value of the composite index (CI) shows that ahigher CI value will represent a high level of agricultural development as well a smaller CI value will represent a lower level of agricultural development. The villages of the study area are classified into a different level of agricultural development that range from (<0.00) to (>1.00) in Table 02.

Table 02 : Level of Development

Value of Composite Index (CI)	*Level of development*	*No. of villages*
Above 1.00	Relatively high developed	33
1.00 to 0.50	Moderately high developed	54
0.50 to 0.00	Low developed	177
Below 0.00	Very low developed	463
	Uninhabited/forest villages	17

Source: Computed by Authors

Results and Discussion

The results of the study indicated that agricultural development in the Singrauli district is not uniform and varies spatially. The district was divided into four regions based on the spatial pattern of agricultural development, namely the northern, eastern, western, and southern regions. The northern and eastern regions of the district were found to be more developed in terms of agriculture, while the southern and western regions were lagging behind.

The study identified various factors that influence spatial variation in agricultural development in the district. The factors include soil type, irrigation facilities, landholding, and cropping patterns. The northern and eastern regions of the district had fertile soil and better irrigation facilities, which led to higher agricultural productivity. The study found that the southern and western regions had poor soil quality

and inadequate irrigation facilities, affecting agricultural productivity. The study also found that the landholding pattern in the district was skewed towards small and marginal farmers, who lacked access to credit and technology. This had a negative impact on agricultural productivity. The agricultural development in the district can be evaluated on the basis of various indicators such as villages having agricultural credit societies, net irrigated areas to the total cultivable area, villages having mandis/regular markets, etc. Here's a breakdown of the agricultural development in the Singrauli district based on the indicators mentioned in Table 01:

X1. **Villages Having Agricultural Credit Societies:** Singrauli district had a total of 727 inhabited villages in 2011, out of which only 30 villages had agricultural credit societies (ACSs). This indicates that the district has a very low level of access to credit facilities for farmers.

X2. **Villages Having Areas Under Non-Agricultural Uses:** Singrauli district have 33,437.60 hectares of area comes under the areas under non-agricultural uses. This indicates that the district has a relatively low level of industrialization and urbanization, and a high dependence on agriculture.

X3. **Villages Having Net Area Sown (In Hectares):** Singrauli district has a total geographical area of 5,672 square kilometers, out of which 2,246 square kilometers are cultivable. The net area sown in the district is 1,274 square kilometers, indicating a relatively high level of agricultural development.

X4. Villages Having No. of Commercial & Co-operative Banks: Singrauli district has a total of 20 commercial and co-operative banks. However, the number of villages with access to these banks is not available, making it difficult to determine the level of access to banking facilities for farmers.

X5. Villages Having Agricultural Marketing Society: Singrauli district has a total of 15 agricultural marketing societies. These societies provide a platform for farmers to sell their produce directly, leading to increased profitability. However, the number of villages with access to these societies is not available.

X6. **Villages Having Net Irrigated Area to The Total Cultivable Area:** Singrauli district has a total cultivable area of 2,246 square kilometers, out of which only 311 square kilometers are irrigated. This indicates a relatively low level of irrigation facilities, leading to low agricultural productivity.

X7. **Villages Having Cultivable Areas to The Total Area:** Singrauli district has a total geographical area of 5,672 square kilometers, out of which 2,246 square kilometers are cultivable. This indicates a high dependence on agriculture in the district.

X8. **Agricultural Density:** The agricultural density of the Singrauli district is 188 farmers per square kilometer. This indicates a high level of dependence on agriculture and a relatively high population engaged in agricultural activities.

X9. **Villages Having Mandis/Regular Market:** Singrauli district has a total of 12 mandis/regular markets, providing farmers with a platform to sell their produce. However, the number of villages with access to these markets is not available.

X10. Villages Having Power Supply for Agricultural Use: Singrauli district has a total of 727 inhabited villages, out of which only 116 villages have power supplies for agricultural use. This indicates a low level of access to electricity for agricultural activities.

The district's agricultural development is classified into four categories: relatively high, moderate, low, and very low, based on various factors such as soil fertility, irrigation facilities, cropping intensity, and productivity (Fig. 01).

Relatively High Agricultural Development

This category is ranging from 1.00 and above. It is the highest level of agricultural development in the region. The agricultural development in the Singrauli district is relatively high in the areas of Morwa, Deosar, and Chitrangi tehsils. There are only 33 villages having the category of relatively high agricultural development among 727 inhabited villages of the district which the Deosar block having 14 villages and the Chitrangi and Singrauli

blocks having 10 and 9 villages respectively in Table 03. These regions have fertile alluvial soil and are well-irrigated by the sonriver and its tributaries. The farmers in these regions practice intensive farming and grow a variety of crops such as paddy, wheat, soybean, and pulses. The agricultural productivity in these regions is high, and the farmers also practice modern farming techniques to maximize yields.

Table 03 : Distribution of Villages of The Level of Agricultural Development in Singrauli District

Cd Block	Relatively High Developed	Moderately High Developed	Low Developed	Very Low Developed	Uninhabited	Total
Chitrangi	10	17	49	228	5	309
Deosar	14	19	69	117	2	221
Singrauli	09	18	59	118	10	214
Total	**33**	**54**	**177**	**463**	**17**	**744**

Source: Computed by Authors

Moderately High Agricultural Development

It is the second highest level of agricultural development in the region (Fig. 01) and it ranges from 1.00 to 0.50 CI value. In the district there are only 54 villages out of the 727 inhabited villages in which Deosar, Singrauli and Chitrangi block having 19,18 and 17 villages comes under the moderately high developed category respectively. The agricultural development in the Singrauli district is moderate in the regions of Singrauli and Mada tehsils. These regions have medium to low soil fertility, and irrigation facilities are limited. The farmers in these regions practice traditional farming techniques and grow crops such as paddy, wheat, and pulses. However, productivity is relatively low due to the lack of modern farming techniques and inadequate irrigation facilities.

Low Agricultural Development

The low agricultural development level is varying from 0.50 to 0.00 CI value. In this category, there are 177 villages which Deosar, Chitrangi and Singrauli block have 69, 49 and 59 villages respectively in the Singrauli district. The agricultural development in the Singrauli district is low in the regions of Waidhan and Mau tehsils. These regions have poor soil fertility, and irrigation facilities are almost non-existent. The farmers in these regions practice rain-fed farming and grow crops such as paddy, wheat, and pulses. The productivity is low, and the farmers face difficulties in meeting their basic needs due to inadequate yields.

Very Low Agricultural Development

This category is the lowest level of agricultural development in the Singrauli district and it ranges from 0.00 and below the CI value. The level of development shows the worst condition of villages in the district there are such kind of 463 villages in which Chitrangi, Deosar and Singrauli block having 228, 118 and 117 villages respectively come under very low agricultural development. The agricultural development in the Singrauli district is very low in the region of Bargawan tehsil. This region has extremely poor soil fertility, and irrigation facilities are almost non-existent. The farmers in this region practice subsistence farming and grow crops such as maize, sorghum, and millets. The productivity is extremely low, and the farmers face severe economic hardship.In conclusion, the Singrauli district's agricultural development varies across different regions, ranging from relatively high to very low. The government needs to focus on improving irrigation facilities, soil fertility, and providing modern farming

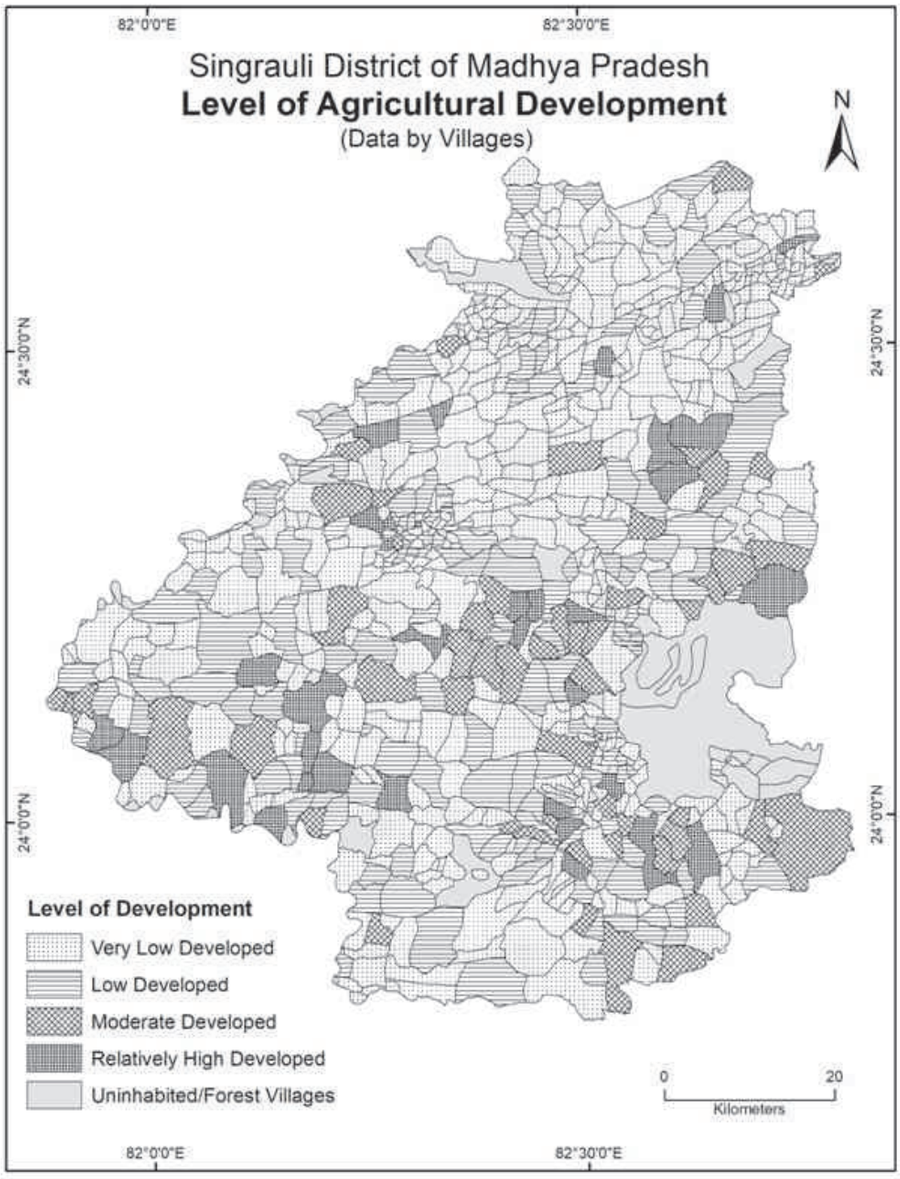

Fig. 01 : **Level of Agricultural Development in Singrauli District**

techniques to farmers in the moderate, low, and very low agricultural development regions. This will not only increase agricultural productivity but also uplift the socio-economic status of the farmers.

Conclusion

Agriculture is an essential sector for economic growth, particularly in developing countries where the majority of the population depends on agriculture for their livelihoods. The levels of agricultural development vary significantly across different regions, even within the same country, due to various factors such as natural resource endowment, socio-economic factors, infrastructure, and government policies. This study analyzed the spatial pattern and regional disparities in agricultural development in Singrauli district, Madhya Pradesh, India, using the composite index method. The study found that the district has a predominantly rural economy and depends heavily on agriculture. The major crops grown in the district are paddy, wheat, gram, and soybean. The study identified that 33 villages in the study area were relatively highly developed, 54 were moderately high developed, 177 were low developed, and 463 were very low developed in terms of agricultural development.

The findings of this study have significant implications for policymakers and stakeholders in the agriculture sector, particularly in rural areas. The study suggests that policies and strategies aimed at promoting agricultural development should focus on addressing the underlying causes of spatial variability in agricultural development and reducing regional disparities. The study recommends that policies and interventions should be implemented to reduce the spatial variability in agricultural development and promote overall economic development.

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A COMPARATIVE STUDY ON THE SOCIO-ECONOMIC CONDITIONS OF HARIJAN COLONIES IN FOUR DISTRICTS OF UPPER ASSAM, INDIA

Preeti Barsha Borah and Lanusashi Longkumer

ABSTRACT

Harijan, popularly known as Dalits in India belonged to Scheduled Caste population. Many of them are live in poor socio-economic conditions, under social discrimination and unhygienic environmental condition which affect both physical and mental health. A structured schedule survey and interview, statistical techniques are used to analyse data. Kendall's ranking coefficient method is used to show the variation in the socio-economic development of Harijan colonies of four selected areas in Upper Assam which are regarded as slums. The study reveals that the socio-economic and environmental conditions of one area are considerably better than others.

Keywords: *Harijan, Comparison, Socio-economic condition, Ranking, Development.*

Introduction

The origin of Harijan is the result of India's caste system in the hierarchy of society. The word Harijan is consist of two words 'Hari' means 'God', and 'Jan' means 'People'. Therefore, the Harijan means 'Children of God'. The term was first used by Mahatma Gandhi in the year 1933. The Indian caste hierarchy system refers to these people as lower caste and they are at the bottom of the Hindu caste system. This system divided the people into the four major castes based on their occupation and it is also mentioned in the Vedas (Ambedkar, 2007; Sten, 1993; De Bary, 1958; Hutton, 1963). According to Hindu mythology, the Brahmins, the priestly class came from the head of God and they were eligible for learning and teaching. The Kshatriyas, the warrior class came from the shoulder of God and they are also suitable for learning. Their work is to protect the people by waging a war against the enemies. The Vaisyas, the trading class, came from the thigh of God and their work is to trade, perform agriculture and business and feed the above two classes. The Sudras are the servants, who came from the feet of God and their work is to do all menial works to the above three twice-born castes. The fifth Verna is called Untouchables. Historically they are people of a society who principally engaged as manual scavengers, and cloth washers so they don't have equal rights as equal to higher class society and are termed as untouchable people or Pariahs. Many of them are termed as 'Dalits' which in Marathi means 'broken'. The father of the Indian Constitution Dr B.R. Ambedkar termed the fifth Varna as broken men. Anthropologists have also reported the presence of "untouchability" in several countries of Africa, Asia, i.e. India, Sri Lanka, Pakistan, etc., where some tribal communities are viewed as "polluting" by the dominant communities and kept at a distance from the mainstream of social and cultural life (Jodhka and Shah, 2010). They continue to experience social limitations and caste discrimination. Harijans are considered members of the scheduled caste and a number of programmes have been started to help this community. Harijan colonies are the names of their inhabited territories. The Harijan people in Assam are not Assamese natives, according to historical records. During the British colonial era, they immigrated to Assam in various decades, primarily from Bihar, Rajasthan, Uttar Pradesh, and Punjab.

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Different sub-community groups belonging to the scheduled caste population are Bansphor, Bhuinmali, Mali, BrittialBania, Bania, Dhupi, Dhobi, Dugla, Dholi, Hira, Jalkeot, Jhalo, Malo, Jhalo-Malo, Kaibartta, Jaliya, Lalbegi, etc. In Assam, the major scheduled caste group Bansphor are belonged to the Harijan community. They settled in different parts of Assam and their residential areas are known as Harijan Colonies. The word 'Dalit' is not used by the local people of Assam people of these areas are known as Harijans. These Harijan colonies are mostly situated as informal settlements like slums near the town areas or urban centres in Assam. Generally, most of their habitat areas are included in the list of slum areas because they are suffered from various socio-economic and environmental problems and their basic needs are scarce. It is worth mentioning that, Dalits are poor and illiterate and undergo the ordeal of caste discrimination and generally live in slums. The backwardness of the Dalits has historical, social, and political roots that are attributed to poverty; lack of educational facilities, discrimination, and inability to enter government services and other lucrative jobs has all contributed to their backwardness (Selvanathan, 1989). Dalit women are bonded, abused, sexually exploited by other castes, humiliated and easy targets of insults (Devanathan, 2014). There are numerous incidents with this problem that are rising in India and other nations, like Africa. Populations of scheduled castes, particularly the Harijan people, experience several social issues in addition to deplorable economic situations. Gender discrimination or gender imbalance is well evident in the Harijan community (Handique and Chutia, 2015; Goswami and Sarma, 2020), a victim of different diseases such as Tuberculosis, leprosy, etc. (Singh, 1978). Many schemes in India provide free education and free health facilities to the Harijan societies, but they are not aware and most people are not interested in educating their children, especially women education. Parents in their society are more interested in educating their sons rather than in their daughters. Early marriage, domestic chores, and traditional and conservative thinking remain major barriers for Harijan women. Harijan girls in many cases have to limit their education up to the school level (Mazumder, 2000; Goswami and Sarma, 2020). This study compares Harijan colonies, which are slum regions inhabited by members of the same community and evaluates their current distribution in the Upper Assam districts of Dibrugarh, Golaghat, Jorhat, and Tinsukia. A comparative examination of the socio-economic and environmental circumstances was used to conduct the study.

The Study Area

Upper Assam is an administrative division of Assam state, which comprises 9 districts. This region is located in the eastern part of the Brahmaputra Valley between 26° 75′ North latitude and 94° 22′ East longitude. It has a total area of about 8,901 sq. km, and the average elevation of the region is 80 metres above sea level. The study was conducted at Harijan Colonies in the Jorhat, Golaghat, Dibrugarh and Tinsukia Districts of Upper Assam. The study areas were chosen after a pilot survey revealed that they are listed as slum areas in municipal records. Their socio-economic and environmental characteristics differ from place to place.

Database and Research Methodology

Several works of literature were studied and collected secondary data from Municipality Boards and planning offices. Primary data collected through an interview Schedule survey of community individuals of randomly selected households and observation was also used at the identical time. The population of the study consists of the Dalit man and women community of Dibrugarh Shantipara Harijan Colony and Golaghat Harijan Colony in Assam. In order to investigate the problem more deeply, logically, and meaningfully at the micro-level interviews were performed after undertaking a structured schedule survey. The schedule requested information on a variety of pertinent topics, including the gender distribution, level of education, occupation, income, housing, and sanitation. Both qualitative and quantitative analysis has been done. The data were edited, coded and fed into the

computer with table plans with frequencies and percentages. For the study are Sex ratio, Masculinity proportion, Surplus and Deficit of women, Literacy rate and Unemployment percentage were measured. Kendall's Ranking method has been used to measure the socio-economic condition, expressed as:

$$Cj = \Sigma_{i=1}^{n} Ri.....(1)$$

Where, Cj is composite rank value of the j^{th} district and Ri indicates an indicator of development. It is one of the simplest methods of computing composite score involving multivariate data with different measurement units. In this method raking of variables has been done as per their frequency. The highest value ranked 1st position and lowest value ranked at the bottom and vice versa. In case of the indicators such as poverty, unemployment, etc. the lowest value ranked as 1st position because low rate of poverty or unemployment indicates socio-economic growth and development. In this work socio-economic condition of Harijan people of Assam in four districts has been studied which has been measured and compared through Simple Ranking method.

Results and Discussion

According to a recent report published in the 'Human Rights Quarterly' by Clifford Bob, Duquesne University, there are about 160 million Dalits in India. This report mentioned that the Harijan people are facing discrimination and violence because of their subordinate position in the Hindu caste system which resulted in the conversion of the Hindu religion to other religions to escape from untouchability. In Assam, there are 17 Groups of people included in the Scheduled Caste list, although not all of these groups settled as informal settlements, e.g. Harijan Colonies. The groups with the surnames such as Bansphors, Dhupi, Dugla, etc. mainly settled down as Harijan Colonies who migrated to the urban areas in search of income. The population belonging to scheduled caste increased from 18,25,949 in 2001 to 2,23,321 in 2011(Table01), which shows the rapid growth of the Harijan population.

Table 01 : Scheduled Caste Population Groups in Assam

Sl No.	Name of The Scheduled Caste	Total Population		Proportion of Total Population in %	
		2001	2011	2001	2011
1	All Scheduled Castes	18,25,949	22,31,321	6.85	7.15
2	Bansphor	14,760	16,359	0.8	0.7
3	Bhuinmali	57,974	69,535	3.2	3.1
4	Brittial/Bania	47,974	50,598	2.6	2.2
5	Dhupi/Dhobi	49,929	52,431	2.7	2.3
6	Dugla	6,364	7,991	0.3	0.3
7	Hira	55,106	55,300	3.0	2.4
8	Jalkeot	23,511	24,774	1.3	1.1
9	Jhalo	77,533	80,376	4.2	3.6
10	Kaibartta	5,81,559	6,93,219	31.8	31
11	Lalbegi	552	790	0.03	0.03
12	Mahara	1,725	1,822	0.1	0.08
13	Mehtar	12,715	8,835	0.7	0.3
14	Muchi	70,954	77,643	3.9	3.4
15	Namasudra	5,55,621	6,31,542	30.4	28
16	Patni	1,51,992	1,81,904	8.3	8.1
17	Sutradhar	62,032	66,303	3.4	2.9

Source: Statistical Handbook of Assam 2001-2011

The analysis of collected data and observation found that the areas are inhabitant by the same community of people Harijans belonging to Scheduled caste and traditionally their religion is Hinduism. The dominant language is Hindi in Harijan colonies and they are also able to speak Assamese. Despite these, the Harijan Colonies are listed as identified slum areas in the list of Municipality Boards. Identified slums are areas with a minimum of 300 population or about 60-70 households poorly built. These areas are congested areas with an unhygienic environment. As a slum area, they are facing various problems like the lack of proper sanitation, the lack of pure drinking water facilities, illiteracy, poverty, high rate of crime, etc. Harijan colonies' socio-economic conditions vary from one another in terms of things, like occupations, dwelling styles, family structures, and educational attainment. This study found two Harijan colonies in the Dibrugarh district: Chiring Chapori Harijan Colony and Shantipara Harijan Colony, and there is one colony in each of the other three districts. In comparison to the Harijan Colony in Golaghat District, the Harijan Colonies in Dibrugarh, Tinsukia, and Jorhat districts are in an extremely poor socio-economic situation. In the Dibrugarh Shantipara, Jorhat and Sripuria Harijan Colony ofTinsukia District, the surname of the residents is Bansphores. The Bansphores family originated in Bihar and moved to Assam at various points in time in quest of a better life. The majority of the Harijans in the Golaghat area had the surname Singh, who were originally from Punjab and Haryana before moving to Assam.

Demographic Aspects

The population composition of the study areas of the Harijan people is very. As per the 2011 census, the total population is the highest in the Sripuria Harijan Colony of Tinsukia (3,306), followed by Dibrugarh Shantipara (2,278), Jorhat (approx.2,267) and Golaghat Harijan areas (1,200). The total number of households recorded in the 2011 census was 842 in Sripuria of Tinsukia, 470 in Shantipara of Dibrugarh, 530 in Jorhat and 325 in Golaghat Harijan colony (Fig 01). The numbers of households are very low compared to the population in the areas. From this, it can be identified that a high number of the population in the areas living in congestion.

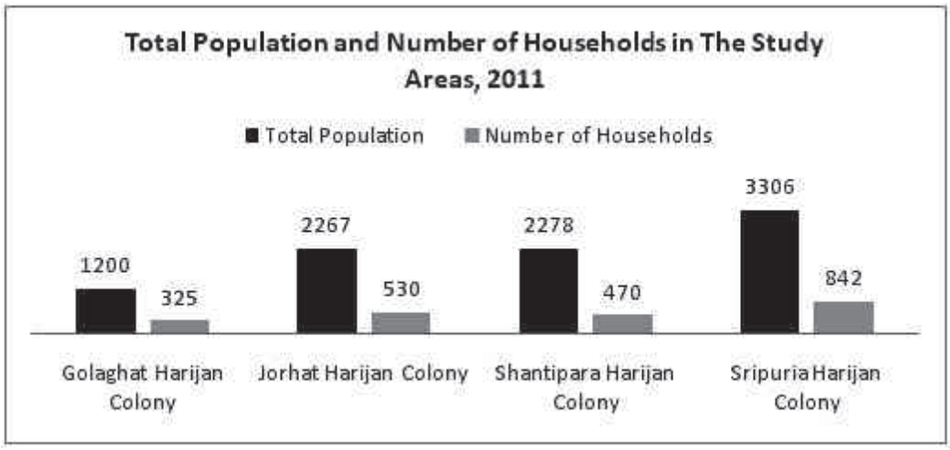

Fig. 01

Age-Sex Structure

A fourfold classification of age groups has been attempted to explore the realities of Harijan slum dwellers such as less than 20, 20-30, 31-51 and above 51. It is observed that the age groups are less than 20 (10.7%), 20-30 (41.3%), 31-51 (27.3%), and above 51 (20.7%). In the Golaghat slum area, the age group 20- 30 (48. 0 %) is more benefited than the Dibrugarh age group 31-40 (37.3%). The Sex-ratio, masculinity proportion and the deficit and surplus of the female population have been calculated to assess gender imbalance in the study areas.

i) Sex Ratio = $\frac{Pf}{Pm}$ x 1000

Ii) Masculinity Proportion = $\frac{Pm}{Pt}$ x 100

iii) Surplus and Deficit of female population = $\frac{Pf - Pm}{Pm}$ x 100

Where, Pm= male population, Pf= female population and Pt represents the total population. Sex ratio, masculinity proportion and Surplus/deficit of the female population are the measures to find out the gender gap which is a major indicator of socio-economic development. These measures were positive in the Shantipara Harijan Colony in the Dibrugarh District and the rest areas found with negative growth. The higher value in sex ratio indicates a lower gender gap. In the Golaghat Harijan area, the sex ratio is the highest which is 1,075.47 followed by Shantipara of Dibrugarh (913.79) and Jorhat (873.01). The Sripuria Harijan area in the Tinsukia district has the lowest sex ratio which is 781.25. In the Shantipara Harijan Colony of Dibrugarh district masculinity proportion was found positive and the Surplus female population and the sex ratio are also quite high (Table 02). As per the field investigation data, the deficit female population found in the Harijan Colonies of Jorhat, Golaghat and Tinsukia district.

Table 02 : Sex Ratio, Masculinity Proportion, Surplus and Deficit of The Female Population

Name of The Study Areas	Male	Female	Sex Ratio	.	Masculinity Proportion	Surplus/Deficit in The Female Population
Jorhat Harijan Colony	63	55	873.01	3	53.38	-12.69
Golaghat Harijan Colony	108	99	1075.47	1	52.17	-8.33
Shantipara Harijan Colony, Dibrugarh	53	58	913.79	2	47.74	9.4
Sirpuria, Tinsukia	96	75	781.25	4	56.14	-21.87
Total	320	287	3,643.52		209.43	-33.49

Source: Field Survey

Education Level

More people in the Golaghat region are literate than in the other Harijan Colonies. The highest level of learning extends to the graduate level found in Golaghat and Jorhat Harijan area. Out of the total population questioned, 21.4% are illiterate, 48.2% are primary school dropouts, 8.9% are still in elementary school, 17.9% are in high school, and 3.6% are graduate students. In contrast, the Shantipara slum in Dibrugarh has the lowest literacy rate (48.10%), the biggest percentage of illiterates (51.9%), and the highest percentage of dropouts (27.8%) and 20.3% found in the primary level of schooling.

The literacy rate has been found the highest in Golaghat Harijan Colony followed by Jorhat and Tinsukia district and the lowest literacy found in Shantipara Harijan colony in Dibrugarh District . The

average literacy in slums is lower than the state average and female literacy is also low. The low number of female literacy is a result of family burden, unawareness, lack of interest, and gender discrimination. Many of the females are illiterate and married at an early age. The number of dropped-out persons in all areas is found very high. In these areas, several people are dropped out because children have to work to support families and lack financial support most of the dwellers dropped school at the primary level.

Occupational Structure

Income search or occupation is the main reason that Harijans are settled in unhygienic poorly developed, uninhabitable areas which later become informal settlements like slums. It has been over Nine years since the Parliament enacted the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act 2013. But the bread winners mainly engaged as manual scavengers and daily wage labourers especially the dwellers of Shantipara Slum, Jorhat Harijan Colony and Sripuria. Their income is flexible. Most dwellers engaged as daily wage labourers and their daily income is between Rs.150-Rs.200. The income of maximum families ranges between Rs.3,000 to Rs.5,000. But the income status is high in the Golaghat Harijan Colony because maximum dwellers are engaged in the service sector such as sweeper/cleaner and another service sector in different government or non –government offices. They are also worked in small business sectors.

Almost all the dwellers of Shantipara Harijan Colony are engaged as manual scavengers and cleaners. Most of the workers are informal workers whose monthly income generally ranges between Rs.3,000-5,000. The business of dwellers includes door-to-door selling of clothes, jewellery, vegetables/fruits, etc. by using bicycles. Some of the children aged between 5 to 12 years worked as rag pickers (Table 03).

The Harijan Colony in Golaghat is developed compared to the other areas. Traditionally the main work of Harijan was manual scavengers, sweepers and cleaners, cloth washers, etc. but in the case of the Golaghat area, Harijan people are now transformed into other activities like government services, business, street vendors, etc. Ranking Co-efficient (Composite score) = Summation of individual ranks of different indicators higher the value lower is the socio-economic development and vice versa. The analysis of the data based on demographic aspects, i.e. occupation, income, literacy, household condition, sanitation, etc. reveals that the socio-economic condition of Golaghat Harijan colony is more developed compared to other Harijan colony areas of selected districts (Table 04). The good planning management of the Municipality board and community participation related to the development of the socio-economic and environmental condition of the area.

Table 03 : Occupational Structure of The Study Areas

Shantipara Harijan Colony, Dibrugarh			
Occupational activities	Frequency	Percentage	R_3
Unemployed	33	41.60	4
Government Service	4	5.00	
Manual scavenger/ Sweeper/Cleaner	16	20.20	
House Maid	10	12.60	
Daily wage labour	12	15.60	
Business	4	5	
Total	79	100.0	

Harijan Colony, Golaghat District			
Government Services	9	16.1	
Manual Scavenger/ Sweeper/ Cleaner	4	7.1	
House Maid	6	10.7	
Daily wage labour	7	12.5	
Business	9	16.1	
Total	56	100.0	
Harijan Colony, Jorhat District			
Unemployed	32	39.5	3
Government Services	3	3.8	
Manual Scavenger/ Sweeper/ Cleaner	10	12.34	
Housemaid	8	9.87	
Daily wage labour	20	24.69	
Business	8	9.8	
Total	81	100	
Sripuria, Tinsukia District			
Unemployed	12	31.5	1
Government Services	2	5.26	
Manual Scavenger/ Sweeper/ Cleaner	4	10.52	
Housemaid	3	8	
Daily wage labour	15	39.46	
Business	2	5.26	
Total	38	100	

Source: Field Survey

Table 04 : Ranks of Selected Development Indicators for The Study Areas of Upper Assam and Ranking Co-Efficient, According To Kendell's Method Based on Survey Data.

The Study Areas	Sex Ratio (R_1)	Literacy Rate (R_2)	Working Population (R_3)	Percentage of Unemployed (R_4)	Ranking Co-Efficient
Jorhat Harijan Colony	3	2	1	3	9
Golaghat Harijan Colony	1	1	3	2	7
Shantipara Harijan Colony, Dibrugarh	2	3	2	4	11
Sripuria, Tinsukia	4	4	4	1	13

Household Facilities

In the Shantipara area, all houses are shacks except one or two. These shacks have one to two small rooms including a kitchen. Similarly in the Jorhat Harijan Colony, the houses have one to two rooms. The ownership of the Sripuria Harijan area belongs to the central government therefore this settlement is temporary. Thus, their houses are shacks with very low household facilities. In Shantipara Harijan Colony electricity is available only for rent. The dwellers have to pay a fixed rate of Rs.500 per Month for electricity. Almost every house has one or two rooms including the kitchen which have one to two electric bulbs. On the other hand in the Golaghat Harijan Colony, each house has its electricity which is freely provided by the government. The result of the comparison between these two Harijan Colonies shows that the socio-economic and environmental status of the Golaghat Harijan Colony is better than the other Harijan settlement areas.

Sanitation Facilities

Sanitation facilities are an element for the study of the level of human development which is considered a basic need for the human being. During the research, it has been found that the condition of sanitation in Shantipara Harijan Colony is in a very poor state. About 30 households have to share a common latrine (pour) without bathrooms. The dwellers have to use open spaces for the bath. A similar condition has been seen in Jorhat and Tinsukia Districts. On the other hand in the Golaghat district, this situation is far better. About 10 households have to share a common toilet (pour) provided by the Municipality and the rest have private latrines (flash) and bathrooms in a good condition. The drains are clean in the Golaghat area, and they have fewer mosquito problems. The drains are full of garbage in the Shantipara Harijan colony due to a lack of daily clearance. This is a major reason they are facing mosquito problems or insect problems throughout the year. Generally, their houses are surrounded by drains. In the rainy season due to waterlogging the drain water enters their houses and diseases spread.

Table 05 : Overall Socio-Economic Status of TheStudy Areas of Upper Assam

Basis of Comparison	Harijan Colony, Golaghat	Shantipara Harijan Colony, Dibrugarh	Jorhat Harijan Colony	Sripuria Harijan Colony, Tinsukia
Area in Sq. Km	0.0142	0.146	0.17	0.4
Total Households	325	470	269	842
Total Population (2011 Census)	1200	2278	1639	3306
Literacy Rate	High	Low	Low	Low
Monthly Income Approx.	Rs.5000-15,000	Rs.3,000-5,000	Rs.3,000-6,000	Rs.3,000-10,000
House type	All are Pucca.	All are kutcha	Kutcha, Pucca and Semi Pucca	All are kutcha
No of rooms	2 to 3	1 to 2	1 to 3	1 to 2
Sanitation Facilities	Private and public latrines (Flush/Pour) are available.	Public Latrines(Pour & Pucca) in a very poor condition.	Public Latrines(Pour & pucca) in a very poor condition.	Public Latrines(Pour & kutcha) in a very poor condition.

Source: Field survey

Other Aspects

Alcoholism is extended deeply to the root among the dwellers of all Harijan Colonies. During the research, it is found that the main causes of the deaths were liver diseases due to a high intake of liquors. This is also a cause of domestic violence and other crimes. People generally avoid visiting doctors and prefer to go to the persons who give local medicine, and they called them Baba or Bej (local doctors) in the local language. Illiteracy, superstitious beliefs and poverty are the main reason behind this. The Dalits are termed as the most socio-economically deprived people in India. These people in Assam face many problems and their socio-economic status is still in a poor condition. The overall socio-economic condition of all Harijan Colonies in Upper Assam is different but in general, their condition lacking behind (Table 06).

Conclusion

In Assam, the Harijan people immigrated and built permanent colonies over several decades. They continue to be under social and economic oppression. Harijan colonies are characterised as slum regions since they lack essential amenities including housing, drinking water, sanitation, education, etc. In addition, they experience humiliation, social prejudice, malnutrition, alcoholism, domestic abuse, and other problems. According to this study, Golaghat District has more developed socio-economic and environmental conditions than the Harijan colonies. The conventional economic activities in this region give way to new ones. The findings of this study draw attention to the issues facing the Harijan population in Assam. The growth of the Harijan people requires accurate mapping, sound planning policies, and the engagement of planners, municipality boards, and community members as a whole.

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TRENDS OF URBANIZATION IN KRISHNANAGAR MUNICIPALITY, NADIA DISTRICT, WEST BENGAL

Soumitra Gaine and Kumar Amit

ABSTRACT

There has been a unique trend of urbanization observed in the nineteenth century. It is projected that more than half or two-third of the global population will be residing in urban areas by 2050. The per capita income of average people has seen a major hike in recent days propelling them to flock towards urban areas to uplift their standard of living. India is no exception when it comes to the trend of rapid urbanization that the world is witnessing now a days. Although urbanization in India is sometimes metropolitan city oriented, the other small and medium size cities have also increased in association of globalization recorded by Census, 2011. Many small census towns (CTs), Notified Areas (NAs) are connected or associated with the Municipalities(M). Krishnanagar Municipality is also experienced with rapid growth of urbanization since Independence (1947).

Key Words: *Urbanization, Globalization, Metropolitan City, Census Towns (CTs), Notified Area (NA).*

Introduction

The word 'Urbanization' is a comprehensive term usually demonstrates with urban areas by geographically and demographically sense within changes time. In India, statutory body, e.g. Municipal corporation, municipality, cantonment, notified areas, etc. are considered as urban area (Chatterjee, 2014). Whereas, 2011 census recognized that places which have a minimum population of 5,000, male main working population more than seventy five per cent engaged in non-agricultural activity and population density is equal or more than 400 persons per square kilometre (Chandramouli, 2014). United Nations (UN) considered population in localities having 2,000 and more may be considered as urban population (Durand, et al., 1965).

City and Urbanization

Due to the lack of a fixed and unanimous definition it's difficult to figure out the precise and scholarly definition of the term 'Urban' (Carter, 1981). In many countries, an urban area can be recognized by the number of people living there, the economic activities of the citizen and its administrative nature. Ramchandran stated that the urban area may fall into five categories like 1. demographic, 2. economic, 3. social, 4. morphological, and 5. functional (Ramchandran, 2012). Caves defined city as a place of permanent and densely settled place with definite, administrative boundaries where vast number of population engaged in non-agricultural activities (Caves, 2004). Census of India has been modified the definition of urban areas time to time before and after Independence. The general report of the census of India, 1901 defines Municipalities, civil lines within municipal limits and permanently inhabited area having a population more than 5,000 as Urban areas (Bose, 1973).

Before 1951, all those settlements as urban which municipalities, civil lines or any other

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permanent settlements with continuous collection of houses of not less than five thousand persons. Between 1951 to 1981, the urban area has been categorized into statutory, e.g., Municipal Corporation (MC), Municipality (M), Notifies Area Committee (NAC) and non-statutory, e.g., census towns (CTs) having not less than 5,000 population, a population density of 400 persons per square kilometer and 75 per cent of the workforce employed in the non-agricultural sector. Nadia, Haora and North 24 Parganas in West Bengal are experiencing high density of urban population due to comparative high growth of economic development (Ghosh Biswajit & Chakma, 2014). After partition, the most of the refugees coming from Bangladesh (formerly East Pakistan) are mostly gathered in three main districts of West Bengal namely 24 Parganas (North& South), Kolkata, and Nadia. Due to communal disturbances, most of the refugees from formerly East Pakistan (now Bangladesh) has migrated since 1947 to 1970 in Nadia District (Dey, 2007). Most of them are gathered in surrounding parts of Krishnanagar and other towns in Nadia District.

The Study Area

Krishnanagar is a small town and district head-quarters of Nadia District and it locates 100 kms north from Kolkata. Krishnanagar Municipality established in 1st November 1964(CDP, 2014). Kishnanagar Municipality started their journey with a population of two thousand only. In 2011, the population of this city has been reached to 1.81 lakh. The actual area of Krishnanagar municipality is 15.95 km2 and it has been subdivided into 24 wards.

Geographically, the city located between 23°22′30 to 23°22′30 north latitudes and 88°28′30 to 88°31′30 south longitudes along the left bank of the river Jalangi. Krishnanagar Municipality lies within Krishnanagar -I block and it is surrounded by 3 census towns namely

Sonda(CT), Baruihuda(CT) & Paschim Bhatjangla(CT). The city is well connected with eastern railway and 34 NH and state highways.

Historical Background of The Study Area

The origin and development of Krishnanagar city is quite ancient. The city was founded in the seventeenth century during the reign of Raja Raghab Ray (1618-1669 A.D.) (W. W. Hunter, 1875). At the initial phase, Krishnanagar was a village called 'Reui' (S. De Sarkar, 2015). In 1663, Raja Raghab Ray (1618-1669 A.D.) shifted his capital from Matiary (near Banpur, Nadia) to the village 'Reui'. In the honor of Lord Krishna, his son Maharaja Rudra Ray (1676-1693 A.D.) renamed his capital 'reui' to 'Krishnanagar'. The origin of Kolkata and Krishnanagar takes place at a same period of time. Later, during the reign of Maharaja Krishnachandra, Krishnanagar expanded through establishment of Sanskrit toll, schools, temples and construction of roads, etc. The city has been pointed out in Rennel's Atlas in 1776 (Rennell, 1976). Later the city has also been depicted in David Rumsey's Historical map Collection (Johnstone, 1861). According to the 2011 census, the total population of the city is 1.53 lakh among which male and female inhabitants are 77,146 and 75,916 respectively. The male-female ratio is 984 females per thousand males. Number of females is more than male has been found in ward no 12, 14, 16, 18,19, 20 and 24.

Objectives

The major objectives of the study are:

1. To analyse the temporal growth of Urbanization in Krishnanagar Municipal area.
2. To compare level of urbanization in different wards of Krishnanagar Municipality.
3. To analyse the spatio-temporal changes of urbanization within the municipality.

Database and Research Methodology

The present work is based on the data from secondary sources like District Census Handbook of Nadia, West Bengal (1951, 1961, 1971, 1981, 1991, 2001, and 2011), and District statistical Handbook for last three decades, District Planning Report, Human development Report of Nadia District. Articles, Periodicals, other research articles, District

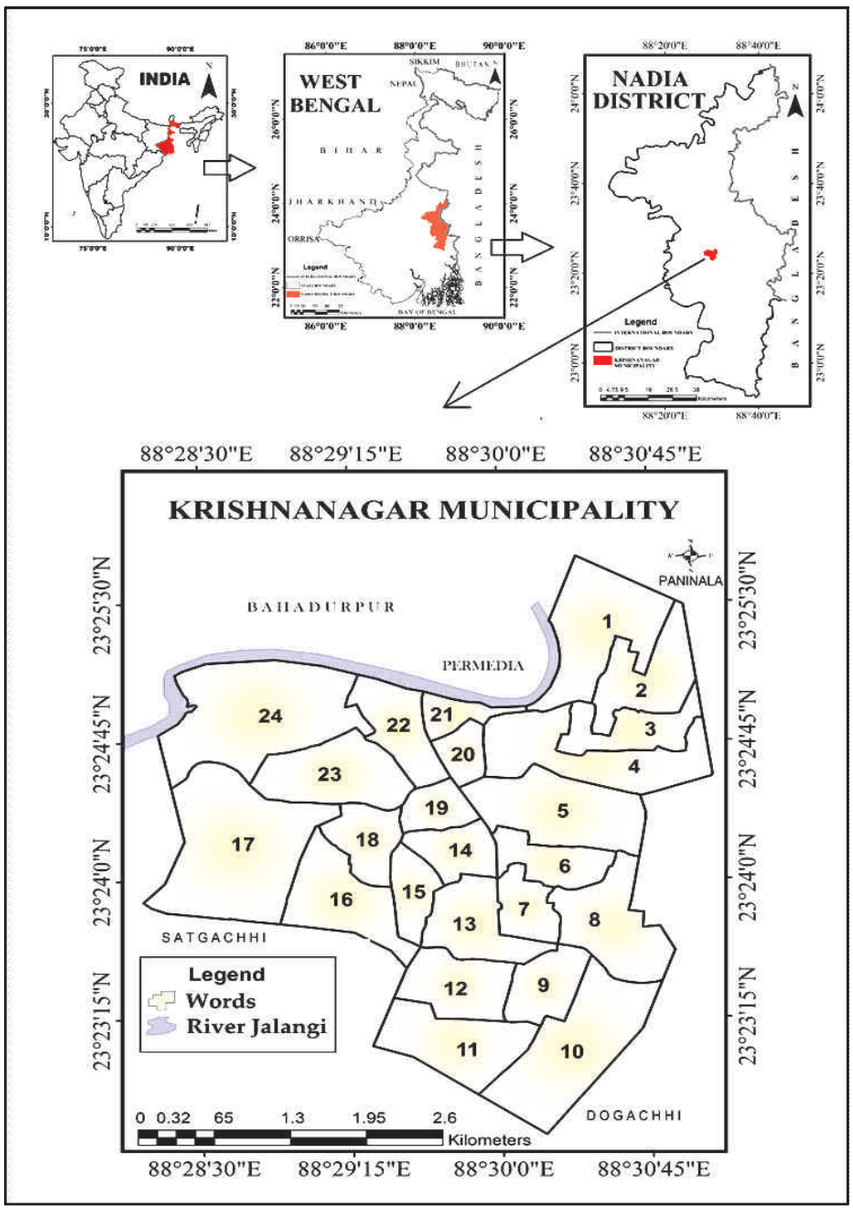

Fig. 01 : Location of Krishnanagar City, West Bengal, India
Source: Town Planning Circle, Development & Planning (T & CP), Government of West Bengal

Gazetteers of Nadia District by J.H. Garrett (Garrett, 1910), Statistical Account of Bengal by Hunter (W. Hunter), Draft Development Plan (2014-2019), etc. has been used to fulfillment of the study.

The data for analysis of the temporal patterns of urbanization of Krishnanagar Municipal area have been collected from Census of India (2001-2011). Census data from 1951 to 2011 has been analyzed using Minitab, Microsoft Excel 2016 and all the related maps and Diagrams were prepared with the application of ARC GIS 10.6 software. Analysis, assessment and verification of data in the context of Krishnanagar Municipality and Krishnanagar CD Block are used.

In spatial planning process, a set of variables operate within a system (Biswajit Ghosh & Chakma, 2014). Sivaramakrishnan chose several Urban indices like level of urbanization, decadal growth rate to measure the process of Urbanization. Several Urban indices has been used to measure the trends and process of urbanization of Krishnanagar Municipality like,

Annual Exponential Growth Rate can be defined the trends of population growth between two census years by using the formula

Annual Exponential Growth Rate (EXP) (%)

$$EXP = \left\{\left(\frac{P_{10}}{P_0}\right)^{\frac{1}{10}} - 1\right\} \times 100$$

where, P_{10} = next census year population P_0 = Previous census year Population of the City.

Tempo of Urban Population (PU) refers to speed of urbanization and is measured as change registered in the level or degree of urbanization over the years.

$$Pu = \frac{1}{n}\left[ln\left(\frac{Put+n}{Put}\right)\right] \times 100$$

and Tempo of Rural Population (P_r)

$$\mathrm{Pr} = \frac{1}{n}\left[ln\left(\frac{Prt+n}{Prt}\right)\right] \times 100$$

where u= Urban Population r= rural population, ln= natural log, Put+n =percentage of Urban (Pu) and Rural (Pr) of next census year respectively and n= census year interval.

Level of Urbanization (UL)

$$UL = t\left(\frac{UP}{TP}\right) \times 100$$

Where, UP (t) and TP (t) are the urban and total population at a certain time (t) interval i.e, 10 Years.

Urban Density (UD) shows the spatial distribution of population with the help of a system of graded shading and colour, drawn following the boundaries of administrative units i.e., wards. It is calculated in following way

$$UD = \left(\frac{UP}{UA}\right)$$ Persons per square kilometre.

Location Quotient (LQ) is an index of distribution of areas for comparing between two elements like areas with population. The formula for computing location quotient (LQ) can be written as:

$$LQ = \frac{Pi \div P(\Sigma Pi)}{Ai \div A(\Sigma \mathrm{Ai})}$$

Where, Pi = Population of the Wards, P = Total Population of The City, Ai = Area of the ward and A = Total area of the city.

The relationship between Population size and its distribution of each settlement in an area can be explained by using **Rank-size Rule (Pr)** (Zipf, 1941).

$$Pr = P1\ (r)^{-q}$$

Where, r= rank of a city, Pr= population of a city of rank, r, P1= the estimated population of the largest city and q= an exponent which generally has a value close to 1.

Decadal growth of Municipal Population (UP) indicates degree of Urbanization within period of time interval (2001-2011).

Degree of Municipal Population (2001-2011) =

$$: \left(\frac{UP_{2011} - UP_{2001}}{UP_{2001}}\right) \times 100$$

Urbanization Rate (U_{Rate}) indicates the percentage of change of Urban Population(UP) in census Interval (2001-2011) with using following formula (Biswajit Ghosh & Chakma, 2014).

$$U_{Rate} = \left\{\frac{UP_{2011}(\%) - UP_{2001}(\%)}{UP_{2001}(\%)}\right\} \times 100$$

Factors Affecting Urbanization in Krishnanagar

The population history of Nadia city is about two and hundred years old. Population is being concentrated since the beginning of municipality. The municipality is developed by several factors like economic development, administrative setup, etc. There is strong positive relation between economic development with urbanization. In 11th five-year plan stated about 62 per cent of gross Domestic Product (GDP) in urban sectoral development is directly related with urbanization (Bhagat, 2011). About two hundred years ago, Maharaja Krishna Chandra Roy settled 200 potters and craftsman with their family at the northern end of the city and city was expanded (Badsha, 2014). The clay dolls are made by the clay artisans are unique in their realism. There are more than two hundred clay shops are the major tourist attraction places in this city. As the headquarters of Nadia district, many administrative buildings, government residences, seminar halls, district magistrate office, judge court, church, land revenue office, electric office has been setup in Krishnanagar. On the basis of basic needs of growing population of the city and its surroundings, various markets, shopping complex, sentrum mall, big bazar, flats are developed besides the national highway and main centre of the city. Like another small and medium town, Krishnanagar has affected by slum population. The slum area at northern part has been shifted towards the eastern end of the city and new bus depo has been constructed.

Results and Discussion

Growth of Population of Krishnanagar City During 1901-2011

Like another traditional city of West Bengal, Krishnanagar city has been growing in unplanned and spontaneous manner in its 150 years of urban career (Islam & Tarafder, 2013). There is an effect of urban containment policies (UCPs) on urban growth by its boundary emphasized upon changes in population, employment, land values and built-up areas. Tripathi used two approaches to measure the trends of urbanization. Demographic approach, where, growth of urban population to the total population has been taken as a major part and number of cities and their expansion called geographical approach. Krishnanagar municipality established in 1864 with the population is only five thousand there.

Table 01 : Temporal Changes of Urbanization in Krishnanagar Municipality (1901-2011)

Year	Total Population of Krishnanagar CD Blocks	City Population	Size-Class	Decadal Growth of City Population	Annual Exponential Growth (%)	Level of Urbanization (%)	Tempo of Urbanization
1901	74,447	24,547	III			32.97	
1911	77,606	23,475	III	-4.37	-0.45	30.25	-0.86
1921	71,731	22,309	III	-4.97	-0.51	31.10	0.28
1931	75,784	24,284	III	8.85	0.85	32.04	0.30
1941	91,603	32,016	III	31.84	2.80	34.95	0.87
1951	1,57,981	50,042	II	56.30	4.57	31.68	-0.98
1961	2,19,381	70,440	II	40.76	3.48	32.11	0.14
1971	2,72,958	85,923	II	21.98	2.01	31.48	-0.20
1981	2,59,936	98,141	II	14.22	1.34	37.76	1.82
1991	3,45,083	1,21,110	I	23.40	2.13	35.10	-0.73
2001	4,19,496	1,39,110	I	14.86	1.40	35.45	0.10
2011	4,67,895	1,53,062	I	10.03	0.96	38.90	0.93

Source: Based on data obtained from District Census Handbook, Nadia (1901-2011)

At the beginning of nineteenth century, the population of the city reaches 24 thousand (Table No.01). The population has been gradually declined about 9.34 per cent during the period from 1901 (24,547) to 1921 (22,309). Feminine of 1918 in Bengal, insufficiently supply of medical facilities, the influenza epidemic may negatively be affected on population growth in this city as well as all over West Bengal.

The average annual exponential growth rate became negative between 1901 and 1921 census year (Fig No 02). After independence, the population growth of Krishnanagar municipality has been dramatically changed from thirty-two thousand to fifty thousand or by 56.30 per cent between 1941 to 1951. The average annual exponential growth rate is 4.57 per cent in these decades. The growth rate of municipal population after independence became higher (4.57 per cent per annum) than national average (3.5 per cent per annum) recorded in 1951 census.

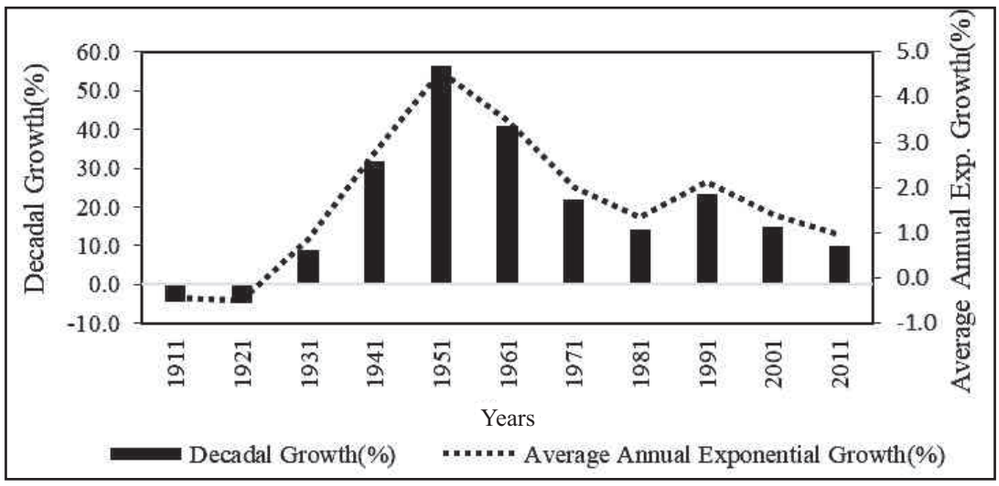

Fig. 02 : Decadal & Annual Exponential Growth of City Population (1901-211)

From 1951 to 1971, the population growth rate of Krishnanagar and its surroundings was almost the same. The urban growth rate became steady between 1961 and 1971. The average annual exponential growth rate varies between 3.48 per cent per annum to 2.01 per cent per annum. During the partition of former Pakistan, a large number of refugees from East Pakistan (now Bangladesh) for religious reasons started living in the outskirts of Krishnanagar. The size-class of Krishnanagar has been rise next class (II) since 1991s but the growth rate has been lowered down from 1.40 per cent per annum to 0.96 per cent per annum during 2001 and 2011 census period.

Rank-size rule graph (Table No.02) shows that the estimated population of Krishnanagar city is higher than actual population residing in the city of Nadia district. The tendency of population concentration mainly large-city oriented in Nadia district like Krishnanagar, Santipur, Chakdah, Ranaghat municipal areas. The distribution of urban population has been decentralized to all over municipalities in the district (Table No. 02).

Table 02 : Rank-Size Rule Showing Primacy of Krishnanagar Municipality in Nadia District.

Town Name	Actual Population of Town (UP)	Class	Rank(r)	$\frac{1}{r}$	Estimated Population (P_n)
Krishnanagar (M)	1,53,062	I	1	1.00	29,1051
Santipur (M)	1,51,777	I	2	0.50	1,45,526
Nabadwip (M)	1,25,543	I	3	0.33	97,017
Kalyani (M)	1,00,575	I	4	0.25	72,763
Chakdaha (M)	95,203	II	5	0.20	58,210
Ranaghat (M)	75,365	II	6	0.17	48,509
Gayespur (M)	58,998	II	7	0.14	41,579
Taherpur (NA + OG)	38,039	III	8	0.13	36,381
Birnagar (M)	30,799	III	9	0.11	32,339
Cooper's Camp (NA + OG)	23,119	III	10	0.10	29,105
	SUP=8,52,480			$\Sigma\frac{1}{r}$ **=2.93**	

Source: Calculated by the Author based on data obtained from Primary Census Abstract, Nadia 2011

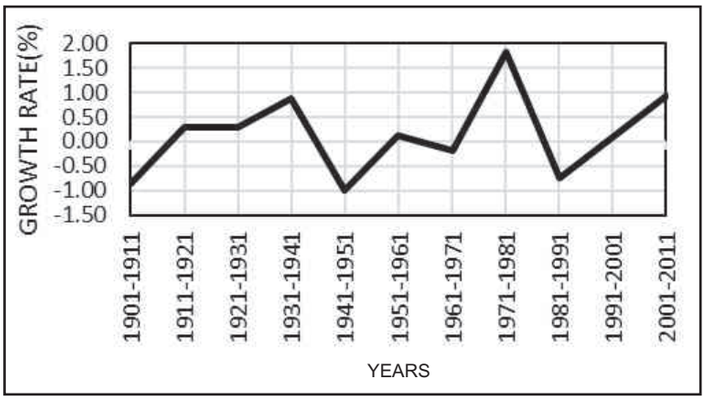

Fig. 03 : Krishnanagar Municipality : Tempo of Urbanization (1901-2011)

The level, degree and speed of urbanization can be measured by tempo of urbanization (Datta, 2006). In Krishnanagar CD block, the tempo of urbanization has been fluctuated from 1901 to 2011 (Fig. 03). Before Independence (between 1901 to 1941), it grew moderately to one per cent. But after Independence due to influx of refugees migrated from formerly East Pakistan (now Bangladesh) trends has been increased between 1951 to 1981 decades. It increased once again during 2001-2011.

Rate of Urbanization (2001-2011)

Since the second last decades (2001-2011) urbanization in Krishnanagar has been lower than the previous decades (fig. 04). The average rate of urbanization is about 4 per cent lower prior to the previous (14 per cent) one from 1991 to 2001. The highest rate (56 per cent) was observed after the Independence as cross-border migration. Growth rate of population is not equal to all over wards in this city. The most interesting part is that the central and oldest wards of the city recorded negative growth (0 to -14 per cent) of the urban population during 2001 to 2011.

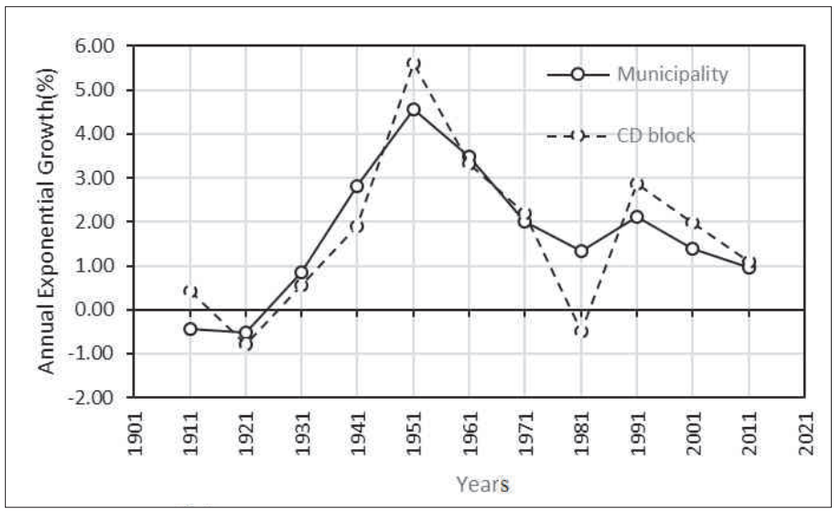

Fig. 04 : Rate of Urbanization of Krishnanagar City (1901-2011)

Source: Prepared based on author's calculation from DCHB, Nadia (1951-2011)

Ward no. 3,4,8,17,18,20,21,22 and 23 shows negative growth of population due to decline of natural growth, local employment, etc. The rate of urbanization is slow (below 10 per cent) at the north-eastern wards (Ward no. 7, 11, 13,14,15,16, and 19) of this city. The population growth rate is higher at the outward wards of the city like ward no. 2 at the north-east, ward no 6 at the east and ward no 9, 10 and 12 in the south, and ward no 24 in the north. The Jalangi River is the natural barrier of urban growth at the north end of the city.

Conclusion and Suggestions

The development of municipal trends to increase of Urban development and subsequently effect the development of Urbanization process. As a planned city with two and half hundred years of urban history, the urbanization and urban development of Krishnanagar have been suffered from poor transport facilities, availability of land, unemployment etc. The riverside wards no. 17, 21,22, 23 & 24 have civic problems with water logging during the monsoon season, whereas wards no 1,2,3, 8 & 10 have housing crises due to the refugees coming from Bangladesh. There is a need for proper planning and a policy for the establishment of new settlements and industries resides alongside NH- 34 (ward no. 17). Accelerated growth of urbanization is possible on the construction of a bridge over the Jalangi River on the northeast side of the city.

The trends of urbanization of krishnanagar city growing at a moderate growth rate following the district and state level. New settlements and high-rise

buildings are being built in the city center, replacing various hundred years old houses. Due to the existence of the Jalangi river in the northern part, the expansion of the city has been limited to the northern boundary, but the western, north-eastern, and southern portions of the city are expanding and growing since 1971. Although the population growth rate from 2001 in some wards in the middle part of the city has increased negatively, the rate of population growth is higher in the outlying areas due to availability of agricultural land. Inadequacies of transport network, lack of proper urban planning and civic amenities and decentralization have become obstacles in the way of urbanization in Krishnanagar city. Krishnanagar municipality needs to be proper planning and policies for infrastructural development at the local and state level.

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SOLID WASTE MANAGEMENT PRACTICES AND THEIR CONSEQUENCES ON HUMAN HEALTH: A CASE STUDY OF KANPUR CITY

Rohit Singh and Saumya Singh

ABSTRACT

Solid waste management has become a significant concern in modern times due to the increasing volume and complexity of waste that poses a serious risk to ecosystems and human health. This paper aims to investigate the spatial distribution of water-borne diseases in Kanpur city, India, and the relationship between drainage conditions and the occurrence of these diseases.The study collected primary data through interviews with 622 randomly selected households from different wards of Kanpur city. Using SPSS software, the study created a cross-table to examine the occurrence of water-borne diseases and maps using ArcGIS 10 software to visualize the distribution. The study found that irregular garbage disposal and old sewerage pipelines in the inner zone of the city resulted in a higher percentage of water-borne diseases.Moreover, the study revealed that maximum cases of water-borne diseases were reported in residential wards and residential cum commercial wards due to poor sanitary conditions and irregular garbage collection. The shortage of municipal workers has worsened the city's deteriorating conditions, and a higher incidence of water-borne diseases was reported in areas without proper sewerage facilities. The study also observed the spread of water-borne diseases due to clogged sewerage systems.Effective solid waste management is crucial for the safety of the human environment and human health. The findings of this study highlight the urgent need for better solid waste management practices and proper drainage facilities to prevent water-borne diseases in Kanpur city.

Key Word: *Human health, Water-borne diseases, Drainage Condition.*

Introduction

The environment's condition plays a vital role in the health and wellbeing of all living beings, including humans. According to the World Health Organization (1985), health encompasses physical, mental, and social wellbeing, not merely the absence of diseases and infirmity. Environmental health considers the overall suitability of the environment in relation to habitat and people, taking into account economic, social, and environmental control.

Research indicates that various aspects of urbanization, such as housing, working environment, quality of life, and waste disposal system, have a positive correlation with health. To ensure better survival for humanity, the physical environment's attributes must be controlled. Environmental control maintains environmental quality, providing comfort and efficient performance to mankind. However, the rapid urbanization and development have created serious problems associated with human environmental conditions in India, such as slums, restricted living space, and noise.

Changes in the social environment have intensified poverty and waste disposal problems, resulting in a close relationship between solid waste management and public health. For example, the outbreak of plague in 1994 in Surat and other cities of India was due to unhygienic sanitary conditions and inefficient and inadequate health services. This was

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mainly because of the unauthorized growth of slums in congested urban areas with the absence of essential basic civic amenities and improper disposal of garbage.

The increasing numbers of squatter settlements have contributed to growing piles of garbage, but municipal corporations responsible for sanitation are not serious about providing essential services. Asper national census, 2011 about 31% of India's population lives in urban areas, with one-fourth of this number living in slums. More than half of Mumbai's population lives in slums with little or no waste collection system. As a result, vector-borne and water-borne diseases are prevalent in several parts of the city.

Poor sanitary conditions cause major reported cases of diseases, such as diarrhea, diphtheria, tetanus, and measles. Contamination of water supplies due to improper disposal of sewage and solid waste causes epidemics like jaundice and gastroenteritis. Inadequate solid waste management creates favorable conditions for the proliferation of vectors, especially filariasis vector, culex quinquefasciatus, houseflies, cockroaches, and rodents, leading to diseases such as filariasis.

The outbreak of vector-borne disease depends on the complex interaction of three agents: parasite, host, and vector in a particular environment, including physical, socio-economic, and cultural factors. Vector-borne diseases are caused by various parasites transmitted by a living carrier, such as malaria, filariasis, Japanese encephalitis, dengue, chikungunya, dengue hemorrhagic fever, leishmaniasis, dermal and visceral, and plague. All these diseases are caused by unhealthy environmental conditions.

This literature review reveals that solid waste management is a major issue in India, with the unscientific disposal of waste closely associated with at least 22 human diseases. Improper solid waste disposal and garbage handling by workers involved in its collection and disposal can have severe health consequences. The government's lack of concern towards the healthcare system exacerbates these problems. Therefore, this study aims to investigate the spatial distribution of water-borne diseases in Kanpur city by examining the relationship between drainage conditions, disease occurrences, and the need for proper solid waste management and healthcare facilities in the country.

The Study Area

Kanpur, located at 26 ° 28' 15" N latitude and 80 ° 23' 45" E longitude, is a significant city in Northern India. Positioned on the right bank of the river Ganga, Kanpur is known as the industrial capital of Uttar Pradesh, boasting its historical, religious, and commercial significance. The region is drained by two rivers, Ganga and Pandu, and has a total area of approximately 298.98 km2, divided into 6 zones and 110 wards. With a population of 27,67,031 in 2011, Kanpur ranks as the fifth most highly-populated city in India, surpassing the 2001 population count of 25,51,337. The city occupies a prominent position in North India as one of the major industrial hubs, and the river Ganga adds to its charm and significance.

Objectives

- To find out the spatial distribution (Sanitary Zone wise and Functional character of Ward wise) of the occurrence of water-borne diseases in Kanpur city
- To examine the relationship between drainage conditions and occurrences of water-borne diseases

Research Methodology

The study is based on primary data, which was collected through an interview schedule from randomly selected 622 households belonging to different wards of Kanpur city. To obtain an in-depth view and perception regarding occurrences of water-borne diseases among citizens of Kanpur city, a detailed interview schedule has been prepared on the basis of previous studies. Furthermore, the cross table has been prepared using SPSS software (version 20) and Maps are created by using Arc GIS 10 software.

Results and Discussion

Occurrences of Water-Borne Diseases in Kanpur City

In the present analysis, an attempt has been made to assess the zone-wise occurrence of waterborne diseases caused due to uncontrolled disposal of garbage and other factors in the city. Results of the survey have been tabulated according to zone (Table 01). All the percentages have been calculated on the basis of multiple responses to various diseases. In all the cases respondents mentioned their responses to all nine types of diseases.

Table 01 : Sanitary Zone Wise Occurrences of Water Borne Diseases in Kanpur City

Diseases	Percentage of Respondents						
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Total
Jaundice	14.2	16.9	21.2	14.6	17.3	15.8	100
Cholera	25.8	11.1	12.6	17.9	13.2	19.5	100
Typhoid	15.4	13.6	18.2	11.2	18.2	23.4	100
Diarrhea	13.5	27.0	34.2	4.5	8.1	12.6	100
Encephalitis	14.0	34.9	7.0	7.0	16.3	20.9	100
Hepatitis	11.1	26.9	8.3	10.2	22.2	21.3	100
Malaria	14.7	15.1	18.6	9.0	23.7	19.0	100
Gastro Problem	16.9	20.4	14.1	12.6	16.1	19.9	100
Others	20.7	6.9	20.7	31.0	6.9	13.8	100

Source: Based on Personal Survey, 2018

Fig. 01 show that 260 respondents mentioned that they have suffered from Jaundice. Out of all the zones, the maximum number of respondents (21.2%) suffered in zone 3 mostly covering Ramadevi, Kidwai Nagar, Baba Chauraha, Sisamau and Kashav Nagar areas of the city from jaundice followed by 17.3 per cent in zone 5 covering Zarib Chawki, Shastri Nagar, Govind Nagar area of the city while minimum (14.2%) in zone 1 covering Civil Lines, Parade, Kakadeo, Birhana Road, Phoolbagh, Mall Road, Ghantaghar, and Coolie Bazar areas of the city. The higher percentage of jaundice occurring in zone 3 is perhaps due to irregular disposal of garbage and old sewerage pipelines. In this zone, garbage remains for 2-3 days at collection points. Nearly 190 respondents suffered from cholera. Of the total respondent who suffered from cholera, the maximum number of respondents (25.8%) suffered in zone 1 followed by (19.5%) in zone 6 while the minimum number of respondents who suffered from cholera have been reported in zone 2 (11.1%). The higher percentage of cholera occurrence in zone 1 is perhaps caused due to poor sanitary conditions prevailing in the core of the city. Of the total respondents, 214 suffered from typhoid.

Out of them, the maximum number of respondents (23.4%) suffered in zone 6 followed by zone 3 (18.2%) and zone 5 (19.5%) whereas, the minimum (11.2%) in zone 4. It has been noticed that 111 respondents suffered from Diarrhea. Out of them, the highest percentage of respondents (34.2%) suffered in zone 3 followed by zone 2 (27%) while the minimum number of respondents (4.5%) suffered in zone 4. It is noted that 86 respondents suffered from encephalitis. Out of these maximum percentage of respondents (34.9%) suffered in zone 2 whereas the minimum (7%) suffered in both zone 3 and zone 4 (7%). Further, 108 respondents suffered from

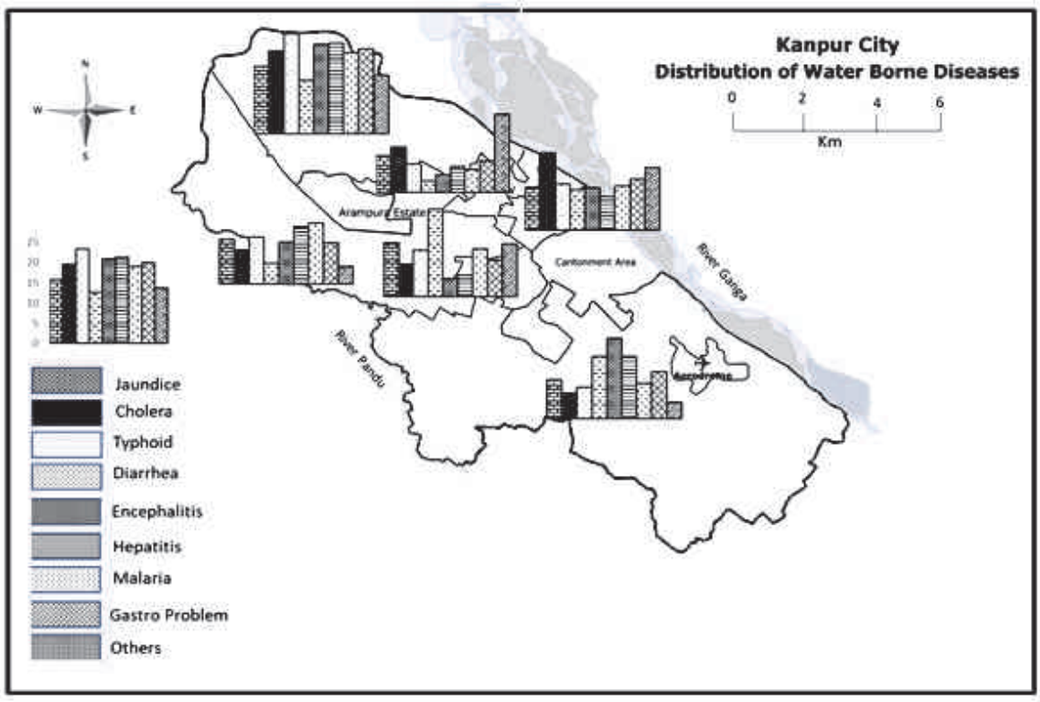

Fig. 01

hepatitis. Of this, the maximum number of respondents (26.9%) suffered in zone 2 whereas, the minimum (8.3%) was in zone 3. A higher number of malaria (279 respondents) cases are reported in Kanpur city. Among all the zones, the maximum number of respondents (23.7%) suffered in zone 5 followed by zone 6 (19%) while the minimum number of respondents (9%) suffered in zone 4. The higher percentage of malaria occurrence in zone 5 and zone 6 is perhaps due to ill drainage conditions. There are drains which remain open and sometimes overflowing. People from these zones throw their daily waste in front of houses and nearby drains. During the rainy season, all drains become choked and waterlogged over the whole area. Due to this water remains over the area for many days. These areas provide the ideal condition for the growth of mosquitos. About 397 respondents suffered from Gastro problems. Out of them, the maximum number of respondents (20.4%) suffered in zone 2 followed by zone 6 (19.9%) while the minimum (12.6%) suffered in zone 4. The highest percentage of gastro problem occurrences is perhaps due to the poor groundwater quality of these zones worse than other zones.

Table 02 shows the nature of the locality-wise occurrence of waterborne diseases caused due to uncontrolled disposal of garbage in the city. All the percentages have been calculated on the basis of multiple responses as regards various diseases. In all the cases respondents mentioned their responses to all the diseases. Out of the total respondent maximum percentage of jaundice cases (52.3%) have been reported in residential areas (namely Gernail Ganj, Colonel Ganj, Tiwari Purwa, Anwarganj, Nawabganj,

Table 02 : Functional Character of Wards And Occurrences of Water Borne Diseases in Kanpur City

Diseases	Percentage of Respondents				
	Industrial	Industrial cum Commercial	Residential	Residential cum Commercial	Total
Jaundice	8.1	5.8	52.3	33.8	100
Cholera	14.2	9.5	46.3	30.0	100
Typhoid	2.8	13.1	57.9	26.2	100
Diarrhea	6.3	5.4	36.9	51.4	100
Encephalitis	2.3	3.5	54.7	39.5	100
Hepatitis	4.6	0.0	51.9	43.5	100
Malaria	7.5	3.9	51.3	37.3	100
Gastro Problem	8.6	9.1	49.4	33.0	100
Others	13.8	3.4	58.6	24.1	100

Source: Based on Personal Survey, 2018

Sarojini Nagar, Ambedkar Nagar, Khalasi Line, Mc Robert Ganj) whereas 33.8 per cent in residential cum commercial wards (namely Chunniganj, Parade, Old Kanpur, Nankari, Jajmau, Juhi Kala, Civil Lines, Lajpat Nagar, FazalGanj, Naveen Nagar (Kakadeo), Chamanganj). It is interesting to note that the minimum number of respondents (5.8%) in industrial cum commercial wards (namely Kalyanpur, Vishnupuri, Nirala Nagar, Ratanlal Nagar, Cooperganj, Vashant Vihar, and Raipurwa).

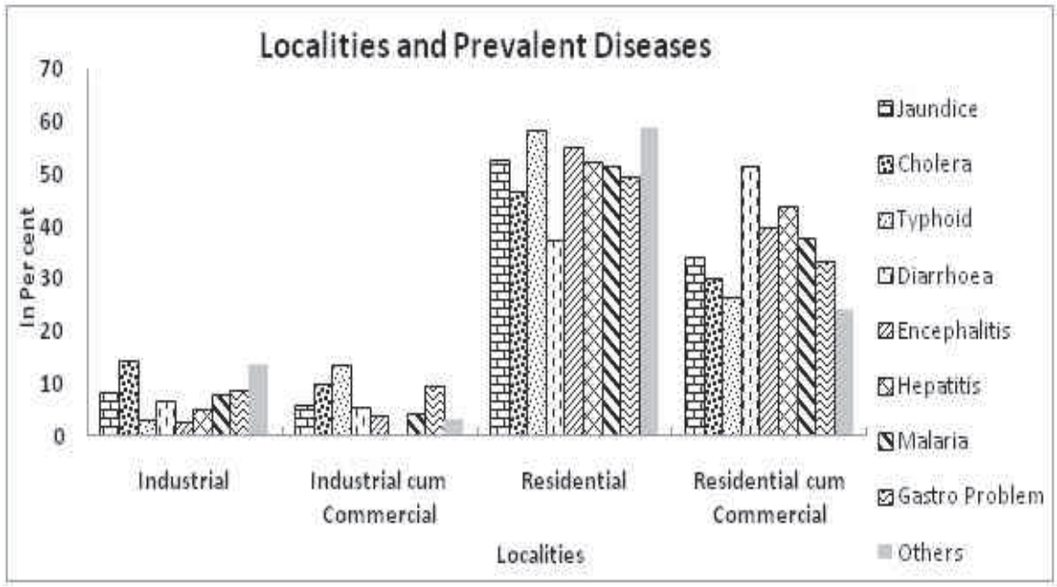

Fig. 02

Out of 190 respondents' the maximum number of cholera (46.3 %) cases were reported in residential wards followed by residential cum commercial wards (30%) while minimum (9.5%) cases were reported in industrial-cum-commercial wards. It is reported that 214 persons suffered from typhoid. Out of this highest (57.9%) cases were reported in residential wards followed by residential cum commercial wards (26.2%). Whereas, minimum (2.8%) cases were reported in industrial wards (such as Rawatpur, Panki, Patkapur, Kidwai Nagar (south), Daheli-Sujanpur, Sutherganj, Barra (west), Dabauli, Juhi). Out of the total respondents, 111 incidences of diarrhea have been reported. Of this maximum (51.4%) cases were reported in residential cum commercial wards followed by 36.4 per cent in residential wards while the minimum (5.41%) was reported in industrial cum commercial wards. Out of the total respondents who suffered from encephalitis maximum (54.7%) cases were reported in residential wards while the minimum (2.3%) was in industrial wards. As far as malaria cases are concerned the highest number of cases were reported in residential wards (51.3%) followed by residential cum commercial wards (37.3%) while minimum (3.9%) in industrial cum commercial wards. During the field survey, nearly 397 cases of gastro have been reported in Kanpur city. Of this, a maximum (49.4%) cases were reported from residential wards followed by residential cum commercial wards (33%) while minimum (8.6%) cases were reported in industrial wards (Fig 02). It is noted that the maximum cases of all diseases reported in residential wards and residential cum commercial wards. It is due to the irregular collection of garbage and the poor sanitary condition of these wards. Further shortage of municipal workers has also worsened the deteriorating conditions of the city residential cum commercial wards. It is perhaps due to irregular collection of garbage and poor sanitary condition of these wards. Further shortage of municipal workers has also worsened the deteriorating conditions of the city.

Attitude Towards Water Borne Diseases (Age Wise)

An attempt has also been made to know people's response towards water-borne diseases due to improper handling of solid waste according to different age groups. All the percentages have been calculated on the basis of multiple responses as regards various diseases. In all the cases respondents mentioned their responses to all the diseases (Table 03). A total of 260 respondents suffered from jaundice. Out of the highest (40%) cases of jaundice are reported in the age group of 30 to 45 years followed by the age group of 18-30 years (23.1%) while, minimum cases (0.8%) in the age group of below 18 years (Fig. 03). Out of 190 respondents suffered from cholera maximum (47.4%) cases are reported in the age group of 30 to 45 years whereas minimum (3.7%) in the age group of below 18 years. Maximum (34.6%) cases of typhoid are reported in the age group of 30 to 45 years followed by the age group of 18-30 years (30.8%) whereas; minimum (0.5%) cases are reported in ages below 18 years. As far as diarrhea cases are concerned, the highest incidence is reported in the age group of 18-30 years (50.5%) followed by the age group of 30 to 45 years (26.1%) while a minimum (5.4%) reported in age of below 18 years. Out of the total respondents, 108 persons suffered from hepatitis. Out of this, a maximum (39.8%) cases are reported in the age group of 30-45 years while a minimum (1.9%) cases are found in the age of below 18 years. The highest incidence of malaria cases (39.4%) and gastro problem (33.2%) are reported in the age group of 30-45 years whereas, minimum cases of malaria (1.1%) and gastro problem (2%) have been reported in the age group of below 18 years.

Drainage Condition of City And Occurrences of Diseases

The Condition of the wastewater disposal system and solid waste disposal also affects the occurrence of various water-borne diseases. In light of this fact, responses are also tabulated according to availability of types of drainage systems available in their locality.

Table 03 : Age-Group Wise Occurrence of Water Borne Diseases in Kanpur City

Diseases	Percentage of the respondent					
	Below 18	18-30	30-45	45-60	Above 60	Total
Jaundice	0.8	23.1	40.0	21.5	14.6	100
Cholera	3.7	14.2	47.4	19.5	15.3	100
Typhoid	0.5	30.8	34.6	16.8	17.3	100
Diarrhea	5.4	50.5	26.1	9.0	9.0	100
Encephalitis	2.3	39.5	32.6	18.6	7.0	100
Hepatitis	1.9	37.0	39.8	11.1	10.2	100
Malaria	1.1	24.0	39.4	19.7	15.8	100
Gastro-Problem	2.0	25.9	33.2	28.2	10.6	100
Others	10.3	24.1	17.2	41.4	6.9	100

Source: Based on Personal Survey, 2018

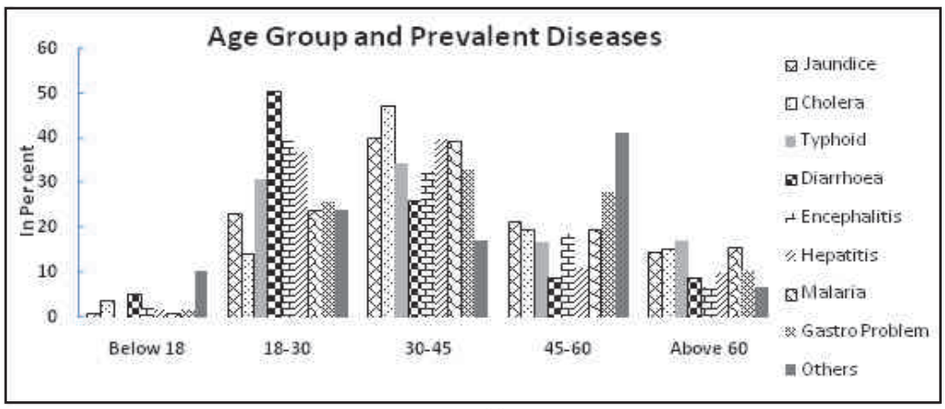

Fig. 03

Table 04 : Occurrences of Diseases And Drainage Condition of Locality in Kanpur City

Diseases	Percentage of Respondents		
	Sewerage	Open Drains	Total
Jaundice	21.9	78.1	100
Cholera	26.8	73.2	100
Typhoid	25.2	74.8	100
Diarrhea	31.5	68.5	100
Encephalitis	25.6	74.4	100
Hepatitis	19.4	80.6	100
Malaria	18.6	81.4	100
Gastro Problem	30.5	69.5	100
Others	34.5	65.5	100

Source: Based on Personal Survey, 2018

Table 04 reveals the occurrence of waterborne diseases according to the availability of types of drainage conditions in their locality. It has also been reported that respondents who live in localities having open drains are highly prone to waterborne diseases. Out of total respondents nearly, 78.1 per cent suffered from jaundice, 73.2 per cent from cholera, 74.8 per cent from typhoid, 81.4 per cent from malaria and 69.5 per cent from gastro problems whereas, respondents suffered from diarrhea 68.5 per cent and from encephalitis are 74.4 per cent. It is perhaps due to the presence of open drains which become the harbour of mosquitos and house flies. About 30.2 per cent of respondents live in localities having sewerage facilities. Out of them, 21.9 per cent of respondents have suffered from jaundice, 26.8 per cent from cholera and 30.5 per cent from Gastro problems. However, a higher incidence of waterborne diseases has been reported in those areas where sewerage facility exists. This is due to the reason that these sewerages do not properly function and are often clogged; so, drain water start flowing over streets and causing the spread of water-borne diseases

Conclusion

The study reveals that a higher percentage of jaundice and cholera was reported in the inner part of the city. It is perhaps due to irregular disposal of garbage, old sewerage pipelines and poor sanitary condition prevailing in the core of the city. In the inner zones, garbage remains for 2-3 days at collection points. The higher percentage of malaria occurrence in the outer area of the city is perhaps due to ill drainage conditions. There are drains which remain open and sometimes overflowing. People from these zones throw their daily waste in front of houses and nearby drains. During the rainy season, all drains become choked and waterlogged over the whole area. Due to this water remains over the area for many days. These areas provide the ideal condition for the growth of mosquitos. The paper also reestablishes the fact that maximum cases of water-borne diseases are reported in residential wards and residential cum commercial wards. It is perhaps due to the irregular collection of garbage and poor sanitary condition of these wards. Further, the shortage of municipal workers has also worsened the deteriorating conditions of the city. Furthermore, this paper reveals that a higher incidence of waterborne diseases has been reported in those areas where sewerage facility does not exist. This is due to the reason that these sewerages do not properly function and are often clogged; so, drain water start flowing over streets and causing the spread of water-borne diseases. This paper overall there is a positive relationship between water-borne diseases and unscientific management of solid waste. There is poor behaviour of people towards the scientific management of solid waste which, enhances water-borne diseases by leaps and bounds.

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MATERNAL HEALTH STATUS: A CASE STUDY OF JALAUN DISTRICT

Sumedha Sachan and Ram Singh

ABSTRACT

Maternal health is an integral part of family welfare as well as society. It is a matter of great concern because of having the foundation of healthier society. The Government of India has launched various schemes and programmes to provide safe motherhood. Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK) under RCH services are two important schemes to strengthen maternal health. Despite all of the efforts, maternal mortality and morbidity are high in our country. The utilisation of antenatal, prenatal and postnatal care is still less. Low socio-economic status coupled with unawareness related to maternal health contribute to less utilisation of maternal health services and resulted in poor maternal health status. The paper examines various determinants of the utilisation of maternal health services and identifies the factors responsible for poor utilisation of maternal health services.

Key words: *Maternal Health, Antenatal, Prenatal, Postnatal, Mortality, Morbidity.*

Introduction

Maternal health refers to the health of women during pregnancy, childbirth and also includes the postpartum period. It encompasses preconception, prenatal and postnatal care. Better maternal health is a sign of development and an integral part of family welfare. A healthier mother is the base of healthier family as well as healthier nation. Our country has achieved positive growth in maternal health status yet maternal mortality and morbidity both are continue high despite a lot of efforts for improving maternal health. In India, maternal mortality ratio is 113/per 1,00,000 live birth (UNICEF, 2018). WHO (2014), reports that 20 per cent of global maternal deaths occur only in India, in spite of advancement of public health care and medical technology more than 70 per cent of all maternal deaths are consequences of poverty, inadequate, inaccessible or unaffordable health care, unequal access to resources, low status of women and low literacy level.

In India the reproductive and child health (RCH) programme aims at conducting at least four antenatal check-ups includes a weight, blood pressure and respiratory rate, abdominal palpation for foetal growth, hemoglobin estimation and urine tests, two doses of TT injection and at least 100 tablets of IFA (Ministry of Health and Family Welfare, 2010). The Government of India has launched Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK) to provide safe motherhood. All of the services under these schemes are available at every public health centre at free of cost. Accredited Social Health Activist (ASHA) escorts maternal health in rural part of the country and her responsibility is that not any mother should left to access ANC, PNC and institutional delivery services.

The sustainable development goal aims at reducing the maternal mortality ratio by 2030. And for 2025, the goals are that antenatal care coverage to be sustained above 90 per cent and skilled attendants at birth above 90 per cent. 100 per cent of deliveries should be performed by trained health worker and maternal mortality ratio should be reduced to a level below 100/per 1,00,000 live births. In order to achieve

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this goal, all women related to reproductive age need access to high quality of antenatal care along with institutional delivery facilities. In India antenatal care services are available but the utilisation of these existing services is poor. The utilisation of maternal and child health care services depends upon availability and accessibility of these services and socio-demographic, communication factors and quality of care provided to the women of reproductive age (Kulkarni and Nimbalkar, 2008). In India, only 40 per cent women receive at least four antenatal care visits for their last birth. Again, 17 per cent of births in rural India take place at home (International Institute for Population Sciences, 2019-21).

Objectives

The main objectives of this study are: to analyze the maternal health status; to identify the causes affecting utilisation pattern of maternal health services; and to suggest various measures to increase utilisation of maternal health services.

The Study Area

The study area, 'Jalaun' district comes under Jhansi division and it is situated between $25^{0}44'$ to $26^{0}27'$ north latitudes and $79^{0}01'$ to $79^{0}58'$ east longitudes. It consists total area of 4,565 sq. km. It is bounded by Etawah and Kanpur Dehat districts in the north, Hamirpur district in the east, Jhansi district in the south and Bhind and Datia districts of Madhya Pradesh in the west. Jalaun district is a backward district of Uttar Pradesh under the scheme of Backward Region Grant Fund (BRGF). The study area belongs to Bundelkhand Region. It consists of 05 Tahsils, 09 Community Development Blocks and 942 inhabited villages (2011). It has 16, 90,000 Population, with 70.20% rural, 24.80% urban and 27.80% SC population (2011).

Data Base and Research Methodology

The present study is based on primary data. Intensive field work from January to March 2022 was conducted to collect primary data. 405 Samples for household survey were selected from 27 villages (03 Villages from each development block). The villages were selected in such a way that the villages must lie within a radius of 1, 3 to 5 and above 5 km to each PHC. The female respondents had been selected having various socio-economic and demographic characteristics. For data analysis, MS Excel and SPSS software have been used for analyze the data and Arc GIS software has been used for mapping.

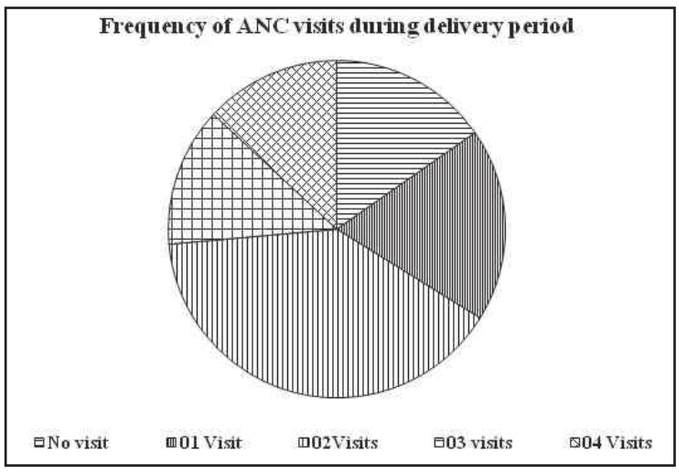
Results and Discussion

Frequency of visits for ANC services

Antenatal care is a comprehensive care which women receive throughout their pregnancy. A woman having antenatal care throughout her pregnancy gives better birth outcome. It is also associated with better health status of woman. It is beneficial for both maternal and child health and every woman must receive antenatal care services. Potdar (2000) reveals in his study that pregnancy needs specialized care. Quality of care is more important rather than quantity of care. Through this paper it has been assessed the frequency of antenatal checkups along with all of the services related to maternal health.

Figure 01 reveals the frequency of ANC visits by the respondents. There are 15.3 per cent respondents who never visited for ANC while 39.8 per cent respondent benefitted from two ANCs. Only 13.1 per cent respondents have taken four ANC services against 39.6 per cent in U.P. This less utilisation of ANC services is due to unawareness of the respondents about maternal health care and its necessity. Male involvement also contributes to utilize maternal health services. There is a perception among the respondents or their husbands that if there is no complication during first pregnancy or beginning of the pregnancy, it has no need of ANC along with due to irregular menstrual cycle, many of the respondents do not detect their pregnancy and late detection contributes to less ANC visits.

Table 01 represents frequency of visits among different socio-economic variable. There are about 85 per cent Hindu respondents who are benefitted from ANC services, while 83 per cent Muslim respondents avail the ANC services. Only



Source: Based on table 01 Fig. 01

14.3 per cent respondents of Hindu religion get 04 ANC services, while not a single Muslim respondent avails 04 visits of ANC services. There are about 14 per cent respondent of both General and OBC

Table 01 : Frequency of ANC Visits According to Socio-economic Characteristics.

Socio-economic Variables	No Visit	01 Visit	02Visits	03 Visits	04 Visits	Total
Religion						
Hindu	56(15.1)	61(16.5)	149(40.3)	51(13.8)	53(14.3)	370
Muslim	06(17.1)	14(40.0)	12(34.3)	03(8.6)	00	35
Category						
General	11(13.6)	20(24.7)	34(42.0)	06(7.4)	10(12.3)	81
OBC	29(14.4)	36(17.9)	76(37.8)	30(14.9)	30(14.9)	201
SC	22(17.9)	19(15.4)	51(41.5)	18(14.6)	13(10.6)	123
Education						
Illiterate	11(13.1)	28(33.3)	34(40.5)	03(3.6)	08(9.5)	84
Primary	26(20.3)	17(13.3)	54(42.2)	20(15.6)	11(8.6)	128
Secondary	18(17.1)	14(13.3)	42(40.0)	18(17.1)	13(12.4)	105
Higher Education	07(8.0)	16(18.2)	31(35.2)	13(14.8)	21(23.9)	88
Occupation						
Farmer	37(16.9)	33(15.1)	88(40.2)	33(15.1)	28(12.1)	219
Labourer	21(15.0)	31(22.1)	57(40.7)	16(11.4)	15(10.7)	140
Businessman	02(11.1)	04(22.2)	09(50.0)	02(11.1)	01(5.6)	18
Serviceman	01(4.8)	04(19.0)	07(33.3)	03(14.3)	06(28.6)	21
Other	01(14.3)	03(42.9)	00	00	03(42.9)	07
Total	**62(15.3)**	**75(18.5)**	**161(39.8)**	**54(13.3)**	**53(13.1)**	**405**

Source: Based on personal survey, 2022-23
Note: The figures given in parentheses indicate the percentage.

category and nearly 18 per cent respondents of SC category never avail the ANC services. Education is most significant in utilisation pattern. The utilisation of 04 ANC visits is higher among the respondents having higher education (23.9%) than those of illiterate (9.5%) respondents. Occupation has direct linkage with earning. The utilisation of 04 ANC services is lesser among the respondents of labourer category (10.7%) while it is higher (28.6%) among the respondents of service man category.

Status of Institutional Delivery

Institutional delivery means giving birth to a child in a medical institution under the supervision of trained and competent health personnel. The Government of India has promoted institutional delivery to reduce maternal morbidity and mortality and to make motherhood safer. Table 02 evinces that in the study area, only 69.7 per cent of the deliveries took place in a medical institution against 82.9 per cent in U.P. and 88.6 per cent in India (NFHS-5, 2021). Thus, in this context the position of the district is very poor.

In the study area about 70 per cent respondents of Hindu religion and 63 per cent Muslim respondents obtain the facility of institutional delivery. The utilisation is less among the respondents of SC category (68%) rather than General category's respondents (72%). The impact of education, both in husbands and wives is significant and positively associated with the utilisation of medical institution for delivery. Only 45 per cent of illiterate respondents deliver their child in a medical institution compared to secondary (91.5%) and higher educated respondents (100%).

Qualitative Assessment of Postnatal Care

There are major maternal health challenges in the postnatal period like postpartum anemia, hypothyroid, eclampsia, hypertension, hemorrhoids,

Table 02 : Institutional Deliveries According to Socio-economic Characteristics

Socio-economic variables	Respondents said 'Yes'	Respondents said 'No'
Religion		
Hindu	258(69.7)	112(30.3)
Muslim	22(62.9)	13(37.1)
Category		
General	58(71.6)	23(28.4)
OBC	138(68.7)	63(31.3)
SC	84(68.3)	39(31.7)
Education		
Illiterate	60(44.8)	74(55.2)
Primary	82(66.1)	42(33.9)
Secondary	75(91.5)	07(8.5)
Higher Education	65(100.0)	00
Occupation		
Farmer	147(67.1)	72(32.9)
Labourer	98(70.0)	42(30.0)
Businessman	14(77.8)	04(22.2)
Serviceman	15(71.4)	06(28.6)
Others	06(85.7)	01(14.3)
Total	**280(69.1)**	**125(30.9)**

Source: Based on personal survey, 2022-23
Note: The figures given in parentheses indicate percentage.

pituitary failure and infertility. These can result in long term disability and mortality from postnatal problem. Yet, it is the most neglected period for the provision of quality care. Table 03 represents that only 13.3 per cent respondents have been taken postpartum services while 86.7 per cent have not been taken the services.

Table 03 : Postpartum Care According to Socio-economic Characteristics

Socio-economic variables	Respondents said 'Yes'	Respondents said 'No'
Religion		
Hindu	54(14.6)	316(85.4)
Muslim	00	35(100.0)
Category		
General	07(8.6)	74(91.4)
OBC	34(16.9)	167(83.1)
SC	13(10.6)	110(89.4)
Education		
Illiterate	03(3.6)	81(96.4)
Primary	15(11.7)	113(88.3)
Secondary	17(16.2)	88(83.8)
Higher Education	19(21.6)	69(78.4)
Occupation		
Farmer	35(16.0)	184(84.0)
Labourer	12(8.6)	128(91.4)
Businessman	02(11.1)	16(88.9)
Serviceman	03(14.3)	18(85.7)
Others	02(28.6)	05(71.4)
Total	**54(13.3)**	**351(86.7)**

Source: Based on personal survey, 2022-23
Note: The figures given in parentheses indicate percentage.

The utilisation of postnatal care services among the Hindu women is very less (14.6%),while not even a single woman of Muslim religion receives PNC services. The category wise utilisation of PNC services is higher among the women of OBC category (16.9%) compare to General (8.6%) and SC category women (10.6%). Education and PNC services are positively correlated; the utilisation increases with increasing level of education. Illiterate women received less PNC services compare to literate one. The utilisation of PNC services is higher among those women whose husbands are serviceman (14.3%) comparatively to labourers (8.6%).

Conclusion and Suggestions

The study found that the status of maternal health is not satisfactory. Only 13 per cent women have received at least four ANC visits, nearly 30 per cent women delivered their children at home and only 13 per cent women received postnatal care. All of above indicates towards poor maternal health of women. Illiteracy, poverty and unawareness contribute to poor maternal health status, which may result in pregnancy complications or effect on neonatal health. Lack of adequate and equitable health care facilities coupled with poor socio-economic status are responsible for less utilisation of maternal health services. As the study area is patriarchal in nature and women have few rights. Male of the family especially husband decides when and where she should go for medical care. Thus, the inadequate rights of women delimit the utilisation of

maternal health services.

This research paper suggests to empowered women through literacy, employment and other social reforms. More often, women feel shy to talk about sex and related complications which further may be resulted in pregnancy complications or other health issues. Sex and maternal health should be necessary part of women's counseling and should be implemented through ASHA and other health workers. The facilities provided by Maternal and Child Health Centres (MCH) or Sub-centres should be increased both in quantitative and qualitative aspects. The policies and programmes should not be confined only at health centres but community's involvement should also be ensured with the resolution that no one should left. The Public Distribution System (PDS) and other initiatives should be linked with health care policies. Especially, the initiative provided under JSY and JSSK schemes should be linked with full utilisation of antenatal, prenatal and postnatal care. The accountability of ASHA, ANM, AWW and other health workers should be ensured. Such measures will surely help to increase the utilisation of maternal health services and improve the maternal health status in the study area.

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PATTERN OF AGRICULTURAL DEVELOPMENT IN THE UNDIVIDED SIVASAGAR DISTRICT, ASSAM (INDIA)

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ABSTRACT

Assam is primarily an agrarian state. More than 70% of the total population are still dependent on agriculture. The state has significantly shown its augmentation in agricultural sector over past years despite the common challenges like flood, drought, man-animal conflict, etc. This paper is an honest attempt to study the scenario of agricultural development in the undivided Sivasagar district of Assam. The paper is prepared aiming at analysing the level of agricultural productivity and the spatial pattern of agricultural development of the district. Here, the methods namely Z score, Principal Component Analysis and Kendall's Ranking Coefficient Method are used. The study is accomplished with the help of both primary and secondary data. The secondary data is collected from Directorate of Economics and Statistics, Government of Assam. The study reveals that the district is marked with its spatial variation of agricultural development and agricultural productivity.

Key words: *Agricultural Development, spatial pattern, principal component, composite Z-Score, Sivasagar District.*

Introduction

The measurement of agricultural development has been a prime concern all over the world. The agricultural development of a given region is considerably influenced and determined by some factors such as physical setting, socio-economic status, technological and organizational approach, infrastructural pattern, systematic planning in farming and many more. The variation of agricultural development primarily depends on these factors. In the study of agricultural development, agricultural productivity plays a pivotal role. Agriculture productivity measures the total amount of agricultural output produced from the combined set of land, labour, capital, and other material resources employed in farm production of a given area. The study of agricultural output of a given area is very essential to policy and decision making in the interest of implementing new and holistic strategies in farming activities in near future as required for sustainable development. The study of agriculture productivity helps the policy makers and academicians measure the actual picture of agricultural development of a region. The sustainability of human life solely depends on agricultural output produced from agricultural land which always remains limited to human beings. Hence, proper use of land is also a must for us; and the utilization of land has been a burning issue globally over the past decades. The rapid growth of population on the one hand and the constant shrinkage of land on the other hand have already caused a serious threat to a country like India. Due to the growth of land put under non-agricultural use (human settlement), the agricultural land has globally shrunk more or less. The Sivasagar district is also no exception from it.

So far as the agricultural development of Sivasagar district is concerned, it is observed that the district is characterized by its spatial variation which is going to be analyzed in detail.

The Study Area

Sivasagar district is situated in the North-Eastern part of Assam between 94°25′ and 95°25′ longitude and 26°45′ to 27°15′ latitude. The district is

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located at Upper Brahmaputra Valley of agro-climatic zone of the state. The North and Western part of the district is bounded by Dibrugarh and Jorhat district of Assam respectively and the East and Western part is bounded by Arunachal Pradesh and Nagaland. The district consists of 3 civil sub-divisions – Sivasagar, Nazira and Charaideo; 9 blocks, 118 Gram-Panchayats and 878 revenue villages.

Significance of the Study

The present study bears immense significance. The study of agricultural development has been a prime concern for the geographers all over the world in recent times. The pattern of agricultural development in a given area is an important factor which plays a crucial role in the measurement of sustainability of any area since it helps the policy makers and academicians in preparing strategic plans keeping in view sustainable development in near future. The proper study of agricultural development is a very crucial and current issue globally.

Objectives of the Study

The study is carried out keeping in view the following objectives.

(a) To analyse the level of agricultural productivity in Sivasagar district.

(b) To find out the spatial pattern of agricultural development of the district.

Research Methodology

The study is carried out with the help of both primary and secondary data. In order to interpret the spatial pattern of agricultural development in Sivasagar district the methods namely Z score and Principal Component Analysis are used. For the application of these methods a list of sixteen important variables has been prepared concerning the agriculture of the district. The Z score of the variables is obtained with the help of the following method.

$$Z = \frac{X - \square}{SD}$$

Where 'X' is the individual row score of a given variable, '′ ' is the Mean and SD is the Standard Deviation of all data. Composite Z-Score and Inter-Variable Correlation Matrix are worked out on computer using SPSS (Statistical Package for the Social Sciences) software. Kendall's Ranking Coefficient Method is used in order to rank the agricultural produce in the district.

Results and Discussion

Agricultural productivity plays a pivotal role in the measurement of agricultural development. Agricultural productivity generally refers to the crop-yield per unit of area. The intensity of agricultural productivity depends on the interplay of physical, cultural, economic and technological variables; attitudes of the farmers towards work and their aspirations for better standard of living. In the context of agricultural productivity of Sivasagar district, it is seen that the district is characterised by its spatial variation. The level of agricultural productivity has been figured out with the help of Kendall's ranking co-efficient method based on the three years average (2013-15) of crop-yield of the six selected main crops namely paddy, tea, oilseeds, pulses, sugarcane and vegetables. Table 01 reveal the spatial variation of agricultural productivity among the seven revenue circles. Both Dimow and Sivasagar revenue circles deserved 'high' level of agricultural productivity whereas Mahmora, Amguri, Nazira and Sonari revenue circles remained in 'moderate' level of agricultural productivity. Sapekhati revenue circle recorded 'low' level of agricultural productivity in 2015-16.

Spatial Pattern of Agricultural Development

The list of variables used for the analysis of the spatial pattern of level of agricultural development in Sivasagar district is as follows:

1. Intensity of cropping (X1)
2. Percentage of area under cash crops to total cropped area (X2)
3. Percentage of area under horticultural crops to total cropped area (X3)
4. Crop diversification Index (X4)

Table 01 : Average Yield (kg/ha) of Selected Crops in Sivasagar District (Three Years Average, 2013-15) (Based on Kendall's Ranking Coefficient Method)

Average Yield of Crops / Revenue Circles	Paddy		Pulses		Oilseeds		Sugarcane		Vegetables		Tea		Summation of Ranks	Ranking Coefficient
	kg/ha	Ranking	kg/ha	Ranking	kg/ha	Ranking	kg/ha	Ranking	kg/ha	Ranking	Kg/ha	Ranking		
Dimow	2375	2	965	2	645	2	3533,0	1	1143,5	3	1610	5	15	2.5
Mahmora	2320	4	886	4	440	6	3502,0	3	1127,0	4	1646	4	25	4.17
Sivasagar	2426	1	1030	1	670	1	3514,5	2	1175,0	1	1345	7	13	2.17
Amguri	2348	3	864	5	556	3	3485,5	4	1158,0	2	1585	6	23	3.9
Nazira	2195	7	764	7	415	7	3419,0	7	9845	6	1720	1	35	5.9
Sonari	2270	5	952	3	488	4	3452,5	5	1013,0	5	1680	2	24	4
Sapekhati	2245	6	838	6	465	5	3427,5	6	9720	7	1665	3	43	7.17

Source: Data collected from Directorate of Economics and Statistics, Government of Assam, Guwahati and computed by the Researcher

5. Percentage of average yield per hectare productivity of paddy (X5)
6. Percentage of average yield per hectare productivity of tea (X6)
7. Percentage of Agricultural Workers to the total workers (As per Population Census, 2011) (X7)
8. Agricultural Market Frequency (X8)
9. Percentage of HYV paddy to total paddy area (X9)
10. Per hectare consumption of fertilizer (X10)
11. Percentage of area under irrigation to total cropped area (X11)
12. Percentage of farm households using Power Tiller/Tractor (X12)
13. Percentage of farm households using water Pump Set (X13)
14. Percentage of farm households using insecticides & pesticides (X14)
15. Percentage of farm households using Thresher Machine (X15)
16. Average size of land holding (X16)

(The Variables from 8 to 16 are based on Primary Data, 2015-16.)

Table 01 highlights the data matrix for the calculation of Z score of the level of agricultural development of Sivasagar district. After processing the data some positive and negative Z score values have been derived. All the Z score values under individual variable column are summed up to obtain Composite Z Score Values as shown in Table 03. From these Composite Z Score Values three categories of agricultural development regions are drawn assuming -3 to 0 as 'low', 0 to 6 as 'medium' and 6 & above as 'high'. It is understood from Table 03 that only one revenue circle namely Dimow falls in 'high' level of agricultural development region of the district. Likewise, Mahmora and Sivasagar revenue circles come under 'medium' level of agricultural development region and all other remaining revenue circles Amguri, Nazira, Sonari and Sapekhati are included in the 'low' level of agricultural development region of the district.

In the use of Principal Component Analysis, the same variables (as shown in Table 02) are taken into consideration. The matrix of inter-variable correlation (r) (as shown in Table 04) has been worked out with the help of SPSS. The Eigen values of the correlation matrix (r) have also been worked out and these Eigen values are shown in descending order in Table 05. Considering the 4th and 5th Eigen values as almost in unity, there are only three Eigen values clearly greater than unity as 7.025, 3.699 and 2.230. These three Eigen values account for 80.963% of total variance of data matrix. Multiplying each element

Table 02 : Sixteen Variables Related to Agriculture Development in The Revenue Circles of Sivasagar District, 2015-16.

SL No	Revenue Circles	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}
1	Dimow	122.93	21.57	9.27	0.49	14.65	13.76	54.67	18	52.27	37	15.10	93.14	24.51	80.4	17.65	1.39
2	Mahmora	112.58	23.66	7.77	0.48	14.19	14.31	46.32	17	47.86	39	9.67	96.78	12.65	88.98	6.13	1.32
3	Sivasagar	117.92	0.87	10.40	0.28	17.05	11.81	33.43	16	65.28	41	18.07	89.37	21.28	93.62	11.71	1.14
4	Amguri	105.34	15.75	4.21	0.34	14.47	13.65	43.49	14	61.5	37	10.74	92.46	11.33	93.72	11.33	1.46
5	Nazira	103.99	40.65	4.41	0.54	12.24	16.35	32.55	22	62.90	34	8.15	92.69	10.57	88.62	10.57	0.98
6	Sonari	110.34	27.29	10.69	0.55	13.97	15.53	31.18	13	56.07	27	6.25	95.09	13.94	94.68	10.25	1.05
7	Sapekhati	113.55	39.43	4.71	0.53	13.46	14.62	---	10	63.15	31	9.20	89.11	26.93	94.88	10.9	0.87

of the Eigen vectors corresponding to the afore said 3 Eigen values normalized to unity by the square root of their Eigen values.

For working out the scores of 1st, 2nd and 3rd principal components, the 16 elements of each of the three Eigen vectors are used as weight of the standardized values of all the 16 variables in the data matrix. The score of the above three Principal Components are shown in Table 06.

The factor of 1st principal component shows that it has positive correlation with percentage of average yield per hectare productivity of paddy (X5), per hectare consumption of fertilizer (X10), percentage of farm households using water Pump Set (X13), percentage of farm households using Thresher Machine (X15) and average size of land holding (X16). It has also negative correlation with crop diversification Index (X4), percentage of average yield per hectare productivity of tea (X6), percentage of farm households using Power Tiller/Tractor (X12) and percentage of farm households using insecticides & pesticides (X14). All these correlations indicate a thrust towards agricultural modernization and diversification and hence the first component is entitled as 'Index of Agricultural Modernization and Diversification'. Fig. 01 reveals the spatial variation of agricultural modernization and diversification in Sivasagar district. It is observed that out of the seven revenue circles only Sivasagar falls under 'high' level of agricultural modernization and diversification. On the other hand, Dimow and Amguri deserve 'medium' level of agricultural modernization and diversification; and the other revenue circles namely Mahmora, Nazira, Sonari and Sapekhati remain in 'low' level of agricultural modernization and diversification of the district.

The 2nd Principal Component has been traced out to represent the status of commercialization and innovative practices in agriculture in Sivasagar district. It is seen that the 2nd Principal component has significant positive correlation with percentage of area under cash crops to total cropped area (X2), percentage of agricultural workers to the total workers (X7), per hectare consumption of fertilizer (X10) and average size of land holding (X16). On the other hand, it has negative correlation with percentage of HYV paddy to total paddy area (X9). All these correlations signify the commercialization and innovative practices in agriculture in Sivasagar district and therefore, all of them are put for the 'Index of Commercialization and

Table 03 : Composite Z-Score at the Revenue Circle Level Computed For Agricultural Development in Sivasagar District, 2015-16

SL No	Revenue Circles	ZX_1	ZX_2	ZX_3	ZX_4	ZX_5	ZX_6	ZX_7	ZX_8	ZX_9	ZX_{10}	ZX_{11}	ZX_{12}	ZX_{13}	ZX_{14}	ZX_{15}	ZX_{16}	Composite Z Score Value
1	Dimow	1.59	0.19	0.67	0.3	0.25	-0.37	1.95	0.6	-0.95	0.39	0.99	0.18	1.07	-1.97	1.9	0.98	**7.39**
2	Mahmora	0.03	-0.04	0.15	0.21	-0.07	0.02	1.15	0.34	-1.63	0.8	-0.33	1.48	-0.69	-0.33	-1.51	0.67	**0.25**
3	Sivasagar	0.83	-1.69	1.06	-1.69	1.9	-1.71	-0.11	0.08	1.06	1.21	1.71	-1.19	0.59	0.56	0.15	-0.15	**2.61**
4	Amguri	-1.06	-0.62	-1.1	-1.12	0.13	-0.44	0.87	-0.45	0.48	0.39	-0.07	-0.08	-0.89	0.58	0.04	1.3	**-2.04**
5	Nazira	-1.26	1.19	-1.03	0.77	-1.41	1.42	-0.2	1.63	0.69	-0.24	-0.7	0.01	-0.1	-0.4	-0.2	-0.87	**-0.7**
6	Sonari	-0.31	0.23	1.16	0.87	-0.22	0.86	-0.33	-0.71	-0.37	-1.69	-1.16	0.88	-0.5	0.77	-0.29	-0.56	**-1.37**
7	Sapekhati	0.18	1.11	-0.1	0.68	-0.57	0.23	-	-1.49	0.73	-0.86	-0.45	-1.28	1.43	0.8	-0.1	-1.37	**-1.06**

Source: Worked out in Computer using SPSS on the basis of data, 2015-16

Table 04: Inter-Variable Correlation Matrix for Revenue Circle Level Data on Agricultural Development in Sivasagar District, 2015-16

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}
X_1	1	-0.407	0.642	-0.142	0.593	-0.587	0.512	-0.103	-0.299	0.315	0.697	-0.182	.789*	-0.476	0.558	0.183
X_2	-0.407	1	-0.539	.889**	-.948**	.893**	-0.103	0.029	-0.048	-0.666	-.767*	0.126	-0.060	-0.055	-0.161	-0.571
X_3	0.642	-0.539	1	-0.123	0.620	-0.371	-0.062	-0.019	-0.342	0.052	0.377	0.221	0.222	-0.140	0.186	0.113
X_4	-0.142	.889**	-0.123	1	-.819*	.871*	-0.007	0.044	-0.368	-0.733	-0.732	0.387	-0.010	-0.224	-0.080	-0.472
X_5	0.593	-.948**	0.620	-.819*	1	-.944**	0.069	-0.180	0.105	0.593	.827*	-0.297	0.335	0.100	0.206	0.365
X_6	-0.587	.893**	-0.371	.871*	-.944**	1	-0.265	0.204	-0.142	-0.719	-.883**	0.411	-0.420	-0.038	-0.251	-0.445
X_7	0.512	-0.103	-0.062	-0.007	0.069	-0.265	1	0.062	-0.638	0.427	0.320	0.264	0.411	-0.748	0.416	.848*
X_8	-0.103	0.029	-0.019	0.044	-0.180	0.204	0.062	1	-0.156	0.412	0.161	0.305	-0.423	-0.642	0.108	0.201
X_9	-0.299	-0.048	-0.342	-0.368	0.105	-0.142	-0.638	-0.156	1	-0.063	0.164	-.846*	0.140	0.548	0.119	-0.489
X_{10}	0.315	-0.666	0.052	-0.733	0.593	-0.719	0.427	0.412	-0.063	1	.772*	-0.098	0.014	-0.331	0.054	0.586
X_{11}	0.697	-.767*	0.377	-0.732	.827*	-.883**	0.320	0.161	0.164	.772*	1	-0.462	0.496	-0.313	0.518	0.375
X_{12}	-0.182	0.126	0.221	0.387	-0.297	0.411	0.264	0.305	-.846*	-0.098	-0.462	1	-0.621	-0.314	-0.366	0.412
X_{13}	.789*	-0.060	0.222	-0.010	0.335	-0.420	0.411	-0.423	0.140	0.014	0.496	-0.621	1	-0.150	0.552	-0.241
X_{14}	-0.476	-0.055	-0.140	-0.224	0.100	-0.038	-0.748	-0.642	0.548	-0.331	-0.313	-0.314	-0.150	1	-0.559	-0.440
X_{15}	0.558	-0.161	0.186	-0.080	0.206	-0.251	0.416	0.108	0.119	0.054	0.518	-0.366	0.552	-0.559	1	0.222
X_{16}	0.183	-0.571	0.113	-0.472	0.365	-0.445	.848*	0.201	-0.489	0.586	0.375	0.412	-0.241	-0.440	0.222	1

Source: Worked out using SPSS on the basis of both primary and secondary data, 2015-16

Correlation is significant at the 0.05 level (2-tailed).*
Correlation is significant at the 0.01 level (2-tailed).**

Table 05 : Eigen Values Arranged in Descending Order

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.025	43.905	43.905	7.025	43.905	43.905
2	3.699	23.117	67.022	3.699	23.117	67.022
3	2.230	13.940	80.963	2.230	13.940	80.963
4	2.083	13.021	93.984			
5	.963	6.016	100.000			
6	8.492E-16	5.308E-15	100.000			
7	5.027E-16	3.142E-15	100.000			
8	2.997E-16	1.873E-15	100.000			
9	2.719E-16	1.700E-15	100.000			
10	2.230E-16	1.394E-15	100.000			
11	2.886E-17	1.804E-16	100.000			
12	-1.490E-16	-9.311E-16	100.000			
13	-1.586E-16	-9.910E-16	100.000			
14	-3.117E-16	-1.948E-15	100.000			
15	-6.455E-16	-4.034E-15	100.000			
16	-2.324E-15	-1.452E-14	100.000			

Source: Worked out using SPSS on the basis of both primary and secondary data, 2015-16

Table 06: Scores of Principal Components

SL No	Revenue Circles	Scores of Principal Components		
		1st	2nd	3rd
1	Dimow	.94350	.87682	1.69827
2	Mahmora	-.03665	1.21270	-.51434
3	Sivasagar	1.58587	-.97347	-.52327
4	Amguri	.22206	.04305	-1.38431
5	Nazira	-1.14618	.38750	-.21442
6	Sonari	-.79450	.08253	.17304
7	Sapekhati	-.77410	-1.62913	.76503

Source: Worked out using SPSS on the basis of both primary and secondary data, 2015-16

Innovative Practices in Agriculture'. Fig. 02 represents the spatial variation of commercialization and innovative practices in agriculture in Sivasagar district based on the 2nd Principal Component. Fig. 02 reveals that only Mahmora revenue circle is marked by 'high' level of the commercialization and innovative practices in agriculture in the district. Dimow, Amguri, Nazira and Sonari revenue circles attain 'medium' level of commercialization and innovative practices in agriculture; and the other two revenue circles –

Sivasagar and Sapekhati – remain in 'low' level of the commercialization and innovative practices in agriculture in the district.

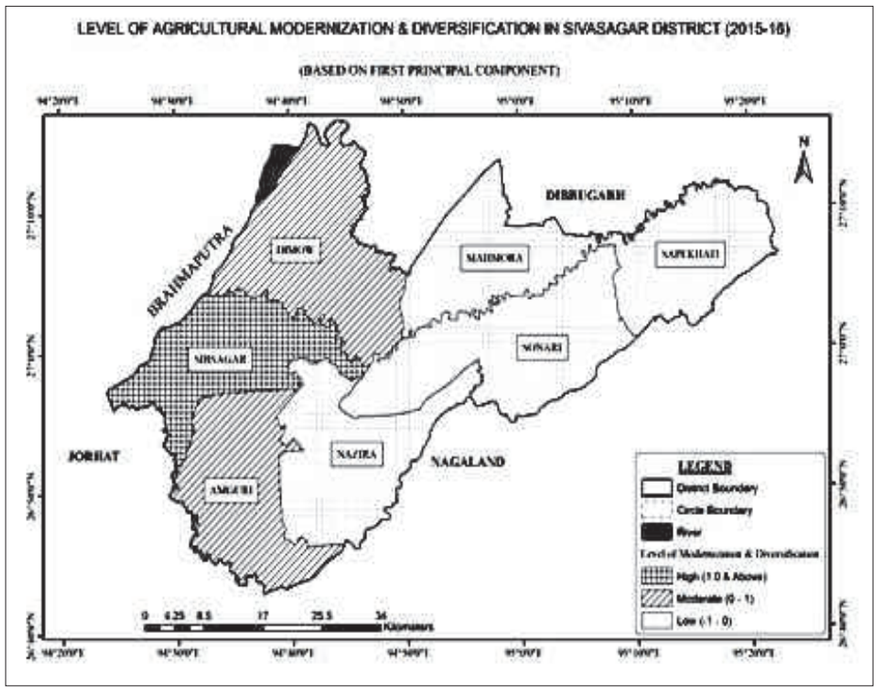

Fig. 01

The 3rd Principal Component is taken for showing the status of infrastructural development in agriculture in Sivasagar district. It has only two significant positive correlation with agricultural market frequency (X8) and percentage of area under irrigation to total cropped area (X11). These two variables represent the 'Index of Infrastructural Development in Agriculture'. Fig. 03 highlights the spatial variation of infrastructural development in agriculture in Sivasagar district. It is seen that Dimow revenue circle remains in 'high' level of infrastructural development in agriculture whereas Sonari and Sapekhati revenue circles remain in 'medium' level of infrastructural development in agriculture in the district. The other remaining revenue circles – Mahmora, Sivasagar, Amguri and Nazira – record 'low' level of infrastructural development in agriculture in Sivasagar district.

Conclusion

On the whole, Sivasagar district is marked by its spatial variation in respect of agricultural productivity, agricultural development, agricultural modernization and diversification etc. The study reveals the spatial variation of the agricultural development in the revenue circles of the district. The scenario of agricultural development in the district is still lagging far behind the rest of the country. Since

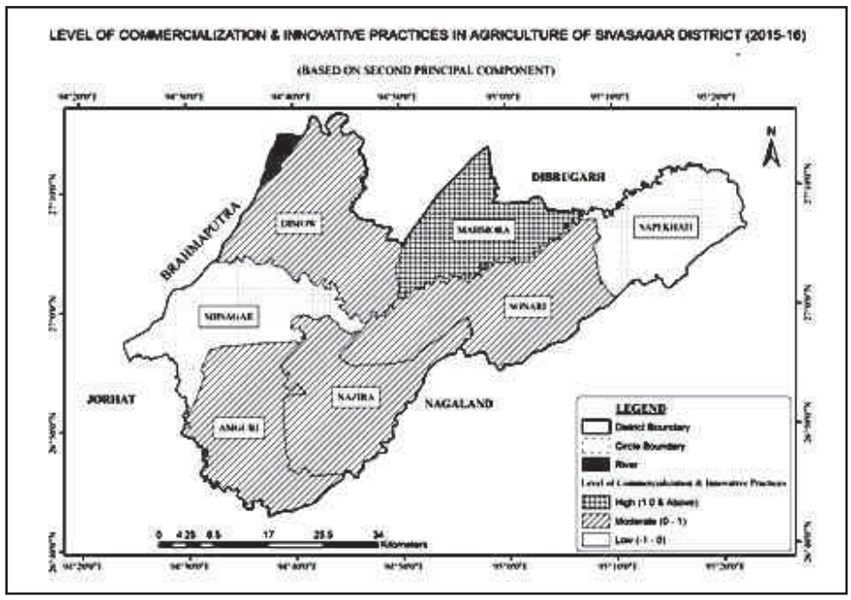
LEVEL OF COMMERCIALIZATION & INNOVATIVE PRACTICES IN AGRICULTURE OF SIVASAGAR DISTRICT (2015-16)
(BASED ON SECOND PRINCIPAL COMPONENT)
N
DIBRUGARH
BRAHMAPUTRA
DIMOW
MAJIMORA
SAPEKHATI
SONARI
SIBSAGAR
JORHAT
NAZIRA
NAGALAND
AMGURI
LEGEND
District Boundary
Circle Boundary
River
High (1.0 & Above)
Moderate (0 - 1)
Low (-1 - 0)
Kilometers

Fig. 02

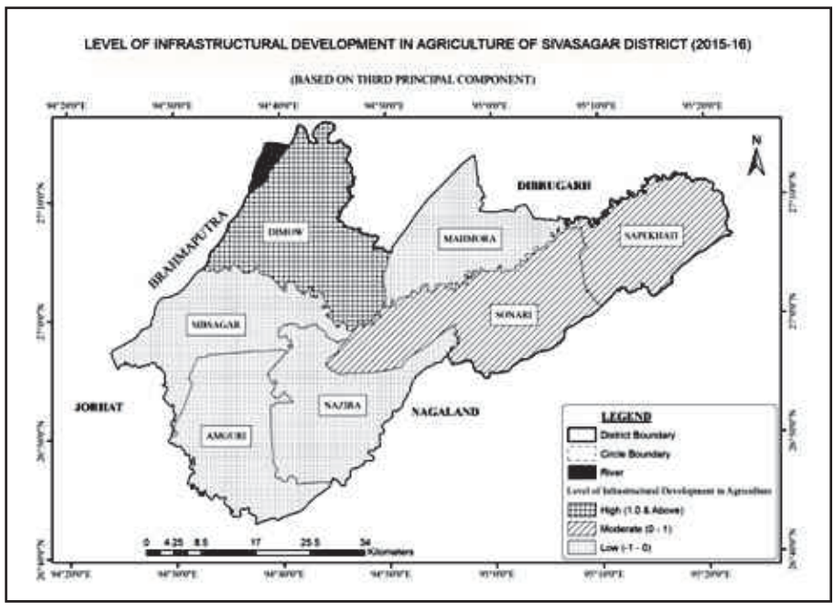
LEVEL OF INFRASTRUCTURAL DEVELOPMENT IN AGRICULTURE OF SIVASAGAR DISTRICT (2015-16)
(BASED ON THIRD PRINCIPAL COMPONENT)
N
DIBRUGARH
BRAHMAPUTRA
DIMOW
MAJIMORA
SAPEKHATI
SONARI
SIBSAGAR
JORHAT
NAZIRA
NAGALAND
AMGURI
LEGEND
District Boundary
Circle Boundary
River
High (1.0 & Above)
Moderate (0 - 1)
Low (-1 - 0)
Kilometers

Fig. 03

agriculture is the backbone of the economy of the district it is prime time for the policy makers to take adequate measures keeping in view the recurrent challenges confronted by the farmers. Infrastructural needs and innovative practices in agricultural activities should be properly arranged. Healthy market condition should also be promoted and monitored by the concerned authority so that the farmers can be benefited. Otherwise the scenario of agricultural development in the district would always remain bogus.

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Impact of Urbanization on Public Utility Services in Rural-Urban Fringe of Ayodhya (Faizabad) City

Sadaf and Khursheed Ahmad Khan

ABSTRACT

In our day-to-day life, we need directly or indirectly a number of essential services. Water, electricity, transportation, and communication are the public utility services provided by the government, which are essential for human life. The rural-urban fringe is the area of mixed land uses lying outside the municipal boundary of the urban area. The transitional zone is a problem area for administration because these areas neither receive the facilities from the municipality nor from gram panchayats. Therefore, the rural-urban fringe zone lacks public utility services due to the absence of administrative infrastructure. The present study examined the role of urbanization on public utility services in the rural-urban fringe of Ayodhya city. Secondary data has been used for analysis purposes and mostly taken from the Village Directory and House Listing Table for the year 2011 (Census) at the village level. Statistical technique such as regression analysis has been used for analysing the impact of urbanization on public utility services. Those villages and the settlements near the city get better public utility services than the remote villages.

Keywords: *Public Utility Services, Urbanization, Rural-Urban Fringe, Regression Analysis.*

Introduction

The world is urbanizing rapidly. Today, more than half of the world's nearly 55% population (4.2 billion inhabitants) live in cities and towns. By 2050, this urban population will be double its current size, nearly 7 of 10 people will live in cities (World Bank, 2022). Rapid urbanization will be seen mostly in Africa and Asia, and this process will bring huge social, economic, and environmental transformations (United Nations Population Fund, 2022). The contribution of the population residing in urban areas in India is significant to the world's urban population. According to the 2011 census, only 31 per cent of India's population lives in urban areas. According to the United Nations, the urban population of India will be less than 35 percent in 2020 and approximately 40 per cent in 2030. Due to the rising urban population, the city's boundary expands and resulting in increasing suburbanization of cities (Bush, 1997). The cities are expanding in a haphazard manner beyond their administrative boundaries and the transitional land uses (both urban and rural land uses) i.e., rural-urban fringe develops in the countryside. As a result, rural-urban fringe of cities is characterized by the largely unplanned shift from agricultural to mixed rural-urban land uses environmental degradation, slow incremental development of roads, inadequate provision of infrastructure and basic services and scatter urban development (Adell, 1999). Therefore, the rural-urban fringe is a very dynamic land use it changes with time and the transitional zones are undergoing continuous changes in terms of social, economic, demographic and land uses characteristics. These spaces, lying outside the municipal boundaries, are very dynamic and acquire complexities with time. They are undergoing continuous changes in terms of land use, economic

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condition, occupation structure, population characteristics, and social systems as well (Narain, et al., 2013; Shaw, 2015). Public utility services are the facilities provided by the Government, which are crucial for human life. These services are the requirement of every person in any area. The quality of life of people is affected by the availability of public utility services. The supply of water, electricity, postal services, telephone services, the metalled road, bus stop, and railway station facility (fig.01) are considered public utility services.

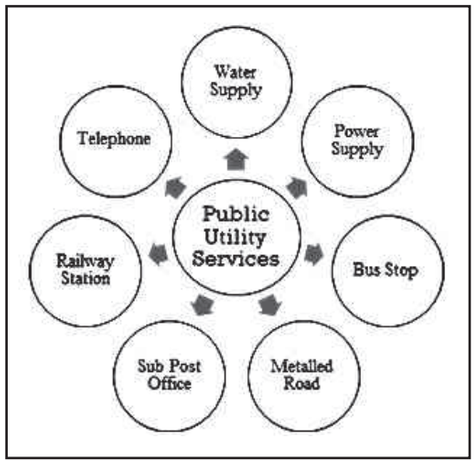

Fig. 01: Public Utility services

If all these services exist in any locality the people get benefits and the standard of living will automatically be improved. The public utility services and facilities are maintained and regulated by the state, national and local governments according to their respective level of authority and have been improved from time to time in the city as well as in the peripheral areas. But these facilities are not proportional to the growth and the distribution of the population (Lal, H., 1987). The transitional zone is a problem area for administration because these areas neither receive the facilities from the municipality nor from gram panchayats. Therefore, the rural-urban fringe zone lacks public utility services due to the absence of administrative infrastructure. For balanced development, each and every village should be benefitted from these facilities. Here in this paper, an attempt has been made to examine the relationship between urbanization and the distribution of public utility services.

The Study Area

Ayodhya (Faizabad) city is located in the state of Uttar Pradesh in Northern India. The city is located at Latitude 26°47'59.08"N & longitude 82°12'18.59"E in Ayodhya (Faizabad) district. The medium-sized class I city is situated on the south bank of the Saryu (Ghaghara) river. The city is well connected by roads and a railway network. National Highway 28 connects the city to Nepal and it is connecting with Lucknow (capital of Uttar Pradesh). The city is well connected with Azamgarh, Allahabad (Prayagraj), Raebareli, Basti, Gonda, Balrampur, Bahraich, and Gorakhpur. The railway connects the city with the many big cities such as Mumbai, Surat, Ahmadabad, and Delhi. The city is the district headquarters of administration, transportation, and educational services.

Identification of Rural-Urban Fringe

On the basis of available literature, personal observation, possible future growth of the city and a master plan report, rural-urban fringe zone of Ayodhya (Faizabad) city has been determined. These are the following variables which are showing the urban influence on the surrounding area of the city.1) Proportion of non-agricultural population 2) Population density 3) Literacy rate 4) Sex ratio 5) Household density 6) Pucca house. The rural-fringe of Ayodhya (Faizabad) city has 69 villages and it extends over 115.8 sq. km. The total area of rural-urban fringe zone lies 10 kilometres from the centre of Ayodhya (Faizabad) city. The primary fringe has a 56,614 population and 9,568 households, whereas the secondary fringe has a 55,466 population and 9,132 households and the rural fringe consists of a 54,122 population and 8,793 households (table 01). The total population, as well as the number of households, is decreasing with the increasing distance from the city centre.

Table 01: Number of Households and Population in Rural-Urban Fringe of Ayodhya City

S.I. No.	Fringe Zone	Zone (distance from the city center)	Number of Villages	Number of Households	Total Population	Area in (sq. km)
1	**Primary Fringe**	0-5km	22	9,568	56,614	29.22
2	**Secondary Fringe**	5-7.5km	23	9,132	55,466	42.52
3	**Rural Fringe**	7.5-10km	24	8,793	54,122	44.14
Total			69	27,493	1,66,202	115.8

Source: Calculated by researcher

Objectives

The main objectives of this paper is to examine the impact of urbanization on public utility services in rural-urban fringe of Ayodhya (Faizabad) City.

Data Base and Research Methodology

The study is based on both primary and secondary sources of data. The primary data is obtained through the field survey conducted in the year 2017 and secondary has been obtained from the Village Directory and House Listing Table (Census of India, 2011). For delineation of rural-urban fringe, the study area has been divided into three zones with a radius of 5, 7.5, and 10 km from the city centre. Village-wise public utility services in rural-urban fringe have been depicted with the help of simple percentages. The regression analysis has been used to analyze the relationship between urbanization and public utility services.

Results and Discussion

1) Water Supply

Earlier the main source of water in rural-urban fringe zone had been the well but later on, the handpumps became the most popular source of water supply and even today the handpumps are the main source of water supply in rural-urban fringe zone. However, only 17 villages are being served by tap water from treated sources. It has been found that only 24.63% of villages are having tap water from treated sources rest 75% of villages are still using handpumps. Thus, in general people in rural-urban fringe of Ayodhya (Faizabad) still depend on primitive means of water supply. Table 02 explains that 7 villages out of 22 villages have tap water from a treated source facility in the primary fringe, while five villages of the secondary fringe received the services of tap water from the treated source. It has been noticed that only 5 villages of the rural-fringe are receiving the tap water facility from the treated

source. The regression equation is: Y=-2.196x+41.26, multiple R = 0.901 and R square= 0.811. The adjusted R square= .622. Fig. 02 shows that the percentage share of water supply facilities in the villages of rural-urban fringe declines away from the city centre.

Table 02 : Tap Water From Treated Source and Power Supply Facilities in Rural-Urban Fringe of Ayodhya (Faizabad) City, 2011.

Zones		Tap water from		Power supply	
		Availability	Total Villages	Availability	Total Villages
Primary Fringe	Count	7	**22**	**15**	**22**
	% within zone	31.8		68.18	
Secondary Fringe	Count	**5**	**23**	**15**	**23**
	% within zone	21.7		65.21	
Rural Fringe	Count	**5**	**24**	**15**	**24**
	% within zone	20.8		62.50	
Total villages	Count	**17**	**69**	**45**	**69**
	% within zone	24.6		65.21	

Source: Village Directory, 2011

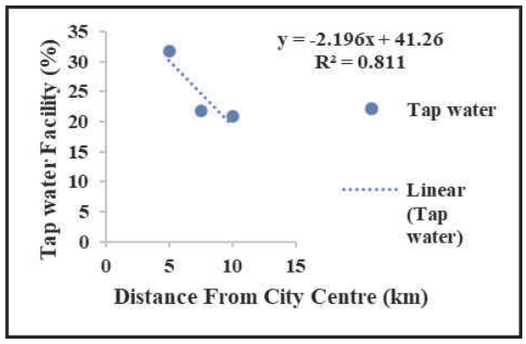

Fig. 02: Relationship between distance and Tap water

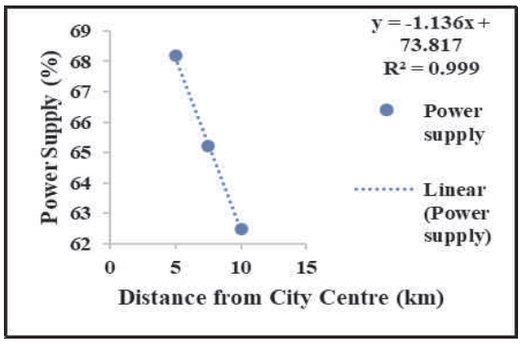

Fig. 03: Relationship between distance and Power supply

2) Power Supply

The transitional zone has mixed types of land uses such as residential, commercial, and agricultural. Therefore, the requirement for electricity is too high for every purpose in the rural- urban fringe. The duration and continuous supply of electricity should be ensured for every purpose. There are 45 villages that have the power supply for all users such as (domestic uses, agricultural use, and commercial uses) in rural-urban fringe. Table 02 explains that 15 villages out of 22 villages have a power supply facility for all purposes in the primary fringe, and 15 villages of the secondary fringe received the services of power supply for all purposes.

It has been noticed that only 15 villages of the rural fringe are receiving the power supply facility for all purposes. The regression equation is: Y=-1.136x+73.817, multiple R = 1.000 and R square= 0.999. The adjusted R square= .999. Fig. 03 shows that the percentage share of power supply facilities for all purposes in the villages of rural-urban fringe declines away from the city centre.

3) Metalled Road Connectivity

Metalled roads are completely constructed with the broken stone, cement, and concrete. The road transportation system is characterized by the movement of goods, credit, messages, people and their ideas, development, and innovations. It is considered the lifeline and backbone of rural areas. Because it acts as an instrument in bridging the gap between urban centres and rural areas. Table 03 shows that the villages of primary as well as secondary fringe are connected with the metalled road. Twenty villages of rural fringe are connected with the metalled road in rural fringe.

Table 03: Metalled Road Connectivity and Telephone Facilities in Rural-Urban Fringe of Ayodhya (Faizabad) City, 2011

Zones		Metalled Road Connectivity		Telephone Facilities	
		Met. Road	Unmet. Road	Availability	Unavailability
Primary Fringe	Count	**22**	**0**	22	0
	% within	100%		100	
Secondary Fringe	Count	**23**	**0**	22	1
	% within	100%		95.65	
Rural Fringe	Count	**20**	**4**	22	2
	% within	83.33%		91.66	
Total villages	Count	**65**	**4**	66	3
	% within	94.20%		95.65	

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

The regression equation is: Y=-3.334x+119.45, multiple R = 0.866 and R square= 0.75. The adjusted R square= .500. Fig. 04 shows that the impact of urbanization is clearly visible on the metalled road connectivity in rural-urban fringe of Ayodhya (Faizabad) city.

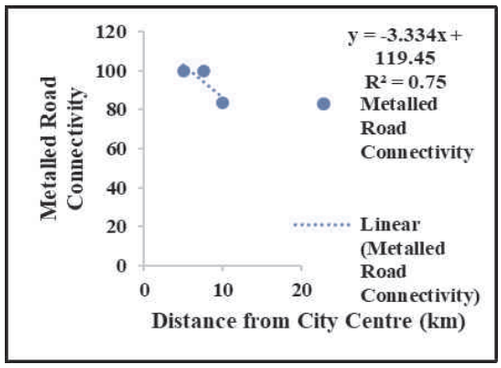

Fig. 04: Relationship between distance and Metalled road

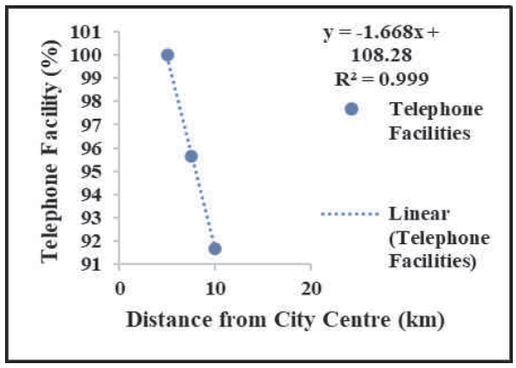

Fig. 05: Relationship between distance and Telephone

4) Telephone Facilities

The telephone network service is actually one great communication system that connects people from different parts of the world. It is a sign of the economic development of a society. It has the ability to bridge the gap between rural and urban people. The government has initiated various schemes related to access to telephone facilities in rural India. Still, there is a wide digital divide in urban and rural areas in terms of access to telephone services. Table 03 depicts that all the villages of the primary fringe have telephone facilities. In the secondary fringe, 95.65% of the villages and 91.66% of villages of the rural fringe are connected with the telephone facilities. The regression equation is: Y=-1.668x+108.28, multiple R =1.000 and the coefficient of determination R square= 0.999. The adjusted R square= .999. Fig 05 shows that the telephone facilities are declining away from the city.

5) Sub Post Office Facilities

For more than 150 years, Indian postal services helped the people with communication facilities and supports rural development by improving the socio-economic conditions of rural areas. Postal services are the largest network in the country and it is very useful for communication facilities and also for financial and retail services. Therefore, access to postal services is a very effective strategy for development in India. Table 04 shows that 31.8% of villages in the primary fringe received postal services by sub-post office. There are 7 villages (30.4%) out of 23 having sub-post office facilities in the secondary fringe, while 25% of villages receive sub-post office services. The regression equation is: Y=-1.362x+39.295, multiple R = 0.946 and the coefficient of determination R square= 0.895. The adjusted R square= .789. Fig. 6 shows that sub post office facilities are declining gradually with the distance from the city.

Table 04: Sub Post Office and Bus Stop Facilities in Rural-Urban Fringe of Ayodhya (Faizabad), 2011

Zones		Sub Post Office Facilities		Bus stop Facilities	
		Availability	Unavailability	Availability	Unavailability
Primary Fringe	Count	**7**	**15**	**7**	**15**
	% within zone	31.8		31.81	
Secondary Fringe	Count	**7**	**16**	**6**	**17**
	% within zone	30.4		26.08	
Rural Fringe	Count	**6**	**18**	**1**	**23**
	% within zone	25		4.16	
Total villages	Count	**20**	**22**	**14**	**55**
	% within zone	28.9		20.28%	

Source: Village Directory, 2011

6) Bus Stop Facilities

An efficient pattern of road network with a good bus transportation system is an important requirement for the people of rural as well as urban areas. The bus transportation system links the city to the surrounding areas. Many rural areas are still backward due to the lack of a rural public transportation system. The metalled road and bus transportation is a symbol of the social and economic development of an area. Table 04 depicts that 7 villages out of 22, 6 villages out of 23, and only one out of 24 villages receive the bus stop facilities in various rural-urban fringe zones. Fig. 09 reveals that the bus stop facility is visible only in those villages which are situated along the transport routes. The regression equation is: Y=-5.53x+62.158, multiple R = 0.947 and R square= 0.897. The adjusted R square= .795. Fig. 07 reveals that bus stop facilities are decreasing with increasing distance from the city.

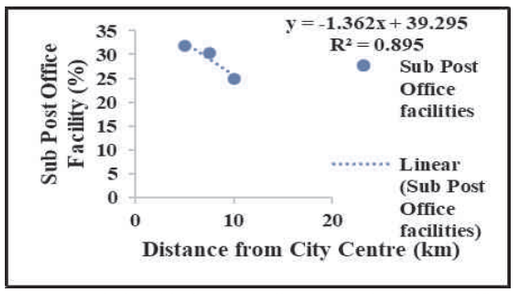

Fig. 06: Relationship between distance and Sub post office

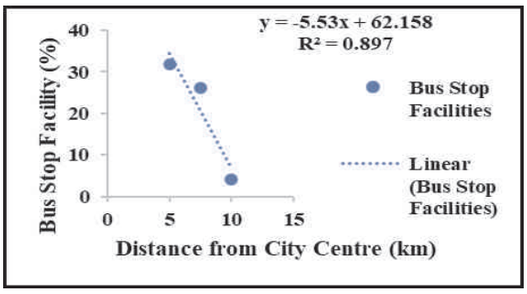

Fig. 07: Relationship between distance and bus stop

7) Railway Station Facilities

The city is served by two major Railway systems, the first one is Ayodhya Cantt (formerly known as Faizabad Junction) and the second one is Ayodhya Junction connects the city to Delhi, Mumbai, Ahmedabad, Varanasi, West Bengal, and Assam. Railway services are a very useful means of transportation and very helpful to reduce the traffic congestion of road transportation. It is very helpful for the inhabitants of rural areas because they can go by rail to Fig. 08: Bus stop Facility distant areas and to nearby areas. Table 05 shows that only 2 villages are received railway station facilities while the secondary and rural fringe has only one railway station facility.

Table 05: Availability of Railway Station Facilities in Rural-Urban Fringe of Ayodhya (Faizabad), 2011

Zones		Railway Station Facilities	
		Availability	Unavailability
Primary Fringe	Count	**2**	**20**
	% within zone	9.09	
Secondary Fringe	Count	**1**	**22**
	% within zone	4.34	
Rural Fringe	Count	**1**	**23**
	% within zone	4.16	
Total villages	Count	**4**	**65**
	% within zone	5.79	

Source: Village Directory, 2011

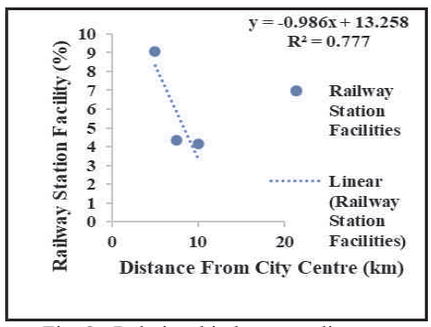

Fig. 8 : Relationship between distance and Railway station

Fig. 8 reveals that railway station facility is declining with the distance away from the city. The regression equation is: Y=-0.986x+13.258, multiple R = 0.882 and R square= 0.777. The adjusted R square= .555. There are only 4 villages that have railway station facilities in rural-urban fringe of Ayodhya (Faizabad) city.

Conclusion

Using the census data of 2011, it is observed that the distribution is unequal with rural-urban fringe having lower access to public utility services. The paper analyzed that the primary fringe possesses better public utility services in rural-urban fringe of Ayodhya (Faizabad) city due to the nearness of the city. Whereas, the villages of the rural fringe are not in good condition and the villages of the secondary fringe are having moderate conditions in terms of better public utility services. The study revealed that there is a declining trend in the availability of public utility services from the city centre to far villages in the rural-urban fringe of Ayodhya.

(Faizabad) city. This finding is also supported by the regression analysis which examines the impact of urbanization on the distribution of public utility services in rural-urban fringe. The study concluded that there is a close relationship between urbanization and the distribution of public utility services in the villages of rural-urban fringe. Ayodhya (Faizabad) city is experiencing unprecedented growth in population within the last few decades.

As a result, the peripheral area of the city is also witnessed a rapid growth in population. So, the provision of public utility services is not in proportion to the phenomenal growth of population in the city as well as in the rural-urban fringe zone. Proper water and power supply for all purposes are the pressing needs of the rural-urban fringe. Improvement in transport and communication is necessary for the periphery of the city. So, the study concluded that public utility services should be improved and the amenities should be provided by the government in proportion to the growth of the population.

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SPATIAL SET-UP OF SCHEDULED CASTE FEMALE URBAN POPULATION AND ITS LEVEL OF SOCIO-ECONOMIC TRANSFORMATION IN WESTERN UTTAR PRADESH (2001-2011)

Vandana Tyagi and Sarla Bhardwaj

ABSTRACT

Western part of Uttar Pradesh is comprised by 27 districts, having an area of 79832 Km.2 inhabited by 7,42,69,758 persons. It's 31.27 per cent population is urban. In 2001, its 13.05 per cent urban population is S/c, which reached 13.24 per cent in 2011. Their ratio is high in those districts which do have large development of leather and household industries. Their growth is 36.80 per cent during the decade of 2001-11. District Saharanpur has recorded the highest growth of 103.79 per cent. Sex-ratio is quite poor. It was 863 females in 2001, and increased to 878 females per 1000 males in 2011. It is more in Rohilkhand Plains. Child ratio is on declining, i.e. from 881 in 2001 to 875 child females per 1000 in 2011. It is highest in central-east part of the Region. The Region had 45.13 per cent female literacy in 2001, which increased to 57.83 per cent in 2011 is an evidence of high social development. It is more in highly urbanised districts. The ratio of female workers in 8.21% in 2001, and it increased to 13.18% in 2011. But, their number has shown more than two times increase. Their distribution and ratio both are uneven among the districts. Their ratio is more in highly urbanised districts. Other female workers are 54,166 in 2001, which increased to 1,25,664 in 2011 showing an addition of 132 per cent. These are more than 70 per cent in both the census years. Districts large in size and highly urbanised do have their ratio significantly. The level of socio-economic transformation is examined on the basis of four indices-ratio of female literates, ratio of female workers, ratio of other female workers and their percentage in female population. Six out of 27 districts do not qualify any type of development. Most urbanised districts are registered as highly developed.

Keywords : *Urbanization. Scheduled caste population, Effective female literacy, Female workers.*

Introduction

Females play an integral role in the development of household activities as well as in social economic transformation the region, on the otherside the perception of females have also changed towards the society. It is generally observed that in the present urban system, female population especially scheduled caste female population has made their effective entry in a number of social and economic activities. There are certain such activities, the development of which is incomplete without their participation. Their increasing efficiency, is caused due to the improvement in their educational status, change in attitude of the society, freely movement in social programmes. There are such certain economic activities, the development of which is not possible without their active participation especially of scheduled caste females. They have transformed the economy of urban areas. There are such economic activities, in which their participation is essential, such as in teaching, knitting, stitching, household industrial activities, medical and nursing sector. The provision of education facilities especially to this deprived society, the financial support by the government agencies, the improvement in the working conditions, and also in security, increase in road accessibility, have transformed the socio-economic conditions of the scheduled caste female population. Their more presence in the working structure denotes

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that they have a great contribution in economic transformation of the region.

The Study Area

The western Uttar Pradesh is composed by upper and middle Ganga-Yamuna Doab, Rohilkhand Plains, Trans-Yamuna Plains. It is bounded by River Yamuna in the west, Siwalik Hills, 160m contour line in the north. In south, it is bounded by the state boundary, and in the east though it follows the district boundaries, just following parallel to 150m contour line. It covers 33.14% of the state. It's total population in 2011 is 7,42,69,758 in total, thus having a density of 930 persons per km2. Total urban population is 2,33,06,715, i.e. 31.27 per cent of the total. Urban S/c population is 30,86,090, i.e. 13.24 per cent of total urban population.

Objectives of the Study

The main objectives of the present study are summarized thus:-

1. To study the trends of percentage of urban S/c population in urban population for the years 2001 and 2011.
2. To examine the growth of S/c urban population during 2001-2011.
3. To study the sex-ratio of 0-6 age group urban S/c population.
4. To study the ratio of S/c urban female literates S/c population.
5. To study the ratio of S/c urban female workers in urban female population having an age above 6 years. This is defined as effective female workers ratio.
6. To study the ratio of other S/c female workers in total S/c female workers.
7. To examine the level of socio-economic transformation of S/c urban female population on the basis of the values in four indices above the average in 2011.

Data base and Research Methodology

The study is based on the secondary data derived from the census reports for 2001 and 2011, Uttar Pradesh. S/c population is defined in Article 341 of the constitution.

The percentage of S/c urban population is calculated from the urban population of the district. The growth of urban S/c population is based on the increase in number during the period 2001 and 2011 and thus this increased number is divided by the S/c population of the previous year 2001 and thus multiplied by 100 to get the result of growth in percentage during the decade. Sex-ratio means here the number of females after 1000 males, in both the population i.e. in total S/c urban population and 0-6 age group urban S/c population. The effective female literacy is ratio between the female population having an age of more than 7 years and the number of female literates. The ratio of S/c urban female workers is based on S/c population having an age of above 6 years and number of actual workers. The ratio of other female S/c workers is based on their proportion in total S/c female workers. Four indices have been selected to determine the level of Socio-economic transformation in the study areas.

The percentage of S/c Population in Urban Population

It examines this pattern of distribution for 2001 and 2011 census years at district level. It is observed that there is not much change in the percentage of S/c population. It has an increase only from 13.05 in 2001 to 13.24% in 2011., but on the other hand the urban S/c population has increased from 22,55,865 in 2001 to 30,86,090 in 2011, showing an addition of 8,35,225 S/c population in urban areas during the decade 2001-11. Their distribution in these census years can be put as follows:-

2011- This year recorded 3086090 S/c urban population, 13.24 per cent of the total urban population. The least ratio 5.11 is scored by Rampur district and the highest ratio of 24.02 is scored by Agra again in this year. Rohilkhand Plain has the low and very low ratio, whereas the south and south-east districts have the high and very high ratio of the urban S/c population.

(i) **Very-Low–** This category retains three districts of 2011 leaving behind Pilibhit. Bijnor (7.67), Rampur (5.11), and Bareilly (7.31) are the districts, which share 6.99 percent urban S/c Population of the Region. All these are Terai districts.

(ii) **Low-** Seven districts of the category are spread in Upper Doab and Rohilkhand Plains, G.B. Nagar (8.93) has joined this category showing the fall in its percentage in comparison of 2001. Pilibhit (8.33) has shown increase in their percentage this year. The other districts are known as Moradabad (9.45), J.P. Nagar (9.09), Baghpat (8.40), Muzaffarnagar (8.63), and Shahjahanpur (8.97).

(iii) **Low-Medium-** Budaun (10.71), Kannauj (11.45), and Kasganj (10.90) share 4.28 per cent S/c urban population. These have dispersed location in central part of the Region.

(iv) **Medium-** Saharanpur (12.85) and Etah (13.18) are the new entrants of the category. The other districts are Bulandshahr (13.71), Mathura (13.98) and Farrukhabad (13.18). All these districts have their dispersed location in Upper Doab, and in central part of middle Doab.

(v) **High-Medium-** Ghaziabad (15.36) and Aligarh (15.64) are new entrants. Meerut (15.73) has maintained its category. Inspite of the increase in S/c urban population these two new districts have shown decline in their percentage in total urban population. These are the part of Upper Doab.

(vi) **High-** It includes four districts Firozabad (16.88), Mainpuri (16.91), Etawah (16.28) and Auraiya (17.53). All of these are occupying the most south-east part of the Region. Etawah has joined it this year.

(vii) **Very-High-** Agra 24.02 and Hathras (20.83) have retained their positions in the category, with an average ratio of 23.57 percent. They in all give shelter to 18.00 percent S/c urban population.

Growth of Urban S/c Population (2001-2011)

It is observed that the study area has an average growth of S/c population 36.80 percent in this decade just equivalent to the growth of urban population. Except Etah now divided into two districts (Kasgnaj and Etah) all the remaining 25 districts have the growth in positive. Etah has recorded minus growth of 1.59 per cent in this period. Eighteen districts have the growth above the average. District Saharanpur has an exceptional growth in these years i.e. 103.79 per cent. It may be due to inclusion of such villages in the municipal limit of the city which have the domination of these people. On the otherhand, Budaun has recorded the least growth of 9.44 per cent.

Table 01 : Growth of Urban S/c Population Among Districts During 2001-2011

Sl No.	Category	Rate of Growth	No. of Districts	2001	2011	Growth in No.	Growth in %
i	-	Negative	1	67,846	66,764	-1082	-1.59
ii	Low	< 20.00	5	1,90,772	2,19,352	28,580	14.98
iii	Moderate	20.01-30.00	9	6,06,739	7,55,795	1,49,056	24.57
iv	High	30.01-40.00	6	8,56,621	11,74,352	3,17,731	37.09
v	Very High	40.01 >	5	5,33,877	8,69,828	3,35,951	62.93
Total			**26**	**22,55,865**	**30,86,091**	**8,30,226**	**36.80**

(i) **Low–** This Category includes five districts with an average growth of 14.98 percent. In Rohilkhand Plains Shahjahanpur (15.27), J.P. Nagar (19.75) alongwith Budaun belong to this category. Baghpat (19.99) and Kannauj (17.67), do enjoy such characteristics. These are Primarily muslim dominated districts.

(ii) **Moderate Growth-** This includes nine districts. Four such districts do occupy the northern half of the Rohilkhand plains. These are Bijnor (24.62), Rampur (21.33), Bareilly (28.76) and Pilibhit (25.59). Three districts namely Farrukhabad (21.95), Mainpuri (29.70) and Etawah (25.00) are developed in the eastern part of Central Doab, whereas Hathras (27.31) and Meerut (22.08) districts do occupy the lands of Upper Doab.

(iii) **High Growth-** Such growth is the feature of six districts. Four of these are spread in the south-west part of the Region. Aligarh (34.83), Mathura (32.99), Agra (39.71), and Firozabad (35.12) are such districts. They are involved in leather industry, Bangle industry. In north, Muzaffarnagar (39.37) and Moradabad (35.11) districts are such districts. Here, sugar industry has inspired their concentration. (Fig.01)

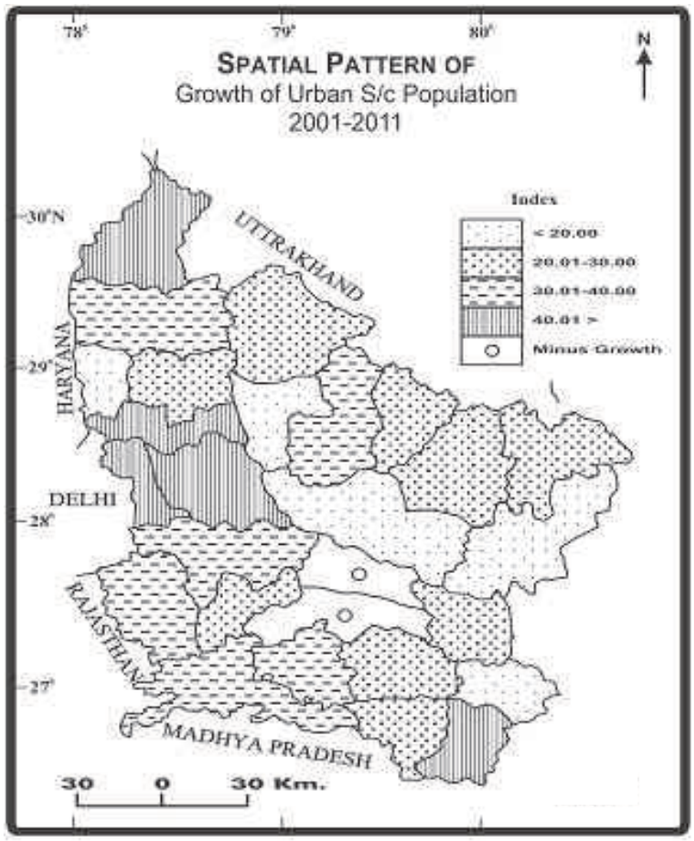

Fig. 01

(iv) **Very-High Growth-** Such districts are five in number Ghaziabad (57.29), G.B. Nagar (79.05) and Bulandshahr (45.02) have their location in south part of Uppar Doab. Their high growth is caused due to their nearness to Delhi. These are the part of National Capital Region. Auraiya (51.05) is situated in the extreme south-east corner just adjacent to Kanpur district. In extreme north, Saharanpur has the highest growth of 103.79, because of the concentration of sugar, leather industries.

As a whole Upper Doab districts have high growth of S/c urban population in comparison of Rohilkhand Plains districts.

Sex-Ratio of Urban S/c Population (2001-11)

Sex-ratio or number of females after 1000 males is fundamental to the geographical analysis of an area. It is an index of socio-economic condition prevailing in the area. Urban areas attract more males than females in number from the surrounding territory to work in different jobs. This happens more true in the case of S/c population. In the case of western Uttar Pradesh, it is observed that urban districts which have low share of S/c population in their urban population, have recorded high ratio of females, Budaun district has the ratio of S/c population 10.71 per cent in its total population, while it has the ratio of females 901 after 1000 males. On the other hand, district Agra has noted the ratio of S/c population 24.02 per cent in 2011, the highest one with, the ratio of females is 862 after 1000 males.

It is observed that except G.B. Nagar and Farrukhabad districts, all remaining 25 districts have noted improvement in the position of females. In 2001, western Uttar Pradesh recorded this ratio 863 females, which reached to 878 females in 2011.

It is revealed that those districts which are more urbanised, register low ratio of females in comparison of those districts which have shown low percentage of S/c urban population.

Sex-ratio of 0-6 Urban S/c Population (2001-2011)

It expresses the number of child females after 1000 child males, to the age-group of 0-6 year. The more number of females in such population may be indicative of high social and economic status of the area. In the case of west Utter Pradesh, this does not seem to be applicable. Here, developed districts have low ratio as compared to less developed districts. District Meerut has 812 child females after 1000 child males in S/c population whereas, on the otherhand, District Pilibhit has recorded the highest ratio of 875 child females in 2011. There has been a decline in this ratio during the decade of 2001-2011. In 2001, the average was 881 child females, which slightly decreased to 875 in 2011.

Distribution of Urban S/c Female Literate Population

S/c female literacy means here the ratio of S/c female literates in the S/c female population having an age of more than 6 years. This is defined as an effective literacy. It is assumed that the high ratio of literacy among these urban females will be an evidence of high social development in that particular area. It is observed that in 2001, this female literacy was 45.13 per cent, which increased to 57.83 per cent in 2011. It shows that these females are taking much interest in education. It is observed also that all the districts have recorded the increase in their percentage. J.P. Nagar, Etah districts have shown impressive changes in their ratio.

Economic Structure of S/c Urban Female Population

It is examined on the basis of percentage of S/c female workers to total S/c female population having an age of more than 6 years. This may be defined as an effective ratio of s/c female workers in S/c female population. It also considers the ratio of S/c other workers in total S/c female workers.

1. Percentage of S/c female Workers- It is observed that there is a slight increase in the percentage of these workers during the decade 2001-2011. This percentage was 8.21 in 2001 which increased to 13.18% in 2011. There were 76540 S/c female workers in 2001, which increased to 162870 in 2011, showing an addition of 112.79 per cent. All the

districts on the basis of percentage of these workers have been put into seven categories, which are as follows:-

(i) **Least Ratio-** In 2001, four districts enjoyed this category. Bijnor (6.43) and Moradabad (6.87) of Rohilkhand Plains; Mainpuri (5.78) and Etawah (6.81) of central-south Doab are such districts. In 2011, this category didn't include any one of these districts.

(ii) **Low Ratio-** In 2001, 12 districts of the category were spread in all parts of the Region. Among these, J.P. Nagar recorded 7.00 per cent S/c female workers, whereas Auraiya 8.91, highest of the category followed by Saharanpur with 8.90 per cent. In 2011, Budaun (8.77) and Kasganj (7.86) were the districts of this category. Both these districts didn't change their positions in this year. (Fig. 02A & 02B)

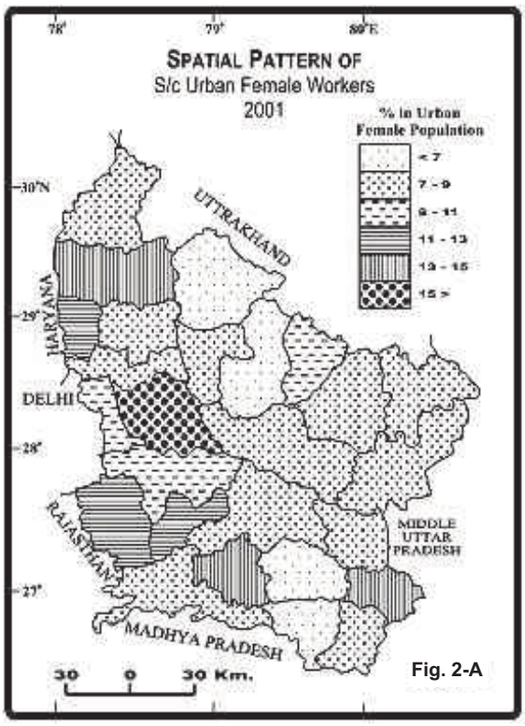

Fig. 2-A

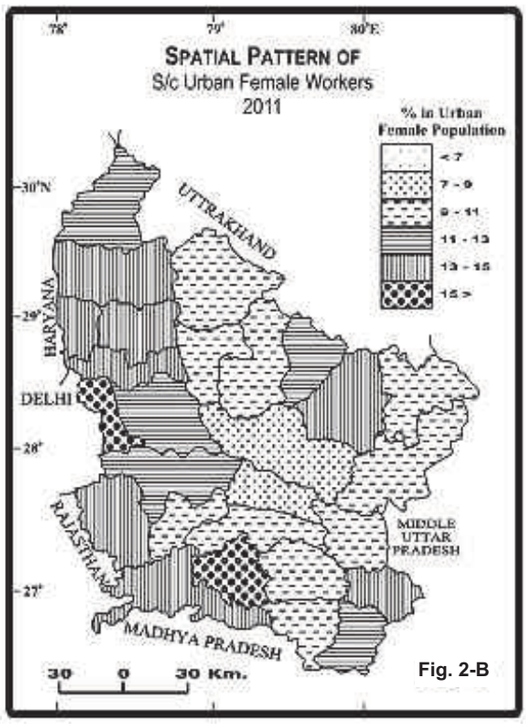

Fig. 2-B

(iii) **Low-Moderate Ratio-** In 2001, Rampur (9.64), Aligarh (9.20) and G.B. Nagar (10.85) claimed this category. Aligarh and Rampur do have the domination of muslim population. In 2011, this category included 10 districts. Most of these are occupying the eastern part of the study area. Here, Pilibhit (9.91), Shahjahanpur (9.68), Farrukhabad (9.24), Mainpuri (9.13), Etah (10.38), Etawah (10.23) are the districts of this characteristics. In western Rohilkhand Bijnor (9.88), J.P. Nagar (9.98) and Moradabad (10.64) do enjoy the same characteristics. Hathras has 9.62 percent female workers. In 2011, these districts include 15.07 pe rcent workers inspite of the inclusion of 10 districts, the highest number included by any of these category. Most of these districts are smaller in size.

Table 02 : Ratio of Female Workers in Female S/c Population Above Age 6 years 2001-2011

Category	Percentage	2001			2011		
		No. of districts	Total Female Workers	Percentage of total	No. of districts	Total Female Workers	Percentage of total
Least	< 7.00	4	6,263	8.18	-	-	-
Low	7.01-9.00	12	39,763	51.95	2	3,340	2.05
L. Moderate	9.01-11.00	3	7,710	10.07	10	24,545	15.07
Moderate	11.01-13.00	3	6,674	8.73	5	25,396	15.59
High	13.01-15.00	3	10,977	14.34	8	91,047	55.91
Very High	15.01>	1	5,153	6.73	2	18,542	11.31
Total		**26**	**76,540**	**100.00**	**27**	**1,62,870**	**100.00**

(iv) **Moderate Ratio-** In 2001, such characteristics was found in Baghpat (11.92), Hathras (11.10) and Mathura (11.79). These were the part of Doab Region. In 2011, this situation was totally changed. This year there were five such districts having their dispersed location. Saharanpur (12.25), Bulandshahr (11.70), Aligarh (12.77), are the districts of Upper Doab. Auraiya (11.50) and Rampur (11.49) do also enjoy this characteristics.

(v) **High Ratio-** In 2001, Muzaffarnagar (14.11), Firozabad (14.60) and Kannauj (13.40) were the districts of this category. In 2011, the situation is altogether changed. It has become the feature of mainly of Doab districts. These are either agriculturally developed or are industrially developed. Muzaffarnagar (14.67) and Kannauj (14.29) have remained in this category. The other six districts are promoted districts- Baghpat (14.03), Meerut (13.53), Ghaziabad (13.33), Mathura (13.35), Agra (14.84) and Bareilly (13.58). These districts have their location mainly in the Doab Region and give shelter to 55.91 per cent female workers of the study area.

(vi) **Very High Ratio-** In 2001, Bulandshahr was the only district of this category with a ratio of 16.51 per cent because of the dominant role of S/c female workers in milk industry. In 2011, Firozabad maintained its position with 21.78 S/c female workers, denoting the impressive increase in their number and ratio both. It was joined by G.B. Nagar with 19.10 per cent S/c female workers. It is a newly developed industrial district, where immigration of female population from nearby villages is highly responsible for such increase.

S/c Female Workers Engaged in Other Activities

Other workers are those who have been engaged in any of these economic activities such as all government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists, etc. In fact, all those workers other than cultivators or agricultural labourers or household industry workers are other workers.

In this part of the study, the proportion of S/c female other workers is calculated in all S/c female workers. These workers, have shown tremendous

growth during the period of 2001 and 2011. In 2001, these were 54166 in number, which increased to 125664, (132 per cent) i.e. an addition of 71498 S/c female workers. Their percentage in total S/c female workers was 70.77 per cent in 2001 and 77.16 per cent in 2011. It indicates that there is not much increase in percentage as compared to their number. Their district-wise distribution in both the census years has lot of a remarkable variations.

(i) **Least Ratio-** In 2001, five districts of western Uttar Pradesh occupied this category. J.P. Nagar (51.06), Rampur (54.30), Bulandshahr (58.63), are in the northern part, whereas Kannauj (43.45) and Auraiya (51.93) are developed on the south-east margins. In 2011, it included Budaun (59.34), and Kannauj (41.96). Kannauj district has noted the fall in their ratio. District Budaun enjoys the same characteristics. (Fig.0 3A & 03B)

(ii) **Low Ratio-** In 2001, Muzaffarnagar (64.60) and Farrukhabad (64.04) enjoyed this category. In 2011, Auraiya (63.76) joined this category by improving the ratio of S/c female other workers.

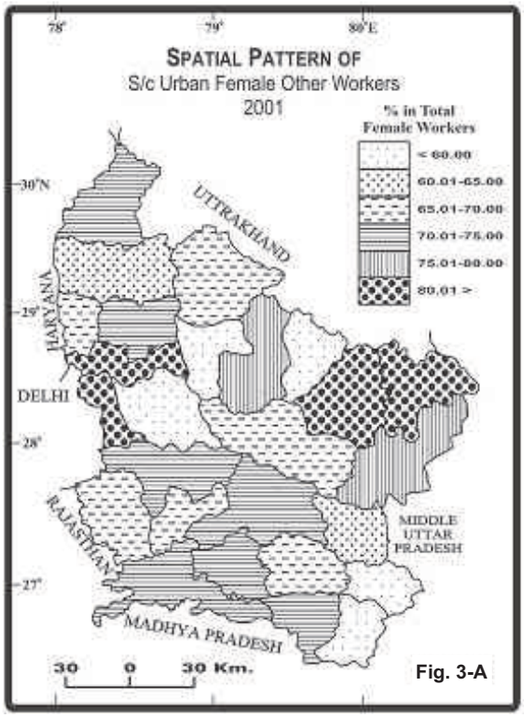

Fig. 3-A

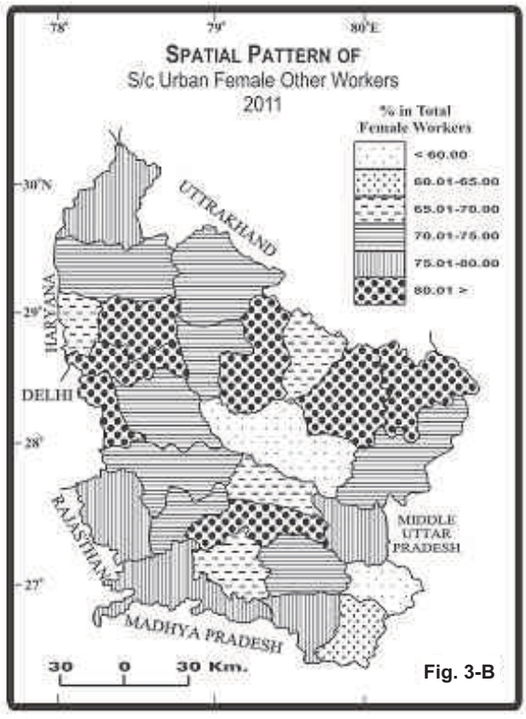

Fig. 3-B

(iii) **Moderate Ratio-** In 2001, six districts scored these values of S/c other female workers. These are distributed in all parts of the study area. Bijnor (67.44), Baghpat (66.17), Hathras (67.44), Mathura (69.31), Mainpuri (68.22) and Budaun (68.04) are such districts. Among these Baghpat (68.96) maintained its position in the category in 2011. The other districts are Rampur (67.70), Firozabad (67.23), and Kasganj (68.82). Their ratio in total has declined in 2011.

(iv) **High Moderate-** This category has the maximum number of the districts in both the census years. Their ratio was in 2001 i.e. 43.29 per cent but was

Table 03 : Number and Percentage of S/c Other Female Workers in 2001 and 2011

Category	Percentage	2001			2011		
		No. of districts	Total Female Workers	Percentage of total	No. of districts	Total Female Workers	Percentage of total
Least	< 60.00	5	5,020	9.27	2	2,162	1.72
Low	60.01-65.00	2	3,424	6.32	1	1,193	0.95
Moderate	65.01-70.00	6	7,413	13.69	4	10,640	8.47
H.Moderate	70.01-75.00	7	23,447	43.29	8	23,696	18.86
High	75.01-80.00	2	3,160	5.83	5	35,683	28.39
Very High	80.01>	4	11,702	21.60	7	52,290	41.61
Total		**26**	**54,166**	**100.00**	**27**	**1,25,664**	**100.00**

reduced to 18.86 per cent in 2011, due to inclusion of small size districts this year. In 2001, Saharanpur (74.77), Meerut (73.69), Aligarh (71.27), Agra (71.31), Firozabad (71.23), Etawah (70.95) and Etah (73.09) were the districts of the category, all dispersed in the Doab Region. In 2011, this category has the distribution of such districts in its central part. Muzaffarnagar (73.38), Bijnor (72.34), J.P. Nagar (71.93), Bulandshahr (73.59), Hathras (70.04) and Mainpuri (73.26) districts have got promotion in the category. On the otherhand, Aligarh (73.70), Shahjahanpur (77.54) were promoted from the least category.

(v) **High Ratio-** In 2001, it was occupied by Moradabad (76.70) and Shahjahanpur (75.40) districts. In 2011, all five districts included by this category were promoted one. These are known as Saharanpur (76.69), Mathura (76.46), Agra (79.13), Farrukhabad (75.79) and Etawah (78.61) districts. Being large in size, they incorporated 28.39 per cent S/c female other workers.

(vi) **Very High Ratio-** In 2001, this category included Ghaziabad (80.12), G.B. Nagar (80.43), Bareilly (81.67) and Pilibhit (87.48) districts. In 2011, this category included seven districts. Out of these three districts were promoted from the lower categories. These are known as Meerut (80.12), Moradabad (85.02) and Etah (81.89) districts. G.B. Nagar (80.10), Bareilly (82.22), Pilibhit (82.05) and Ghaziabad (85.11) maintained their positions in the category in this census year. They include 41.61 per cent S/c female other workers. All these districts have the location of large size cities of the Region.

Level of Socio-Economic Transformation in S/c Female Urban Population

In this part of the study, the level of socio-economic transformation of urban S/c female population has been examined on the basis of four indices. These are, the ratio of urban female literates, ratio of effective female workers, ratio of other female workers and percentage of S/c female population. It is assumed that if any district has its value above the average, in the index as considered here, it may be designated as a developed one. Four categories have been formed.

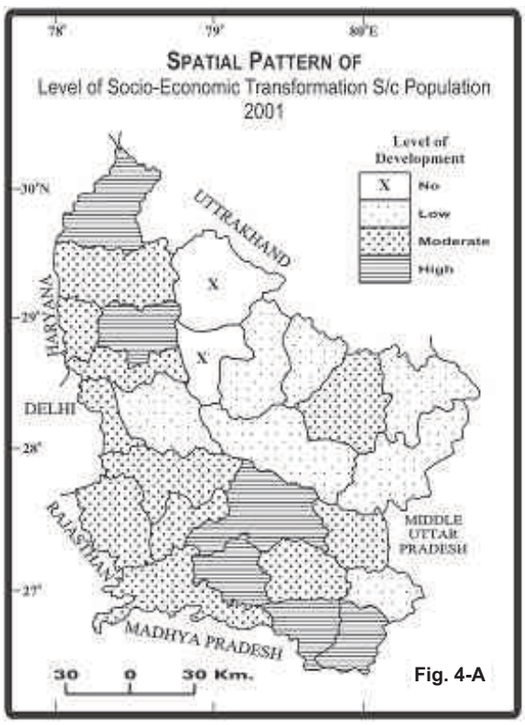

Fig. 4-A

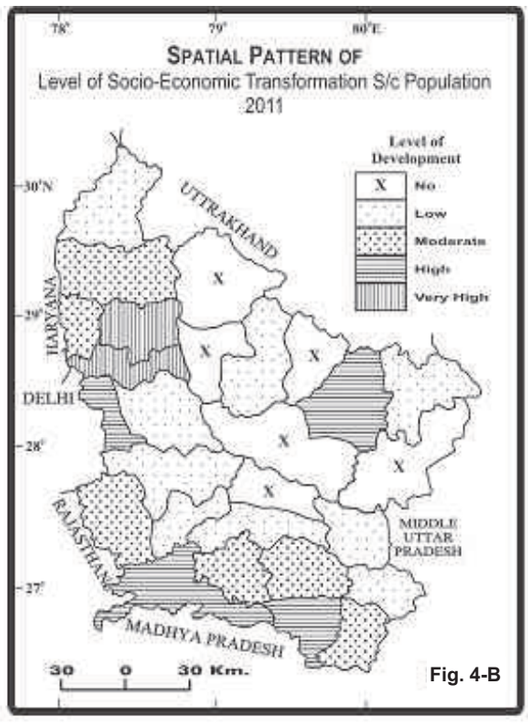

Fig. 4-B

The data for 2011 has been taken into consideration. The following table explains the score values of all the four indices, and the number of districts scoring the values above the average, are given here.

1. **Districts with not much Transformation-** Six districts of the study area have not qualified for any of the four indices as considered here. Their values, are less than the average. Five of these districts are located in Rohilkhand Plains. It shows that this area has not recorded much progress in the socio-economic conditions of S/c Urban female population. These districts are known as Bijnor, J.P. Nagar, Rampur, Budaun and Shahjahanpur. Kasganj, a newly born district, situated on the border of District Budaun is also of such type. All these districts do contain 1,40,052 S/c Urban females, i.e. 9.71 per cent of the total. (04A & 04B)

2. **Low Transformation –** It is incorporated by those districts which have scored the average value for any one of the four indices. Bulandshahr, Aligarh, Hathras, Farrukhabad have the average value in percentage of S/c Urban population. Saharanpur is known for S/c female literacy. Kannauj is known for S/c female workers. As a whole, these districts have 26.61 per cent S/c urban female population.

3. **Moderate Transformation –** These are six in number with S/c female population 2,16,491, 15.00 per cent of the total. These districts are known as Muzaffarnagar, Baghpat, Mathura, Firozabad, Mainpuri and Auraiya. Most of these an known as for female literacy and female workers.

4. **High Transformation-** Such districts are four in number with 24.07 per cent S/c female population. These are 3,47,339 in number. G.B.

Table 04 : Average Values of All four Indices in 2011 and level of Development

Indices	Average Value	No. of districts Scored the values	No. of indices	Level of Development	No. of Districts
1. Percentage of S/c Urban Female Population.	13.24	12	1	Low	9
2. Urban Female Literaces	57.83	10	2	Moderate	6
3. Female Workers (Effective)	13.18	10	3	High	4
4. Other Female Workers	77.16	9	4	Very High	2
Total		**41**			**21**

Nagar, Agra, Bareilly and Etawah are such districts. All of these are significant for the percentage of S/c other female workers. These are highly accessible districts. Agra is known for largest metropolitan city of western Uttar Pradesh. G.B. Nagar has developed Noida as a big industrial and commercial city.

5. **Very High Transformation-** Meerut and Ghaziabad belong to this category. Both of these are situated near to Delhi and are highly accessible districts, which have encouraged S/c female population to get engaged in different non-agricultural activities in urban areas. Such females are 3,55,076 in number, 24.61 per cent of the total. Both of these have large size metropolitan centres.

It is CONCLUDED that those districts which have large size urban centres, high accessibility, nearness to Delhi and direct connectivity with it, development of industrial and commercial activities, high percentage of urban population, high literacy, are highly transformed socio-economically.

Acknowledgement

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FROM HILLS TO HORIZONS: UNDERSTANDING THE ROOTS OF RURAL OUTMIGRATION IN ALMORA, UTTARAKHAND, INDIA

Poonam Shah and Virender

ABSTRACT

The research paper analyses the trend of rural outmigration in the Almora district of Uttarakhand's Kumaon region. The analysis is based on secondary data on the population of 38 village panchayats collected from the Block Development Office, Sult, and a report published by the Rural Development and Migration Commission, Pauri Garhwal, Uttarakhand. The study finds that the villages of Dhauladevi, Bhikiyasain, and Dwarahat blocks in Almora have experienced a population decline at a rate greater than 79% since 2011, and outmigration is responsible for 70.6% of the overall negative decadal growth rate in the area under study. Furthermore, during the period 2011 to 2021-22, the population of 16 village panchayats decreased by 80% and more. The study suggests that employment opportunities can be increased by establishing institutions, developing infrastructure facilities, providing higher education, and implementing modern innovations in agricultural fields, which can help reduce the number of people who leave rural areas in search of better opportunities.

Keywords : *Rural outmigration, unemployment, Almora, Kumaun.*

Introduction

Almora lies on the southern edge of the Kumaun Hills of the Himalayan range. The region is typically recognised for its mountainous terrain. The people of this district face numerous challenges, including unemployment, poor road connectivity, inadequate education infrastructure, lack of medical facilities, environmental hazards, climate change etc. and the economy is also struggling due to these factors. Another challenge facing people living in the region is that they are not able to use many of the resources which are present in the hills. Migration in the state is a major challenge; however, this is not a recent phenomenon. During the 11th and 12th centuries, significant immigration happened, people moved here from many states such as Gujarat and Rajasthan, as well as the Ganges valley . Pilgrims who came to Uttarakhand for religious purposes eventually made this their permanent home. This continued to happen until the time when the British took control of India. The British colonial administration in India was largely responsible for the beginning of the outmigration trend, which began when youth from the region were recruited to serve in the British Army. After the country gained its independence, people began moving to the plains regions of the country in search of employment and an improvement in their standard of living. Migration, on the other hand, began to pick up steam after 1990, or more accurately, after 2000, when Uttarakhand was separated from Uttar Pradesh and established as a separate state. During the last decade, it has been observed that the rural population is out-migrating at a very high rate.

Research conducted on the causes of migration in the Almora district identified that the main factors of rural outmigration are unemployment 65%, education 22%, drastic conditions of agriculture 13%, poor connectivity of roads, and others (Khan A.H., 2016). Employment and education are the main

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reasons for rural male migration, and women's marriage and household relocation are the main reasons for female migration. (Chandra N, 2018).

The Study Area

The Himalayan state of Uttarakhand, a new and young state of northern India also known as Dev Bhoomi, is divided into two distinct regions: Kumaon and Garhwal. Our study area, the Almora District, lies in the Kumaon region of Uttarakhand and it occupies 3,139 square kilometers of area. Almora is located at $29^0$32' 55" N latitudes and $79^0$44' 35" E longitudes with an average altitude of 1,651 meters.

Objectives

The main objectives of this research paper areas follows-

- To investigate the decadal trend of population growth in the Almora district, with a specific focus on understanding the factors contributing to the significant outmigration of the rural population.
- To examine the reasons behind the high rate of rural outmigration, particularly among the young and educated population, and explore the impact of this phenomenon on the economy and social fabric of the region.

Research Methodology

The research methodology employed in this study aims to comprehensively understand the phenomenon of rural outmigration in the Almora district of Uttarakhand's Kumaon region. The research design involves the analysis of secondary data obtained from reliable sources, allowing for a thorough examination of the trends and factors contributing to the population decline and outmigration in the study area. Further, causes of outmigration are also figured out.

Data Collection: Secondary data about population was gathered from the Block Development Office, Sult (Almora), and a report published by the Rural Development and Migration Commission, Pauri Garhwal, Uttarakhand. These sources were carefully chosen to ensure the credibility and reliability of the data used for the analysis. The data included population figures for 38 village panchayats in the Almora district, spanning the period from 2011 to 2021-22.These panchayats were distributed across five blocks: Sult, Dhauladevi, Bhikiyasain, Chaukhutiya, and Dwarahat. The inclusion of these blocks allowed for a comprehensive understanding of the outmigration trends across different areas within the district.

Data Analysis

The primary focus of the data analysis was to determine the decadal trend of population growth and its correlation with rural outmigration. By comparing the population data for 2011 and 2021-22, the overall decadal growth rate was calculated, revealing the extent of population decline and the magnitude of outmigration in the study area.The data was meticulously tabulated and represented in graphical form to enhance the clarity and understanding of the findings. The use of graphs allows for a visual representation of the trends, facilitating the communication of complex information in a more accessible manner. To understand the underlying causes of outmigration, a thorough review of various research papers, Government reports, and data from block offices was conducted. The analysis highlighted several contributing factors, including unemployment, unfavorable climatic changes, harsh agricultural conditions, inadequate educational infrastructure, and limited access to basic amenities.

Results and Discussion

In this study, secondary data on the present population (2021-22) of 38 village panchayats have been collected from the Block Development Office, Sult. These villages belong to various panchayats in 5 blocks of Almora. The current population data for these villages has been compared with the 2011 census data, and the decadal growth rate has been calculated. There are 16,793 census villages (2011 census) in Uttarakhand of which 15,745 are inhabited and 1,048 uninhabited (2011 census). According to the Almora district statistical report 2022, of 2270

Table 01 : Population Growth Rate of 38 Village Panchayats of Almora District

Sr. No.	Name of Blocks	Village Panchayat	Population 2011	Present Population 2021-22	Decadal Growth Rate (in %)
1	Sult	Besar Bagarh	286	50	-82.52
2		Bhawali	229	172	-24.89
3		Dadholi	1,314	966	-26.48
4		Masouli	506	54	-89.33
5		Punakote	696	207	-70.26
6		Puriya Chaura	840	616	-26.67
7		Sakna	604	540	-10.60
8		Simaristana	1,812	409	-77.43
		Sult Block Total	**6,287**	**3,014**	-52.06
9	Dhauladevi	Bhanoli	1,455	105	-92.78
10		Choun Dungar	467	65	-86.08
11		Choushala	790	44	-94.43
12		Dasoli Badiyar	1,184	42	-96.45
13		Gunadity Gunth	313	146	-53.35
14		Lwtaladfora	113	135	19.47
15		Nayal	244	36	-85.25
16		Palari Garh	509	287	-43.61
17		Pali	1,032	208	-79.84
18		Nainoli	350	37	-89.43
19		Chouna	14	8	-42.86
		Dhauladevi Block Total	**6,471**	**1,113**	-82.80
20	Bhikiyasain	Bajan	373	95	-74.53
21		Bouli	395	63	-84.05
22		Budhli	385	87	-77.40
23		Choura Gaja	202	47	-76.73
24		Dalmori	105	22	-79.05
25		Dunga	85	15	-82.35
26		Mahartana	120	21	-82.50
27		Nirkote	194	38	-80.41
28		Pali	446	72	-83.86
29		Sano	260	58	-77.69
30		Silang	140	29	-79.29
31		Syutara	143	41	-71.33
		Bhikiyasain Block Total	**2,848**	**588**	-79.35
32	Chaukhutiya	Bhatkote	674	152	-77.45
33		Chinoni	278	197	-29.14
34		Dheena	538	14	-97.40
35		Dudhaliya Manral	718	174	-75.77
36		Laluri	138	99	-28.26
		Chaukhutiya Block Total	**2,346**	**636**	-72.89
37	Dwarahat	Wamanpuri	383	95	-75.20
38		Kotila	381	64	-83.20
		Dwarahat Block Total	**764**	**159**	-79.19
		Total	**18,716**	**5,510**	-70.56

Data Source- Block Development Office, Sult (Almora, Uttarakhand)

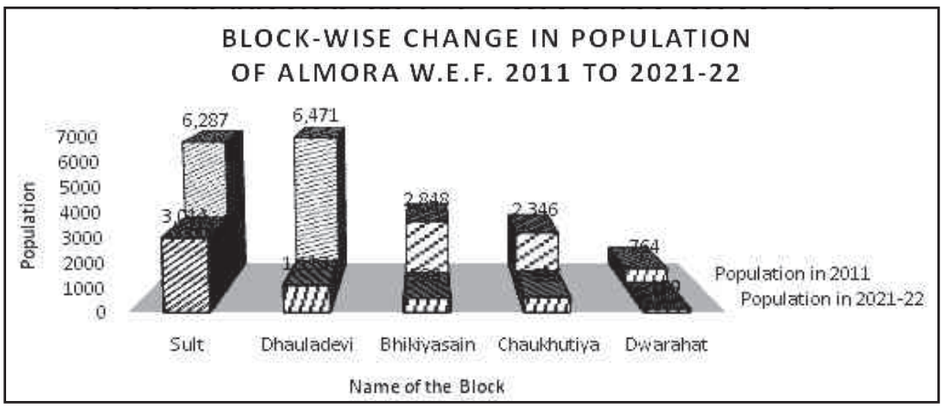
villages in Almora district, 105 are uninhabited. In the last 10 years, the population of almost half of the total number of village panchayats in our study area has decreased by more than 80%. Only one of the 38 villages has a population that has a positive growth rate. While there is one revenue village in Nayal Panchayat of Dhouladevi block became empty during this period. An overall 70.6 % negative decadal growth rate has been observed in the study area. Table 02 indicates that out of these 5 blocks, three blocks- Dhauladevi, Bhikiyasain, Dwarahat-have more than 79% negative growth rate, with Dhauladevi ranked the highest with an 82.8% negative growth rate. While the decadal population growth of Chaukhutiya and Sult has decreased by the rate of 72.9% and 52.1% respectively.

Table 02 : Population Growth Rate of 5 Blocks of Almora District

Sr. No.	Blocks	Population 2011	Present Population 2021-22	Total Out Migration	Decadal growth rate (in %)
1	Sult	6,287	3,014	3,273	-52.1
2	Dhauladevi	6,471	1,113	5,358	-82.8
3	Bhikiyasain	2,848	588	2,260	-79.4
4	Chaukhutiya	2,346	636	1,710	-72.9
5	Dwarahat	764	159	605	-79.1
	Total	18,716	5,510	13,206	

Data Source- Block Development Office, Sult (Almora, Uttarakhand

The graph indicates the block-wise population of the Almora district. The above column shows the population in 2011 and the below column shows the present population of each block. It can easily be concluded that the population of the region is decreasing at a fast pace.



Data Source- Block Development Office, Sult (Almora, Uttarakhand)

Migration away from Uttarakhand is driven by several different push and pull factors. Unemployment, climate change, poor agricultural production, education, and lack of basic infrastructure in rural areas are some of the most prominent causes of this problem. According to the report of the Uttarakhand Migration Commission, the reasons behind this outmigration are unemployment (47.78%), education (11.75%), destruction of agricultural produce by the wild animals (10.99%), medical facilities (8.61%), Poor agricultural produce (8.37%) and lack of infrastructure (3.81%) (Rural Development and Migration Commission Uttarakhand, 2019). The same report highlights that the Gross Domestic Product (GDP) of the hill district is less than 40% of that of the plain district. After leaving their homes, most of the migrants never went back to their original village. As a result, problems associated with depopulation, land abandonment, and food insecurity are becoming more prevalent in rural areas. Additionally, it has serious economic, social and cultural implications for the study region.

Conclusion

The rural area of the Almora district is currently experiencing a widespread problem with outmigration. A significant number of people, mainly young people, have left the region, either temporarily or permanently. In several villages, the elderly and women were the only people who were able to survive with the most basic amenities. Migration has resulted in a loss of population and the abandonment of land in rural areas, both of which have had significant negative effects on agricultural systems. The rate of rural outmigration has been on the rise, particularly since the year 2000, and this trend has only accelerated in more recent years. One of the most significant causes of migration is the high unemployment rate. An increase in employment is not possible in rural areas because these areas lack the infrastructure, business opportunities, agricultural productivity and institutional facilities necessary for such an endeavour. The manifestation of these factors has been a significant out-migration of youth from the region, and if it continues, the out-migration will have severe adverse implications on the economy of the rural areas. It is necessary to take several measures to reduce the number of people leaving their villages and to encourage those who have left to return home. Establishing institutions connected with the process of development is necessary to increase the number of employment opportunities available to the populace of the area. A dedicated tourism policy should be required to be made, which should not only focus on traditional tourism but also on sustainable theme-based tourism. The establishment of educational institutions has the potential to be an effective instrument in the fight against youth outmigration for educational opportunities elsewhere. Agriculture is an industry that could benefit from advancements in modern technology, both in terms of increased crop yield and job opportunities. As a result, the growth of agriculture ought to be ensured on the level of the community. Increased employment is one of the benefits that could result from the government taking the initiative to invest in the construction of new infrastructure facilities.

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ANALYSIS OF LAND USE AND LAND COVER CHANGE USING REMOTE SENSING, OVER THE BARAKAR RIVER BASIN JHARKHAND, INDIA

Umesh Yadav, Kaustubh Narayan Mishra

ABSTRACT

River morphology has been dramatically altered as a result of human land use activities and land cover changes in the Barakar River, Jharkhand, India. The study area focusses on the current work on the generated long time-series land use and land cover (LULC) change from 2011 to 2021 and investigate the LULC changes and river morphology changes of the Barakar River. To highlight the transition between LULC, an intensity analysis of the LULC changes was performed. The detection of targeted transitions from natural to disturbed lands has an impact on the basin's river morphology. River morphology changes along the Barakar River basin were identified based on area analyses such as barren land, agricultural land, river basin area, and built-up area. Vegetation decreased by 2.5%, agricultural land increased by 4.7%, barren land decreased by 6%, built-up increased by 2.6%, reservoirs increased by 1.5%, and rivers decreased by 0.07%, according to estimated percentage area change. These changes explain why the majority of the vegetation and barren land has been converted into agricultural land, with some of it being covered by built-up areas.

Keywords : *LULC, The Barakar River, Remote Sensing.*

Introduction

The study of the evolution and changes of landforms on the surface of the planet brought about by endogenous and exogenous causes is known as geomorphology. Unsustainable use of the environment's natural resources has been prevalent during the past two centuries and has a detrimental impact. The baseline imaginary mapping and further tracking that are a component of the LULC investigation are merged with later information and data to figure out the situation that is present. Water resources are being compromised by humans more frequently each day. Mechanical works, industrial operations, modernity, changes in land use and land cover (LULC) on one or even both sides of the river, and other human work activities along the river basin are only a handful of the numerous ways that human work modifies the river channel and its morphology. Water is one of the important elements due to which earth has different life forms.

The Study Area

Geographically, Jharkhand is surrounded by the states of Uttar Pradesh to the northwest, Bihar to the northwest, West Bengal to the east, Odisha to the south, and Chhattisgarh to the west. The state is divided into 24 districts and has an area of about 793078 hectares out which study area is cover 6,15,900 hectares. Jharkhand is the mineral hub of India. On 15th November 2,000, it was separated from the southern portion of Bihar to become the 28th state in the union.Jharkhand is a state in eastern India, roughly between latitudes of 21.97° N and 25.08° N and longitudes of 82.42° E and 87.49° E out which study area extension is approximately 85.5°E to 87° E and 23.5° N to 24.5° N.Damodar River's principal tributary in Eastern India is the Barakar River .The major geomorphic units found in Jharkhand are Chota Nagpur Plateau, Eastern Ghats, by several

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rivers and their valleys, such as the Damodar River, the Subarnarekha River, the Koel River, and others.Usri and Barsati Rivers, two of the major tributaries, originate in the south and north, respectively. There are fifteen average and minor streams linked in addition to the two tributaries. It flows through the Jharkhand districts of Hazaribagh, Dhanbad, Koderma, Giridih (JHARKHAND) and Asansol (WEST BENGAL). Tilaya in the Hazaribagh district, Belparhari in Girdih and Maithan in the rivers southeast is two of its well-known dams.The Barakar River is the lifeline of the north-eastern part of Jharkhand.

According to the census of India (2011), population of Jharkhand is 32.96 million (3.29 cores), out of which the study area population is 75,80,715 (23.04%). Sex Ratio of Jharkhand state is 947 females per 1,000 males while the study area have sex ratio approximately 938 females per 1,000 males.The Jharkhand state have literacy rate is 66.41 % while the study area average literacy rate of four district is 68.56%.Jharkhand is renowned for its diverse tribal population, comprising various communities such as Santhal, Munda, Oraon, Ho, Kharia, each with its distinct culture, traditions, and languages.

Objectives

The following are the main objectives of the study:

- Geospatial assessment of Land Used Land Cover Changes over the Barakar river basin.
- To examine the spatial distribution and extent of various LULC types in the basin and their changes over time.

Methods of Data Collection

For the research area, data have been collected and used secondary as well as primary data sources for the evolution of the effect of the (LULC) changes from satellite imagery of different time frames. To get the secondary data obtained information from various data sources just like the satellite images getting through different agencies like ISRO, USGS, and others for the spatial-temporal changes. The major tool for imagination is the remote sensing technique. Remote sensing is a method for gathering data about the features of the planet without coming into direct physical touch with it. The use of remote sensing techniques can deliver extensive information in both time and space. For the demarcation and reconstruction of the river channel, aerial photography and satellite images can offer a very effective way of finding hints as to where and how the river migrated. The properties of erosion and deposition can be studied using temporal satellite data. The Study area means The Barakar river basin include the toposheets are 72H/7, 72H/8, 72H/11, 72H/12, 72H/16, 72L/4, 72L/8, 73I/9, 73I/13, 73I/14 which issued by Survey of India.

Research Methodology

The basin area has been calculated and it has been categorized into the giving form of LULC as a constructed area for humans, infertile land, agricultural land, water storage areas, river, and flora & fauna. The LULC categories have been identified and the category-wise change in inland use at different time frames has been calculated. The land use categories have been authenticated with ground truth verification during the field survey.

The data is Land Use Land Cover is performed over The Barakar river basin using Landsat satellite product. Landsat is a series of Earth observation satellites, established jointly by the National Aeronautics and Space Administration (NASA) and the United States Geological Survey (USGS) (Wulder et al., 2008). First Landsat (I) was launched in 1972 to record global coverage (Williams et al., 2006). So far 8 Landsat missions were launched have four different types of sensor MSS (1-3), TM (4-5), ETM+ (7), and OLI/TIRS (8). A detailed description of given in table 1. In this study, we have used Landsat TM to generate the LULC map of 2011 and Landsat OLI/TIRS for 2022. Landsat TM was placed in orbit in 1984 and was operational till 2012 whereas Landsat OLI/TIRS

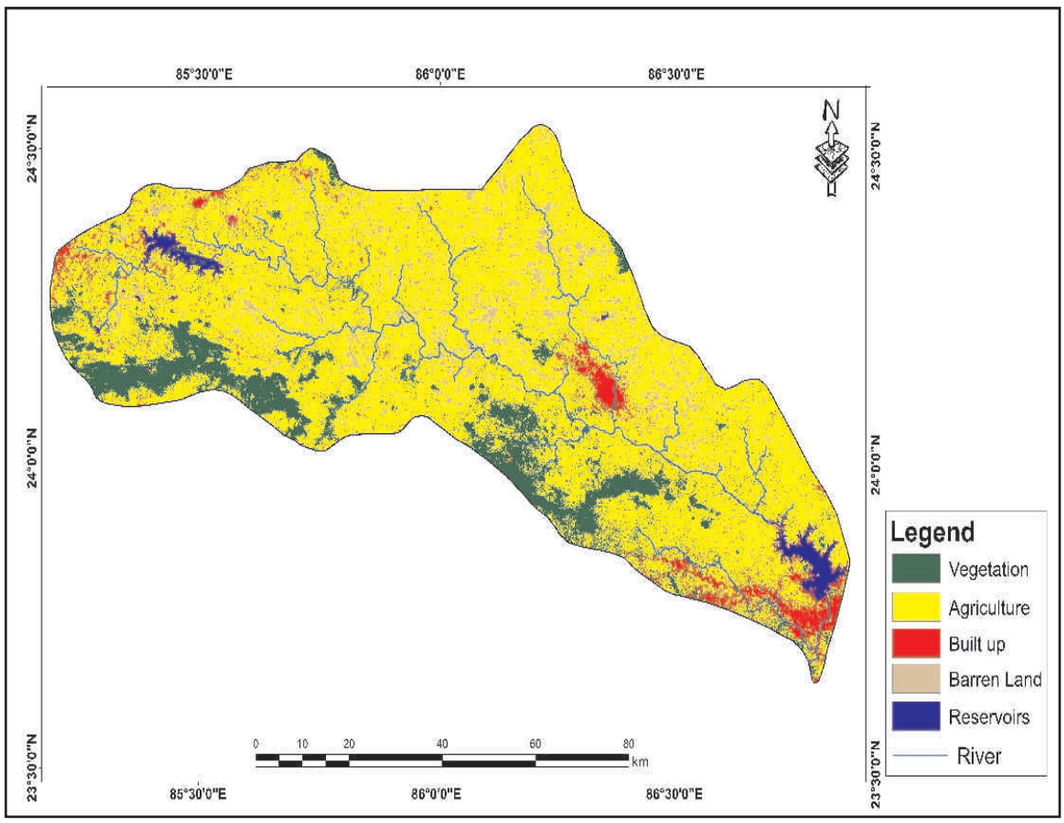
Table 01 : LAND-SAT Product Details.

Sensors	Bands		Wavelength (micrometres)	Resolution (meters)	Acquisition Years
Multispectral Scanner (MSS)	Landsat 1–3	No. of Band = 3 to 4	0.5-1.1	□60	1972–2001*
Thematic Mapper (TM)	Landsat 4–5	No. of Band = 7	0.52–12.35	□30	1984 –2012
Enhanced Thematic Mapper Plus (ETM+)	Landsat 7	No. of Band = 8	0.52–12.35	□30	1999–On going
Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS)	Landsat 8	No. of Band = 11	0.43–12.51	□30	2013–On going

was launched in 2013 and provides data to date. The spatial resolution of both the satellite product used is 30 meters with a temporal resolution of 16 days (Wang, et al., 2017). Data archived for LULC is from the month of October as during this month less probability of getting cloud-contaminated imagery.

Results and Discussion

Supervised Learning technique is used for generation of LULC map for both years. The entire work is performed over QGIS 3.18.2. Both the images are classified into six prominent classes which are (i) Vegetation, (ii) Agricultural Land (iii) Barren Land, (iv) Built, (v) Reservoirs (vi) Rivers. Results depict that in 2011 (fig. 01) majority of the land is covered with agricultural land (3,56,721 hectares) followed by vegetation (1,28,516.4 hectares). Some clusters of built-up areas (50,123.5 hectares) can be seen along with some patches of barren land (1,71,651 hectare). A similar pattern is observed over 2022 (fig.02) having a high built-up area (69,361.6 hectares) and low vegetation (1,09,622.7 hectares) area comparably with 2011 LULC. Change in water bodies is observed from 1,31,08.9 hectares to 24,721.5 hectares and rivers changed from 9,781 hectares to 9,223 from 2011 to 2022 respectively. Estimated percentage area change suggests that Vegetation decreased by 2.5%, Agricultural land increased by 4.7%, Barren Land decreased by 6%, Built-up is increased by 2.6%, Reservoirs is increase by 1.5% and rivers decreased by 0.07%. These changes explain that most of the vegetation and barren land is converted into agricultural land where some of them are covered in the built-up area. Huge change can be noticed at reservoirs may be due to the increase of artificial ponds within the area. Some error in classification is also one of the reasons as some shadow regions or dark pixels may be classified into water bodies.



Source: LANDSAT 7 & 8 Fig. 01: LU-LC 0f The Barakar River of 2011

Table 02 : Percentage Change Matrix and Classes.

		Area (hectare)			Changes
Class	2011	%	2022	%	
Water Bodies	13,108.9	1.79	2,4721.5	3.38	1.590985
Vegetation	1,28,516.4	17.6	1,09,622.7	15.01	-2.58853
Barren Land	1,71,651	23.51	1,26,212	17.29	-6.22537
Agriculture	3,56,721	48.87	3,90,802	53.53	4.66927
Built up	50,123.5	6.89	69,361.6	9.50	2.635717
River	9,781	1.34	9,223	1.26	0.07645
Total	7,29,901.8	100	7,29,942.8	100	

Source for data table 02: Computed by Author

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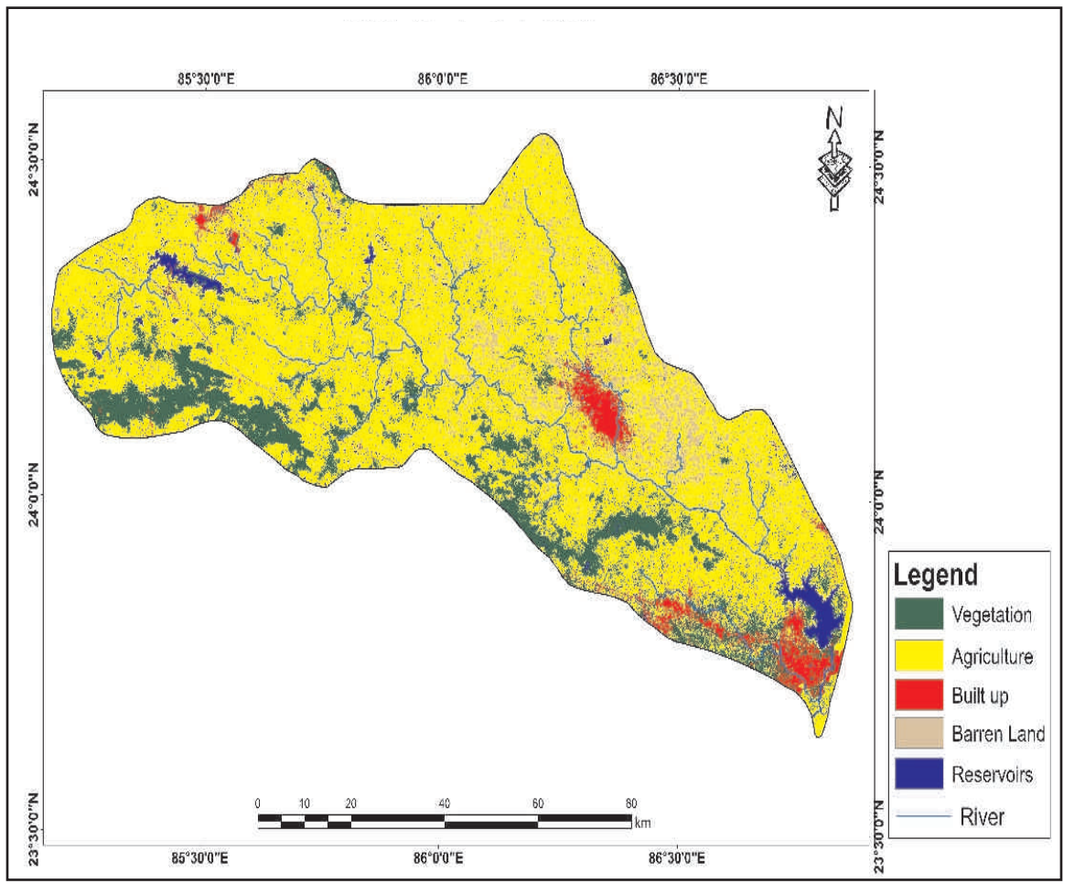

Source: LANDSAT 7 & 8. Fig.02 : LU-LC 0f The Barakar River of 2022.

Area Calculation = $\frac{\beta_i (X_i Y_i)}{10^6}$ 1

(ι) = Total number of pixels for ith class

Y(i) = Width of each pixel

(i) = Length of each pixel

% change formula ($Area_{2022}$ - $Area_{2011}$) $\frac{100}{\text{Total Area}}$

.....2 Verma, et al 2022

The table 02 show the total classes and percentage change and equation 1 calculate the total area and equation 2 calculate the total percentage change over the given year.

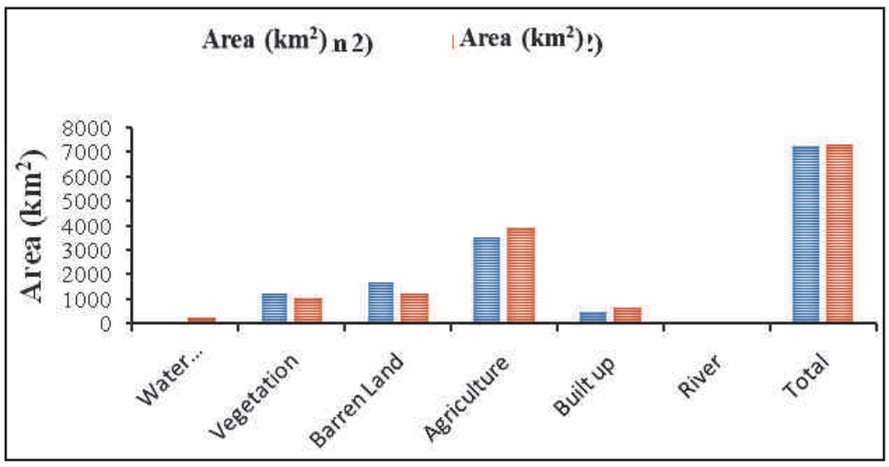

Fig. 03 : Area cover change for the 2011 and 2022

Source: Landsat 7 & 8

The fig. 03 show the total number of classes and percentage change between 2011 and 2022 use of Landsat 7 and Landsat 8. We can see in the table 02, total vegetation (2.5%) and barren land (6.2%) decreases over years and agriculture is increases maximum (4%). Build-up and water body area also increases with 2 % and <1 % respectively.

Conclusion

River morphology, vegetation and barren land area have been changed due to the human activity and nature. It has been observed that calculated percentage change and total area of The Barakar river basin over the year. The Barakar River basin were identified based on area analyses such as barren land, agricultural land, river basin area, and built-up area. According to estimated percentage area change, vegetation decreased by 2.5%, agricultural land increased by 4.7%, barren land decreased by 6%, built-up areas increased by 2.6%, reservoirs increased by 1.5%, and rivers decreased by 0.07%. These changes explain why most of the vegetation and barren land has been converted to agricultural land, with some of it covered by built-up areas.

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STUDY OF GEOTOURISM POTENTIAL IN CHITRAKOOT DHAM REGION USING SWOT ANALYSIS

Anil Kumar and Pranay Kant Biswas

ABSTRACT

The Chitrakoot Dham is an ideal religious region located on the border of Uttar Pradesh and Madhya Pradesh. This is a famous Hindu pilgrimage site in India. It is flanked by the famed Vindhyachal Range's green hills. The geological structure of the Vindhyan range has inspired religious and spiritual stories that continue to be passed down through generations, highlighting the enduring relationship between human culture and the natural world. The Chitrakoot Dham region is associated with geoheritage sites of Vanvasi Ram's exile, and the geotourism potential of these geoheritage sites has been chosen as a research topic. The focus of this research is to highlight Chitrakoot Dham's potential as a geotourism destination and identify the region's SWOT (strengths, weaknesses, opportunities, threats, and interactions) in this regard. Based on the findings of the SWOT and TOWS (Threats, Opportunities, Weaknesses, and strengths) analysis, this tried and tested SWOT model Through these analyses, it can be concluded that the Chitrakoot Dham region has significant geotourism potential, but due to religious supremacy over scientific approaches, it is now only in the discovery stage. On the basis of stages in Butler's tourist cycle of destination evolution. As far as the geotourism aspect goes, the study's results also show that there are different ways to deal with current problems and pave the way for the geotourism aspect to grow in the future.

Keywords : *Hindu Pilgrimage, Vindhyachal, Geoheritage Sites, SWOT, Religious, Butler's tourist cycle.*

Introduction

The Chitrakoot Dham region in India is an adjoining region located on the border between the states of Uttar Pradesh and Madhya Pradesh. This region is famous as a pilgrimage destination. Geologically, this region lies inside the Vindhyan range, which is one of the oldest mountain systems on the Indian subcontinent. It acts as a physical separator between southern India and northern India. The range is rounded and composed of mountains and hills. The Chitrakoot range of the Vindhyan Range is home to a significant number of locations that are recognized as being of geological significance.

This paper is an effort to examine the geoheritage potential of the region and suggest actionable components for developing geotourism in the area. It is believed that this region was home to Lord Rama for a sizeable portion of his time spent in exile. Lord Rama is the focal point around which the entire region of Chitrakoot is organized. There is the possibility of gaining additional knowledge regarding the cultural and historical mixing that took place on this sub-continent.Chitrakoot is a well-known spiritual retreat where explorers and adventurers go almost every day of the year to look for something unique and undiscovered.

Objectives

1- To prepare a catalogue of the geoheritage sites of the Chitrakoot Dham region.

2- To conduct a SWOT and TOWS analysis for an assessment of geotourism potential.

3- To suggest recommendations to utilize the geotourism potential of the region.

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2. Dr. Pranay Kant Biswas, Assistant Professor, C.M.P. Degree College, University of Allahabad, Prayagraj.

The Study Area

Chitrakoot Dham is located between latitudes 24° 21' 15.6996" N to 25° 32' 53.9556" N and longitudes 80° 27' 55.9362" E to 81° 15' 43.9986" E on the border of the districts of Satna in Madhya Pradesh and Chitrakoot in Uttar Pradesh.It is said that the Chitrakoot Dham region encompasses a total of 35 villages spread throughout the states of Uttar Pradesh and Madhya Pradesh. This study made use of the entirety of both the Karwi tehsil in Uttar Pradesh and the Raghu Raj Nagar tehsil in Madhya Pradesh. Chitrakoot (NP) serves as the focal point of our study area, functioning as a central Town and Nagar Panchayat/Nagar Parishad. As per the 2011 Census of India, the population of Chitrakoot city is 23,316, comprising 12,675 males and 10,641 females. The population of children aged 0–6 constitutes 15.72% of the total. The sex ratio of Chitrakoot is 840, which is higher than the state average for Madhya Pradesh, which is 931. It means there is the lowest sex ratio in Chitrakoot. The total literacy rate is 59%, of which 67.83% of men and 48.49% of women are literate. The literacy rate in Scheduled Castes (SC) and Scheduled Tribes (ST) stands at 19.94% and 7.49%, respectively. The data concludes that the region is the least backward.

The study area falls within the Bundelkhand Region, characterized by a landscape that is frequently hilly and undulating, intersected by numerous streams and rivers. The area is encompassed by the Mandakini, Valmiki, Gunta, Gedua, Chakara, and Jhuri rivers, which contribute to its drainage system. Geologically, the study area is part of the Semri group. The Semri group's sedimentary package may be seen in the region. This package marks the northeast Vindhyan basin border. The Chitrakoot Formation, which uncomfortably tops the remnant hills in the northern and northwestern sections of the region (Banerjee A. K. and Singh L.I. J. M., 1981), may be observed in several locations. The Mesoproterozoic Semri Group Chitrakoot Formation is encountered in and around the town. Vertical and lateral facies variation disrupt the Semri Group stratigraphic sequence in the Chitrakoot sub-basin's Lodhwara, Sangrampur, Kamatanath, and Muradpur hill sections (Battacharyya, A. 1996). Anbarasu, K. (2001), Chakraborty, P. P., Dey, S., and Mohanti, S. P. (2010).

Research Methodology

The research methodology is based on a three-step process. In the first part, remote sensing and GIS techniques are used to identify and map geoheritage sites. Geoheritage sites are identified using Google earth pro and 10-m-resolution Sentinel-2-A images. Merge and clipping tools are used to make maps. In the second part, the bibliographical-speculative strategy is used to build a theoretical framework. In the third part, we used a Google form to collect primary data. For data analysis, we used a descriptive approach. Using a SWOT analysis, which looks at the study's strengths, weaknesses, opportunities, and threats, gave more reliable results. The TOWS analysis is a strategic and analytical study that uses the SWOT analysis to learn more about how the four variables affect each other (strengths, weaknesses, opportunities, and threats). We prepared a matrix to start making plans based on these connections. As a result of our research, we now know more about whether or not these geoheritage sites should be part of Chitrakoot Dham's geotourist offering. Combining the TOWS and SWOT analyses helped us come up with a better strategy.

In the TOWS analysis, a strategy is created by balancing strengths, weaknesses, opportunities, and threats. Four elements make up a TOWS analysis:

1. Maxi (SO): This tactic is focused on advantages and strengths. It covers the application of strengths for the achievement of certain possibilities.

2. Maxi-mini (ST): This method demonstrates strengths relative to risks (such as competition). Essentially, the goal of management should be to employ all available resources to reduce or eliminate dangers.

3. Mini-maxi (WO): This approach reveals flaws in connection to opportunities. It is essential to be able to seize certain possibilities. One must overcome short comings.

4. Mini-mini (WT): In light of potential threats, this technique reveals several serious flaws. It is a strategy that is heavily oriented towards defence. The objective is to maximize strengths and minimize weaknesses while avoiding threats. For the TOWS analysis to work, we defined both the information used in the analysis and the information used to find the key relationship between the environmental variables. It also needs a systematic look at both the inside and outside of the environment.

Concept of Geotourism

Geotourism is a type of tourism that protects or promotes a place's environment, history, aesthetics, culture, and the health and wellbeing of its people. Geotourism is a type of tourism that involves geological sites and attractions (Dowling, R., and Newsome, D. (Eds.) (2006)). Geotourism is all about the built and natural environments. In England, Thomas Alfred Hose was the first person to use the word "geotourism" in 1995. The idea behind "geotourism" is much older, but it has only become popular in the last few years. It's a way to take a vacation that's good for people with specific interests. In a nutshell, geotourism is the use of tourism to preserve geological history and culture through guided tours and other educational experiences (Tomi, 2016). As the 20th century came to an end, geodiversity and heritage were widely promoted and explained. To put it simply, geotourism is a way to find geosites and make them more important. Because of this, the safety of geoheritage and geosites will improve (Hose, 1997; Hose, 2005). Hose and Vasiljevi (2012) defined modern geotourism as "the provision of interpretative and service facilities for geosites and geomorphosites and their surrounding topography, as well as their associated in situ and ex situ artifacts, to build support for their conservation by encouraging appreciation, learning, and understanding."

Results and Discussion

In India, religion and nature, particularly geological and geographical features, are so intricately intertwined that attempting to separate them renders them incomprehensible. The geotourism of Chitrakoot Dham stands as a prime example showcasing this profound connection. During primary data collection, we found that most of the tourists who came here were not geotourist because their primary aim for visiting the area was religious. They wanted to see the places where their Lord Rama spent his exile. All these places are geoheritage sites. Just like Gupt Godavari is a solution cave made of a type of rock called Tirohan dolomite (Prasad, C. 1986, 87, 88), this world-class geoheritage site is now the most popular place for religious tourists to visit. Janaki Kund, formed from Tirohan Dolomite dissolution, attracts pilgrims who believe Sita Mata's blessings purify souls through its holy waters.

The outcomes of a survey conducted by the authors during a field visit from April 9, 2022, to April 25, 2022, revealed diverse motivations driving visitors to the area. Religious activities were the main reason for 46.2% of individuals, underscoring the region's religious significance. Local residents accounted for 17.2% of visitors, reflecting their deep connection to the area. Business-related purposes drew 10.8% of visitors, highlighting the economic activity in the region. Health-related visits constituted 8.6%, attributed to the presence of Sadguru Netra Chikitsalay, a medical facility catering to healthcare needs.

Interestingly, geotourism had the least attraction among visitors, implying that the area is n't currently recognized as a prominent geotourism destination. Nevertheless, this signals potential for future exploration and development. The findings underline the room for growth in geotourism, presenting a unique and unified offering in the tourism market. The distinctive Gupt Godavari Cave, with its natural and religious significance, could serve as a geotourism focal point. Linked to the ethical narrative of Lord Ram, the region's political and economic conditions also influence tourism. A significant challenge is the absence of a comprehensive management plan for holistic development, which is seen as a potential threat.

While the Geological Survey of India (GSI) hasn't designated geosites in the region as Geological Monuments, the possibility looms on the horizon.

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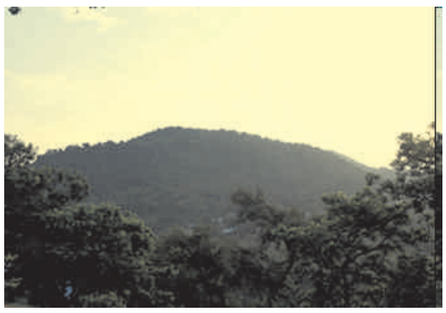
Catalogue of Chitarkoot Dham's Geoheritage Sites

Gupt Godavari Cave, Lat-25°5'52.54" Long-80°46'7.644" Elevation -682 feet (Photo taken by author)



Kamadgiri Hill,Lat-25°10'13.28",Long 80°50'50.8776",Elevation-1006feet (Photo taken by author)

Lakshman Pahadi,Lat- 25°9'54.57" Long-80°50'15.7092", Elevation-658 feet(Photo taken by author)

Sphatic Shila,Lat-25°8'50",Long-80°51'24.336"Elevation-496feet(Photo taken by author)

Janakikund,Lat-25°9'32",Long-80°51'51.012"Elevation-464 feet(Google earth pro imagery)

Sati Anusuiya,Lat-25° 6' 31.12,Long-80°50'27.7944" Elevation-559 feet(Photo taken by author)

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Shabri Water Fall

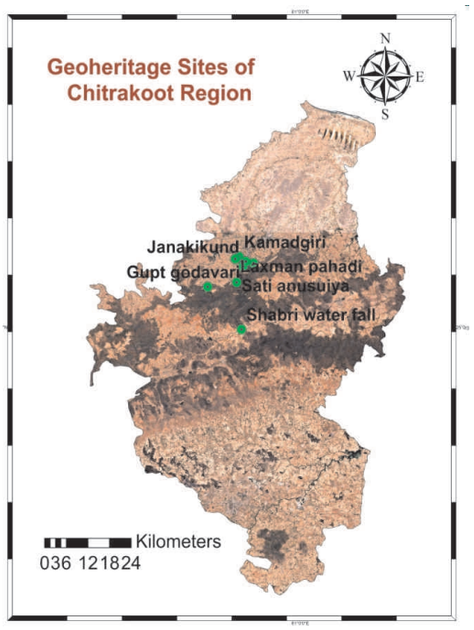

Figure 01: Geoheritage sites of Chitrakoot Dham Source : prepared by Author using QGIS open source software.

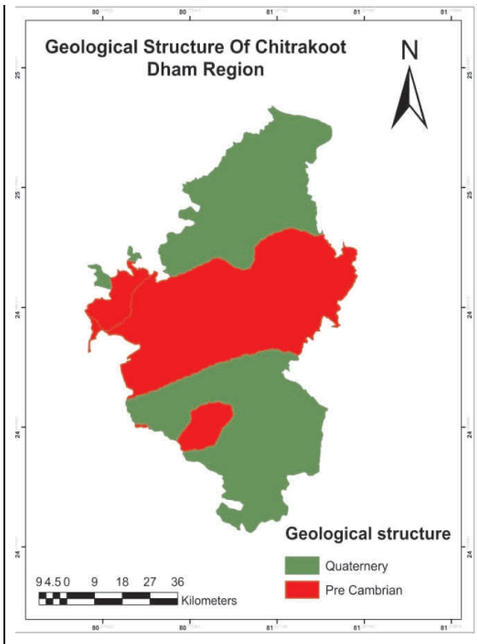

Figure:02 Geological structure of Chitrakoot Dham Region. Source : Prepared by Author using QGIS open source software.

Such a designation integrates geological heritage conservation with community development. It's imperative for tourism administrations in Karwi, Chitrakoot Nagar Parishad, and both states to establish an action plan ensuring sustainable operations. This strategic approach fosters consistent tourism growth while maximizing existing resources.

Swot analysis

Swot analysis is based on primary data collection (google form) and secondary data from website of up tourism department/other sources.

Table : 01 Swot Analysis

Strength	**Weakness**
1- Unique geoheritage site with religious characteristics, Janaki Kund (Tirohan Dolomite Solution Resultant Landform, Kumar (1977), Kamatanath Hill (Good exposure of Bundelkhand granite gneiss complex, Wacke type sandstone shown here, Jaiswal, July 2013). Shabri Waterfall (Bundelkhandian Niyagra Formed by Flow Stream on Red Sand Stone Rock Formation), Attractive Natural landscapes of Shabri water fall and Kamatanath hill. 2- Geological/Geomorphological features of the region. 3- Good road Connectivity among all geoheritage sites. 4- Every site holds religious significance intertwined with geoheritage, as each location is linked to the narrative of Lord Rama's exile. 5- Pollution free Environment.	1- Insufficient and poor quality promotion of the local tourism infrastructure. 2- Lack of investments in tourism and scientific exploration. 3- Amid competition from more developed geotourism destinations in India. 4- Lack of investments in transport facility, lack of geotourism marketing. 5- Supremacy of Religious views. 6- Lack of scientific knowledge about geoheritage value Basic Infrastructure Advertisement. 7- Religious plunder and mismanagement.
Opportunity	**Threat**
1. With the right scientific explanation and promotion, Gupt Godavari has the potential to become a top -notch geotourist site. 2. Shabri Falls is beautiful and has geotourist attraction capability. This is located in a beautiful valley in a quiet and peaceful s etting. This waterfall might be Niyagra of Bundelkhand. 3. The pollution -free environment in this region can provide the potential for sustainable and economically viable development through geotourism. 4. By leveraging the concept of PPP (public-private partner ship) as part of corporate social responsibility, this region could potentially become India's leading geotourism hub.	1- Lack of geoconservation. 2- Mismanagement of geoheritage sites. 3- Poor Infrastructure. 4- Tourism overcrowding. 5- Lack of awareness about geodiversity. 6- Impact of Climate change on geoheriatge sites . 7- Illegal mining.

Table : 02 TOWS Analysis (How Four Variables Affect to Each Other)

		Internal Condition	
		Strength	**Weakness**
	Opportunities	**SO strategy: maxi- maxi** 1. Establishing geotourism (integration of all Geoheritage sites and single regulatory body for the region); 2. Developing features to promote geotourism; 3. Hydrological strength, Sati anusuiya, Shabri water fall, Gupt Godavari; 4. Modernization of street signs and informational panels; 5. Increasing awareness of the local culinary heritage and hospitality 6. Identification of Chitrakoot as a possible candidate for geopark designation.	**WO strategy: mini- maxi** 1. Establishing single regulatory board for whole region; 2. Increasing awareness about geoheritage with the assistance of local government and corporate social responsibility initiatives; 3. More active promotion of scientific approaches to religious tourism; 4. Implementing the fundamental concepts of sustainable development; 5. Increasing one's awareness of environmental issues.
	Threats	**ST strategy: maxi- mini** 1. Promote involvement of qualified people related to geo-tourism; 2. Equal infrastructural development in the whole region (both on the U.P. and M.P. side); 3. Establishing several tourist information centers (including geotourism) in the region; 4. Provide an information brochure which includes the geoheritage value of the region along with religious information; 5. Foundation of the Geo Heritage Research Organization, which would take into account all of the region's attractions and possibilities and promote geotourism in Chitrakoot Dham as an important destination important destination.	**WT strategy: mini- mini** 1. Maximum and s ustainable use of geo-resources; 2. Correlating the tourism industry to other forms of employment; 3. Improvements to existing roadways and other components of the infrastructure; 4. By incorporating tourism activities, tourist organizations may establish more effective and professional relationships.

Aplication of Butler's Tourism Location Model in Chitrakoot Dham Region

Butler's tourism destination area life cycle model, also known as the Butler's tourism location model, was developed by Canadian geographer R.W. Butler in 1980. The model is based on the idea that tourism destinations go through a predictable cycle of development, from exploration and discovery, through growth and consolidation, to maturity and decline.

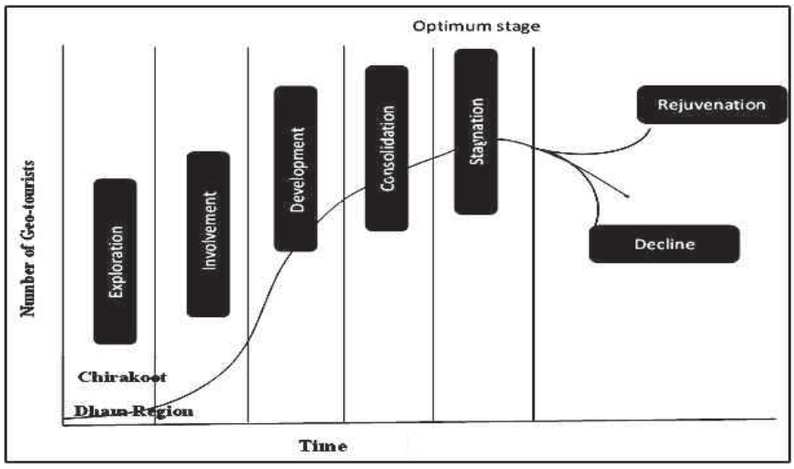

Figure 03 :Application of the Butler Tourist Cycle of Evolution Model in Chitrakoot Dham Region (after Nemanja Tomic, Aleksandar Antic,2017)

Applying Butler's model to the Chitrakoot Dham region, we observe that Region is in an exploratory phase. The region predominantly features self-contained tourism amenities primarily focused on religious activities. Accommodations such as Dharmshalas and Ashrams cater to devotees, complemented by local lodging options like lodges; however, higher-tier hotels such as three- and five-star establishments are absent. As above SWOT and Tows analysis the region has potential to become a geotourist destination.

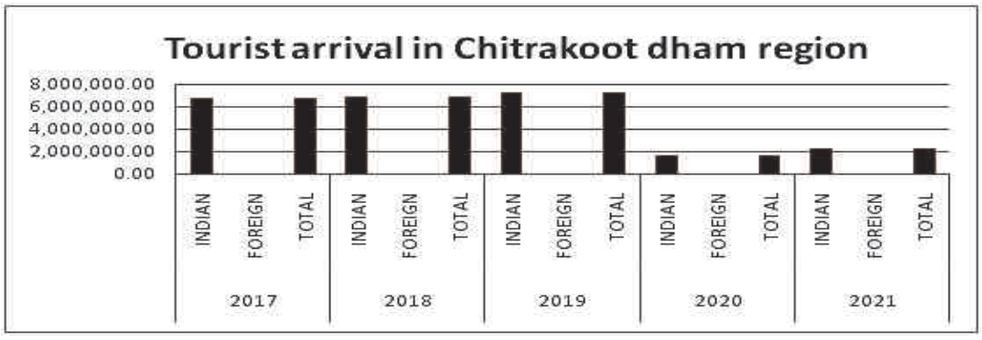

Figure 04: Tourist Arrival in Chitrakoot Dham Region following Butler's Model (prepared by author data source Up tourism)

Conclusion

The purpose of this research is to show what the Chitrakoot Dham Region has to offer in terms of geotourism and geoheritage, as well as what needs to happen for this area to become more involved in geotourism. Our SWOT analysis shows what this tourist spot's strengths, weaknesses, opportunities, and threats are. The TOWS study included every step required to learn more about the Chitrakoot Dham Region, recognize it, and ultimately engage it to develop geo-tourism potential. The suggestions presented are effective responses to the issues and current condition of the field. The analysis revealed that tourism has a lot of potential, both in terms of natural and artificial resources. By using the methods suggested by the TOWS analysis, the natural and man-made values are highlighted, lucrative tourism opportunities are discovered, and a setting is produced that highlights the geological, geomorphological, and archaeological qualities. The abundance of diverse geological and cultural (religious) characteristics in the Chitrakoot Dham Region makes it an ideal location for the growth of geotourism.

This region is divided between two provinces; most of the geoheritage sites are situated in Madhya Pradesh, and some of them in Uttar Pradesh. Both state governments should come together to form a single regulatory authority for the development of the region, so it will be easy for tourist organizations and agencies to carry out their promotion plans for the region. To begin with, however, in order to achieve the goal of increasing the number of visitors, it is essential for organizations that focus on tourism to work together with travel agents. Academic institutions specially situated in this region (Chitrakoot Gramoday University) should come forward for scientific exploration of the region's geoheritage sites.

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GENDER DIGITAL DIVIDE: HOW FAR WOMEN LAG BEHIND

Pooja Pal and Suman Singh

ABSTRACT

Well-being and development are no longer defined based on economic prosperity alone but must incorporate quality and equality in all spheres is a matter of great complexity. The digital divide's importance was noticed during the Covid-19 pandemic, which served people's needs in various facets of life. The study is an attempt to understand the gender digital divide encompassing data from different reports and analyse the status of digital inclusion of women globally and in India as well. It assesses the data from Global System Mobile Association (GSMA), 2018 and National Family Health Survey (NFHS-4 & NFHS-5) data. The study also explores the factors affecting the gender digital divide and expresses the concern about including the other half (women) in main streaming digital world. The study finds that a colossal gender gap exists in accessibility and ownership across the world and India. Further, there is also an evident gap between rural-urban context. To overcome this gap women should be provided with access to the internet and affordable smart phones. Women should be engaged in digital training programs and skill development to bridge the existing gender gap.

Keywords: *Development, Gender digital divide, Digital Inclusion, GSMA, NFHS.*

Introduction

Digital divide and information poverty are significant issues prevailing across society. Digital divide refers to the gap between people who have adequate access to information communication technology (ICT) and people who have poor or no access to ICT (Soomro, et al., 2020).

It highlights the lack of accessibility and knowledge to use digital platforms and Information and Communication Technology (ICT). World Bank's (2016) world development report on "Digital Dividends" indicated that women's access to ICT is the third most important issue for women after poverty and violence. Financial constraints stop women from spending money to access digital literacy and afford its utilization in daily life.

The digital divide is one of the most significant virtual inequalities as women lag in availing the benefits and require the attention of geographers and social scientists. ICT including the computer, Internet, and mobile phones, has enormous potential to unify humanity and connect the whole world into one big family.

It reduces the distance across the globe as everyone can connect anytime. In any given spatio-temporal context, computers, the Internet and mobile phones enable information sharing at greater convenience at the global and local levels. Gender equality necessitates equipping both males and females with equal access to capabilities; so, they can choose opportunities that improve their lives. World Development Report 2016 reported that globally the wide variety of users has tripled in a decade, from 1 billion in 2005 to an expected 3.2 billion by the end of 2015.

Despite the critical importance, very few

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women and girls have access to digital information, resulting in the problem of a gender digital divide across nations and societies, implying an uneven distribution of digital technologies and creating an imbalance in gender equality. This is mainly influenced by the exclusion of women from technology education (Bala, 2017), the high cost of technologies, financial and institutional constraints (Bala, 2017), lack of required skills, and remote locations (NFHS-4 and 5).

Objectives

1. To comprehend the concept and measurement of the gender digital divide.
2. To assess the gender digital divide across World and India and the factors affecting it.

Database and Research Methodology

The study is primarily based on extensive literature and secondary data related to the subject matter. The secondary data sources include the report published by the Global System Mobile Association (GSMA) Intelligence, 2018. GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Secondary data is also extracted from the National Family Health Survey 2015-16 and 2019-21, conducted by the Ministry of Health and Family Welfare, which provided information about mobile ownership in the Indian context. Internet and Mobile Association of India (IAMAI) is a not-for-profit industry body registered under the Societies Registration Act, 1860. Its mandate is to expand and enhance the online and mobile value-added services sectors. It is dedicated to presenting a unified voice of the businesses it represents to the government, investors, consumers, and other stakeholders.

Concept and Measurement of Digital Divide

The term 'digital divide' received considerable attention in a U.S. Department of Commerce report in 1995 to raise the issue of the 'haves' versus the 'have-nots' in rural and urban America who were not able to access or participate in the IT revolution (Compaine, 2001). The inequality between those with consistent, adequate access to digital information and those who lag far behind is called Digital Divide. The report by the National Telecommunications and Information Administration (NTIA) in 1995 attracted public attention concerning the Digital divide. The report discussed Internet access in rural and urban United States and called for a study on Internet usage and its prevalent gap.

The digital divide is the gap between those who have accessibility to latest information technology and those who lack it (Soomro, et al., 2020). Jha and Pandey (2016) opined that the individual-level divide is much more relevant to frame the course of action to bridge the digital divide. According to OECD(2001),the digital divide is the gap at various socio-economic levels among individuals, households, businesses, and geographic areas. It concerns their opportunities to access information, technology, and Internet usage for various purposes. The digital divide can also be defined as the socio-economic difference between people accessing ICT (Ramona, 2014). The term also refers to gaps between groups in their ability to use ICTs due to varying literacy and technical skills and the gap in the availability of quality, valuable digital content.

What is Gender Digital Divide?

The gender digital divide can be defined as the unequal opportunity for information and communication technology use between men and women in social, political, economic, and cultural domains. UNESCO interpreted the Gender digital divide as one of the most significant inequalities to be amplified by the digital revolution (Primo, 2003). It is also defined as an under-representation of women in the ICT sector. Women can connect to digital space with physical access and sufficient skills (Cooper and Kimberlee, 2003). Women can use ICT as an empowerment tool, leading to gender equality (Khan and Ghadially, 2010). By recognizing the significance of the digital gender divide for women, United Nations placed information and communication technology at the centre of its new sustainable development goals

for 2030, with countries assuring to amplify the gender equitable access and usage of the digital world for women.

Results and Discussion

Gender Digital Divide Across Different Regions of The World

A report, 'Women and Mobile: A Global Opportunity' published through GSMA (Global System Mobile Association), on their Internet Usage and SIM Ownership survey shows the Gender gap in access to mobile and the Internet. It was found that over 1.7 billion females with low and middle earnings do not own a mobile phone. Further, women, on average, are 14 % more likely to own a mobile phone, and in South Asia, 38 % less likely to own a mobile phone. It also reveals that even if they own a mobile phone, there is a significant difference in their usage timing. There are multiple barriers to their utilisation, including security, harassment, technical illiteracy, and social norms.

Table 01 : Mobile Ownership, Gender Gap, Women Unconnected, Women Using Internet And Who Are Not Using It

Regions	Mobile ownership rate of women (%)	Gender Gap in mobile ownership (%)	Women unconnected (million)	Proportion of women who use Internt (%)	Gender Gap in mobile internet use (%)	Women not using internet (million)
Middle East and Africa	80	9	25	44	20	69
Europe and Central Asia	90	-2	17	60	4	68
East Asia and Pacific	93	1	54	64	4	284
South Asia	62	28	219	27	58	426
Sub-Saharan Africa	69	15	86	29	41	200
Latin America & Caribbean	86	1	31	66	2	76

Source: GSMA Intelligence, 2018

From the above table 01, it is pretty evident that digital divide is wider in Asian and African regions whereas it is narrow in developed Europe and American regions. Mobile ownership rate is lowest in South Asia (62%) whereas it is highest in East Asia and Pacific (93%). Similar nature can be seen for gender gap in mobile ownership. It is surprising to note that only 27% women in South Asia have access to internet while 64% women in East Asia and pacific have access to internet. A significant increase in the gender gap in mobile ownership can be observed in South Asia and in Middle East and North Africa while a decline can be observed in Europe and Central Asia.

Table 02 : Mobile Ownership and Mobile Internet Penetration in Asian Counties

Countries	Mobile Ownership			Mobile Internet User		
	Male (%)	Female (%)	Gender Gap (%)	Male (%)	Female (%)	Gender Gap (%)
Bangladesh	86	58	33	30	13	58
China	96	96	0	82	81	1
India	80	59	26	36	16	56
Indonesia	72	64	11	43	36	18
Myanmar	87	74	15	57	35	39
Pakistan	78	50	37	38	11	71

Source: GSMA Intelligence, 2018

Table 02 shows the broader gender digital divide in Asian countries. In China, no gender gap exists in mobile ownership, and a meagre 1% gender gap is present in using mobile Internet. The conditions in Pakistan are worrisome, where a 37% gender gap exists in mobile ownership, and it approximately doubles (71%) in the usage of mobile internet datasets. It can be observed that India lags behind China, Myanmar and Indonesia as they have a lower gender gap in mobile ownership and internet usage. For India, the gender gap in mobile ownership is 26%, while this figure is more than double (56%) for the gender gap in using Mobile Internet.

Gender Digital Divide in India

Various research confirms that the hassle of the virtual divide is starker in developing countries like India and is more significant in rural and urban India (Singh, 2010). Major metropolises are at par with developed countries. However, rural areas in states like Bihar and Uttar Pradesh are worse off than numerous of the least developed countries, and when we look at the gender digital divide, it is still worse. The problem can be better understood by considering (a) access to social-networking sites, (b) mobile phone access (c) equal access to males and females. Similarly, the IAMAI (Internet and Mobile Association of India) report "Internet in India, 2015" also revealed similar Internet access findings. When it comes to accessibility to the Internet, according to NFHS-5, men account for 71 % and women 29% in India; the gap is slightly lower in urban India men (62 %) and women (38 %), but relatively low for rural areas with the accessibility of men (88 %) and women (12 %).

According to NFHS-4 and NFHS-5, which were conducted in 2015-16 and 2019-21 respectively. About half (46 per cent) had a mobile phone that they

themselves used, which increased to 54 per cent (NFHS-5). Further, ownership of a mobile phone that women themselves use increases with age and area of residence, from 25 per cent among women aged 15- 19 to 56 per cent among women aged 25-29 and then decreases among older women as per NFHS-4. While the same figure for NFHS-5 stands at 32 per cent and 65 per cent respectively. Both round of NFHS indicated that urbanwomen (62 per cent in NFHS-4 and 69 per cent in NFHS-5) are more likely to own a mobile phone that they use than rural women (37 per cent in NFHS-4 and 47 per cent in NFHS-5).

Table 03 : Table Showing Mobile Ownership Among Women of India Using NFHS Data

State/UT	NFHS- 4 (%)	NFHS-5 (%)	% Change	State/UT	NFHS-4 (%)	NFHS-5(%)	% change
India	45.9	54	17.65	Odisha	39.2	50.1	27.81
Andhra Pradesh	36.2	48.9	35.08	Punjab	57.2	61.2	6.99
Arunachal Pradesh	59.8	76.4	27.76	Rajasthan	41.4	50.2	21.26
Assam	46	57.2	24.35	Sikkim	79.8	88.6	11.03
Bihar	40.9	51.4	25.67	Tamil Nadu	62	74.6	20.32
Chhattisgarh	31	40.7	31.29	Telangana	47.4	60	26.58
Goa	80.9	91.2	12.73	Tripura	43.9	53.1	20.96
Gujarat	47.9	48.8	1.88	Uttar Pradesh	37.1	46.5	25.34
Haryana	50.5	50.4	-0.20	Uttarakhand	55.4	60.9	9.93
Himachal Pradesh	73.9	79.5	7.58	West Bengal	41.8	50.1	19.86
Jharkhand	35.2	49	39.20	Andaman and Nicobar	66.9	80.8	20.78
Karnataka	47.1	61.8	31.21	Chandigarh	74.2	70	-5.66
Kerala	81.2	86.6	6.65	Dadra & Nagar Haveli & Daman & Diu	46	60.5	31.52
Madhya Pradesh	28.7	38.5	34.15	Jammu and Kashmir	53.9	75.2	39.52
Maharashtra	45.6	54.8	20.18	Ladakh	71.2	81.2	14.04
Manipur	63.1	72.2	14.42	Lakshadweep	64.9	84	29.43
Meghalaya	64.3	67.5	4.98	NCT Delhi	66.6	73.8	10.81
Mizoram	77	82.3	6.88	Puducherry	67.3	82.9	23.18
Nagaland	70.4	82.5	17.19				

Source: National Family Health Survey 4 and 5 conducted in 2015-16 and 2019-21.

As per NFHS-4, Kerala had the highest (81.2%) of women with mobile ownership. This may be owing to factors such as an excellent female literacy rate (92.07 %) and sex ratio (1084) as per Census 2011. As per NFHS-5 (2019-21), Goa had the highest (91.2%) of women with mobile phone ownership due to its high rate of urbanisation (62.20 %) and reasonable female literacy rate (84.66%) as per Census 2011. Madhya Pradesh has the least share of the female with mobile phone ownership due to its 21.1 per cent share of the tribal and rural dominated (72.40 %) population, which is further characterised by the low level of literacy (69.30 %) and low level of living. It is also important to note that Madhya Pradesh ranked last as per both NFHS-4 and NFHS-5, calling for urgent intervention to ameliorate women's condition by improving their literacy rate and uplifting them from poverty. However, among Union Territories, Chandigarh (74.2%) and Lakshadweep (84%) stood first as per NFHS-4 and NFHS-5, respectively, while Dadra and Nagar Haveli (46%, 60.5%) ranked last per both rounds of NFHS-4 and NFHS-5 respectively. When we shed light on the percentage change, it can be seen that all the states have improved significantly except Haryana (-0.20%) and Chandigarh (-5.66%). Further, when we draw attention towards Internet usage, then 33% of women and over 51% of men between the ages 15-49 in India have ever used the Internet, which again varies according to the residence in Urban or Rural areas. However, the disparity is evident in possession of mobile phones and internet usage.

Factors Influencing the Gender Digital Divide

Women are under-represented compared to men when considered from the perspective of technology usage leading to gender digital divide (Mitra, et al., 2000; Pinkard, 2005). Women are more likely to have a borrowed set and are often required to seek permission for a handset, which indicates their limited autonomy (Datta, 2022) which affects their freedom to usage of mobile phones and Internet. According to Gill, et al. (16), four barriers push women backwards in internet access and usage: exclusion from technology education, free time limitation, socio-cultural norms favouring men and financial and institutional barriers. Inaccessibility and poor technological infrastructures (Rogers, 2016) hinder women's access to ICT in public and at home. Among all the barriers, the education gap plays a significant role (Lythreatis, et al., 2022) the low literacy rate, poor educational system and less attribution of parents and teachers create an obstacle for women in accessing technological knowledge. Rural-urban divide also affects digital divide (Bala, 2017) where the physical infrastructures seem to have mainly concentrated in the urban area while the rural women are far from getting benefits or even access to these infrastructural facilities. In low and middle-income countries, the rural-urban digital divide is more when compared to high-income countries. A recent study by Bala (2017) identified that career preference through technical education influences digital access and hence leading to gender digital divide. Melhem, et al. also highlighted in their study that digital divide is influenced by less accessibility of women to scientific and technical education specifically and to education in general.

Social norms play a vital role in excluding females, as it is evident that women are assigned to care work due to gender roles and norms.

Conclusion

It is difficult to ignore the present scenario when we discuss about inclusive growth, sustainable development, and the importance of new technology in main streaming gender and generating possibilities for women to succeed. The examination of the above-mentioned data shows that the gender digital divide is a global issue that has particularly serious implications in nations like India, where the situation is worse at the local level in both urban and rural areas. In India, where only 32.65 % of women are employed, women need help as they cannot afford network services due to this economic constraint. This results in women lagging in accessing digital services and remaining a part of the vicious cycle of skill gap to fulfil the gap of the gender digital divide. It is high time the government realized and evolved

some Gender Digital Empowerment ratio and gathered and processed data district-wise, incorporating this ratio while focusing on gender-development schemes for the states and evaluating women empowerment in the true sense.As the gender gap in mobile ownership and mobile internet penetration is higher in India as compared to other Asian countries which calls for national planning to include women in mainstreaming digital literacy and skill development. Further, the mobile ownership is lower among women in states like Madhya Pradesh, Chhattisgarh, Jharkhand,and Uttar Pradesh. So, local level study in these states can provide a better picture for policy framework and lowering the gender digital divide. Moreover, training programs for enhancing digital literacy can play a major role in bridging this gender digital divide.

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REGIONAL DEVELOPMENT WITH SOCIAL JUSTICE - A CASE STUDY OF PATHA AREA OF BUNDELKHAND, U.P.

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ABSTRACT

Patha area which is an upland plateau, is characterized by rocky terrain and chronic shortage of water. Its economic strength lies in its natural resources, particularly forests. The area is dominated by Kol tribe who are not getting social justice on account of terror of rural elites locally called "Dadus" and non-sympathetic attitude of bureaucrats. They possess poor land holding and majority of them are agricultural labourers. Land alienation, wrong implementation of land Pattas allotment and dispossession of land have become crucial factor to inflict tension in class of exploits. Due to poverty the tendency of borrowing made them bonded labour. On account of this obnoxious practice, they have no economic independence. The traditional rights of Kols in forests have been badly affected not only by colonial but also by post-independence different forest policies. Area development and welfare programmes could not make them able to attend higher income and better standard of living. The main objective of this study is to highlight the pathetic condition of the trodden Kol community due to denial of social justice by the exploiters and find out the solution of their upliftment by evolving a strategy by taking them as a target group in the frame of regional social justice. This study is primarily based on primary data from randomly selected Kol households of all Kol inhabited villages. This economically and socially backward area needs a balanced regional development which not only aims at increased welfare in aggregate terms but also equitable distribution of it among areas and groups of people. The denial of social justice is partly a consequence of lack of access to public services to the poor. The concept of social justice as applied to the measures of the society also cover it in the concept of regional social justice. Kol tribe of this area should be constituted as target-group in the regional development of Patha area as this approach for regional development aims at the poor section of the society.

Key words: *Backwash-Effect, Target-Group, Impermeable, Empowerment, Sustainable, Inter-Personal, Anachronism, Obnoxious.*

Introduction

The existing approaches to regional development lack a comprehensive social policy with the result, the poor sections of the society do not benefit adequately from the planning and development activities[1]. GNP dominated growth process has further led in the widening of income inequalities. Despite huge investments, absolute poverty, a condition of life so degrading so as to insult human dignity, is on the increase[2]. Tribals at the lowest ladder of the class ordering or at least benefited with regional development programmes as the present development models are not 'target group' oriented. They suffer from the backwash effects of growth rather than benefits by the progress. As the social policy becomes the main dynamic factor of regional development the due weightage is must for social justice while implementing regional development programmes and schemes.

THE STUDY AREA

Patha area (1165 km^2) which lies on the south of the first Vindhyan Range in the district of Chitrakoot (U.P.) is the most backward area of Bundelkhand. It is extended in the southern and south-eastern part of this district. It is a sharply defined upland plateau of some continuous ranges and

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isolated hills. It is a drought-prone and water-scarce area.

The economic strength of the area lies in its natural resources, particularly forests (reserved and unclassed) which cover 22.74% of its geographical area, are not being utilized for local people[3]. Agriculture, which is the backbone of its economy, provides employment for 85% of its total work force. Industrially it is poor while spatial and functional integration of settlements and economy is really a problem in the area due to high spacing of settlements and poor service facilities[4]. Patha area (106450 persons) is dominated by Kols (38%) who are still not notified as scheduled tribe in Uttar Pradesh.

OBJECTIVES

Community and area development programme and even latest rural development programmes could not bring change in the economy and quality of life of Kols. Kols are not getting social justice on account of terror of rural elites (dadus) and contractors as well as non-sympathetic attitude of bureaucrats. Keeping these points in view the paper aims to (i) bring in light the existing social inequalities and identify the problems of Kols due to social injustice, (ii) assess the impact of development schemes and programmes on the life of Kols, and (iii) evolve an appropriate approach for the development and welfare of this weaker section within a comprehensive social policy frame.

RESEARCH METHODOLOGY

This Study is mainly based on primary data which have been collected with the help of village and household interview schedules covering all Kol inhabited villages. 10% of the households (410) of Kol inhabited villages were selected on the basis of stratified random sample technique.

Secondary data have been freely used from books, journals, surveys and government reports. Moreover, a lot of information has been also used from a comprehensive survey of socio-economic life of Kols of Patha based on anecdotal and personal observation which was conducted by ABSSS (Akhil Bhartiya Samaj Sevak Sansthan) during 1990 – 2000.

SOCIAL STATUS AND ECONOMY OF KOLS

Patha Area is comprised of 106 inhabited villages (79 in Manikpur Block and 27 in Mau Block) and one urban centre – Manikpur. In Manikpur Block, the Kols preponderate in as many as 58 out of 79 villages. 11 villages are exclusively inhabited by Kols. In 8 villages of Mau Block, Kols form the majority. At present in the study area in 9 villages Kol population is 100%. Concentration of Kols is low in large-size villages in which major percentage of cultivated area is possessed by caste Hindus who out number the Kols[5]. High concentration of Kols is marked in villages situated nearby forests where conditions for the living are favorable. Kols have a corporate life of their own as they have their settlements separate from other communities in mixed villages[6]. Presence of habitations for Kols or other scheduled caste families between the houses of caste Hindus is not tolerated. It is, however, unusual for the rich farmer to have Kol families living in or around the campus of his own farmhouse. Kols along with other scheduled castes suffer from the stigma of untouchables and such they are roughly treated at par with other untouchables[7]. It is an anachronism that most of the Pradhans and members of village panchayats being ex-landlords, rich farmers and contractors are able to keep the Kols at their mercy even in villages with clear Kol majority. Hindu ladies treat Kolins at par with Harijan women. Non-tribals keep themselves aloof from the affairs of the Kols.

Before the independence of the country this area had an impermeable society of structural rigidities. The society was certainly a feudal type, which was completely monopolized by the upper most stratum of the society. But after independence with the abolition of "Zamindari" system, this society gradually changed into permeable one in which developmental investment is monopolized by a majority. Part of it percolates down to a variety of middle man vertically and horizontally linked with each other on one hand and with the monopoly group on the other[8]. Most of the benefits of development programmes are reaped by

upper caste people and "Dadus" with little material gains accruing to Kols.

The economy of the Kols is primarily based on agriculture and gathering of forest produce. Kols can be broadly divided into three categories such as; agriculturalists, agricultural labourers and non-agricultural labourers. Amir Hasan's (1972), depth study of three Kol dominated villages reveals that nearly four-fifth of the Kols are dependent on agriculture as cultivators of their own lands or agricultural labourers[9]. In the present study it was found that 60.8% are cultivators while the percentage of share-croppers is 17%. Due to increasing pressure of population 35% of the Kols have poor land holding (less than 0.8 hectare). As their land provides them meagre produce, 33.8% are agricultural and non-agricultural labourers. They have no caste occupation but 4.3% are engaged in secondary sector like wage labourers in collection and sale of forest produce and the rest 1.1% earn their livelihood from tertiary sector[10]. Animal husbandry is being practiced as subsidiary occupation. None of the Kol families is engaged in business.

Forests and tribals are inseparable because forests are an integral part of the tribal economy. Reserved forests are scattered in 5 patches under 3 forest ranges only in Manikpur Block, which shares only 27.51% of the total Patha Area. Kols' settlements are very much accessible to forests as out of 106 inhabited villages, 59 villages have unclassed forests with varying percentage between 0.03 and 93.8% of the total land area[11]. 21 villages possess less than 20% area under unclassed forest while 7 villages represent more than 60% area under it. Use of forests and their produce is traditional to tribals and other traditional forest dwellers. Forests not only provide them food, fodder and fuel but also the work of plucking of "tendu" leaves and gathering of NTFP (Non- Timber Forest Produce). It accounts as much as 30% of their total income. Thus, the main non-agricultural employment for Kols is the collection of NTFP. There is not much agricultural activity during summer when nearly 2/3rd of the Kols engages themselves in plucking "tendu" leaves[12]. Out of 410 selected Kol families 33.8% of Kols who are agricultural and non-agricultural labourers, entirely depend on forest produce in the lean months of agriculture. During the course of present survey 90% of the Kol families of 24% of Kol inhabited villages were found migrating for seasonal employment such as plucking of "tendu" leaves (72.0%), preparing of stone chips (27.0%), cutting of forest trees (19.0%) and other works (0.9%)[13]. The simplest factual statement on the Kols' economy would be that it was conditioned to serve the best interest of non-tribals who employed the Kols as chief labourers in all their economic activities[14].

SOCIAL INJUSTICE AND PROBLEMS OF KOLS

Kols who constitute about 38% of the total population, have been the subject of worst form of exploitation by the ex-landlords, dadus, contractors and indebtors. With the result that today the Kols live a life of helplessness not knowing how to get out of the web woven around their lives by the vested interests. The Kols of Patha area are very poor community and partly dependent upon agriculture. The economy of Kols is closely linked with that of upper caste people who are in the position to determine their occupational pattern and control their economy. Large-scale employment of Kol women and girls leads to social problems. Some of the unscrupulous employees, forest contractors and their henchmen as well as money lenders take undo advantage of their abject * 1. Amchurnerva, 2. Mangawan, and 3. Lalai poverty prevailing among the Kols[15]. Many Kol women are compelled to sell their honour in consideration for paltry sums. Thus they live a life of abject poverty and exploitation and almost complete subjugation of feudal landlords. However, the main problem as perceived is their poverty caused by a syndicate of vested interest. Among the host of problems a few main problems have been highlighted in the present study.

LAND PROBLEM

One of the crucial problems which is being

faced by the Kols is the land problem. It includes (1) Uneconomic small size holding, (2) Tenancy Rights, and, (3) Possession and management of "patta" lands. Among the Kols the size of holding is generally small, which is the grass effect of alienation of tribal land by groups of intermediaries of feudal system of the past[16]. As the land remained the same due to their low purchasing capacity, the holding size was reduced to a great extent. Amir Hasan's study reveals that the average size of holding among the Kols during 60s was 1.8 acres[17]. In the present survey it was found that 8.9 and 28.6% of Kol families possessed below 1 acre and 1 to 2 acres of land holding respectively. Such small holdings, which are being parcelled out into smaller units of operation, yield just insufficient to cope up with the demand of food and further incapable of increasing yield by the use of modern technology.

Problem of land tenancy among tribals arose since their land became saleable commodity. Under the new law U.P. Zamindari and Land Reform Act. In 1950, Kols who should have become sirdar, were dispossessed from their land due to connivance of "zamindars" and revenue officials by producing fictitious Kol tillers in the court. Thus, what was given to Kols by one hand was taken away by the other. Their economy was badly hit in the bargain as many lost their land. Land alienation resulted in two ways; (1) the most furtile land has been occupied by upper caste people, and, (2) the best suited land has gone out of their hands[18]. With the result none of the Kols in the study area is 'bhumidar'. Moreover, some of the Kols were returned their land by "zamindars" but now to be cultivated on 'batai' (share-cropping) without any title whatsoever. Amir Hasan's survey of 26 Kol farmers of three villages reveals that 40% of the farmers were found practicing 'batai' system[19]. In the present survey it was found that 25% of the Kol families are indulged in 'batai' system.Continuance of possessing land under this system which provide them a meagre percentage of yield, remains uncertain.

Surplus Land obtained due to imposition of Ceiling of Holding Act, have been distributed among marginal farmers and landless farmers/labourers. Distribution of 'Pattas' was done according to Section 1952 and 198 of Zamindari Abolition and Land Reform Act, 1950. The implementation of Ceiling Law and land 'patta' allotment programme where almost completely frustrated by the 'Dadus' acting in league with local administration. Out of 264 sampled Kol cultivators 81% were given cultivable wasteland and forest land as 'patta' land but the fact is that majority of them are neither aware of such land given to them nor they could take physical possession due to fear of ex-landlords and capitalist farmers. Land 'pattas' given to Kols remained as entitlements only on paper. Further large tracts of land allotted to them in 1980 came under litigation with the forest department claiming ownership rights. Whatever patta lands they received, became uneconomic holdings leading to other problems of farm practices.

Dispossession of land or for that matter of any transferrable had been a crucial factor to inflict tension in class exploitees. Turning into subsistence farmers, Kols have been left with uneconomic size of holding. They have been relentlessly alienated from land and driven into rank of landless labourers, side by side with greater concentration of land in large operational holding[20]. On account of land problems a major shift in their occupation was marked during 1971-81. Out of 9 Kol villages 6 have shown a decrease of 7 to 81% in cultivator category. This decrease resulted in an increase in the percentage of agricultural labourers ranging between 17-51%. These land problems have rapidly changed their socio-economic life. Because the concept of private land ownership and legal title is alien to tribal society; the Kols have been unable to establish legal ownership to the land that they have been cultivated for generations.

PROBLEM OF INDEBTNESS AND BONDED LABOUR

The chronic indebtness have been, and still most difficult problem, facing almost the entire tribal population in India[21]. It is certainly due to rampart poverty and deficit economy. Due to precarious land problems and absence of any savings, the Kols,

particularly marginal farmers and agricultural labourers, have to borrow to meet expenses in connection with social obligations like festivals, life-cycle rituals and for subsistence. They are forced to go to money lender when, during lean periods, they are facing starvation. Another factor for their approaching to local money lender is that the co-operative societies advance loan for only productive purposes. Amir Hasan's survey of 25 families of 3 villages reveals that as many as 96% of the Kol families have to borrow from money lenders and forest contractors[22]. The rate of interest ranged between 25 to 70% at the time of survey.

This tendency of borrowing has been exploited by ex-landlords, 'shahukars' and contractors locally known as 'dadus'. Their tendency to borrow has especially exploited by contractors, whose modus operandi is to distribute a petty amount of cash to Kols as loan to be adjusted against their wages, as soon as they are employed. Most of the indebtors are unable to return their loan during their specific period and thus have to serve the debtor as bonded labour. Nearly 80% of the borrowers have to work for the moneylenders while 33% of them work as ploughmen of creditors in lieu of interest as mentioned by Amir Hasan[23]. Under the terms of agreement, some of them have to work at money lender's place. They are still summoned by the creditors to odd jobs and sometimes physically tortured. The present survey of 410 Kol families of the study area reveals that 22% of Kol families are working as bonded labour in spite of the enactment of Bonded Labour System (Abolition) Act, 1976. In a door-to-door survey launched in 1987, 252 bonded labours were discovered[24]. Due to this obnoxious practice, Kols of this area live a life of helplessness with no independent economic existence. Thus the debtors not only exploit them economically by keeping them in bondage but also treat them in the most inhumane manner imaginable.

PROBLEMS RELATED WITH FORESTS

The ever-increasing restrictions and withdrawal of concessions to tribals due to changing forest policies have led to many hardships and to a piquant situation[25]. The traditional rights of tribals are no longer recognised as rights. In 1894 (First Forest policy) they became 'rights and privileges' and in 1952 (New Forest Policy) they became 'rights and concessions. The New Forest Policy legislation has shattered and disturbed the tribal lives depriving them even some of the privileges due to which survival of tribals has been threatened by wide-spread of unemployment[26].

Before the implementation of National Forest Policy, 1988, ex-landlords and contractors did not allow them to have a protective relationship with forests because of near bounded-type condition[27]. They forced them to carry out illegal work for them in forests in the collection of various types of NTFP. The traders and contractors used to get huge profits from this while Kols could get minimal benefit. In the Contract System of Plucking of 'tendu' leaves forest contractors who used to engage Kols on low wages and exploit them badly was banned after the formation of Uttar Pradesh Forest Development Corporation, 1974. In this over-all exploitation and deprivation of Kols their women could hardly collect firewood and sell it in the nearby market - a trade that involves a lot of drudgery and brings very little economic benefits. Kols had been put again in trouble as some of the patta land allotted to them was claimed as forest land by forest department.

IMPACT OF FIVE-YEAR PLAN'S DEVELOPMENT PROGRAMMES ON KOLS

During the First Five Year Plan Community Development Programmes were started in 1952 but in this area after the establishment of NES Blocks under Food Production Programme 2,250.1 hectares of cultivable waste and open forest land were distributed among Kols, Harijans and other caste families as 'patta' land during Second Five Year Plan Period (1956-1961). Caste Hindus and Harijans were allotted 57.3 and 14.0% of total land while 28.7%, i.e., 732.0 hectares of such land were allotted to 515 landless Kol families. Due to poor quality of soil and lack of irrigation facilities patta land could not be utilised. Programmes related to food production, social amenities and industrial development were continued up to Third Five-Year Plan. As there was no

representation of Kols in Nyay Panchayats and District Harijan Advisory Committee, Kol families could not be benefitted. Under the rehabilitation scheme of the then Harijan and Social Welfare Department of the state government 161 houses were built in 11 new Kol colonies situated in 8 villages Despite of shortcomings, this programme undoubtedly made a deep impact on the Kols. Unfortunately, after the end of Third Five Year Plan (1961-1966) all special schemes including rehabilitation programme were given up mainly on the ground of financial stringency. This gave a great set back to development programmes among the course.

During The Fourth Five Year Plan Period (1969-1974) to minimise the adverse effects of drought on the production of crops and livestock and productivity of land, water and human resources DPAP (Drought Prone Area Programme) of integrated rural development was launched in 1973-74. As the Patha area is water-scarce and drought-prone area under social sector two drinking water supply schemes, namely (i) Patha Rural Drinking Water Supply Scheme, and (ii) Bargarh Rural Drinking Water Supply Scheme were executed in 1974. Out of 100 inhabited villages only 91 were covered under these schemes but treated water was supplied to only 60 villages. Due to financial loss of Rs.10 lakh on the maintenance of these two schemes, supply of water was stopped in 15 villages which had no private connection. Poor Kols were again deprived of this facility[28]. During The Fifth Five Year Plan (1974-1979) as the main stress was on employment, poverty alleviation (Garibi Hatao) and Social Justice, Minimum Needs Programme (MNP) was introduced in the first year of this Plan to provide certain basic minimum needs and social economic development of the community, particularly the underprivileged population. This programme could hardly provide benefit to Kols.

The 7th and 8th Five Year Plans also aimed to poverty alleviation as they generated adequate employment. NREP and RLEGP programmes were continued during this period. These two programmes were integrated to a new scheme JRY (Jawahar Rojgar Yojana) in 1989. In 1993 the Employment Assurance Scheme (EAS) was initiated to provide employment to agricultural labourers during the lean agricultural season. Later on, during 9th Five Year Plan EAS was merged with SGRY (Sampoorna Gramin Rojgar Yojana) in 2001. The main issue of this plan was 'Garibi Hatao' (poverty alleviation), by generating employment and rural development by providing basic minimum needs. As this approach of providing employment was of purposeful activities, Kols of Patha Area were also benefitted to some extent during these plan periods.

The 10th Five Year Plan (2002-2007) focused on elimination of poverty, elimination of social, economic and regional inequalities and unemployment. In 2005 NREGA (National Rural Employment Guarantee Act) which aims to guarantee the right to work was started in India to enhance livelihood, security in rural areas by providing at least 100 days of wage employment in a year to at least one adult member of poorest and socially and economically deprived families. Women were also guaranteed one third of jobs made available under MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act). With this income generating programme, no doubt, some Kol families of Patha Area were benefited though in majority of the Kol villages the 'Mukhiyas' manipulated the funds and had their say in MGNREGA. During Eleventh and Twelfth Five Year Plans Period though the stress was on reducing poverty, providing education and developing agriculture but no programmes like Integrated Area Development were started. MGNREGA continued in these plan periods. Some amendments were also made in the act as the number of working days was increased to 150 days. In 2014 it was proposed to limit this programme within tribal and poor people.

ROLE OF NGO'S IN CHANGING LIFE OF KOL COMMUNITY

Prior to Community Development Programmes in this area two Christian missionaries (1) The Roman Catholic Mission at Ranipur Village,

and (2) St. Rita's Own Mission at Manikpur Town where rendering education and medical services for Kols. Ranipur Mission has been able to make deep impact on some Kol families to whom they converted into Christianity by establishing a hospital in Ranipur. Before 1970 there were no NGOs in this area for the upliftment of Dalits and Kols. In 1968 the first NGO named as Satgur Seva Sangh Trust (SSST) was established on the promise of selfless service to mankind at Chitrakoot Town just near Patha Area. This trust brought 3 tier technology, i.e., cross-breeding of cows, planting of 'Subabul' trees for fodder and fuel and farming by nutrient technology. This work of social forestry was started under 'Patha Project'. By the end of 1985, about 2000 families were covered under this project who grew 'subabul' as a green fodder plant on their 1 acre plot[29]. In an area once bafled by ravines this organisation has culled out in 4 years a pleasant campus of 150 acres. It became successful by planting 'subabul' in deforested areas and wastelands. Under the domain of health, this trust started Satgur Netra Chikitsalaya in Chitrakoot Town which is rendering comprehensive eye care services to the masses for the last 40 years. The second NGO which is very active in the upliftment of Kols in particular, is Sewa Samarpan Sansthan, a sub-body of Akhil Bharatiya Banvasi Kalyana Ashram. It was established in 1978 at Kanpur for the total development of tribes, particularly of Uttar Pradesh. Its domain covers children's education and literacy, Dalit upliftment, minority issue, rural development and poverty alleviation. For providing education to tribals it has established two hostels; (1) Birsa Munda Chatravaas (with 150 students) in Kanpur City and the next at Manikpur Town. It has made the Kols of Patha conscious of their rights and benefits.

Akhil Bharatiya Seva Samaj Sansthan (ABSSS) is another important NGO which was established in 1987 at Chitrakoot committed to uplift tribals, Dalits and deprived section in Bundelkhand and regenerated self-esteem and confidence of marginalised people, particularly Kols of Patha Area. On the initiative of ABSSS The Patha Kol Adhikar Manch was established in 1990 with 10,000 members and over the years it emerged as a major force for awareness generator. The major work of this NGO for the Kols of Patha Area was a survey of 100 'patta' land holders from 20 villages of Patha Area who could not get possession of this land. With the efforts of this Sansthan by the end of 1997 seventy households got possession of their 'patta' land and 25,000 poor Kol families acquired 10,000 acres of land. It also generated awareness among the Kols for organising and mobilising them around the issues that have a bearing on their lives. With its help they got self-respect and dignity and have stood up for their rights. Among other activities of ABSSS one is to liberate them from bonded labours and engage them in social forestry and make them aware of water conservation. By the end of 1997-98 ABSSS was running 40 primary schools (2,160 boys and 890 girls) and started 100 non-formal education centres to increase literacy in this area under Mahila Samaykh Project. Besides these NGOs, there are other NGOs which are giving their service to improve the life of Kols.

STRATEGY FOR REGIONAL DEVELOPMENT WITH SOCIAL JUSTICE

In India which planning was started, was in the form of centralised form of planning. In 2nd Five Year Plan Period Planning Commission accepted the policy of balanced regional development of regions but in Third Plan Period regional planning approach was accepted for the less developed and underdeveloped regions. At state level community development projects were started for socio-economic upliftment of rural areas. As balanced regional development and dispersal of economic activities were joined together a Fourth Five Year Plan Period Target Area and Target group approach were started but it couldn't come up to micro level regions/areas. During the Fourth to Ninth Five Year Plan Periods various programmes such as; Special Problem Areas Programme, Minimum Need Programme, Integrated Rural Development Programme, D.P.A.P. and various employment generation programmes for rural people viz; TRYSEM, RLEGP, DWCRA, EAS and JRY were started but they could not bring real upliftment of poor

class people as there was no emphasis on social aspect. All these approaches were either sectoral or area development approach.

Looking at the present trend 'district' as a planning unit will still be remote from the people it is meant to benefit[30]. In order to bring planning closer to the people and anticipate mass participation in programme planning will have to be undertaken at lower level aiming at human welfare. Regional development is a potential instrument for the integration and promotion of social and economic development efforts. It aims to induce rapid structural change and social reform specially to achieve a broader distribution of returns from development among less privileged group in society. Regional development not only claims at increased welfare in aggregate terms but also at a more equitable distribution among areas and groups of people[31]. The inequalities in development – regional as well as inter-personal have thus to be seen symptoms of something more deep routed, more fundamental and basic. The existing approaches to regional development lack a comprehensive social policy with the result poorer sections of the society do not benefit adequately from the planning and development activities. Unless development is carried within a comprehensive social policy frame which attacks the cause of poverty and development directly, it would fail to find a lasting solution of persisting poverty among regions and communities.

Social objectives of development are to be viewed as a part and parcel of the development process rather than a mere special welfare-oriented measures. Social justice denotes that all people are fairly without any social distinction. This ensures that the absence of privileges is limited to a very specific segment of society and the conditions of the poor classes and women are strengthened. Moreover, social justice encompasses economic justice. Thus, social justice promotes fairness and equity across many aspects of society. The implicit assumption that high rates of growth could automatically bring in solution to the social problem, has to be proved incorrect[32]. Social justice includes (1) equal opportunities for individuals and the various social groups, (2) just distribution of income and other benefits, and (3) social security to handicapped. The concept of social justice as applied to the majors the society also covers in it the concept of regional social justice.

The approaches to regional development should be two-fold (1) Area Approach, and (2) Household Approach. The first one attacks the problem of poverty as grassroot level while household approach aims at poor section of the society which would be constituted as the target group in a regional development. The household of target group should be given a package of activities which enable it to become economically viable. The following strategies have been suggested for the regional development of this backward area targeting the Kols who represent the poorest section of the society.

Agrarian reform which aims at growth and social justice, is must. Though radical measures were taken for bringing about the solution of land in favour of tillers and landless Kols in form of 'patta' land but such lands were grabbed or occupied illegally by landlords (dadus) could hardly benefitted to Kols. With the strenuous efforts done by ABSSS during '90s several poor Kol families got possession of 'patta' allotted to them. In this regard these patta lands must be vacated and given to Kols again and financial assistance with subsidy should be extended to Kols with land holding of less than 2 acres under IRDP. Unless the Kols get rid of indebtedness and accompanying evil of bonded labour, it is futile to expect a real economic improvement in their lot.

In the study area Reserve Forest and open unclassed forests cover 27.34% and 22.66% of its geographical area. All 9 villages with 100% Kol population are situated adjacent to reserve forests whereas open unclassed forests are spread in its 56 villages and out of it 12 villages show more than 50% of its total area under this category. However, the Kols' most grim concern remains the forest department's restrictions on the use of forest produce. They face harassment from the authorities even if they collect the twigs and barks and sell them. For the Kols, the

difficulty lies in the implementation of Forest Right Act, 2006. The majority of the Kols are forest dwellers, so any moment without forest rights is futile[33]. It is judicious that forest-based income opportunities should be provided mainly to Kols as this has been their traditional work. State Government's Forest Department should provide some concessions for other traditional forest dwellers (Kols) in the Forest Right Act, particularly for furnishing the proof of their presence in the forest for 75 years to maintain the harmony of other traditional forest dwellers' livelihoods. The NGOs and other informal groups like Van Sanrakshan Samiti, etc, must have a clear mission of motivating and organising these traditional forest dwellers in a pro-active manner to play a role of an equal partner in the overall sustainable development of NWFP (Non-Wood Forest Produce) and particularly in the marketing of these products[34].

The economy of Kols is closely related with that of upper-caste people and 'dadus' who are in a position to determine their occupational pattern and control their economy by employing them as cheap labourers. Agricultural labourers represent 38.8% and majority of them are landless. Their subsidiary occupation is linked with seasonal migration when the agricultural activities are generally ceased. The 'Tendu' trade provides Kols with a fairly lucrative job but for only 6 to 9 weeks in a year[35]. There are days and periods when they are jobless or do not have sufficient work. They are least benefited with the income-generating schemes and programmes. The higher social groups corner more remunerative opportunities forcing this weakest group to continue at the subsistence level. Failure to generate adequate employment opportunities will lead to social unrest and wrecking of the very benefits of planned development[36].

In order to make Kols economically viable the most important labour-initensive which should get momentum is the scheme of social forestry. It envisages increased productivity from wasteland along with the compatible objective of raising village income[37]. As the Forest Development Programmes have much higher employment popularity, there must be co-ordination between forest policy and tribal development. Benefits should flow to traditional forest dwelling people by forestry programmes, conservation and recognition of their traditional skills. The problem of full employment among the Kols can be solved if a few schemes are taken up by The State's Forest Department. A complementary aspect of increasing income level of rural population is the development of small- scale industries at growth centres[38]. Landless Kols have to be supported by creation of additional employment opportunities in household cottage industries based on their local forest produce such as; bamboo basket making, furniture, agricultural implements, toy and lacquer industry which can be easily developed in the village and rural growth centres of this area. In case of cottage industry projects, the approach should be (1) to increase the wage income, and (2) include on benefits sides those addition to lower income group (particularly Kols) associated with the project. A complementary development of services is necessary to meet the goal of full employment[39]. In order to give full employment to Kols and make them free from the clutches of rural elites and money lenders, the implementation of group-oriented programme is the only remedy.

It is strange to know that the Kols in Uttar Pradesh are still under scheduled caste category whereas in M.P. and other states they are scheduled tribe. Unless the Kols of Patha Area are not declared scheduled tribe the real social justice to them cannot be imagined. The need of the day is that Kols must organise a sustained movement for their demands like Gujar Community Movement of Rajasthan for tribal status. The wide gulf between rhetoric and action points to the lack of commitment and sincerity on the part of all major political parties and of the state-level administration towards poverty and social uplift of the poor, particularly when it means challenging the dominant power structure at the local level. The NGOs of this area which have made the Kols conscious of their rights and privileges should continue their efforts for upliftment of Kols.

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राजस्थान के झुन्झुनूं जिले में भूमिगत जल संसाधन की उपलब्धता एवं उपयोग

संजीव कुमार एवं कविता चौधरी

शोध सारांश

पृथ्वी पर उपलब्ध जल में से लगभग 2.7 प्रतिशत जल ही स्वच्छ जल है। जिसमें से लगभग 75.2 प्रतिशत जल ध्रुवीय क्षेत्रों में बर्फ के रूप में जमा रहता है और 22.6 प्रतिशत भू–जल के रूप में विद्यमान है, शेष जल नदियों, झीलों, वायुमण्डल नमी, मिट्टी, वनस्पति, आदि में मौजूद है। राजस्थान की भौगोलिक एवं प्राकृतिक स्थिति के कारण अकाल व सूखा की पुनरावृत्ति होती रहती है, फलस्वरूप सतही एवं भूमिगत जल स्त्रोतों की कमी सदियों से रही है। राज्य में प्रतिव्यक्ति जल उपलब्धता लगभग 637 घन मीटर है जो न्यून है वहीं दूसरी ओर केवल 12.54 प्रतिशत ब्लॉक भूमिगत जल उपलब्धता की दृष्टि से सुरक्षित श्रेणी में वर्गीकृत है। अध्ययन क्षेत्र अर्द्ध शुष्क जलवायु में स्थित एक कृषि प्रधान क्षेत्र है। जहाँ सतही जल संसाधनों का अभाव है परिणामस्वरूप जल आवश्यकता के लिए भूमिगत जल पर पूर्ण रूप से निर्भर है। झुन्झुनूं जिले में भूमिगत जल उपलब्धता 23,406.65 हेक्टेयर मीटर है एवं भूमिगत जल का सर्वाधिक उपयोग कृषि क्षेत्र में सिंचाई हेतु किया जाता है। जिले में भूमिगत जल विकास स्तर 195 को प्राप्त हो चुका है, साथ ही सभी ब्लॉक भूमिगत जल दोहन की दृष्टि से अतिदोहित श्रेणी में सम्मिलित है। प्रस्तुत शोध पत्र में झुन्झुनूं जिले में भूमिगत जल संसाधन की वर्तमान स्थिति का अध्ययन किया गया है।

***शब्द संक्षेप** : अतिदोहित श्रेणी, भूमिगत जल उपलब्धता, वार्षिक पुनर्भरण, जोहड़, भूमिगत जल विकास स्तर।*

प्रस्तावना

पृथ्वी का लगभग 71 प्रतिशत धरातल जल से आच्छादित है, परन्तु अलवणीय जल, कुल जल का लगभग 3 प्रतिशत ही है, इसमें से भी केवल 1 प्रतिशत से भी कम हिस्सा जीव जगत के उपयोग के लिए उपलब्ध है। जल न केवल मानव जाति के लिए, बल्कि जीव–जन्तुओं और पेड़ पौधों सहित समस्त जीव जगत के जीवन का आधार तथा एक सार्वजनिक सम्पति के रूप में प्रकृति द्वारा प्रदान किया गया निःशुल्क उपहार है। ''जलमेव जीवनम्'' भारतीय सभ्यता एवं संस्कृति में जल को जीवन माना गया है तथा जल के स्त्रोतों, जल का समस्त जीवों के लिए महत्व व संरक्षण पर जोर देते हुए इसे औषधीय गुणयुक्त कहा गया है। भारत में एक वर्ष में वर्षण से प्राप्त कुल जल की मात्रा लगभग 4,000 घन किलोमीटर है। धरातलीय जल और पुनः पूर्तियोग भौम जल से 1,869 घन किलोमीटर जल उपलब्ध है। इसमें से केवल 60 प्रतिशत जल का लाभदायक उपयोग किया जा सकता है अर्थात् देश में कुल उपयोगी जल संसाधन 1,122 घन किलोमीटर है। देश के उत्तरी–पश्चिमी भाग में स्थित राजस्थान, भारत के 10.4 प्रतिशत क्षेत्र में स्थित है जो 1.16 प्रतिशत सतही जल एवं 1.70 प्रतिशत भूमिगत जल के साथ 5.67 प्रतिशत जनसंख्या का भरण पोषण करता है। शुष्क जलवायु, अधिक तापमान, न्यून वर्षा, आदि प्राकृतिक एवं भौगोलिक स्थिति के कारण अक्सर अकाल–सूखा की पुनरावृति होती रहती है, इसी कारण राज्य में सतही व भूमिगत जल की कमी सदियों से रही है। राज्य में 1947 में प्रति व्यक्ति जल उपलब्धता 2000 घन मीटर थी जो घटकर 637 घन मीटर के स्तर पर पहुँच गई है। राजस्थान राज्य में सन् 1984 में 236 ब्लॉक में से 203 ब्लॉक (86.02

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प्रतिशत) सुरक्षित क्षेत्र में वर्गीकृत थे, जो घटकर वर्ष 2020 में नवीनतम आंकलन के अनुसार 295 ब्लॉक में से केवल 37 ब्लॉक (12.54 प्रतिशत) सुरक्षित क्षेत्र में वर्गीकृत है। विगत तीन दशकों में बढ़ती हुई जनसंख्या, शहरीकरण, औद्योगीकरण, आधुनिक जीवन शैली और विभिन्न मानवीय गतिविधियों के कारण भूमिगत जल के अनियंत्रित दोहन से वर्तमान में राजस्थान के 69.8 प्रतिशत ब्लॉक (203) अतिदोहित श्रेणी में वर्गीकृत है। अध्ययन क्षेत्र अर्द्ध–शुष्क जलवायु में स्थित है जहाँ अनियमित एवं न्यून वर्षा के फलस्वरूप सतही जल संसाधनों की कमी है। इस कारण दैनिक जीवन, औद्योगीकरण, एवं कृषि सिंचाई में जल की आवश्यकता को पूरा करने के लिए भूमिगत जल पर निर्भरता निरन्तर बढ़ती जा रही है। पिछले कुछ वर्षों से जिले में भूमिगत जल का इस कदर अंधाधुंध दोहन किया गया है कि आज सम्पूर्ण जिला जल संकट की समस्या से त्रस्त है।

अध्ययन के उद्देश्य

- झुन्झुनूं जिले में भूमिगत जल उपलब्धता की स्थिति का ब्लॉक स्तर पर अध्ययन करना।
- झुन्झुनूं जिले में भूमिगत जल की उपयोगिता का ब्लॉक स्तर पर अध्ययन कर भविष्य के लिए जल आवश्यकता का पता लगाना।

अध्ययन क्षेत्र

राजस्थान के उत्तरी–पूर्वी भाग के शेखावाटी क्षेत्र में 27°38′ से 28°31′ उत्तरी अक्षांश एवं 75°.02′ से 76°.06′ पूर्वी देशान्तर के मध्य झुन्झुनूं जिला स्थित है जो उत्तर–पश्चिम में चुरू, दक्षिण–पश्चिम एवं दक्षिण–पूर्वी में सीकर तथा उत्तर–पूर्व में हरियाणा के हिसार और महेन्द्रगढ़ जिले से घिरा हुआ है। अध्ययन क्षेत्र की औसत ऊँचाई 338 मीटर है। जलवायु की दृष्टि से अर्द्धशुष्क जलवायु में स्थित होने के कारण औसत वार्षिक तापमान 25.07 सैल्सियस, औसत वार्षिक वर्षा 49.6 सेन्टीमीटर है। वर्षा की कम मात्रा के कारण अध्ययन क्षेत्र में बरसाती नदी नालों का प्रायः अभाव है। एक मात्र मौसमी कांतली नदी दक्षिण से उत्तर दिशा की ओर प्रवाहित होती थी जो विगत 15 से 20 वर्षो में मृत प्रायः है। झुन्झुनूं जिले का कुल क्षेत्रफल 5,92,800 वर्ग हेक्टेयर है जो आठ उपखण्ड, आठ तहसील एवं आठ पंचायत समिति में विभाजित है जिसमें 976 गाँव व 12 शहर बसे हुए है। कुल जनसंख्या 21,37,045, जनसंख्या घनत्व 361, साक्षरता 74.1, लिंगानुपात 950 है।

शोध विधि तंत्र एवं आंकड़ों का प्रयोग

प्रस्तुत शोध पत्र में द्वितीयक आंकड़ों की सहायता ली गई है। द्वितीयक आंकड़े सरकारी प्रकाशनों, जिला सांख्यिकीय रूप–रेखा, केन्द्रीय भू जल बोर्ड, जयपुर एवं भू जल विभाग, झुन्झुनूं से एकत्रित किये गये है। प्राप्त आंकड़ों के आधार पर विभिन्न तालिकाओं का निर्माण कर सांख्यिकीय विधियों से विश्लेषण कर मानचित्रों की सहायता से प्रदर्शित किया गया है।

भूमिगत जल की उपलब्धता

खनिज भण्डारों की तरह भूमिगत जल भण्डार भी निर्धारित स्थानों में पाया जाने वाला प्राकृतिक संसाधन है। भूमिगत जल भण्डार का संचय जलीय चक्र के एक भाग के रूप में पृथ्वी के धरातलीय सतह के नीचे होता है तथा वर्षा जल इन भूमिगत जलभण्डारों के निर्माण में महत्वपूर्ण भूमिका निभाता है। वर्षा के अतिरिक्त चट्टानों की संरचना व संरध्रता, धरातलीय स्वरूप, आदि भी भूमिगत जल भण्डारों की उपलब्धता को प्रभावित करते है। प्रकृति में भूमिगत जल भण्डारों की स्थिति विशिष्ट है। भूमिगत जल भण्डारों के पूर्ण दोहन के उपरान्त् भी खनिज भण्डारों के विपरीत वे हमेशा के लिए समाप्त नहीं होते है बल्कि प्रतिवर्ष वर्षाकाल में इनका पुनर्भरण होता रहता है। अध्ययन क्षेत्र में भूमिगत जल की कुल उपलब्धता 23,406.65 हेक्टेयर मीटर है। ब्लॉक स्तर पर भूमिगत जल स्तर की उपलब्धता का वर्णन सारणी 01 में किया गया है। जिसके अध्ययन से स्पष्ट होता हैं कि झुन्झुनूं जिले में ब्लॉक स्तर पर भूमिगत जल की उपलब्धता की मात्रा में असमानता पायी जाती है। ब्लॉक स्तर पर भूमिगत जल की उपलब्धता के आधार पर जिले को चार श्रेणियों में विभाजित किया जा सकता है –

- **अति उच्च भूमिगत जल की उपलब्धता (3,000 हेक्टेयर मीटर से अधिक)**

झुन्झुनूं जिले के तीन ब्लॉक में भूमिगत जल की

उपलब्धता 3,000 हेक्टेयर मीटर से अधिक है जो कि अति उच्च है। उदयपुरवाटी ब्लॉक में 3,895 हेक्टेयर मीटर भूमिगत जल उपलब्ध है जो जिले के कुल भूमिगत जल उपलब्धता का 16.64 प्रतिशत है। अलसीसर में 3,094.81 हेक्टेयर मीटर व झुन्झुनूं में 3,022.75 हेक्टेयर मीटर भूमिगत जल उपलब्ध है जो सम्पूर्ण जिले के भूमिगत जल का क्रमशः13.22 व 12.91 प्रतिशत है। उदयपुरवाटी ब्लॉक में अरावली पर्वत श्रेणी की पहाड़ियों से छोटे–छोटे नदी नालों का उद्‌गम होता है साथ ही इस ब्लॉक की सीमा क्षेत्र में कांतली नदी भी प्रवाहित होती है जिसके फलस्वरूप भूमिगत जल उपलब्धता अधिक पायी जाती है, वही दूसरी ओर अलसीसर ब्लॉक में कुल भूमिगत जल उपलब्धता में से 373.41 हेक्टेयर मीटर जल लवणीय है जिस कारण कुऐं व नलकूपों की संख्या कम है फलस्वरूप भूमिगत जल की निकासी कम है।

● उच्च भूमिगत जल उपलब्धता (2,800 से 3,000 हेक्टेयर मीटर के मध्य)

इस वर्ग में अध्ययन क्षेत्रों के दो ब्लॉक खेतड़ी व नवलगढ़ सम्मिलित है। खेतड़ी ब्लॉक 10.68 प्रतिशत भू–भाग पर विस्तृत है जहाँ 12.16 प्रतिशत (2,847.45 हेक्टेयर मीटर) भूमिगत जल की उपलब्धता है। इसी प्रकार नवलगढ़ ब्लॉक 11.72 प्रतिशत भू–भाग पर विस्तृत है, जहाँ भूमिगत जल की उपलब्धता 12.4 प्रतिशत (2,842.49 हे. मी) है। अतः स्पष्ट है कि इस वर्ग में क्षेत्रफल की अपेक्षा भूमिगत जल की उपलब्धता अधिक है।

सारणी 01 : झुन्झुनूं जिले में ब्लॉकानुसार भूमिगत जल की उपलब्धता (2016–17)

ब्लॉक का नाम	क्षेत्रफल (हे. मी.)	सम्पूर्ण क्षेत्र का प्रतिशत	भूमिगत जल की उपलब्धता (हे. मी.)	सम्पूर्ण भूमिगत जल उपलब्धता का प्रतिशत
अलसीसर	82,715	15.33	3,094.81	13.22
बुहाना	62,430	11.58	2,739.46	11.70
चिड़ावा	49,304	9.14	2,173.93	9.29
झुन्झुनूं	74,496	13.81	3,022.75	12.91
खेतड़ी	57,583	10.68	2,847.45	12.16
नवलगढ़	63,200	11.72	2,842.49	12.14
सुरजगढ़	77,909	14.44	2,790.75	11.92
उदयपुरवाटी	71,710	13.29	3,895.00	16.64
झुन्झुनूं (योग)	11,978.00	100	23,406.65	100.00

स्त्रोत :– भू जल विभाग, झुन्झुनूं

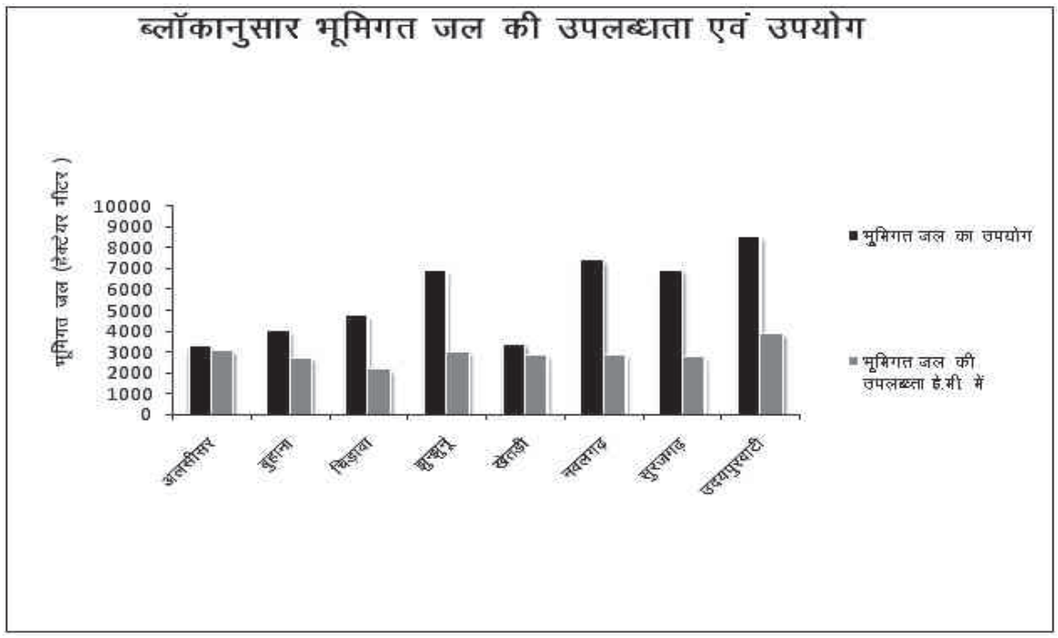
● मध्यम भूमिगत जल उपलब्धता (2,600 से 2,800 हेक्टेयर मीटर के मध्य)

इस वर्ग में अध्ययन क्षेत्र के दो ब्लॉक सुरजगढ़ व बुहाना सम्मिलित है। सुरजगढ़ ब्लॉक कुल भौगोलिक क्षेत्र के 14.44 प्रतिशत भाग में विस्तृत है, जहाँ कुल भूमिगत जल उपलब्धता का 11.92 प्रतिशत ही पाया जाता है, वही दूसरी ओर बुहाना ब्लॉक में 11.58 प्रतिशत भू–भाग के साथ भूमिगत जल उपलब्धता का 11.70 प्रतिशत भाग पाया जाता है। इस प्रकार तालिका 01 के अध्ययन से स्पष्ट है कि सुरजगढ़ व बुहाना ब्लॉक में क्षेत्रफल की अपेक्षा भूमिगत जल की उपलब्धता कम है।

● निम्न भूमिगत जल उपलब्धता (2,600 हेक्टयर मीटर से कम)

इस वर्ग में अध्ययन क्षेत्र का केवल चिड़ावा ब्लॉक ही सम्मिलित है। चिड़ावा ब्लॉक में जिले के सम्पूर्ण क्षेत्रफल

का 9.14 प्रतिशत तथा भूमिगत जल उपलब्धता 9.29 प्रतिशत भाग पाया जाता है अर्थात् इसमें भूमिगत जल की उपलब्धता और क्षेत्रफल का प्रतिशत लगभग समानता की स्थिति में है परन्तु कुल भूमिगत जल की उपलब्धता 2,173.93 हेक्टेयर मीटर है जो न्यूनतम है। इसका मुख्य कारण कुऐं व नलकूपों द्वारा भूमिगत जल का अंधाधुंध दोहन है।



चित्र 01 : झुन्झुनूं जिले में ब्लॉकानुसार भूमिगत जल की उपलब्धता एवं उपयोग

भूमिगत जल का उपयोग

भूमिगत जल का उपयोग स्थानीय मांग एवं उपलब्धता पर निर्भर करता है। विगत कुछ दशकों से निरन्तर बढ़ती जनसंख्या, नगरीकरण, औद्योगीकरण, आदि के फलस्वरूप अध्ययन क्षेत्र में घरेलू, कृषि व औद्योगिक क्षेत्र में भूमिगत जल के उपयोग में निरन्तर वृद्धि हो रही है। झुन्झुनूं जिले में कुल भूमिगत जल की उपलब्धता 23,406.65 हेक्टेयर मीटर है जबकि भूमिगत जल का कुल उपयोग 45,411.63 हेक्टेयर मीटर है। जिससे स्पष्ट होता है कि भूमिगत जल दोहन की दर, पुनर्भरण की दर से अधिक है इसी कारण अध्ययन क्षेत्र अतिदोहित क्षेत्र में वर्गीकृत है तथा भूमिगत जल विकास स्तर 194 प्रतिशत है। अध्ययन क्षेत्र में सिंचाई हेतु भूमिगत जल की निकासी 36,888 हेक्टेयर मीटर है जो कुल भूमिगत जल निकासी का 81.23 प्रतिशत है। अध्ययन क्षेत्र एक कृषि प्रधान क्षेत्र है, फलस्वरूप भूमिगत जल का सर्वाधिक उपयोग सिंचाई हेतु किया जाता है। वहीं दूसरी ओर औद्योगिक व घरेलु उपयोग हेतु जल निकासी 8,523.62 हेक्टेयर मीटर है जो कुल भूमिगत जल निकासी का 18.78 प्रतिशत है। झुन्झुनूं जिले को भूमिगत जल के उपयोग के आधार पर चार भागों में विभाजित किया जाता है –

सारणी 02 : झुन्झुनूं जिले में ब्लॉकानुसार भूमिगत जल का उपयोग (2016–17)

ब्लॉक	क्षेत्र का प्रकार	सिचाई हेतु भूमिगत जल की निकासी	औद्योगिक व घरेलु उपयोग हेतु भूमिगत जल की निकासी	कुल भूमिगत जल निकासी (उपयोग)	सिंचाई हेतु भूमिगत जल निकासी का प्रतिशत (कुल भूमिगत जल की उपलब्धता)	औद्योगिक व घरेलु उपयोग हेतु भूमिगत जल निकासी का प्रतिशत (कुल भूमिगत जल की उपलब्धता)	भूमिगत जल का विकास स्तर (कुल भूमिगत जल निकासी का प्रतिशत)	वर्ष 2025 तक के लिए घरेलु उपयोग हेतु जल आवंटन	भविष्य के लिए भूमिगत जल की उपलब्धता	श्रेणी
अलसीसर	गैर कमान क्षेत्र (NC)	2,390.04	766.16	3,156.20	87.82	28.15	115.97	1,034.32	1,316.88	अतिशोषित
	लवणीय क्षेत्र(SAL)	121.44	38.78	160.22	32.52	10.38	42.90	–	214.63	सुरक्षित
	योग	2,511.48	804.94	3,316.42	81.15	26.01	107.16	1,034.32	–1,102.25	अतिशोषित
बुहाना	गैर कमान क्षेत्र (NC)	2,950.81	1,082.31	4,033.12	107.72	39.51	147.23	1,461.12	–1,946.41	अतिशोषित
चिड़ावा	गैर कमान क्षेत्र (NC)	3,802.66	952.14	4,754.80	174.92	43.80	218.72	120.24	–1,966.35	अतिशोषित
झुन्झुनूं	गैर कमान क्षेत्र (NC)	5,651.82	1,301.47	6,953.29	186.98	43.06	230.04	1,757.00	–4,688.33	अतिशोषित
खेतड़ी	गैर कमान क्षेत्र (NC)	2,679.36	700.83	3,380.19	94.10	24.61	118.71	946.12	–1,062.78	अतिशोषित
नवलगढ़	गैर कमान क्षेत्र (NC)	6,199.87	1,226.09	7,425.97	218.11	43.13	261.24	1,655.23	–5,277.85	अतिशोषित
सुरजगढ़	गैर कमान क्षेत्र (NC)	5,757.70	1,210.98	6,968.68	206.31	43.39	249.70	1,634.83	–4,880.85	अतिशोषित
उदयपुरवाटी	गैर कमान क्षेत्र (NC)	7,334.32	1,244.85	8,579.17	188.30	31.96	220.26	1,680.55	–5,473.06	अतिशोषित
झुन्झुनूं	गैर कमान क्षेत्र (NC)	6,766.56	8,484.84	45,251.41	159.62	36.84	196.46	10,289.60	–	अतिशोषित
	लवणीय क्षेत्र(SAL)	121.44	38.78	160.22	32.52	10.38	42.9	–	214.63	सुरक्षित
	योग	36,888.01	8,523.62	45,411.63	157.59	36.41	1.94	10,289.40	214.63	अतिशोषित

स्त्रोत : भू जल विभाग, झुन्झुनूं

1. अति उच्च उपयोग (240 प्रतिशत से अधिक)

इस वर्ग में अध्ययन क्षेत्र के नवलगढ व सुरजगढ़ ब्लॉक सम्मिलित है। नवलगढ़ व सुरजगढ़ ब्लॉक में क्रमशः 2,842.49 व 2,790.75 हेक्टेयर मीटर भूमिगत जल उपलब्ध है (तालिका 01)। इसके विपरीत भूमिगत जल निकासी क्रमशः 7,425.97 व 6,968.68 हेक्टेयर मीटर है। तालिका 02 के अध्ययन से स्पष्ट होता है कि नवलगढ़ व सुरजगढ़ ब्लॉक के क्रमशः कुल भूमिगत जल निकासी का 83.49 व 82.62 प्रतिशत जल सिंचाई हेतु उपयोग किया जाता है वही दूसरी ओर क्रमशः कुल भूमिगत जल उपलब्धता का 218.11 व 206.31 प्रतिशत सिंचाई हेतु उपयोग में लिया जाता है तथा दोनों ही ब्लॉक कृषि प्रधान क्षेत्र होने के कारण अतिदोहित श्रेणी में सम्मिलित है जहाँ भूमिगत जल विकास स्तर क्रमशः 261.24 व 249.70 प्रतिशत है।

2. उच्च उपयोग (220 से 240 प्रतिशत के मध्य)

इस श्रेणी में सम्मिलित झुन्झुनूं व उदयपुरवाटी ब्लॉक में क्रमशः 3,022.75 व 3,875.00 हेक्टेयर मीटर भूमिगत जल उपलब्ध है, जबकि भूमिगत जल निकासी क्रमशः 6,953.29 व 8,579.17 हेक्टेयर मीटर है अर्थात भूमिगत जल उपयोग की दर, जल उपलब्धता की दर से अधिक है, इसी के परिणामस्वरूप झुन्झुनूं व उदयपुरवाटी में भूमिगत जल विकास स्तर क्रमशः 230.04 व 2,220.26 प्रतिशत को प्राप्त कर चुका है।

3. मध्यम उपयोग (200 से 220 प्रतिशत के मध्य)

तालिका 02 के अध्ययन से स्पष्ट है कि इस श्रेणी में केवल चिड़ावा ब्लॉक सम्मिलित है जहाँ 3,022.75 हेक्टेयर मीटर भूमिगत जल की मात्रा उपलब्ध है तथा कुल भूमिगत जल निकासी 454.80 हेक्टेयर मीटर है, जिसका 79.97 प्रतिशत सिंचाई हेतु उपयोग किया जाता है, वही दूसरी ओर कुल भूमिगत जल उपलब्धता में से सिंचाई हेतु उपयोग 174.92 प्रतिशत है। इस प्रकार चिड़ावा ब्लॉक भी अति दोहित श्रेणी में सम्मिलित है जहाँ भूमिगत जल का विकास स्तर 218.72 प्रतिशत है।

4. निम्न उपयोग (200 प्रतिशत से कम)

इस वर्ग में बुहाना, खेतड़ी व अलसीसर ब्लॉक सम्मिलित है। अलसीसर ब्लॉक में जल में लवण की मात्रा अधिक होने पर इसका उपयोग प्रायः पेयजल व सिंचाई हेतु कम किया जाता है। खेतड़ी ब्लॉक में अरावली पर्वत श्रेणी का अधिक विस्तार होने एवं भूमि की सतह के नीचे चट्टानी परत होने के कारण कृषि योग्य भूमि के अन्तर्गत क्षेत्र में कमी है साथ ही जल की गुणवत्ता सिंचाई हेतु प्रतिकूल है। इसी प्रकार बुहाना ब्लॉक में कुओं व नलकूपों की संख्या जिले के औसत से कम है अतः तीनों ही ब्लॉकों में भूमिगत जल का तुलनात्मक रूप से कम उपयोग किया जाता है।

निष्कर्ष

अध्ययन क्षेत्र में सतही जल संसाधनों का अभाव होने के फलस्वरूप विशेषकर सिंचाई एवं औद्योगिक व घरेलु पेयजल के रूप में भूमिगत जल का अत्यधिक दोहन किया जाता है। झुन्झुनूं जिला अर्द्ध शुष्क जलवायु में स्थित एक कृषि प्रधान क्षेत्र है जिस कारण यहाँ खरीब फसल ऋतु में मानसून अंतराल के दौरान रक्षित सिंचाई एवं रबी फसल ऋतु में उगाई जाने वाली अधिकांश फसलें सिंचाई पर निर्भर है, जिसका सीधा प्रभाव भूमिगत जल भण्डार पर देखा जा सकता है। झुन्झुनूं जिले के सभी आठ ब्लॉक में भूमिगत जल दोहन की दर, पूनर्भरण की दर से अधिक है जिस कारण सम्पूर्ण जिला अतिदोहित श्रेणी में सम्मिलित है तथा भूमिगत जल विकास स्तर 194 प्रतिशत है।

भूमिगत जल की सतत् उपलब्धता बनाये रखने के साथ–साथ कृषि पारिस्थितिकी एवं पर्यावरण को सन्तुलित बनाये रखने के लिए इसका संरक्षण व मितव्ययिता से उपयोग किया जाना चाहिए। इस हेतु सामान्य जन को जल संरक्षण के प्रति जागरूक करते हुए जल की उपलब्धता को बनाये रखने के लिए वार्षिक पूनर्भरण दर को बढ़ाना आवश्यक है। इसके लिए प्रत्येक गाँव में स्थित हमारी संस्कृति के प्रतीक जोहड़, चरागाह व सार्वजनिक भूमि में छोटे–छोटे जलाशयों एवं घर की छतों के माध्यम से वर्षा जल संचयन को प्रोत्साहित किया जाना

चाहिए, जिसमें घरेलु उपयोग के साथ–साथ औद्योगिक, सरकारी भवनों, आदि को गुणवत्ता पूर्ण जल की नियमित और पर्याप्त आपूर्ति की जा सके। इसके अतिरिक्त कांतली नदी बेसिन में अवैध खनन एवं अतिक्रमण पर कानूनी रोक लगाने के साथ–साथ इसके प्राकृतिक बहाव को पुनः विकसित करने हेतु सरकारी स्तर पर एक विस्तृत कार्ययोजना बनाना आवश्यक है जिसका धनात्मक प्रभाव भूमिगत जल स्तर पर पड़ेगा एवं साथ ही भविष्य के लिए भूमिगत जल उपलब्धता के स्तर को बनाये रखा जा सकेगा।

सन्दर्भ

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ग्रामीण आवासों एवं जनसंख्या की स्थिति में परिवर्तन बेमेतरा जिला (छत्तीसगढ़) : एक भौगोलिक अध्ययन

अनार एवं घनश्याम नागे

शोध सारांश

आवास मनुष्य की मूलभूत आवश्यकता है। प्रत्येक मनुष्य अपने विभिन्न क्रियाकलापों को स्वतंत्र रूप से करना चाहता है व पर्यावरण से सुरक्षित भी रहना चाहता है। इस हेतु आवास की आवश्यकता अति महत्वपूर्ण हैं। पर्यावरणीय समस्या से बचाव हेतु सुरक्षित व अच्छी स्थिति वाले आवास की उपलब्धता का होना प्रत्येक मनुष्य के लिए नितांत आवश्यक है। अध्ययन क्षेत्र में आवास की स्थिति व जनसंख्या में बहुत असमानता पायी जाती है। अध्ययन क्षेत्र में 2011 की जनगणना के अनुसार कुल जनसंख्या 7,95,759 है। इनमें से 90.6 प्रतिशत ग्रामीण जनसंख्या है। पुरुष जनसंख्या 3,97,650 व महिला जनसंख्या 3,98,109 हैं। जिले के ग्रामीण क्षेत्रों में 5,59,242 आवास है। 2001 की जनगणना के अनुसार ग्रामीण क्षेत्रों में आवास की संख्या 1,03,202 था जो 2011 में बढ़कर 1,43,422 हो गयी अर्थात् इसमें 28.04 प्रतिशत की वृद्वि हुई है। क्षेत्र में जनसंख्या वृद्वि की तुलना में मकानों की वृद्धि 1.85 प्रतिशत कम हुई है। अध्ययन क्षेत्र में निवासरत परिवारों में 48.4 प्रतिशत परिवारों के मकान अच्छी स्थिति में है। 29 प्रतिशत परिवारों के मकान रहने योग्य अर्थात् मध्यम स्तर के है। 16.2 प्रतिशत परिवारों के मकान जीर्ण–शीर्ण स्थिति में तथा अन्य स्तर वाले आवासों का प्रतिशत 6.3 है। सरकार द्वारा ग्रामीण क्षेत्रों में भूमहीन मजदूरों के अतिरिक्त मध्यवर्गीय परिवारों को भी बहुत ही कम ब्याज दर पर ऋण प्रदान कर उनके आवास प्रतिरूप में परिवर्तन किया जा सकता है। साथ ही साथ जनसंख्या नियंत्रण संबंधी कार्यक्रमों का व्यापक प्रचार–प्रसार एवं जनसंख्या नीति का उचित कियान्वयन कर जनसंख्या के स्थिति में भी परिवर्तन लाया जा सकता है।

शब्द कुंजी *: आवास, जनसंख्या, घनत्व, भूदृश्य, शिक्षा, स्वास्थ्य।*

प्रस्तावना

ग्रामीण बस्तियों में निवास करने वाली जनसंख्या की आर्थिक सामाजिक एवं सांस्कृतिक संरचना में पर्याप्त विभिन्नता पाई जाती है। व्यवासायों की प्रधानता तथा प्रकृति के अनुसार अधिवासों को वर्गीकृत किया जाता है। प्रस्तुत अध्ययन ग्रामीण अधिवासों की स्थिति एवं उनकी दशाओं पर आधारित है। आवासीय दशा आर्थिक स्थिति व जीवन स्तर पर निर्भर करती है। आवास की दशाएँ मानवीय जीवन को व्यापक रूप से प्रभावित करती है। अतः आवास की संरचना में घर का प्रकार, दीवाल का प्रकार, छत का प्रकार, कमरों की संख्या, पेयजल की सुविधा, शौचालय की व्यवस्था, प्रकाश की सुविधाएँ, शिक्षा का स्तर तथा उसमें निवास करने वाले लोगों की संख्या, आदि प्रभावित करता हैं। जनसंख्या में लगातार वृद्वि के परिणामस्वरूप ग्रामीण क्षेत्रों में आवास की मांग दिन–प्रतिदिन बढ़ती जा रही है। सांस्कृतिक भू–दृश्यों में अधिवास सर्वप्रमुख तथ्य है। अधिवास अपने आकार – प्रकार के अनुसार विभिन्न प्रकार के होते हैं। कुछ परिवारों या गृह वाले लघु पुरवा से लेकर ग्राम, ग्रामीण बाजार, कस्बा, शहर, महानगर, आदि सभी अधिवास के अंतर्गत सम्मिलित किए जाते है। अतः अध्ययन क्षेत्र में जनसंख्या की स्थिति में परिवर्तन ,आवास की आवश्यकता तथा उसकी स्थिति का समुचित अध्ययन करना नितांत आवश्यक है।

1. अनार, शोध छात्र, भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर, छ.ग.।
2. डॉ. घनश्याम नागे, अतिथि सहायक प्राध्यापक भूगोल, शा.पं. जवाहर लाल नेहरू कला एवं विज्ञान स्नातकोत्तर महाविद्यालय, बेमेतरा, छ.ग.।

उद्देश्य

प्रस्तुत शोध अध्ययन के निम्नांकित उद्देश्य हैं –

1. जिले के ग्रामीण क्षेत्रों में आवास एवं जनसंख्या में दशकीय वृद्वि दर का पता लगाना ।
2. राजनीतिक, आर्थिक एवं सामाजिक कारकों का आवास के प्रकारों पर प्रभाव का आकलन करना।
3. आवास के भौगोलिक वितरण का अध्ययन करना ।
4. जनसंख्या वृद्धि का ग्रामीण आवास पर प्रभाव का अध्ययन करना ।

आँकड़ों के स्त्रोत एवं शोध विधितंत्र

प्रस्तुत शोध अध्ययन मुख्यतः प्राथमिक आँकड़ों पर आधारित है। आँकड़ों का संकलन साक्षात्कार अनुसूची के माध्यम से किया गया है। इस अध्ययन के लिए अध्ययन क्षेत्र के 16 गाँवों के 1500 परिवारों का चयन उद्देश्य पूर्ण विधि द्वारा किया गया है। परिवारों को उनके आवास के आधार पर चार वर्गों में अच्छी स्थिति वाले, मध्यम श्रेणी, निम्न श्रेणी व अति निम्न श्रेणी में वर्गीकृत कर अध्ययन किया गया है। अध्ययन क्षेत्र में, आवास एवं जनसंख्या सम्बंधी आँकड़े जनगणना पुस्तिका 2001 एवं 2011 से प्राप्त कर अध्ययन किया गया है।

अध्ययन क्षेत्र

प्रस्तुत शोध अध्ययन का क्षेत्र बेमेतरा जिला है। यह छत्तीसगढ राज्य के दक्षिण–पश्चिम भाग में स्थित है। भौगोलिक दृष्टिकोण से 21°21′ से 22°03′ उत्तरी अक्षाश तथा 81°07′से 81°55′ पूर्वी देशान्तर के मध्य में विस्तृत है, इसका कुल भौगोलिक क्षेत्रफल 2,854.81 वर्ग किलोमीटर है। प्रशासनिक रूप से यह जिला 5 तहसीलों–नवागढ, बेमेतरा, बेरला, साजा व थानखम्हरिया में विभक्त है।

अधिवासों की स्थिति

अध्ययन क्षेत्र में ग्रामीण अधिवासों की स्थिति का आँकलन करने के लिए कुछ महत्वपूर्ण कारकों को अधार माना गया है। जो जनसंख्या, घरों में पीने के पानी की व्यवस्था, विद्युत, शौचालय, कमरों की संख्या, व रसोई की व्यवस्था को अधार माना गया है। अध्ययन क्षेत्र में अच्छी स्थिति के आवास (रहने योग्य) जीर्ण–शीर्ण तथा अन्य आवास को सम्मिलित कर अध्ययन किया गया है।

अध्ययन क्षेत्र में सर्वेक्षित परिवारों के मकान छोटे–छोटे है। क्षेत्र में औसत 38.6 प्रतिशत परिवार ऐसे हैं जिनके मकानों का क्षेत्रफल 250 वर्गफुट से कम है। 38.7 प्रतिशत परिवारों के मकान 250 से 500 वर्गफुट के है। 500 से 750 वर्गफुट क्षेत्रफल में निर्मित मकानों का प्रतिशत 10.7 तथा 750 से 1000 वर्गफुट क्षेत्रफल में निर्मित मकानों का प्रतिशत 10 है। 2 प्रतिशत परिवारों के मकान 1000 से अधिक वर्गफुट क्षेत्रफल के हैं। अध्ययन क्षेत्र में औसत 16.5 प्रतिशत परिवार ऐसे है जिनके मकानों के दीवाल मिट्टी से निर्मित है। 6.6 प्रतिशत पत्थर से निर्मित तथा 33.4 प्रतिशत कच्ची ईंट से निर्मित दीवाल है। पक्की ईटों से निर्मित दीवाल 43.4 प्रतिशत है।

तालिका 01 : बेमेतरा जिला : अधिवासों की स्थिति एवं सुविधाएँ

क्र.	गृहों के प्रकार	सुविधाएँ	गृहों की संख्या	गृहों का प्रतिशत
1	अच्छी स्थिति के आवास	शौचालय ,रसोई घर, पीने के पानी, बिजली, कमरों की संख्या ,मकान के अकार एवं प्रकार	726	48.4
2	रहने योग्य आवास	शौचालय ,रसोई घर, पीने के पानी, बिजली, कमरों की संख्या ,अर्द्वपक्का मकान	436	29.1
3	जीर्ण–शीर्ण आवास	रसोई घर, पीने के पानी, बिजली, कमरों की संख्या , कच्चा मकान	243	16.2
4	अन्य स्तर के आवास	झोपडी	95	6.3
योग			1,500	100

स्त्रोत :– व्यक्तिगत सर्वेक्षण 2020.

जिले में औसत 6 प्रतिशत परिवार ऐसे हैं जिनके मकानों के छत घास–फूस से निर्मित है। 42.5 प्रतिशत मकानों के छत खपरैल से, सीट (लोहे) से निर्मित छत 41.9 प्रतिशत एवं सीमेंट से निर्मित छत 9.5 प्रतिशत है। अध्ययन क्षेत्र में औसत 48.4 प्रतिशत परिवार ऐसे है जिनके मकानों के फर्श मिट्टी से निर्मित है। 29.0 प्रतिशत सीमेंट से 16.2 प्रतिशत पत्थर एवं 6.3 प्रतिशत टाईल्स से निर्मित फर्श प्राप्त हुआ है। अध्ययन क्षेत्र मे औसत 31.9 प्रतिशत परिवार ऐसे है जिनके मकानों में कमरों की संख्या 1 से 2 है। 35.5 प्रतिशत मकानों में कमरों की संख्या 3 से 4 है। 5 से 6 कमरे वाले मकानों का प्रतिशत 21.6 तथा 7 से 8 कमरों वाले मकानों का प्रतिशत 7.6 है। 3.4 प्रतिशत मकानों के कमरों की संख्या 8 से अधिक है।

अध्ययन क्षेत्र में अच्छी स्थिति वाले आवासों का प्रतिशत 48.4 हैं। 29 प्रतिशत परिवारों के मकान रहने योग्य है। 16.2 प्रतिशत परिवारों के मकान जीर्ण–शीर्ण है। अन्य आवासों का प्रतिशत 6.3 है। अध्ययन क्षेत्र में अच्छी स्थिति वाले आवास सर्वाधिक 62 प्रतिशत ग्राम मोहतरा में तथा सबसे कम 21.6 प्रतिशत सहसपुर में प्राप्त हुए हैं। जिले में रहने योग्य या मध्यम श्रेणी का आवास सर्वाधिक 40.3 प्रतिशत देवरबीजा में प्राप्त हुआ है, वहीं सबसे कम 18 प्रतिशत मोहतरा में प्राप्त हुआ है। अध्ययन क्षेत्र के चयनित ग्रामों में जीर्ण–शीर्ण आवासों का सर्वाधिक (20 प्रतिशत) कुसमी में तथा सबसे कम 10.8 प्रतिशत बदनारा में प्राप्त हुआ है।

जिले में अन्य स्थिति वाले आवासों का सर्वाधिक 6.3 प्रतिशत मुरता में तथा सबसे कम 1.3 प्रतिशत सहसपुर में प्राप्त हुआ है। क्षेत्र में उच्च प्रतिशत होने का कारण–उच्च शैक्षणिक स्तर, सिंचाई सुविधाओं का विकास, समतल कृषि–भूमि कृषकों की आय में वृद्धि ग्रामीण परिवारों में जागरूकता तथा साक्षरता दर में वृद्वि मुख्य है। क्षेत्र में निम्न स्तर के आवास पाये जाने के कारणों में आर्थिक स्थिति का निम्न होना मुख्य है।

जनसंख्या की स्थिति में परिवर्तन

किसी क्षेत्र में जनसंख्या की जानकारी प्राप्त करने के लिए जनसंख्या वितरण एवं घनत्व का सर्वाधिक महत्व होता है। जनसंख्या वितरण एवं घनत्व दोनों परस्पर संबंधित होते है। जनसंख्या वितरण से धरातलीय स्थिति का ज्ञान होता है जिससे किसी भी क्षेत्र विशेष के भौगोलिक कारकों का स्पष्ट स्वरूप दिखाई देता है।

अध्ययन क्षेत्र में जनसंख्या वितरण

किसी विशिष्ट समय में किसी प्रदेश में जनसंख्या का वितरण वहाँ के प्राकृतिक दशाओं के अतिरिक्त सामाजिक, आर्थिक, राजनैतिक और ऐतिहासिक कारकों के सम्मिलित प्रभाव का परिणाम होता है। अध्ययन क्षेत्र में ग्रामीण एवं नगरीय जनसंख्या के वितरण में अत्यधिक असमानता है। 2011 की जनगणना अनुसार अध्ययन क्षेत्र की कुल जनसंख्या 7,95,759 है। जिसमें ग्रामीण जनसंख्या 90.62 तथा नगरीय जनसंख्या 9.38 प्रतिशत है। क्षेत्र में अनुसूचित जाति 18.09 तथा अनुसूचित जनजाति 4.67 प्रतिशत है।

तालिका 02 : बेमेतरा जिला : ग्रामीण एवं नगरीय जनसंख्या – 2011

क्र.	विकास खण्ड	कुल जनसंख्या	जनसंख्या घनत्व	ग्रामीण जनसंख्या	प्रतिशत	नगरीय जनसंख्या	प्रतिशत
1.	नवागढ	1,97,081	315	1,79,944	91.3	17,137	8.69
2.	बेमेतरा	2,15,624	296	1,87,088	86.7	28,536	13.23
3.	बेरला	1,87,376	241	1,82,211	97.2	5,165	2.74
4.	साजा	1,95,678	269	1,71,949	87.8	23,729	12.12
जिला		7,95,759	279	7,21,192	90.62	74,567	9.37

स्त्रोत :–भारतीय जनगणना पुस्तिका 2011.

जनसंख्या घनत्व

किसी प्रदेश के क्षेत्रफल तथा उसके जनसंख्या के पारस्परिक अनुपात को जनसंख्या घनत्व कहते है। अतः किसी प्रदेश में जनसंख्या का घनत्व वहाँ के प्राकृतिक संसाधनों और आर्थिक विकास की अवस्था पर निर्भर करता है। अध्ययन क्षेत्र में जनसंख्या घनत्व में अत्यधिक असमानता पाई गयी है। क्षेत्र की जनसंख्या घनत्व को तीन श्रेणियों में रखकर अध्ययन किया गया है।

1. अधिक जनसंख्या घनत्व के क्षेत्र 300 व्यक्ति से अधिक
2. मध्यम जनसंख्या घनत्व के क्षेत्र 250 से 300 व्यक्ति
3. निम्न जनसंख्या घनत्व के क्षेत्र 250 व्यक्ति से कम

अधिक जनसंख्या घनत्व के क्षेत्र

इसके अंतर्गत जिले के उतरी क्षेत्र नवागढ़ विकासखण्ड सम्मिलित है। इस क्षेत्र में जनसंख्या घनत्व 300 व्यक्ति प्रति वर्ग किमी0 से अधिक है। इसका कारण इस क्षेत्र में समतल मैदानी भू–भाग ,सिंचाई की सुविधा, यातायात एवं परिवहन साधनों की अधिकता मुख्य कारण है।

मध्यम जनसंख्या घनत्व के क्षेत्र

इसके अतंर्गत 250 से 300 व्यक्ति प्रतिवर्ग किलोमीटर जनसंख्या घनत्व वाले क्षेत्र सम्मिलित हैं। जिले के दक्षिण–मध्यवर्ती क्षेत्र जिसमें (बेमेतरा तथा बेरला) विकासखण्ड सम्मिलित है। बेरला विकासखण्ड में 241 तथा बेमेतरा में 296 व्यक्ति प्रति वर्ग किमी0 जनसंख्या घनत्व है। यह समतल मैदानी क्षेत्र होने के कारण जनसंख्या मध्यम सघन है,लेकिन अधिक जनसंख्या घनत्व क्षेत्र की तुलना में यहाँ उपर्युक्त सुविधओं की अपेक्षाकृत कमी के कारण यह मध्यम जनसंख्या घनत्व के क्षेत्र में शामिल हैं।

निम्न जनसंख्या घनत्व के क्षेत्र

यहाँ जनसंख्या घनत्व 250 व्यक्ति प्रतिवर्ग से कम हैं। इसके अंर्तगत जिले के पश्चिमी क्षेत्र (साजा विकास खण्ड) सम्मिलित है। यहाँ जनसंख्या घनत्व कम होने के कारणों में अनुपजाऊ मिट्टी की अधिकता, भूमिगत जल–स्तर की कमी, सिंचाई स्रोतों का अभाव, मैकल वृष्टि छाया प्रदेश, चरागाह तथा कृषि योग्य बेकार भूमि की अधिकता एवं अविकसित परिवहन सुविधा के कारण जनसंख्या विरल है।

आवास की स्थिति में परिवर्तन

आवास मानव की प्राथमिक आवश्यकताओं में से एक है। 2001 की जनगणना के अनुसार ग्रामीण क्षेत्रों में आवास की संख्या 1,03,202 थी जिसमे सर्वाधिक 26,789 बेरला में एवं सबसे कम 24,158 बेमेतरा में प्राप्त हुआ है। 1991 से 2001 की अवधि में ग्रामीण क्षेत्रों में आवास की संख्या 1,03,202 थी जो 2001 से 2011 की अवधि में बढकर 1,43,422 हुई है अर्थात् (28.04 प्रतिशत) मकानों की वृद्धि हुई है। जिसमें सर्वाधिक 18.5 प्रतिशत नवागढ एवं सबसे कम वृद्वि 3.7 प्रतिशत बेरला में हुई है। अध्ययन क्षेत्र में 1991 से

तालिका 03 : बेमेतरा जिला : अधिवास एवं जनसंख्या की स्थिति (1991–2011)

विकास खण्ड	1991–2001			2001–2011			1991–2011 वृद्वि प्रतिशत
	जनसंख्या	ग्रामीण आवास	प्रतिशत	जनसंख्या	ग्रामीण आवास	प्रतिशत	
नवागढ	1,27,842	25,814	13.8	1,79,944	38,152	32.3	18.5
बेमेतरा	1,24,881	24,158	15.1	1,87,088	35,931	32.7	17.6
साजा	1,37,064	26,441	17.4	1,71,949	33,873	21.9	4.5
बेरला	1,37,949	26,789	20.7	1,82,211	35,466	24.4	3.7
जिला	5,27,736	1,03,202	16.8	5,59,242	1,43,422	28.04	11.2

स्त्रोत :– जिला साख्यिकी पुस्तिका 2011.

2001 की अवधि मे ग्रामीण क्षेत्रों में आवासों का प्रतिशत 16.8 है। जो 2001 से 2011 की अवधि बढकर 28.04 प्रतिशत हो गया है अर्थात् 20 वर्षो मे मकानों की संख्या में 11.2 प्रतिशत की वृद्वि हुई है। अध्ययन क्षेत्र में दशकीय जनसंख्या वृद्वि 2001 से 2011 की अवधि में 29.89 प्रतिशत हुई है जबकि ग्रामीण आवासों में वृद्वि 28.04 प्रतिशत है। अतः जनसंख्या की तुलना में आवासों की संख्या में 1.85 प्रतिशत की कमी हुई है। यह बढती जनसंख्या के लिए एक गंभीर समस्या है।

निष्कर्ष एंव सुझाव

1. ग्रामीण क्षेत्रों में रोजगार, शिक्षा एवं स्वास्थ्य संबंधी सुविधाओं में वृद्वि के कारण विगत एक दशक में आवासों में जनसंख्या की तुलना में अपेक्षाकृत कम वृद्धि हुई है।
2. जिले में अच्छे स्तर के आवासों में वृद्धि बहुत ही कम हुई है परंतु जीर्ण–शीर्ण आवासों की संख्या में अधिक वृद्धि हुई है। इससे स्पष्ट है कि लोगों की आर्थिक स्थिति में कम सुधार हुआ है। लोगों की आर्थिक स्थिति में सुधार की आवष्यकता है जिससे अच्छी स्थिति के आवास निर्माण में वृद्वि हो सकें।
3. जनसंख्या नियंत्रण संबंधी विभिन्न कार्यक्रमों एवं योजनाओं को उचित ढंग से क्रियान्वित किया जाने से बढती जनसंख्या पर नियंत्रित किया जा सकता है जिससे आवास की समस्या कम होगी।
4. संयुक्त परिवार को जहाँ तक संभव हो सके बढ़ावा दिया जाय और संयुक्त परिवार के महत्ता से लोगों को अवगत किया जाय। जिससे अधिक आवासों की आवश्यकता कम होगी। संयुक्त परिवार के लोगों में आपसी सदभाव का विकास होगा जिससें छोटे–छोटे एवं जीर्ण–शीर्ण आवासों की संख्या में कमी आयेगी।
5. आवास निर्माण में शासकीय योजनाओं के साथ स्वयं की सहभागिता द्वारा श्रेष्ठ एवं अच्छे स्तर के आवासों का निर्माण किया जा सकता है।
6. प्रधानमंत्री आवास योजना का उचित ढंग से क्रियान्वयन किया जायें साथ ही लाभान्वित की सहभागिता को भी सुनिश्चित किया जाय। जिससे अधिक लोगों को आवास की सुविधा प्रदान की जा सकें ।
7. पर्यावरण की सुरक्षा के लिए वन संरक्षण को प्राथमिकता दी जाय। जिससे चारागाह एवं बंजर भूमि पर अतिक्रमण कम हो इससे पशुपालन को प्रोत्साहन मिलेगा और लोगों की अतिरिक्त आय में वृद्वि होगी जिसे वह श्रेष्ठ आवास निर्माण में उपयोग किया जा सकता है।
8. 'ग्रामीण आवास नीति' में महिलाओं की भागीदारी सुनिश्चित की जायें।

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झारखंड में वेक्टर जनित रुग्णता : एक भौगोलिक अध्ययन

रोहित कुमार चौबे

शोध सारांश

मनुष्य का स्वस्थ्य असामान्य रहने की दशा ही रुग्णता कहलाती है अर्थात् मनुष्य का किसी बीमारी से पीड़ित होना ही रुग्णता है, दूसरे शब्दों में कहा जा सकता है कि किसी क्षेत्र विशेष में निश्चित अवधि के दौरान वहाँ की जनसंख्या में कितनी जनसंख्या रुग्ण पाई गई, रुग्णता (Morbidity) को प्रदर्शित करती है। वेक्टर जनित रुग्णता संचारी रुग्णता (Communicable morbidity) के अंतगर्त सम्मिलित है। यह एक ऐसा मानव रोग है जो परजीवी, वायरस एवं बैक्टीरिया के कारण होता है जो वेक्टर द्वारा प्रेषित होते है, वेक्टर जीवित जीव है जो मनुष्यों के बीच या पशुओं से मनुष्यों के बीच संक्रामक रोगजनकों को प्रसारित करते हैं। प्रस्तुत अध्ययन झारखंड राज्य में वेक्टर जनित रुग्णता की स्थिति को रेखांकित करता है, झारखंड EAG (Empowered Action Group) राज्यों में सम्मिलित है। भारत सरकार के स्वास्थ्य एवं परिवार कल्याण मंत्रालय द्वारा निर्गत नेशनल हेल्थ प्रोफाइल, 2021 के अनुसार झारखंड वेक्टर जनित रुग्णता के मामले में काला–आजार के संबंध में दूसरा व मलेरिया के संबंध में चौथा स्थान देश में रखता है। अतएव प्रस्तुत शोध–पत्र वेक्टर जनित रुग्णता के संबंध में राज्य की स्थिति का विश्लेषण प्रस्तुत करता है, जिसके लिए प्राथमिक व द्वितीयक आँकड़े प्रयुक्त किए गए हैं तथा संदर्श गाँवों का तुलनात्मक अध्ययन प्रस्तुत किया गया है जो वर्णनात्मक शोध का बोध कराता है।

शब्द संक्षेप : *रुग्णता, वेक्टर, मलेरिया, डेंगू, रोग, फाइलेरिया।*

प्रस्तावना

रुग्णता मानव शरीर की वह अवस्था है जिसमें मानव शरीर में किसी प्रकार की विकृति अथवा अक्षमता आ जाती है। रुग्णता को अंग्रेजी में "MORBIDITY" कहा जाता है, जो लैटिन भाषा के शब्द "MORIB" का अंग्रेजी रुपांतरण है, जिसका अर्थ "DISEASE" होता है, विश्व स्वास्थ्य संगठन द्वारा रुग्णता को इस प्रकार से परिभाषित किया गया है : ''रुग्णता से तात्पर्य किसी जनसंख्या का रोगग्रस्त या अस्वस्थ होने की स्थिति से है।''

जनसंख्या भूगोल के अंतर्गत्त जनसंख्या गत्यात्मकता वाले अध्याय में मर्त्यता का अध्ययन किया जाता है। यह अध्ययन तभी सफलीभूत हो सकता है, जब मर्त्यता से पूर्व रुग्णता का विधिवत अध्ययन हो।

अध्ययन क्षेत्र

प्रस्तुत शोध–पत्र का अध्ययन क्षेत्र झारखण्ड राज्य है साथ ही राज्य के राँची जिला अंतर्गत्त काँके प्रखंड के अरसण्डे एवं सुकुरहुटू गाँव को संदर्श गाँव के रूप में सम्मिलित करते हुए अध्ययन किया गया है। झारखण्ड राज्य का अक्षांशीय एवं देशांतरीय विस्तार क्रमशः 21°58′10′′ उत्तर से 25°18′30′′ उत्तर एवं 83°19′50′′ पूर्व से 87°57′ पूर्व है तथा क्षेत्रफल 79,714 वर्ग किमी. है। संदर्श ग्राम अरसण्डे का भौगोलिक क्षेत्रफल 4.64 वर्ग किमी. है तथा इसकी भौगोलिक अवस्थिति 23°25′12′′ उत्तरी अक्षांश से 23°26′36′′ उत्तरी अक्षांश एवं 85°20′ पूर्वी देशांतर से 85°21′24′′पूर्वी देशांतर के मध्य है। संदर्श ग्राम सुकुरहुटू का भौगोलिक क्षेत्रफल 10.64 वर्ग किमी. है तथा अक्षांशीय एवं देशांतरीय विस्तार क्रमशः

रोहित कुमार चौबे, शोधार्थी, एम.फिल., यूजीसी–नेट, भूगोल विभाग, राँची विश्वविद्यालय, राँची।
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23°25′15′′ उत्तर से 23°27′15′′ उत्तर एवं 85°15′45′′ पूर्व से 85°19′43′′ पूर्व है।

अध्ययन उद्देश्य

प्रस्तुत शोध–पत्र का उद्देश्य झारखण्ड राज्य में वेक्टर जनित रुग्णता के संबंध में अध्ययन करना है तथा ग्राम अरसण्डे एवं सुकुरहुटू जो क्रमशः शहर व सामुदायिक स्वास्थ्य केन्द्र के समीप व दूर अवस्थित है, इन गाँवों में वेक्टर जनित रुग्ण जनसंख्या की स्थिति का ब्यौरा प्रस्तुत करना है।

शोध विधि तंत्र

शोध विधितंत्र का तात्पर्य क्रमबद्ध रूप से शोध लक्ष्य की प्राप्ति की प्रविधि से है। प्रस्तुत शोध–पत्र हेतु प्राथमिक एवं द्वितीयक दोनों प्रकार के आँकड़ों का प्रयोग किया गया है। प्राथमिक आँकड़ों की प्राप्ति हेतु संदर्श सर्वेक्षण किया गया जिसमें स्थानीय घरों को सम्मिलित किया गया साथ ही निरीक्षण, साक्षात्कार एवं अनुसूची विधि का प्रयोग प्रदत्त संग्रह के लिए किया गया है। द्वितीयक आँकड़ें प्रखण्ड कार्यालय, पंचायत भवन, सामुदायिक स्वास्थ्य केन्द्र, इंटरनेट एवं संबंधित पुस्तक व पत्रिका से संकलित किए गए हैं, आँकड़ों को सारणीबद्ध रूप से प्रस्तुत करते हुए वर्णनात्मक एवं विश्लेषणात्मक विधितंत्रों का प्रयोग किया है।

परिणाम एवं विश्लेषण

शोधार्थी द्वारा झारखण्ड राज्य में वेक्टर जनित रुग्णता के अध्ययन हेतु छह प्रमुख रोगवाहक जनित रुग्णता को अध्ययन का विषय बनाया गया है, इसमें मलेरिया, फाइलेरिया, काला–आजार, डेंगू, चिकनगुनिया, जापानी बुखार सम्मिलित है।

उपरोक्त सारणी 02 राज्य में वेक्टर जनित रुग्णता के संबंध में (2016–2020) ब्यौरा प्रस्तुत करती है, सारणी 02 के अध्ययन से ज्ञात होता है कि राज्य में सर्वाधिक रुग्ण जनसंख्या मलेरिया (3,46,347) से संबंधित है तो वहीं दूसरे स्थान पर फाइलेरिया (90,230), तीसरे स्थान पर काला–आजार (4,264), चौथे स्थान पर डेंगू (2,491), पाँचवे स्थान पर चिकनगुनिया (1,208) छठे स्थान पर जापानी बुखार (298) रेखांकित है यद्यपि 2016 से 2020 तक की अवधि में मलेरिया में निरंतर ह्रास देखा जा रहा है परंतु फिर भी यह पहले स्थान पर ही कायम है, मलेरिया के साथ–साथ अन्य बीमारियों में भी ह्रास परिलक्षित होता है। वेक्टर जनित कुल रुग्ण जनसंख्या

सारणी 01 : रुग्णता के लिए उत्तरदायी रोगवाहक

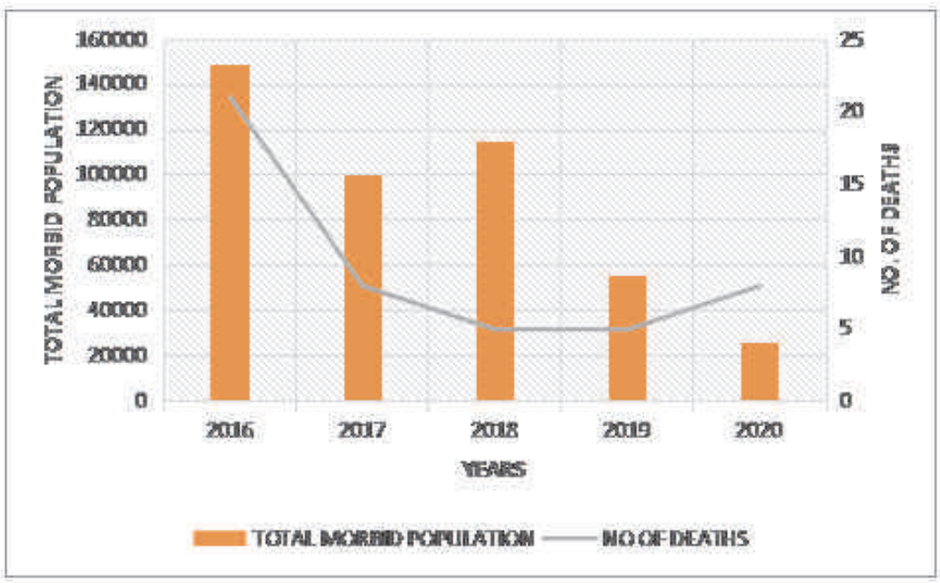
रुग्णता	रोग वाहक
मलेरिया (Malaria)	एनाफेलिस मच्छर (Anapheles Mosquito)
फाइलेरिया (Filaria)	क्यूलेक्स फैटीगेन्स मच्छर (Culex Fatigans Mosquito)
काला–आजार (Kala - Azar)	बालू मक्खी (Sand Fly)
डेंगू (Dengue)	एडीस इजिप्स्टाई मच्छर (Aedes Aegypti Mosquito)
चिकगुनिया (Chikungunya)	एडीस एल्बोपिक्टस एवं एडीस इजिप्स्टाई मच्छर (Aedes Albopictus and Aedes Aegypti M osquito)
जापानी बुखार (Japanese Encephalitis)	क्यूलेक्स ट्रिटेनियोरहाइन्चस मच्छर (Culex Tritaeniorphynchus Mosquito)

स्रोत : नेशनल हेल्थ प्रोफाइल, 2021

सारणी 02 : वेक्टर जनित रुग्णता से ग्रसित जनसंख्या व मृत्यु, झारखण्ड (2016–2020)

वर्ष	मलेरिया		फाइलेरिया		काला–आजार		डेंगू		चिकनगुनिया		जापानी बुखार		वेक्टर जनित रुग्ण जनसंख्या व मृत्यु		कुल अनुमानित जनसंख्या में रुग्ण जनसंख्या प्रतिशत
	रुग्ण	मृत्यु	रुग्ण	मृत्यु	रुग्ण	मृत्यु	रुग्ण	मृत्यु	रुग्ण	मृत्यु	रुग्ण	मृत्यु	रुग्ण	मृत्यु	
2016	1,41,414	15	5,494	00	1,186	00	414	01	14	00	47	05	1,48,569	21	0.40
2017	94,114	02	3,974	00	1,354	00	710	05	17	00	29	01	1,00,198	08	0.26
2018	57,095	04	55,482	00	753	00	463	01	851	00	66	00	1,14,710	05	0.29
2019	37,133	02	16,499	00	541	00	825	00	169	00	112	03	55,279	05	0.14.
2020	16,655	08	8,727	00	430	00	79	00	157	00	44	00	26,092	08	0.06
कुल	**3,46,347**	**31**	**90,230**	**00**	**4,264**	**00**	**2,491**	**07**	**1,208**	**00**	**298**	**09**	**4,44,848**	**47**	**0.23**

स्रोत – www.nvbdcp.gov.in एवं शोधार्थी द्वारा परिगणित



आरेख 01 : वेक्टर जनित रुग्ण जनसंख्या एवं मृत्यु

राज्य में 4,44,848 है जो कुल अनुमानित जनसंख्या का 0. 23: है, 2016 से इसमें भी गिरावट आ रही है परंतु फिर भी यह अधिक है, इस अवधि में रुग्णता के कारण कुल 47 मृत्यु दर्ज की गई है, सर्वाधिक मृत्यु मलेरिया के कारण

रुग्णता की स्थिति जानने के लिए संदर्श सर्वेक्षण हेतु ग्राम अरसण्डे के 19 वार्डों से 10–10 घरों को प्रतिदर्ष घर के रूप में चयनित किया गया तथा सुकुरहुटू गाँव से उत्तरी पंचायत एवं दक्षिणी पंचायत के 50–50 घरों को प्रतिदर्ष घर के रूप में चयनित किया गया।

सारणी 03 : वेक्टर जनित रुग्णता : ग्राम अरसण्डे

वार्ड संख्या	प्रतिदर्श घर	जनसंख्या	वेक्टर जनित रुग्ण जनसंख्या		
			मलेरिया	फाइलेरिया	कुल
1	10	62	05	00	05
2	10	67	02	00	02
3	10	57	07	00	07
4	10	54	04	00	04
5	10	57	03	00	03
6.	10	59	02	00	02
7	10	58	02	00	02
8	10	61	03	00	03
9	10	59	04	00	04
10	10	62	06	03	09
11	10	58	08	02	10
12	10	57	07	01	08
13	10	57	04	00	04
14	10	56	03	03	06
15	10	59	02	00	02
16	10	57	03	01	04
17	10	56	00	00	00
18	10	56	02	00	02
19	10	59	00	00	00
कुल	**190**	**1,111**	**67**	**10**	**77**

स्रोत : शोधार्थी द्वारा किए गए क्षेत्र सर्वेक्षण से प्राप्त आँकड़ों के आधार पर परिगणित

उपरोक्त सारणी 03 से स्पष्ट होता है कि ग्राम अरसण्डे में 190 प्रतिदर्श घरों में 1,111 जनसंख्या का वास है तथा वेक्टर जनित रुग्ण जनसंख्या 77 है जिसमें 67 मलेरिया एवं 10 फाइलेरिया से संबंधित है अर्थात् गाँव में सर्वाधिक रुग्णता मलेरिया की है। ग्राम के उत्तरी भाग में फाइलेरिया का प्रभाव अधिक है, यह हिस्सा पुराना अधिवासित क्षेत्र है, गाँव का दक्षिण भाग नया अधिवासित क्षेत्र है, यहाँ फाइलेरिया का प्रभाव नहीं के बराबर है परंतु मलेरिया प्रभावी है।

सारणी 04 : वेक्टर जनित रुग्णता : ग्राम सुकुरहुटू

पंचायत	प्रतिदर्श घर	जनसंख्या	वेक्टर जनित रुग्ण जनसंख्या		
			मलेरिया	फाइलेरिया	कुल
उत्तरी	50	545	34	18	52
दक्षिणी	50	402	28	12	40
कुल	**100**	**947**	**62**	**30**	**92**

स्रोत : शोधार्थी द्वारा किए गए क्षेत्र सर्वेक्षण से प्राप्त आँकड़ो के आधार पर परिगणित

उपरोक्त सारणी 04 से स्पष्ट होता है कि ग्राम सुकुरहुटू में 100 प्रतिदर्श घरों में 947 जनसंख्या का वास है तथा वेक्टर जनित रुग्ण जनसंख्या 92 है जिसमें 62 मलेरिया एवं 30 फाइलेरिया से संबंधित है, अतः गाँव में सर्वाधिक रुग्णता मलेरिया की है साथ ही फाइलेरिया का प्रभाव भी अधिक है।

चित्र संख्या 01 : रुग्ण ग्रामीण

स्रोत : शोधार्थी द्वारा किया गया संदर्श ग्राम सर्वेक्षण

निष्कर्ष

व्यक्ति का रुग्ण होना उसकी व्यक्तिगत समस्या हो सकती है परंतु यह समाज के लिए भी समस्या है क्योंकि व्यक्ति समाज का क्रियात्मक इकाई होता है, राज्य तथा संदर्श गाँवों में रोगवाहक जनित रुग्णता का अध्ययन यह संकेत देता है कि राज्य में मलेरिया, फाइलेरिया की स्थिति काफी भयावह है, काला–आजार रोग से भी एक भारी जनसंख्या पीड़ित है। राज्य में डेंगू व चिकनगुनिया क्रमशः चौथे व पाँचवे स्थान पर है, एक बड़ी आबादी का इस प्रकार रुग्ण होना जनसंख्या भूगोल में मर्त्यता के अध्ययन से ठीक पहले रुग्णता के अध्ययन का पुरजोर समर्थन करता है, समय के साथ रुग्ण जनसंख्या में कमी आई है परंतु फिर भी यह चिंता का विषय है, गाँव का अध्ययन बताता है कि यहाँ की एक बड़ी आबादी प्रतिवर्ष मलेरिया के प्रकोप से आक्रांत होती है तो वहीं फाइलेरिया के कुछ मामले ऐसे भी जो अनुवांशिक से प्रतीत होते है, (पिता एवं उसके बाद पुत्र, माँ एवं उसके बाद पुत्री का आक्रांत हो जाना) अतः अध्ययन

क्षेत्र के रूग्ण जनसंख्या को नियंत्रित करने के लिए निम्नलिखित उपाय तर्कसंगत प्रतीत होते हैं :

- वेक्टर जनित रोगों के उन्मूलन हेतु चलाए जा रहे योजनाओं व कार्यक्रमों में सुदृढ़ीकरण लाया जाए, संबंधित व्यक्ति तक इसका लाभ पहुँच रहा है या नहीं इसका मूल्यांकन किया जाए।
- गाँवों / शहरों / प्रखंड कार्यालयों में कैम्प के माध्यम से जागरुकता लाई जाए साथ ही जाँच व औषधि की उपलब्धता सुनिश्चित कराई जाए, स्वास्थ्य केंद्रों व सहिया– साथी को सुदृढ़ किया जाए।

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भारत–चीन सम्बन्धों में तवांग का सामरिक महत्व

संध्या सिंह एवं अजय कुमार सिंह

शोध सारांश

अन्तर्राष्ट्रीय राजनीतिक वातावरण में भारत–चीन संबंधों का भौगोलिक दृष्टिकोण से विशिष्ट ऐतिहासिक महत्व रहा है क्योंकि दोनों निकटतम पड़ोसी देश हैं। प्राचीन काल से ही दोनों देशों में सांस्कृतिक और आर्थिक संबंध रहे हैं। यहाँ तक कि भारत के माध्यम से ही चीन में बौद्ध धर्म का प्रचार एवं प्रसार हुआ। भारत–चीन के बीच विवाद की मुख्य जड़ 'मैकमोहन रेखा' है। 'मैकमोहन रेखा' का निर्धारण सन् 1912 ई0 में तिब्बत के स्वतंत्र घोषित होने के बाद एक समझौते द्वारा हुआ। इस समझौते के लिए वार्ता सन् 1913 ई0 में प्रारम्भ हुई जो सन् 1914 में समाप्त हुई। इस वार्ता में ब्रिटिश कालीन भारत, तिब्बत और चीन के प्रतिनिधियों ने भाग लिया। उल्लेखनीय है कि जब समझौते के प्रारूप पर हस्ताक्षर करने की बारी आयी तो भारत एवं तिब्बत ने हस्ताक्षर किये, परन्तु चीन ने हस्ताक्षर करने से मना कर दिया। इस समझौते के प्रारूप को ब्रिटिश सरकार के विदेश सचिव सर हेनरी मैकमोहन ने तैयार किया था। यही इतिहास प्रसिद्ध 'मैकमोहन रेखा' है। चीन के द्वारा उक्त समझौते पर हस्ताक्षर नहीं करने के कारण ही वह मैकमोहन रेखा को नहीं मानता। इन विवादों की वजह से ही दोनों देशों के बीच अद्यतन सीमा निर्धारण नहीं हो सका। आगे चलकर यथास्थिति बनाये रखने हेतु 'लाइन ऑफ एक्चुअल कन्ट्रोल' शब्द का प्रयोग किया जाने लगा। हालांकि यह भी स्पष्ट नहीं है, क्योंकि दोनों देश अपनी अलग–अलग 'लाइन ऑफ एक्चुअल कंट्रोल' बताते हैं।

प्रस्तावना

स्वतंत्रता के पश्चात् भारत के कन्धों पर आने वाले महत्वपूर्ण दायित्वो में सबसे पहला स्थान है – सीमा सुरक्षा का। सर्वविदित है कि भारत का अपने निकटतम पड़ोसी चीन के साथ विवाद का इतिहास स्वतंत्रता से पूर्व का है। चीन की धरती पर किसी का भी शासन रहा हो, उसका एक सूत्रीय ध्येय रहा है कि अपने देश की सीमा का विस्तार करो। भारत की स्वतंत्रता के दो वर्ष बाद चीन में साम्यवादी शासन की स्थापना हुई। चीन के तत्कालीन प्रधानमंत्री चाऊ–एन–लाई ने हमेशा यह कहा कि हम दोनों देश उपनिवेशवादी शक्तियों के शोषण के शिकार हुए हैं। अतः हमें मिलजुल कर रहना चाहिए, परन्तु चीन ने अपनी कथनी और करनी में सदैव अन्तर रखा।

भौगोलिक स्थिति

भारत की सीमा चीन के साथ प्रत्यक्ष रूप से एकदम पश्चिम में मिलती थी और भारत तथा चीन के मध्य तिब्बत प्राचीन काल से एक स्वतंत्र मध्यवर्ती पर्वतीय राज्य रहा। तिब्बत से भारत की सीमायें लद्दाख से सिक्किम तक मिलती रहीं। तिब्बत के चीन में मिल जाने से एक मध्यस्थ राज्य समाप्त हो गया और चीन की सीमाएँ हमारी सीमाओं से टकराने लगीं। वर्तमान भारत–चीन सीमा अफगानिस्तान की सीमा से प्रारम्भ होकर पिपहू दर्रे के पास तक चली जाती है तथा चीन की भारत, नेपाल और भूटान के साथ हिमालय पर्वत श्रृंखला के द्वारा प्राकृतिक सीमा बनती है। भारत–चीन की सम्पूर्ण सीमा को तीन भागों में विभाजित किया जा सकता है।

1. **पश्चिमी भाग** – जो कि लद्दाख को चीन के सिक्यांग प्रान्त और तिब्बत सीमा से अलग करता है।
2. **मध्य भाग** – जो भारत के तीन प्रान्तों हिमांचल प्रदेश, उत्तराखण्ड, सिक्किम को तिब्बत से अलग करता है।

1. प्रो0 संध्या सिंह, प्रोफेसर, रक्षा एवं स्त्रातेजिक अध्ययन विभाग, डी0ए0वी0 कालेज, कानपुर।
2. प्रो0 अजय कुमार सिंह, प्रोफेसर, रक्षा एवं स्त्रातेजिक अध्ययन विभाग, पी0पी0एन0 कालेज, कानपुर।

3. **पूर्वी भाग** – जो सिक्किम, असम, अरुणाचल प्रदेश राज्य को तिब्बत से अलग करता है।

उद्देश्य

प्रस्तुत शोध का मूल उद्देश्य भू–राजनीतिक एवं स्त्रातेजिक महत्त्व को दृष्टिगत रखते हुए भारत एवं चीन के मध्य सीमावर्ती क्षेत्रों में विवाद के विभिन्न मुद्दों एवं भू–भाग सम्बन्धी दावों से उत्पन्न होने वाली चुनौतियों का अध्ययन करना तथा उनके समाधान हेतु अपनी सामरिक नीति का निर्धारण करना जिससे डोकलाम, गलवान एवं तवांग विवाद जैसी घटनाओं वाली विषम परिस्थितियों की पुनरावृत्ति न हो।

शोध विधितंत्र

प्रस्तुत शोध से सम्बन्धित तथ्य एवं जानकारियाँ द्वितीयक आंकड़ों यथा–महत्त्वपूर्ण राष्ट्रीय व अन्तर्राष्ट्रीय प्रकाशनों से प्रकाशित विभिन्न पुस्तकों, पत्र–पत्रिकाओं एवं लेखों, आदि से प्राप्त किये गये हैं।

डोकलाम विवाद

'डोकलाम' चीन और भूटान के मध्य एक विवादित क्षेत्र है। चीन द्वारा इस क्षेत्र में सड़क निर्माण का कार्य शुरू हुआ जिसका भूटान ने विरोध किया। भूटान का चीन के साथ राजनयिक संबंध न होने के कारण भूटान ने अपना विरोध जून, 2017 में भारत स्थित चीन के दूतावास में दर्ज कराया। इसक बाद हुए घटनाक्रम में 'डोकलाम' क्षेत्र में चीन द्वारा किये जा रहे सड़क निर्माण को भारतीय सैनिकों ने रुकवा दिया। भारतीय सेना की इस कार्यवाही पर चीन ने कड़ा एतराज जताया। उसका कहना था कि डोकलाम उसका हिस्सा है और वहॉ किये जा रहे निर्माण कार्य को रोककर भारतीय सेना ने उसकी संप्रभुता का उल्लंघन किया है। चीन ने भारतीय सेना को विवादित क्षेत्र से पीछे हटने अथवा गम्भीर परिणाम भुगतने के लिए तैयार रहने की धमकी दी। जबकि इस सम्बन्ध में भारत का स्पष्ट कहना है कि 'डोकलाम' भूटान का हिस्सा है एवं भारत के लिए रणनीतिक रूप से अत्यन्त महत्वपूर्ण क्षेत्र है। भारत का मानना है कि चीन द्वारा विवादित क्षेत्र में किया जा रहा सड़क निर्माण 'जमफेरी रिज' (Jampheri Ridge) तक पहुँच बनाने का प्रयास है। यह रिज भारत के लिए सामरिक दृष्टिकोण से अत्यधिक महत्वपूर्ण है।

गलवान घाटी विवाद

गलवान घाटी में जून 2020 में चीनी घुसपैठ से राजनैतिक कूटनीतिक और रक्षा विशेषज्ञ सभी हैरान थे। यद्यपि भारत के साथ सरहद पर चीन की ये हरकतें अपवाद नहीं हैं। शायद चीनी आज भी प्राचीन काल के अपने जनरल सुन्तजू की रणनीति पर चल रहे हैं कि 'हर युद्ध छलावे पर आधारित होता है।' 15/16 जून, 2020 की रात पी0एल0ए0 द्वारा मध्य युगीन बर्बरता के साथ नुकीले कील लगे डंडे, पत्थरों से भारतीय सेना के ऊपर जानलेवा हमला किया गया। उल्लेखनीय है कि यह घटना दोनों तरफ के कमाण्डरों की बातचीत में पीछे हटने की रजामंदी के बावजूद हुई। इस घटना की और कई वजहें बताई जा रही हैं। भारतीय सेना ने लद्दाख जैसे दूर–दराज के इलाके में सड़कें और पुल बनाये हैं। इससे दूसरी ओर निगाहें टेढी हो गयीं। यह माना जा रहा है कि चीन की एक मात्र महाशक्ति बनने की कामना बहुत पुरानी है, जिस पर वह लगातार बढ़ रहा है। पूर्व सेना प्रमुख जनरल मनोज मुकुंद नरवणे ने कहा कि दो दशक से पड़ोसी देशों की जमीन पर अतिक्रमण करने और दक्षिण चीन सागर में धौंस दिखाने वाले चीन को जून 2020 में गलवान में पहली बार झटका लगा था, जब भारतीय जवानों के साथ हुई झड़प में उसके सैनिक मारे गये थे। उन्होंने पूर्व रक्षा मंत्री जार्ज फर्नांडीस की उस टिप्पणी को भी याद किया, जिसमें उन्होंने चीन को दुश्मन नंबर वन बताया था। कहा लोग अब अधिक जागरुक हो गये हैं।

तवांग का इतिहास

तवांग अरुणाचल प्रदेश का एक पर्वतीय शहर एवं बौद्धों का प्रमुख धर्मस्थल है। यह अपनी अशांत सीमाओं के कारण हमेशा सुर्खियों में रहा है। चीन तवांग को दक्षिण तिब्बत का हिस्सा होने का दावा करता है, जबकि इतिहासकारों का दावा है कि 16 वीं शताब्दी में तवांग तिब्बत का हिस्सा था। एक दिलचस्प कहानी है जिसके कारण तवांग का भारतीय क्षेत्र में एकीकरण हुआ यह 20वीं

शताब्दी में भारत में स्वतंत्रता संग्राम आन्दोलनों के बीच हुआ था। 1914 की शिमला संधि, जिसमें मैकमोहन रेखा का निर्धारण हुआ था उसी संधि में अंग्रेजों द्वारा ब्रिटिश भारत क्षेत्र में तिब्बती भूमि का एक बड़ा हिस्सा विलय कर दिया गया था, तवांग उसी क्षेत्र का एक हिस्सा है। उसमें तवांग को अरुणांचल का हिस्सा बताया गया। तवांग की अधिकारिक वेवसाइट के अनुसार, यहाँ वर्तमान में 500 से अधिक भिक्षु रहते हैं। 1962 में भारत और चीन के बीच हुई जंग में तवांग के भिक्षुओं ने भारतीय सेना की मदद की थी। 1962 के युद्ध में चीन तवांग पर काबिज था लेकिन युद्ध विराम में उसे हटना पड़ा।

तवांग विवाद

यद्यपि चीन की गिद्ध दृष्टि समूची वास्तविक नियंत्रण रेखा (एल0ए0सी0) पर रही है लेकिन अरुणाचल प्रदेश के तवांग जिले को लेकर उसका मंसूबा बार–बार सामने आता रहा है। 1962 के युद्ध के समय चीन ने अपने सैनिकों का सबसे बड़ा जत्था तवांग के रास्ते ही असम में घुसपैठ करवाया था। अक्टूबर, 2021 में चीन के 200 सैनिकों का एक दल तवांग स्थित भारत–चीन–भूटान सीमा के पास भारतीय गॉव में घुस आया था, जिसे बाद में भारतीय सैनिकों ने खदेड़ दिया था। पूर्वी लद्दाख स्थित एल0ए0सी0 में चीनी घुसपैठ के बाद दोनों देशों के बीच होने वाली सैन्य वार्ताओं में भी तवांग की स्थिति पर चर्चा हुई है। इससे पहले इतनी बड़ी संख्या में वर्ष 2016 में लगभग 250 चीनी सैनिकों ने तवांग स्थित एक दूसरे प्वाइंट से भारतीय सीमा में प्रवेश किया। पुनः जून, 2020 में गलवान घाटी में खूनी संघर्ष के बाद उसी वर्ष चीन के लगभग 100 सैनिक तवांग के एक इलाके में तकरीबन 5 किलोमीटर तक भारतीय सीमा में घुस आये थे। हर बार भारतीय सेना ने मुँहतोड़ जबाब देकर चीनी सैनिकों को खदेड़ा।

चीन की तरफ से बार–बार तवांग में घुसपैठ करने के पीछे दो कारण बताये जाते हैं। एक तो तवांग का रणनीतिक महत्व है क्योंकि इस जिले की सीमा भारत व तिब्बत (चीन) के साथ ही भूटान से जुड़ी हुई है। यहाँ से वह समूचे पूर्वोतर भारत की निगरानी कर सकता है दूसरा तवांग का तिब्बत में प्रचलित बौद्ध धर्म से काफी गहरा नाता है और चीन इस आधार पर ही इस क्षेत्र पर अपना दावा पेश करता है। सेना के सूत्रों से ज्ञात हुआ कि तवांग सेक्टर के यांगत्से इलाके में भारत–चीन के सैनिकों के बीच 09 दिसम्बर, 2022 को गश्त के दौरान उस समय झड़प हो गयी जब करीब 300 चीनी सैनिकों का दल गश्त करते हुए अपने निर्धारित स्थान से आगे बढ़ आया। चीनी घुसपैठ की आशंका को लेकर सतर्क भारतीय सेना ने चीनी सैनिकों को खदेड़ने में सफलता प्राप्त की। दोनों तरफ के सैनिकों में झड़प के मध्य लाठी–डंडों, रॉड, आदि चलने की सूचना है। ऐसा ही गलवान घाटी में भी हुआ था। सूत्रों ने कहा कि सैनिकों ने दृढ़ता से चीनी सैनिकों का मुकाबला किया और दोनों देशों के सैनिकों को मामूली चोटें भी आई हैं। इस झड़प के बाद दोनों पक्ष तुरंत उस क्षेत्र से पीछे हट गये। घटना की अनुवर्ती कार्यवाही के रूप में सेनाओं के स्थानीय कमांडरों के मध्य शान्ति बहाल करने के लिए स्थापित तंत्र के अनुसार फ्लैग मीटिंग हुई।

पंचशील समझौता

चीन के साथ मैत्रीपूर्ण और परस्पर सहयोग को बनाये रखने के उद्देश्य से 29 अप्रैल, 1954 को भारत और चीन के बीच परस्पर सह अस्तित्व के पॉच सिद्धान्तों के आधार पर पंचशील समझौता हुआ उस समझौते के पॉच प्रमुख सिद्धान्त इस प्रकार हैं –

1. एक–दूसरे की सम्प्रभुता और क्षेत्रीय अखण्डता का परस्पर सम्मान करना।
2. एक–दूसरे के आन्तरिक मामलों में हस्तक्षेप न करना।
3. एक–दूसरे पर आक्रमण न करना।
4. एक–दूसरे के साथ समानता एवं परस्परिक लाभ के सिद्धान्त पर काम करना।
5. दोनों देशों के बीच शांतिपूर्ण सह–अस्तित्व की व्यवस्था कायम रखना।

पंचशील समझौता भारत की ऐसी राजनयिक व राजनैतिक अदूरदर्शिता थी जिसके स्पष्ट प्रभाव आज भी

भारतीय प्रतिरक्षा नीति पर देखे जा सकते हैं। वास्तव में, इस समझौते के द्वारा भारत ने तिब्बत पर चीनी आधिपत्य स्वीकार करके दोनों के मध्य स्थित अंतस्थ राज्य (Buffer State) के अस्तित्व को नष्ट करके चीन के साथ संबंधों में सुधार का जो प्रत्यक्ष प्रयास किया वह आगे चलकर ऐतिहासिक भूल प्रमाणित हुआ। चीन द्वारा तिब्बत को आत्मसात करने के पश्चात भारत से स्पर्श करती उसकी सीमाएँ तथा दोनों के मध्य प्रारम्भ सीमा–विवाद पारस्परिक सम्बन्धों की मधुर स्थापना में मुख्य बाधा रहा है। 3,840 किलोमीटर लम्बी भारत–चीन सीमा में भूटान व सिक्किम की सीमाएं तिब्बत से लगी हुई हैं तथा यह सीमा रेखा संधियों परम्पराओं अथवा क्षेत्रों द्वारा पुष्ट ऐसी अन्तर्राष्ट्रीय सीमा है जिस पर सन् 1959 व इससे पूर्व कभी भी कोई विवाद नहीं उत्पन्न हुआ। सदियों से विधि सम्मत यह रेखा भूगोल के जल–विभाजन सिद्धान्त के अनुसार है तथा अधिकांश स्थानों पर यह हिमालय के उन्नत शिखरों द्वारा निर्धारित होती है। यह सम्पूर्ण सीमा रेखा अन्तर्राष्ट्रीय समझौतों द्वारा पुष्ट व मान्य है।

भारतीय सुरक्षा के समक्ष चुनौतियाँ एवं विकल्प

पी0एल0ए0 की रह–रह कर उकसाने वाली गतिविधियाँ भारत के लिए निरन्तर चुनौती पेश करती हैं। भारत को उन चुनौतियों को कम करके नहीं आंकना चाहिए अपितु उन्हें स्वीकार करना चाहिए। भारतीय राजनय के लिए वर्तमान स्थिति एक नाजुक और जोखिम भरी चुनौती है। अतः भारत–चीन रिश्तों को व्यापक परिप्रेक्ष्य में देखने की जरूरत है। इस बीच भारत और चीन के कोर कमांडर स्तर की 17वें दौर की बैठक 20 दिसम्बर, 2022 को चुशुल–मोल्दो बार्डर मीटिंग प्वाइंट पर हुई। इससे पहले 16वें दौर की वार्ता 17 जुलाई, 2022 को हुई थी। बहरहाल कोर कमांडरों के बीच की बैठक के बाद अब उन सभी चार जगहों से दोनों देशों के सैनिक पीछे हट गये हैं, जहाँ पर दो साल के मध्य आमने–सामने आ गये थे। यह केवल डिसइंगेजमेंट है। जिन जगहों पर डिसइंगेजमेंट हुआ है, वहाँ पर 'नो पेट्रोलिंग जोन' बना दिए गए हैं। डिसइंगेजमेंट का अगला चरण होता है, डी–एस्केलेशन यानी भारी फौजी साजो–सामान को हटाना। इसके बाद होता है, डी–इंडक्शन। यानी सेना और भारी साजो सामान को पुरानी स्थिति में वापस लाना। यद्यपि जो कुछ हुआ है उसे हालात सामान्य करने की दिशा में एक कदम माना जा सकता है।

अभी दो इलाके ऐसे हैं जहॉ से वापसी का समझौता नहीं हुआ है। ये हैं देपसांग और डेमचॉक सामरिक लिहाज से देपसांग इलाका बहुत महत्वपूर्ण है, क्योंकि भारत ने इस इलाके में 255 किलोमीटर लंबी एक सड़क बनाई है, जो अब चीनी तोपखाने की मार में आ गई है। यह स्थान भारत के दौलतवेग ओल्दी हवाई पट्टी के नजदीक है और यहाँ से कराकोरम दर्रा करीब 30 किमी0 दूर है। भारत का ध्यान इस ओर गया 2019 में इस इलाके में देश की सबसे दुर्गम, सबसे महत्वपूर्ण लेह और कराकोरम दर्रे के बीच सड़क का 255 किलोमीटर लम्बा दाब्रुक–श्योक–दौलतवेग ओल्दी (डीएस–डीबीओ) सेक्शन 2019 में तैयार हो गया था। इस रास्ते में पड़ने वाली बर्फानी नदियों पर 37 पुल बनाये गये हैं।

पेंटागन स्थित रक्षा विभाग के अधिकारी ब्रिगेडियर जनरल पैट राइडर ने कहा कि भारत चीन सीमा पर चल रहे घटनाक्रमों पर हमारी करीबी नजर है उन्होंने कहा कि हम चीन सीमा पर स्थिति को नियंत्रित करने के लिए भारत के प्रयासों का पूर्ण समर्थन करते हैं। विदेश मंत्रालय के प्रवक्ता नेड प्राइस ने कहा कि भारत अमेरिका का अहम कूटनीतिक साझेदार है और वह सीमा पर किसी भी हमले या झड़प की निन्दा करता है। वास्तविक नियंत्रण रेखा पर सीमा पार से क्षेत्र पर दावे के किसी भी एकतरफा प्रयास का हम कड़ा विरोध करते हैं। व्हाइट हाउस की प्रेस सचिव कैरिन ज्यां–पियरे ने कहा कि हम इस बात से खुश हैं कि दोनों पक्षों ने झड़प रोक दी है। उधर संयुक्त राष्ट्र के महासचिव एंटोनियो गुटारेस के प्रवक्ता स्टीफन दुजारिक ने कहा, हम दोनों देशों से यह सुनिश्चित करने की अपील करते हैं कि क्षेत्र में तनाव को किसी भी स्थिति में बढ़ने न दिया जाये।

चीन की तवांग में घुसपैठ निश्चित ही भारत के लिए चिन्ताजनक है। जिसे हमें इसे कम करके नहीं आंकना चाहिए। सामरिक तौर पर भारत के लिए एल0ए0सी0 पर सन्तुलन और दबदबे को बहाल करना महत्त्वपूर्ण है। भारत को चीन के साथ सीमा विवाद सुलझाने एवं रणनीतिक स्तर पर चीन को घेरने का प्रयास करना चाहिए। ऐसे में भारत को अपनी चीन सम्बन्धी नीति पर पुनर्विचार कर नए विकल्पों की तलाश करनी चाहिए।

उपसंहार

सीमा विवाद आज भी भारत–चीन संबंधों को उसी प्रकार प्रभावित और निर्धारित करते हैं, जैसे वह 1951 में तथा 1962 में करते थे। चीन विगत अनेक वर्षों से एल0ए0सी0 पर यथास्थिति को बदलने की प्रयास कर रहा है। वह इसे छोटे चरणों में कर रहा है लेकिन निरन्तर आगे बढ़ रहा है। चीन की हर साल इस तरह की कोशिशें नजर आती हैं पर हर बार उसे शर्मिन्दगी झेलनी पड़ती है। चीन द्वारा सीमावर्ती क्षेत्रों में किया जा रहा सैन्यीकरण भारत की सुरक्षा के लिए गम्भीर चुनौती है। स्पष्ट है कि जहाँ एक ओर इस क्षेत्र में उसे सामरिक श्रेष्ठता हॉसिल हो गई है वहीं चीन के उक्त कदम भारत–चीन सीमा वार्ताओं पर भी कूटनीतिक अस्त्र के रूप में भी प्रभावी हो सकते हैं।

तवांग पर चीन के नजरिए से वाकिफ होने की वजह से ही भारत ने विगत एक दशक में समूचे अरुणाचल प्रदेश में ढांचागत विकास को काफी तेज कर दिया है। चीन के लिए यह भी एक परेशानी का कारण है। भारत की तरफ से अरुणाचल प्रदेश से लगे इलाकों में कुल 63 परियोजनाओं का निर्माण किया जा रहा है। इससे चीन की सीमा तक भारतीय सेना की पहुँच हो गई है। प्रमाण रहे कि वर्ष 1962 में सड़क मार्ग नहीं होने की वजह से भारतीय सैनिकों को काफी नुकसान उठाना पड़ा था। उल्लेखनीय है कि चीन की तरफ से भी अपने क्षेत्र में इसी गति से सड़कों, पुलों व सैन्य अड्डों का निर्माण किया गया है।

चीन से सटी अरुणाचल प्रदेश की सीमा पर विभिन्न विकास परियोजनाओं का उद्घाटन करते हुए 10 अप्रैल, 2023 को केन्द्रीय गृहमंत्री अमित शाह ने साफ कर दिया कि भारत की ओर बुरी नजर से देखने के दिन लद गए और अब कोई हमारी सुई की नोक जितनी जमीन पर भी अतिक्रमण नहीं कर सकता है। शाह इस सीमाई क्षेत्र का दौरा करने वाले देश के पहले गृहमंत्री हैं। सीमावर्ती इलाकों के विकास की अब तक की गई अनदेखी को देश की सुरक्षा के लिए खतरनाक बताते हुए शाह ने कहा कि मोदी सरकार इसे सुधारने की कोशिश में जुटी है। उन्होंने कहा कि सीमाओं की सुरक्षा देश की सुरक्षा है। यद्यपि बीजिंग में चीन के विदेश मंत्रालय के प्रवक्ता ने कहा कि चीन अमित शाह की अरुणाचल प्रदेश की यात्रा का विरोध करता है वह इसे अपनी क्षेत्रीय संप्रभुता का उल्लंघन मानता है। जंगनान (अरुणाचल के लिए चीनी नाम) चीन क्षेत्र का हिस्सा है। उधर भारतीय विदेश मंत्रालय के प्रवक्ता अरिंदम बागची ने कहा, अरुणाचल प्रदेश भारत का अभिन्न हिस्सा था, है और रहेगा।

भारत–चीन सम्बन्धों में फिलहाल बर्फ पिघलने की उम्मीदें नजर नहीं आ रही हैं। इस समय भारत के लगभग पचास हजार सैनिक पूरे लाबो लश्कर के साथ इस इलाके में तैनात हैं। लगभग इतने ही चीनी सैनिक भी दूसरी ओर हैं। फौजों की पूरी तरह वापसी जब तक नहीं होती, तब तक नहीं कहा जा सकता है कि स्थिति सामान्य हो गई है। यद्यपि भारत और चीन के बीच सीमा के प्रश्न पर व्यापक मतभेद कायम है, किन्तु दोनों पक्ष वार्ता जारी रखने के पक्ष में हैं। यदि भारत और चीन का सीमा समझौता हो जाए तो निःसंदेह अन्तर्राष्ट्रीय राजनीति पर इसके गम्भीर एवं व्यापक दूरगामी परिणाम होंगे। अतः भारत सरकार को अपने राष्ट्रीय हितों को दृष्टिगत रखते हुए, चीन के साथ सीमा विवाद को सुलझाने के लिए एकमुश्त समझौते की पृष्ठभूमि तैयार करनी चाहिए जिससे सभी मुद्दे स्वतः हल हो जाएँ।

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समावेशी हरित विकास अर्थव्यवस्था एवं ठोस अपशिष्ट प्रबंधन का विश्लेषणात्मक अध्ययन

वन्दना द्विवेदी एवं नेहा सविता

शोध सारांश

वैश्विक स्तर पर आज ठोस अपशिष्ट प्रबंधन महत्वपूर्ण चुनौती है जो आर्थिक एवं पर्यावरणीय कारकों को नकारात्मक तरीके से प्रभावित करता है। ठोस अपशिष्ट का सिर्फ बेहतर प्रबंधन आवश्यक नहीं है बल्कि अन्य कारकों सामाजिक, पर्यावरण एवं स्वास्थ्य पर सुचारू रूप से नियंत्रण आवश्यक है। ठोस अपशिष्ट प्रबंधन में समावेशी हरित विकास को सम्मिलित करते हुए उपरोक्त समस्याओं को कम किया जा सकता है। प्रस्तुत शोधपत्र में समावेशी हरित विकास अर्थव्यवस्था एवं ठोस अपशिष्ट प्रबंधन का अध्ययन किया गया है एवं ठोस अपशिष्ट की समस्या के समाधान के रूप में समावेशी हरित विकास के महत्व को दर्शाया गया है।

मुख्य शब्द *: समावेशी हरित विकास, अर्थव्यवस्था, ठोस अपशिष्ट प्रबंधन।*

प्रस्तावना

वैश्विक अर्थव्यवस्था के बदलते परिदृश्य में समावेशी विकास करते हुए हरित अर्थव्यवस्था को अपनाना मानवीय समाज के लिए आवश्यक कदम हो गया है। प्राचीन समय से ही भारत के सन्दर्भ में 'वसुधैव कुटुम्बकम्' तथा 'सर्वे भवन्तु सुखिनः' जैसे श्लोकों में समावेशी विकास की अवधारणा निहित है। बढ़ती हुई बेरोजगारी, आय, असमानता एवं गरीबी से उन्मूलन के लिए समावेशी विकास की अवधारणा महत्वपूर्ण भूमिका निभा सकती है। हरित अर्थव्यवस्था के अर्न्तगत ऐसी अर्थव्यवस्था की संरचना करने का प्रयास किया जाता है जिसमें आधारभूत ढांचा, आर्थिक प्रक्रिया, आय एवं रोजगार की वृद्धि में सार्वजनिक एवं निजी निवेश की महत्वपूर्ण भूमिका हो तथा न्यूनतम कार्बन उत्सर्जन, ऊर्जा के संसाधनों का कुशलतम प्रयोग, जैव विविधता का संरक्षण तथा पर्यावरण को न्यूनतम हानि जैसे कारकों को सम्मिलित किया जाता है। ठोस अपशिष्ट प्रबंधन मानवीय जीवन एवं पर्यावरण को स्वच्छ रखने में महत्वपूर्ण भूमिका निभाता है अतः यह कहा जा सकता है कि ठोस अपशिष्ट प्रबंधन का समावेशी हरित अर्थव्यवस्था के साथ सीधा सम्बन्ध है। वर्तमान समय में ठोस अपशिष्ट प्रबंधन में राजनीतिक, सामाजिक, आर्थिक एवं पर्यावरणीय कारक सम्मिलित है इसलिए ठोस अपशिष्ट का वैज्ञानिक प्रबंधन आवश्यक है जिसमें शून्य अपशिष्ट की संकल्पना शामिल हो।

फरवरी 2023 के भारतीय बजट में समावेशी प्रगति एवं समृद्धि को आधार बनाया गया है जिसके अर्न्तगत समावेशी विकास, आधारभूत ढाँचा में निवेश, युवा शक्ति का बेहतर प्रयोग, विकास में सभी क्षेत्रों की क्षमताओं को सम्मिलित करना एवं हरित अर्थव्यवस्था को साथ लेकर एक लचीली अर्थव्यवस्था को अपनाने का लक्ष्य रखा गया है। विश्व में बढ़ती ठोस अपशिष्ट की मात्रा पर्यावरण एवं मानव स्वास्थ्य के लिए एक गम्भीर चुनौती है। प्रत्येक वर्ष 2.01 बिलियन टन ठोस अपशिष्ट को एकत्रित किया जाता है तथा इस अपशिष्ट का अधिकांश भाग समुद्र एवं खुले स्थानों पर डम्प कर दिया जाता है। जैविक ठोस अपशिष्ट से वैश्विक ग्रीन हाउस में 5 प्रतिशत का योगदान होता है। 2050 तक 70 प्रतिशत वृद्धि की संभावना व्यक्त की गई है जोकि 3.40 बिलियन टन होने की आशंका है।

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समावेशी हरित अर्थव्यवस्था के अर्न्तगत ठोस अपशिष्ट का वैज्ञानिक एवं पर्यावरण अनुकूल प्रबंधन किया जा सकता है जिसके अर्न्तगत ठोस अपशिष्ट प्रबंधन के सभी स्तरों को शामिल किया जाता है। ठोस अपशिष्ट प्रबंधन के सभी स्तर, आर्थिक कारकों, जैसे– आय, रोजगार, उपभोग एवं उत्पादन से सीधे जुड़े हुए हैं इसलिए समावेशी हरित अर्थव्यवस्था के अर्न्तगत ठोस अपशिष्ट का कुशल प्रबंधन किया जा सकता है।

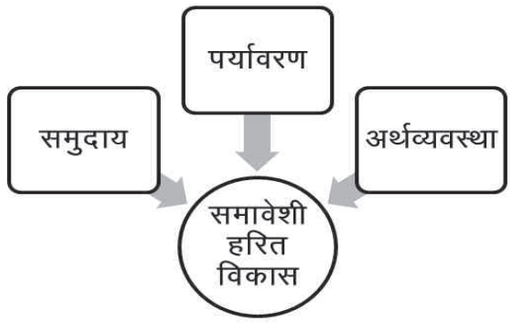
विश्व बैंक की रिपोर्ट के अनुसार भारत के तापमान में लगातार वृद्धि हो रही है जिसके कारण 34 मिलियन व्यक्तियों को नौकरी से नुकसान होने की आशंका है। इस समय भारत में खाद्य पदार्थों की हानि 13 अरब डॉलर है जिसके भविष्य में और अधिक बढ़ने की संभावना है। तापमान में वृद्धि की वजह से होने वाली हानि से बचने के लिए 2040 तक 1.6 ट्रिलियन के निवेश की आवश्यकता होगी। इन सभी समस्याओं से निपटने के लिए समावेशी हरित विकास अर्थव्यवस्था को अपनाकर समुचित दिशा में कदम बढ़ाये जा सकते है।

अध्ययन का उद्देश्य

- समावेशी हरित विकास अर्थव्यवस्था की ओर बढ़ने में ठोस अपशिष्ट प्रबंधन के महत्व का अध्ययन करना।
- ठोस अपशिष्ट प्रबंधन के लक्ष्यों को प्राप्त करने के लिए विकास के नए स्त्रोत के रूप में समावेशी हरित विकास का अध्ययन करना।

समावेशी हरित विकास अर्थव्यवस्था की आवश्यकता एवं ठोस अपशिष्ट प्रबंधन

हाल ही के वर्षों में आर्थिक एवं पर्यावरणीय समस्यायें नई चुनौतियों के रूप में हमारे सामने हैं इसलिए विकास का ऐसा माध्यम अपनाया जाना चाहिए जो पर्यावरण तथा मानवीय दृष्टिकोण से बेहतर हो। उत्सर्जन अतंर रिपोर्ट 2022 के अनुसार इस सदी में 2.4–2.6 डिग्री सेल्सियस तापमान बढ़ने की संभावना है। इसे 1.5 डिग्री सेल्सियस तक लाने के लिए एक व्यापक परिवर्तन की आवश्यकता है। समावेशी हरित अर्थव्यवस्था के द्वारा अधिकांश समस्याओं को सुलझाया जा सकता है, इसमें आर्थिक नीति एवं सतत् विकास दोनों शामिल है। विकासशील देशों के लिए समावेशी हरित विकास सभी क्षेत्रों के लिए अनुकूल है क्योंकि यह गरीबी को कम करने, संसाधनों का बेहतर प्रयोग एवं जलवायु परिवर्तन जैसे कारकों को शामिल करता है। भारत जैसे विकासशील देशों में ऊर्जा, पानी, भोजन, जलवायु परिवर्तन, सामाजिक एवं आर्थिक चुनौतियों का सामना करना पड़ता है तथा इन क्षेत्रों में पारम्परिक विकास को अपनाया जाता है जोकि बाद में पर्यावरण, अनिर्धारित मौसम, हानिकारक गैसों का उत्सर्जन, आदि समस्याओं को उत्पन्न कर देता है। समावेशी हरित अर्थव्यवस्था की संकल्पना इन सभी समस्याओं से सुलझने का रास्ता दिखाती है। समावेशी हरित विकास में नागरिक समुदाय, पर्यावरण एवं अर्थव्यवस्था समाहित है जिसमें ठोस अपशिष्ट प्रबंधन के सभी स्तर निहित है।



वैश्विक स्तर पर बढ़ते हुए ठोस अपशिष्ट एवं प्रदूषण को कम करने के लिए तथा मानवीय आयामों के विकास के लिए यह आवश्यक है कि उत्पादन, उपभोग, संसाधनों का बेहतर प्रयोग एवं पर्यावरण की सुरक्षा जैसे कारकों पर कार्य किया जाये।

संयुक्त राष्ट्र के अनुमानों के अनुसार भारत की 2023 में अनुमानित जनसँख्या 1,42,86,27,663 है, यह पिछले वर्ष से 0.81 प्रतिशत अधिक है। 2023–24 के आर्थिक सर्वेक्षण में भारत की जीडीपी विकास दर 6.0 से 6.8 प्रतिशत एवं अर्थव्यवस्था की विकास दर 7 प्रतिशत रहने की संभावना है। क्रय शक्ति समता में भारत विश्व की सबसे बड़ी अर्थव्यवस्था है तथा बाजार विनिमय दरों के अनुसार पांचवी सबसे बड़ी अर्थव्यवस्था है। आने वाले समय में इन

आँकड़ों में और भी वृद्धि होगी जोकि आर्थिक दृष्टि से सकारात्मक संभावना को दर्शाता है परन्तु पर्यावरणीय दृष्टि से यह नकारात्मकता को व्यक्त करता है। बढ़ती हुई जनसँख्या, जीडीपी की बढ़ती वृद्धि एवं विकास की अन्धी दौड़ ने ठोस अपशिष्ट के उत्सर्जन को बढ़ा दिया है इसलिए ऐसे समय में मानव समुदाय, पर्यावरण एवं अर्थव्यवस्था को समावेशी विकास से जोड़ते हुए ठोस अपशिष्ट के समुचित प्रबंधन की आवश्यकता है। समावेशी हरित विकास एवं ठोस अपशिष्ट प्रबंधन के आपसी सम्बन्धों को हम दिये गये ग्राफ से समझ सकते है –:

समुदाय	• ठोस अपशिष्ट का उत्पादन • ठोस अपशिष्ट का संग्रहण एवं परिवहन
पर्यावरण	• ठोस अपशिष्ट का पृथक्कीकरण • ठोस अपशिष्ट का उपचारण
अर्थव्यवस्था	• ठोस अपशिष्ट प्रबंधन में निवेश एवं तकनीकि का बेहतर प्रयोग • ठोस अपशिष्ट प्रबंधन में रोजगार की संभावना

स्त्रोतः लेखक

समावेशी हरित विकास अर्थव्यवस्था के अर्न्तगत ठोस अपशिष्ट प्रबंधन

विश्व के अधिकांश क्षेत्रों में ठोस अपशिष्ट का प्रबंधन स्थानीय प्रशासन के द्वारा किया जाता है जिसमें सम्बन्धित क्षेत्र के नागरिक तथा प्रशासनिक तंत्र सम्मलित होता है। हरित विकास के अर्न्तगत ठोस अपशिष्ट प्रबंधन के कार्य को हम निम्नलिखित स्तरों में विभाजित करके समझ सकते है –:

1. आरम्भिक स्तर से ही ठोस अपशिष्ट की कम मात्रा उत्पन्न करना

वर्तमान समय में बहुत कम लोग यह सोचतें है कि हम प्रतिदिन कितना ठोस अपशिष्ट उत्पन्न करते हैं? यह एक महत्वपूर्ण प्रश्न है जिस पर विचार किया जाना चाहिए। समय के साथ बढ़ती हुई उपभोग प्रवृत्ति इस प्रश्न को महत्वहीन कर देती है अतः यह सुनिश्चित किया जाना चाहिए कि उपभोग, समझदारी पूर्वक ठोस अपशिष्ट को न बढ़ाते हुए किया जाये। यदि हम शुरुआत में ही ठोस अपशिष्ट के उत्पादन को कम से कम कर दे तो इससे होने वाली समस्याओं को आरम्भिक चरण में ही कम किया जा सकता है तथा यह हरित अर्थव्यवस्था के विकास में भी सहायक होगा।

2. ठोस अपशिष्ट का संग्रहण

पर्यावरण एवं सभी जीवधारियों के लिए यह आवश्यक है कि ठोस अपशिष्ट को सभी क्षेत्रों जैसे घरेलू क्षेत्र, निर्माण क्षेत्र एवं सार्वजनिक क्षेत्रों से संग्रहित करें। यदि ठोस अपशिष्ट का संग्रहण न किया जाये तो यह वातावरण में फैल कर हवा, पानी एवं मिट्टी को दूषित कर देता है। ठोस अपशिष्ट के संग्रहण के लिए श्रम एवं उपयोग किये जा रहें उपकरणों का कुशलतम प्रयोग होना चाहिए जिससे आगे के चरणों में ठोस अपशिष्ट का प्रबंधन उचित तरीके से किया जा सके।

3. ठोस अपशिष्ट का पृथक्कीकरण

इस प्रक्रिया में ठोस अपशिष्ट को उसकी प्रकृति के अनुसार अलग किया जाता है, जैसे– प्लास्टिक, काँच, धातु, कागज एवं अन्य जैविक पदार्थों को पृथक करना। अपशिष्ट को पृथक करने के बाद उसे रिसाइकिलिंग, पुनःप्रयोग एवं लैण्डफिल में भेज दिया जाता है।

4.ठोस अपशिष्ट का उपचारण

ठोस अपशिष्ट के उपचारण की प्रक्रिया के अर्न्तगत जैविक अपशिष्ट से खाद एवं बायो गैस का उत्पादन करना, धातु का उपचारण करके उसे पुनःप्रयोग में लाना, अपशिष्ट की रिसाइकिलिंग करना तथा ऊर्जा का निर्माण करना, आदि कार्य किये जाते हैं। इस प्रक्रिया से ठोस अपशिष्ट को लैण्डफिल में भेजी जाने वाली मात्रा में कमी आती है एवं शून्य अपशिष्ट के लक्ष्य को प्राप्त करने की दिशा में हम आगे बढ़ते है जोकि समावेशी हरित अर्थव्यवस्था से सम्बन्धित है।

5. ठोस अपशिष्ट का निस्तारण

ठोस अपशिष्ट निस्तारण की प्रकिया में अपशिष्ट को इस प्रकार निस्तारित किया जाता है कि पर्यावरण एवं जीवधारियों पर इसका प्रतिकूल प्रभाव कम से कम हो साथ ही यह प्रयास किया जाता है कि अपशिष्ट की कम से कम मात्रा लैण्डफिल तक पहुँचे।

इस प्रकार ठोस अपशिष्ट प्रबंधन के सभी स्तर किसी न किसी प्रकार से समावेशी हरित विकास से सकारात्मक रूप से सम्बन्धित है। भारत में समावेशी विकास की अवधारणा 11वीं पंचवर्षीय योजना में प्रस्तुत की गई थी एवं 12वीं पंचवर्षीय योजना की थीम 'तीव्र, समावेशी एवं सतत् विकास' थी। इस आधार पर भारत में समावेशी हरित विकास को साथ लेकर ठोस अपशिष्ट प्रबंधन की दिशा में कार्य आरम्भ किये गये हालांकि अभी भी ठोस अपशिष्ट प्रबंधन के क्षेत्र में उल्लेखनीय कार्य करना आवश्यक है।

तालिका 01 : भारत में जनसंख्या के आधार पर प्रमुख राज्यों का ठोस अपशिष्ट प्रबंधन में प्रदर्शन

क्र.संख्या	राज्य	प्रति व्यक्ति ठोस अपशिष्ट का उत्पादन (ग्राम/दिन)	ठोस अपशिष्ट प्रबंधन में गैप (प्रतिशत में)	पर्यावरण प्रदर्शन (ठोस अपशिष्ट प्रबंधन के अर्न्तगत प्राप्तांक)
1.	उत्तर प्रदेश	62.66	62.47	46.00
2.	महाराष्ट्र	178.05	27.49	67.50
3.	बिहार	39.11	100	29.00
4.	पश्चिम बंगाल	140.75	93.66	29.75
5.	आन्ध्र प्रदेश	125.47	80.60	58.00
6.	मध्य प्रदेश	96.45	9.81	76.75
7.	तमिलनाडु	189.33	12.60	62.25
8.	राजस्थान	88.76	8.77	48.00

स्त्रोतः MSW annual report 2020-21

ठोस अपशिष्ट प्रबंधन गैप

उत्पन्न अपशिष्ट एवं पर्यावरण अनुकूल निस्तारित अपशिष्ट में अन्तर उपरोक्त आँकड़ों में प्रति व्यक्ति ठोस अपशिष्ट उत्पादन एवं पर्यावरण प्रदर्शन को दर्शाया गया है। उपरोक्त सभी राज्यों में आँकड़ों के प्रदर्शन में अन्तर है जो समावेशी हरित विकास की संकल्पना को अनदेखा करता है। ठोस अपशिष्ट के उत्पादन एवं ठोस अपशिष्ट प्रबंधन गैप में भी बहुत ज्यादा अंतर है जोकि कुप्रबंधन को प्रदर्शित करता है।

भारत में समावेशी विकास की अवधारणा के साथ ठोस अपशिष्ट प्रबंधन की दिशा में किये गये कार्य–

'स्वाहा रिसोर्स मैनेजमेंट प्राइवेट लिमिटेड' द्वारा भारत के प्रमुख शहरों में ठोस अपशिष्ट प्रबंधन का कार्य किया गया है। यह कंपनी समावेशी विकास को ध्यान में रखते हुए सभी क्षेत्रों से अपशिष्ट को एकत्रित करती है। इसके द्वारा अपशिष्ट को एक संसाधन के रूप में अपनाते हुए सामाजिक, आर्थिक एवं पर्यावरणीय लाभ को ध्यान में रखा जाता है। भारत में स्वच्छ भारत अभियान के अर्न्तगत अग्रणी स्थान पर रहने वाले इंदौर नगर का ठोस अपशिष्ट प्रबंधन इसी कंपनी के द्वारा किया जाता है जहाँ पर सड़क किनारे रहने वाले नागरिकों को इस कार्य में सम्मिलित किया जाता है एवं उन्हें आर्थिक रूप से सशक्त बनाने का प्रयास किया गया है। इसी प्रकार प्रयागराज के नैनी में स्थित स्वाहा के ठोस अपशिष्ट प्रबंधन में गरीब महिलाओं को शामिल करते हुए प्लाण्ट में ही उनके बच्चों की शिक्षा एवं रहने का प्रबंध किया गया है जोकि समावेशी हरित विकास को दर्शाता है। भारत की लगभग 31 प्रतिशत

जनसँख्या नगरों में रहती है एवं इसका जी.डी.पी. में 63 प्रतिशत का योगदान है। आने वाले समय में ये आँकड़े और बढ़ने वाले है इसलिए सरकार ने 'स्मार्ट सिटी मिशन' योजना की शुरूआत की। यह योजना समावेशी विकास एवं हरित अर्थव्यवस्था के आधार पर संचालित की जा रही है जिसमें मूल आधारभूत आवश्यकताओं को प्राथमिकता में रखा जाता है। बेगंलुरू में गैर लाभकारी संगठन 'साहस' के द्वारा ठोस अपशिष्ट प्रबंधन के क्षेत्र में कार्य किया जा रहा है जो शून्य अपशिष्ट की अवधारणा पर आधारित है। अपशिष्ट को संसाधन मानते हुए 3R (Reduce, Reuse, Recycle) की प्रणाली में कार्य करते हुए यह संगठन समावेशी विकास एवं हरित अर्थव्यवस्था को अपनाता है।

निष्कर्ष

वर्तमान समय में निरन्तर विकास की दौड़ के कारण आज इंसानो का जीवन अत्यन्त सहज एवं सरल हो गया है परन्तु इस विकास के कुछ नकारात्मक पहलू भी सामने आये है जिसमें पर्यावरण के अर्न्तगत ठोस अपशिष्ट का अनुचित प्रबंधन भी शामिल है। ठोस अपशिष्ट का अनुचित प्रबंधन मानव एवं अन्य प्राणियों के स्वास्थ्य, पारिस्थितिकीय वातावरण एवं समुद्र के पारिस्थितिक तंत्र को विपरीत ढंग से प्रभावित करता है। आये दिन समाचार पत्रों एवं सूचना संसाधनों में ठोस अपशिष्ट के कुप्रबंधन से जुड़ी खबरें सामने आती रहती है जिसका एक बड़ा कारण ठोस अपशिष्ट प्रबंधन के प्रति उपेक्षित दृष्टिकोण है। बढ़ती हुई जनसँख्या, उपभोगवादी प्रवृत्ति एवं विकास की अन्धी दौड़ के कारण ठोस अपशिष्ट की मात्रा में निरन्तर वृद्धि हो रही है। विकसित देशों की अपेक्षा विकासशील देशों में यह समस्या एक चुनौती के रूप में हमारे सामने है जिसका समाधान समावेशी हरित विकास अर्थव्यवस्था में दिखाई पड़ता है। समावेशी हरित विकास अधिकांश समस्याओं के निवारण हेतु पर्यावरण अनुकूल उपायों की संकल्पना को अपनाता है। ठोस अपशिष्ट प्रबंधन के सभी स्तरों में समावेशी हरित विकास की अवधारणा निहित है जिसके अर्न्तगत समुदाय, रोजगार, गरीबी उन्मूलन, न्यूनतम उपभोग, एवं पर्यावरण जैसे कारक शामिल है। ठोस अपशिष्ट प्रबंधन की प्रक्रिया में रोजगार के नये अवसर, तकनीकि के बेहतर प्रयोग की संभावना, पर्यावरण को न्यूनतम क्षति एवं जन जागरुकता को सम्मिलित करते हुये समावेशी हरित विकास अर्थव्यवस्था को अपनाकर ठोस अपशिष्ट प्रबंधन की समस्याओं से निजात पाई जा सकती है तथा वैश्विक परिदृश्य को एक सकारात्मक दिशा की ओर मोड़ा जा सकता है।

आभार

यह शोध पत्र छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर के ''सी. बी. रमन शोध परियोजना सम्बन्धी योजना'' द्वारा स्वीकृत लघु शोध परियोजना के अन्तर्गत किये गये शोध का भाग है। मैं शोध के लिए आर्थिक सहायता देने हेतु छत्रपति शाहू जी महाराज विश्वविद्यालय का आभार व्यक्त करती हूँ।

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''उत्तर प्रदेश से ग्रामीण–नगरीय अंतरराज्यीय बाह्य–प्रवास के प्रवाह–प्रतिरूप का एक भौगोलिक अध्ययन''

विनय कुमार एवं संजय कुमार

शोध सारांश

प्रवास मुख्यतः वह परिघटना है जो शुरू भी किसी स्थान पर प्राकृतिक कारणों, मानवीय कारणों, संसाधनों और आर्थिक क्रियाओं एवं आवश्यकताओं के असंतुलन के फलस्वरूप होती है और दूसरे स्थान पर भी भविष्य में पुनः असंतुलन पैदा करने का काम करती है। प्रस्तुत अध्ययन का उद्देश्य उत्तर प्रदेश की ग्रामीण पृष्ठभूमि से कार्य या रोजगार के लिए दूसरे राज्यों के शहरी क्षेत्रों में होने वाले बाह्य–प्रवास का लिंगवार विश्लेषण करना एवं व्याप्त प्रवाह–प्रतिरूप को निर्धारित करना है। उत्तर प्रदेश से होने वाला कुल ग्रामीण–नगरीय बाह्य–प्रवास पूरे भारत के आंतरिक ग्रामीण–नगरीय बाह्य–प्रवास का 1991 में 0.77% था जो कि 2011 में वृद्धि के साथ 8.44% हो गया। वहीं उत्तर प्रदेश से पूरे देश के अंदर रोजगार के लिए होने वाला बाह्य–प्रवास पूरे देश के अंदर होने वाले कुल ग्रामीण–नगरीय बाह्य–प्रवास का 1991 में 15.29% था जो कि 2011 में तीव्र वृद्धि के साथ 37.44% हो गया।

संकेत शब्द– *प्रवास, ग्रामीण–नगरीय, अन्तरराज्यीय, बाह्य–प्रवास, प्रवाह–प्रतिरूप।*

प्रस्तावना

प्राचीन काल से ही मानव द्वारा अपने निश्चित उद्देश्यों की पूर्ति के लिए एक स्थान से दूसरे स्थान की ओर प्रवास किया जाता रहा है। किसी स्थान की जनसांख्यिकी में परिवर्तन के लिए उत्तरदायी तीन घटकों (जन्म, मृत्यु व प्रवास) में प्रवास भी एक प्रमुख घटक के रूप में अपना स्थान रखता है। भारत जैसे विकासशील देशों में ग्रामीण–नगरीय प्रवास का मुख्य प्रभावी कारण शहरों में विभिन्न क्षेत्रों में व्याप्त पर्याप्त अवसर न होकर ग्रामीण क्षेत्रों से लगाया गया दबाव बल है जो कि गरीबी, बेरोजगारी, प्राकृतिक आपदाओं और अपर्याप्त विकास के कारण लगता है (दास, के. सी., साहा, एस. के. दास, 2012)। इसकी पुष्टि सब्यसाची त्रिपाठी (2020) के अध्ययन से होती है जिसमें अगर भारत में शहर और गांव के बीच यदि स्वास्थ्य सुविधाओं में सुधार, रोजगार के अवसर और आर्थिक दशा में गरीबी एवं असमानता कम पाई जाती है तो गांव से शहर की तरफ होने वाला प्रवास कम पाया जाता है।

भारत में ग्रामीण क्षेत्रों से शहरी भागों की ओर होने वाले प्रवास का मुख्य कारण गाँवों और शहरों के मध्य आर्थिक संसाधनों एवं रोजगार के अवसरों पर व्याप्त उच्च असमानता है, जिसने तीव्र शहरीकरण में अपनी महत्वपूर्ण भूमिका निभाई है गरीब और पिछड़े राज्यों से पुरुषों एवं महिलाओं (पुरुषों के साथ) का प्रवास अधिक आमदनी वाले राज्यों की ओर होता है (मित्रा, ए. और मुरायमा, एम., 2009)।

भारत में कुल पुरुष प्रवासियों की आधी और कुल महिला प्रवासियों की दो–तिहाई जनसंख्या द्वारा अपने जन्म के जिले की सीमा के अंदर, बाकी बचे 30% पुरुष और 24% महिलायें अपने जन्म के प्रदेश के अंदर विभिन्न जिलों में

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प्रवास करते हैं और केवल 19% पुरुष और 9% महिलायें ही देश के अन्दर एक प्रदेश से दूसरे प्रदेश में प्रवास करते हैं (परसुरामन, एस., 1986)। सन् 2001 से 2011 के मध्य उत्तर प्रदेश की प्रवासी जनसंख्या में 41% की वृद्धि देखी गई है, जिसमें उत्तर प्रदेश में अंतःराज्यीय (जिले के अंदर और एक जिले से दूसरे जिले में) प्रवास में सबसे अधिक तीव्रता से वृद्धि हुई है और साथ ही साथ देश के अन्य राज्यों से उत्तर प्रदेश के लिए प्रवास भी बढ़ा है हालांकि अभी भी दूसरे राज्यों से उत्तर प्रदेश में आने वाले प्रवासियों की तुलना में बाह्य प्रवास अधिक होने के कारण से कुल प्रवास दर में कमी आ रही है (सिह, डी.पी., बिरादर, आर. और द्विवेदी, एल.के., 2021)।

अध्ययन क्षेत्र

उत्तर प्रदेश भौगोलिक रूप से उत्तर भारत के मैदान के लगभग मध्य में स्थित भू–भाग है, जिसका अक्षांशीय विस्तार 23°52′ उत्तरी से 31°28′ उत्तरी अक्षांश तक एवं देशांतरीय विस्तार 77°30′ पूर्वी से 84°39′ पूर्वी देशांतर तक पाया जाता है। यह भारत का क्षेत्रफल की दृष्टि से चौथा सबसे बड़ा राज्य एवं जनसंख्या की दृष्टि से सबसे अधिक जनसंख्या (19,98,12,341; 2011 की जनगणना के अनुसार) वाला राज्य है। उत्तर प्रदेश का जनसंख्या घनत्व 828 व्यक्ति प्रति वर्ग किलोमीटर, लिंगानुपात 912 (प्रति 1000 पुरुषों में) एवं साक्षरता दर 70. 69% (2011 की जनगणना के अनुसार) है जिसमें पुरूष साक्षरता दर 70.20% और महिला साक्षरता दर 59.30% पायी जाती है। उत्तर प्रदेश में मुख्यतः गंगा–यमुना का दोआब, घाघरा नदी का मैदान और हिमालय की तलहटी से सटा हुआ तराई का भूभाग है। उत्तर प्रदेश की प्रशासनिक राजधानी लखनऊ एवं व्यवसायिक राजधानी कानपुर है। उत्तर प्रदेश में कुल 71 जिले हैं। 2011 की जनगणना के आधार पर उत्तर प्रदेश की 77.73% जनसंख्या ग्रामीण क्षेत्रों में और 22.27% जनसंख्या नगरीय क्षेत्रों में निवास करती है। उत्तर प्रदेश में अधिकतर छोटे एवं मध्यम आकार के अल्पविकसित कस्बे देखने को मिलते हैं जो कि अपर्याप्त सामाजिक–आर्थिक अवसर, सामाजिक सुख–साधन और व्यवस्थाओं की चपेट में हैं जिससे कि लोगों को बेहतर अवसर की तलाश में दूसरे राज्यों की ओर प्रवास करने पर मजबूर होना पड़ता है।

अध्ययन के उद्देश्य

प्रस्तुत अध्ययन का उद्देश्य उत्तर प्रदेश की ग्रामीण पृष्ठभूमि से कार्य या रोजगार के लिए दूसरे राज्यों के शहरी क्षेत्रों में होने वाले बाह्य–प्रवास का लिंगवार विश्लेषण करना एवं व्याप्त प्रवाह–प्रतिरूप को निर्धारित करना है। अध्ययन की सुविधा के लिए उत्तर प्रदेश से उच्चतम 10 राज्यों की ओर होने वाले ग्रामीण–नगरीय बाह्य प्रवास का विधिवत् अध्ययन किया गया है।

आंकड़ों के स्रोत एवं शोध विधितंत्र

प्रस्तुत अध्ययन में ग्रामीण–नगरीय बाह्य प्रवास के अध्ययन के लिए भारतीय जनगणनाओं (सन् 1991, 2001 व 2011) से प्राप्त द्वितीयक आंकड़ों का प्रयोग किया गया है। विधितंत्र के रूप में प्रतिशतता, तालिका एवं ग्राफ, आदि का प्रयोग किया गया है। अध्ययन की सुविधा के लिए उत्तर प्रदेश से उच्चतम 10 राज्यों की ओर होने वाले ग्रामीण–नगरीय बाह्य–प्रवास का अध्ययन भारतीय जनगणनाओं (सन् 1991, 2001 व 2011) की डी–सीरीज की तालिका 03 से प्राप्त द्वितीयक आंकड़ों का प्रयोग करते हुए किया गया है।

परिणाम और विमर्श

1. कुल ग्रामीण–नगरीय बाह्य प्रवास की कुल अन्तर राज्यीय बाह्य प्रवास से तुलना

अधिकतर मामलों में बाह्य – प्रवास का मुख्य कारण अधिक जनसंख्या घनत्व उभरकर सामने आया है लेकिन कभी–कभी किसी स्थान पर अच्छी कमाई के चलते भी प्रवास बड़ी मात्रा में देखा जाता है क्योंकि सामान्यतः यहाँ पर लोग भूमिहीनता, निम्न–मजदूरी और सामाजिक उत्पीड़न एवं गंतव्य स्थान के आकर्षण के प्रभाव में आकर प्रवास करते हैं और प्रवास का यह प्रकार धीमी गति से ही सही लेकिन प्रवास के उत्पत्ति स्थान एवं प्रवासी के सामाजिक–आर्थिक विकास में अपना महत्वपूर्ण योगदान देता है (हान, ए. डी., 2002)।

तालिका 01 : उत्तर प्रदेश से होने वाले कुल अन्तरराज्यीय बाह्य प्रवास की कुल रोजगार एवं ग्रामीण–नगरीय रोजगार के लिए होने वाले प्रवास से तुलना

जनगणना वर्ष	कुल (बाह्य प्रवास) (क)	पुरुष (%में)	महिला (%में)	रोजगार के लिए कुल बाह्य प्रवास (ख)	पुरुष (% में)	महिला (% में)	ख/क *100
2001	92,55,257	**53**	**47**	31,68,000	96	**4**	**34%**
2011	1,23,19,592	**51**	**49**	37,34,502	58	**42**	**30%**
ग्रामीण नगरीय प्रवास की चारों प्रकार के कुल प्रवास से तुलना							
जनगणना वर्ष	कुल (बाह्य प्रवास) (क)	ग्रामीण नगरीय बाह्य प्रवास (ख)	ख/क *100	रोजगार के लिए कुल बाह्य प्रवास (ग)	रोजगार के लिए ग्रामीण नगरीय बाह्य प्रवास (घ)	घ/ग *100	घ/क *100
2001	92,55,257	48,86,370	**53%**	31,68,000	21,16,961	**67%**	**23%**
2011	1,23,19,592	65,99,898	**54%**	37,34,502	24,71,561	**66%**	**20%**

स्त्रोत : भारतीय जनगणना (सन् 2001 और 2011 के अनुसार)

उत्तर प्रदेश से देश के विभिन्न राज्यों की ओर होने वाले कुल अन्तरराज्यीय बाह्य प्रवास (ग्रामीण–ग्रामीण, ग्रामीण–नगरीय, नगरीय–ग्रामीण और नगरीय–नगरीय) एवं कुल ग्रामीण–नगरीय बाह्य प्रवास का तुलनात्मक अध्ययन भारत की जनगणनाओं सन् 1991, 2001 एवं 2011 के आंकड़ों के आधार पर करने पर तालिका 01 को देखकर स्पष्ट रूप से समझा जा सकता है कि सन् 2001 से 2011 के मध्य उत्तर प्रदेश से कुल अंतरराज्यीय बाह्य प्रवास में महिलाओं की संख्या में मात्र 2% की वृद्धि हुई लेकिन इसी समय महिलाओं द्वारा रोजगार के लिए हुए कुल अंतर राज्यीय बाह्य प्रवास में 38% की वृद्धि हुई, जिसको देखकर स्पष्ट रूप से कहा जा सकता है कि महिलाओं द्वारा सभी उद्देश्यों के लिए कुल अन्तरराज्यीय बाह्य प्रवास में वृद्धि हुई है। वही 2001 की तुलना में 2011 में रोजगार के लिए होने वाले कुल अंतरराज्यीय बाह्य प्रवास में 4% की कमी आई है। अब अगर हम 2001 में हुए रोजगार के लिए ग्रामीण–नगरीय बाह्य प्रवास का कुल बाह्य प्रवास से अंश निकालते हैं तो यह लगभग 23% प्राप्त होता है जो कि 2011 में 20% रह जाता है। इस प्रकार हम कह सकते हैं कि रोजगार के लिए कुल ग्रामीण – नगरीय प्रवास में 3% की कमी हुई है। वहीं कुल ग्रामीण–नगरीय बाह्य प्रवास में तो 1% की वृद्धि हुई है लेकिन रोजगार के लिए कुल ग्रामीण–नगरीय अंतरराज्यीय बाह्य प्रवास में कमी आई है।

2. ग्रामीण नगरीय अंतरराज्यीय बाह्य प्रवास

(क) सभी उद्देश्यों के लिए– सन् 2011 की जनगणना के अनुसार यह पाया गया है कि उत्तर प्रदेश की लगभग 28% जनसंख्या प्रवासियों की श्रेणी में आती है जो कि 2001 में 24% थी, वही लगभग 13 मिलियन लोग ऐसे थे जिन्होंने उत्तर प्रदेश में जन्म लिया और देश के अन्य राज्यों में विभिन्न कारणों से प्रवासित हुए (सिह, डी.पी., बिरादर, आर. और द्विवेदी, एल.के., 2021) ।

तालिका 02 को देखने से पता चलता है कि उत्तर प्रदेश से सन् 1991 के बाद 2011 तक में सभी उद्देश्यों के लिए होने वाले अंतरराज्यीय बाह्य प्रवास में पुरुषों की संख्या में 29% की वृद्धि हुई वहीं महिलाओं के प्रवास में इतनी ही कमी दर्ज की गयी । वहीं जहां 1991 में उत्तर प्रदेश से मध्यप्रदेश में 28.54%, हरियाणा में 16.15%, बिहार में 15.

तालिका 02 : सभी उद्देश्यों के लिए होने वाला ग्रामीण–नगरीय अन्तरराज्यीय बाह्य प्रवास

क्र. सं.	राज्य का नाम	सन् **2011** की जनगणना के अनुसार प्रवासी आंकड़े			राज्य का नाम	सन् **1991** की जनगणना के अनुसार प्रवासी आंकड़े		
		कुल(% में)	पुरुष (%में)	महिला (%में)		कुल(% में)	पुरुष (%में)	महिला (%में)
1	भारत	**65,99,898**	**59**	**41**	भारत	**11,18,494**	**30**	**70**
2	दिल्ली एनसीआर	30.39	55	45	मध्य प्रदेश	28.54	**19**	**81**
3	महाराष्ट्र	28.60	**66**	34	हरियाणा	16.15	**28**	**72**
4	गुजरात	9.64	**67**	33	बिहार	15.70	**10**	**90**
5	हरियाणा	7.64	53	47	राजस्थान	11.18	**13**	**87**
6	मध्य प्रदेश	4.51	45	**55**	दिल्ली	11.00	55	45
7	पंजाब	4.12	59	41	पंजाब	4.69	54	46
8	उत्तराखंड	3.96	49	**51**	गुजरात	2.42	75	25
9	राजस्थान	2.22	46	**54**	महाराष्ट्र	2.03	69	31
10	चण्डीगढ़	2.07	**59**	41	प. बंगाल	1.96	58	42
11	पश्चिम बंगाल	1.94	57	43	असम	1.67	57	43
12	अन्य	4.85	57	43	अन्य	4.54	58	42

स्त्रोत : भारतीय जनगणना (सन् 1991 और 2011 के अनुसार)

70% बाह्य प्रवास पाया गया जो कि 2011 में दिल्ली एनसीआर में 30.39%, महाराष्ट्र में 28.60%, गुजरात में 9. 64% के साथ पूरी तरह क्षेत्रीयता के आधार पर बदलता हुआ प्रतिरूप दिखाता है।

(ख) रोजगार के लिए – गरीब और पिछड़े राज्यों में जनसंख्या की गतिशीलता अधिक देखी जाती है। वहीं पुरुषों का प्रवास अधिक आमदनी वाले राज्यों की ओर एवं गाँव की महिलायें अपने राज्य की सीमा के अंदर (विवाह के कारण) ज्यादा प्रवास करती हैं और अब तो अकेले पुरूषों के साथ–साथ अकेली महिलाओं की संख्या में भी अब नौकरी की तलाश के लिए प्रवास में लगातार वृद्धि हो रही है (मित्रा, ए. और मुरायमा, एम., 2009)। किसी राज्य से अधिक संख्या में होने वाला बाह्य प्रवास उस राज्य के लिए अच्छा संकेत नहीं है क्योंकि प्रवास का मुख्य कारण गरीबी और बेरोजगारी की अधिकता है, यहाँ पर कम आय वाले राज्यों को चाहिए कि वह अपने राज्य में छोटी और प्रेरणादायक औद्योगिक इकाइयों को लगाए जिससे बेरोजगारी दर और बाह्य प्रवास की भारी संख्या को कम किया जा सके (ब्रार, के. और सिओ, बी., 2021)

तालिका 03 को देखने से पता चलता है कि सन् 1991 के बाद 2011 तक में होने वाले रोजगार के लिए ग्रामीण–नगरीय अन्तर राज्यीय प्रवास में महिलाओं की संख्या में 6% की कमी आयी है है। इससे पता चलता है कि रोजगार के लिए महिलाओं द्वारा अंतरराज्यीय बाह्य प्रवास में कमी हुई है। वहीं 1991 से 2011 के मध्य रोजगार के लिए हरियाणा, पंजाब और मध्य प्रदेश, आदि के लिए होने वाले

तालिका 03 : कार्य या रोजगार के लिए ग्रामीण–नगरीय अन्तरराज्यीय बाह्य प्रवास

क्रम संख्या	राज्य का नाम	सन् **2011** की जनगणना के अनुसार प्रवासी आंकड़े			राज्य का नाम	सन् **1991** की जनगणना के अनुसार प्रवासी आंकड़े		
		कुल(% में)	पुरुष (% में)	महिला (%में)		कुल(% में)	पुरुष (% में)	महिला (% में)
1	भारत	**24,71,561**	**95**	**5**	भारत	**1,71,054**	**89**	**11**
2	महाराष्ट्र	33.66	96	4	दिल्ली	22.59	94	6
3	दिल्ली एनसीआर	28.00	96	4	हरियाणा	17.00	**83**	**17**
4	गुजरात	10.40	96	4	पंजाब	12.82	**80**	**20**
5	हरियाणा	6.96	**92**	**8**	मध्य प्रदेश	11.14	89	11
6	पंजाब	4.45	**92**	**8**	गुजरात	6.51	93	7
7	मध्य प्रदेश	3.24	93	7	राजस्थान	4.77	**87**	**13**
8	उत्तराखंड	3.13	94	6	बिहार	4.50	92	8
9	चण्डीगढ़	2.26	96	4	महाराष्ट्र	4.37	94	6
10	राजस्थान	1.70	94	6	पश्चिम बंगाल	4.07	92	8
11	पश्चिम बंगाल	1.47	96	4	हिमाचल प्रदेश	3.78	89	11
12	अन्य	4.67	95	5	अन्य	8.41	89	11

स्त्रोत : भारतीय जनगणना (सन् 1991 और 2011 के अनुसार)

बाह्य प्रवास में कमी आयी है और जहाँ 1991 में उत्तर प्रदेश से महाराष्ट्र को रोजगार लिए 4.37% लोग (कुल बाह्य प्रवास का) ही जा रहे थे, 2011 में अत्यधिक तीव्र वृद्धि के साथ 33.66% लोग प्रवासित हुए और दिल्ली एनसीआर में भी रोजगार के लिए प्रवासियों की संख्या में तीव्र वृद्धि हुई।

3. उत्तर प्रदेश से देश के अन्य राज्यों में होने वाले दशकीय ग्रामीण–नगरीय अन्तरराज्यीय बाह्य प्रवास का तुलनात्मक विश्लेषण

चूंकि उत्तर प्रदेश की अधिकांश जनसंख्या कृषि कार्यों में लगी हुई है और किसान इतने महंगे कृषियंत्र, उर्वरक, रासायनिक दवाओं, आदि का उपयोग खाद्यान्न फसलों में करने में समर्थ नहीं है, जिसके परिणामस्वरूप कम आय प्राप्त हो पाती है और किसानों को अधिक आय वाले क्षेत्रों की तरफ प्रवास करने को मजबूर होना पड़ता है।

तालिका 04 को देखकर पता चलता है कि 1991 में उत्तर प्रदेश से सभी उद्देश्यों के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास, भारत के अन्दर अन्तिम निवास स्थान के आधार पर कुल ग्रामीण–नगरीय बाह्य प्रवास का 0.77% था जो कि 2001 में तीव्र वृद्धि के साथ 9. 45% हो गया और 2011 में निम्न कमी के साथ 8.44% हो गया। वहीं 1991 में उत्तर प्रदेश से रोजगार के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास, भारत के अन्दर अन्तिम निवास स्थान के आधार पर कुल ग्रामीण–नगरीय बाह्य प्रवास का 3.17% जो कि 2001 में तीव्र वृद्धि के साथ 15. 63% हो गया और 2011 में निम्न में कमी के साथ 13.81% हो गया। वहीं 1991 में उत्तर प्रदेश से रोजगार के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास, उत्तर प्रदेश से सभी कार्यों के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास का 15.29% था जो कि 2001 में तीव्र वृद्धि के साथ 43.32% हो गया और 2011

तालिका 04 : उत्तर प्रदेश से देश के अन्य राज्यों में होने वाला ग्रामीण–नगरीय अन्तरराज्यीय बाह्य प्रवास (कुल, रोजगार के लिए एवं ग्रामीण–नगरीय) का तुलनात्मक अध्ययन

जनगणना वर्ष	भारत के अन्दर अन्तिम निवास स्थान के आधार पर कुल ग्रामीण–नगरीय बाह्य प्रवास (क)	उत्तर प्रदेश से सभी कार्यों के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास (ख)	पूरे भारत में रोजगार के लिये कुल ग्रामीण–नगरीय लिये बाह्य प्रवास (ग)	उत्तर प्रदेश से रोजगार के लिये कुल ग्रामीण–नगरीय बाह्य प्रवास (घ)	ख/क ×100 (य)	घ/ग × 100 (र)	घ/ख ×100 (व)
1991	1,45,04,531	11,18,494	53,97,376	1,71,054	0.77	3.17	15.29
2001	5,16,86,356	48,86,370	1,35,38,079	21,16,961	9.45	15.63	43.32
2011	7,82,01,477	65,99,898	1,78,91,595	24,71,561	8.44	13.81	37.44

स्त्रोत : भारतीय जनगणना (सन् 1991, 2001 और 2011 के अनुसार)

में निम्न कमी के साथ 37.44% हो गया।

निष्कर्ष

वर्तमान भारतीय परिदृश्य में ग्रामीण–नगरीय प्रवास एक महत्वपूर्ण घटना है क्योंकि जहाँ एक तरफ भारतीय कस्बों एवं नगरों का नीतिबद्ध तरीके से विकास नहीं हुआ है जिसके कारण शहरी गरीबी जैसी परिस्थितियों ने जन्म ले रखा है। इसका प्रमुख कारण शहरों में बढ़ रही जनसंख्या के अनुरूप उपलब्ध अपर्याप्त जन सुविधाएं हैं। अगर लोगों को स्थानीय स्तर पर या उनकी सबसे नजदीक कस्बों शहरों में सम्मानजनक रोजगार उपलब्ध कराया जा सके तो बड़े शहरों में बढ़ रही अनावश्यक भीड़ पर काबू पाया जा सकता है और क्योंकि इससे क्षेत्रीय विकास में भी मदद मिलेगी जिससे पूरे देश में सतत् विकास को भी बढ़ावा मिलेगा। प्रस्तुत अध्ययन से पता चलता है कि सन् 2001–. 2011 के मध्य कुल ग्रामीण–नगरीय बाह्य प्रवास में तो वृद्धि हुई है लेकिन रोजगार के लिए होने वाले कुल प्रवास (ग्रामीण–ग्रामीण, ग्रामीण–नगरीय, नगरीय–ग्रामीण और नगरीय–नगरीय) में कमी आयी है एवं रोजगार के उद्देश्य से होने वाले ग्रामीण–नगरीय प्रवास में भी कमी आई है। सन् 2001 की तुलना में सन् 2011 में महिलाओं द्वारा सभी उद्देश्यों के लिए कुल अन्तरराज्यीय बाह्य प्रवास में वृद्धि हुई है। उत्तर प्रदेश से सन् 1991 के बाद 2011 तक में होने वाले अन्तरराज्यीय बाह्य प्रवास में पुरुषों की संख्या में वृद्धि हुई वहीं महिलाओं के प्रवास में इतनी ही कमी दर्ज की गयी । 1991 के बाद 2011 तक में उत्तर प्रदेश से होने वाले अंतर राज्यीय बाह्य प्रवास में क्षेत्रीयता के आधार पर तीव्रता के साथ बदलता हुआ प्रतिरूप देखने को मिलता है। वहीं महिलाओं के अंतरराज्यीय प्रवास में (विशेष रूप से रोजगार के लिए) कमी पायी गयी है।

सन्दर्भ ग्रंथ सूची

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