Journal Volume No. 32 (June/July 2024)
THE KONKAN GEOGRAPHER
ISSN No. 2277-4858 **Impact Factor *(IIFS)* 7.125**
(National Interdisciplinary Peer Reviewed Refereed Research Journal)
KONKAN GEOGRAPHERS ASSOCIATION OF INIDA

INDEX

KONAKN GEOGRAPHERS' ASSOCIATION OF INDIA

(Registration No. 3341/2010 Sindhudurg, MS, INDIA)

DIRECTOR BODY 2020-2025

Dr. Shivaram Thakur	PRESIDENT	S. P. K. College, Sawantwadi, Sindhudurg
Dr. Ramchandra Katkar	VICE-PRESIDENT	S. P. K. College, Sawantwadi, Sindhudurg
Dr. Rajaram Patil	SECRETARY	A & C College Phondaghat, Sindhudurg
Dr. Sudhir Buva	JOINT SECRETARY	S. P. K. College, Sawantwadi, Sindhudurg
Dr. Sambhaji Patil	TREASURER	Kankavli College Kankavli,, Sindhudurg
Dr. Hemant Pednekar	ADVISOR	Ex. Vice Principal, Kirti College, Mumbai
Prof. Hanmantrao Yadav	DIRECTOR	S. R.M. College, Kudal, Sindhudurg
Dr. Sumedha Dhuri	DIRECTOR	J.B. Naik. College, Sawantwaadi, Sindhudurg
Dr. Balu Rathod	DIRECTOR	Kankavli College Kankavli,, Sindhudurg
Dr. Pradnyakumar Gatade	DIRECTOR	Laximibai Halbe College, Dodamarg
Dr. Balasaheb Rahane	DIRECTOR	Sonopant Dandekar College, Palghar
Prof. Kamlesh Kamble	DIRECTOR	Br. Khardekar College, Vengurla
Prof. Rajkumar Kamble	DIRECTOR	ASC College, Unde, Tal: Uran, Raigad
Dr. Pooja Mohite	DIRECTOR	S.P. Hegshetye College, Ratnagiri
Prof. Nisha Deodhar	DIRECTOR	Manjunatha College of Commerce, Thane

Our Konkan Geographers' Association of India is publishing from 2012 National level Interdisciplinary peer reviewed Journal and from 2023 with impact factor (HFS) 7.125. KGAI also publishes Geographical text and reference books in Marathi and English medium. The life membership is opened to all researcher and geographers from India and abroad. We have organized 18 National and 03 International (online) level conferences in various states of India.

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Women in Indian Agriculture: Empowerment and Challenges

- Dr. Urmila Sabharwal,
Associate Professor, Pt.N.R.S. Govt. College, Rohtak

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract :

This paper explores the role of Indian women in agriculture, focusing on the issues and challenges they face in this sector. Despite playing a significant role in agricultural production, women are often marginalized and face several barriers, including limited access to resources, land ownership, education, and credit. This paper analyzes the cultural, economic, and social factors that contribute to the challenges faced by women farmers and highlights some of the initiatives taken by the government and non-governmental organizations to empower them. The paper concludes by emphasizing the need for concerted efforts to address the issues faced by women farmers and create an enabling environment that recognizes and supports their vital contributions to agriculture and rural development in India.

Keywords :

Indian women, agriculture, gender roles, challenges, empowerment, rural development, traditional practices, modern technologies, land ownership, access to resources, gender wage gap, discrimination, cultural barriers, policy interventions.

Introduction :

Agriculture is the backbone of India's economy, and the sector employs over 50% of the country's workforce. Women play a significant role in agricultural production, contributing to nearly 60-70% of the total agricultural labor force. Despite this, women farmers in India are often marginalized and face several challenges in accessing resources, credit, land ownership, and education. The issues and challenges faced by women in agriculture have a significant impact on the overall agricultural productivity of the country, food security, and rural development.

This paper explores the role of Indian women in agriculture and the issues and challenges they face in this sector. The paper analyzes the cultural,

economic, and social factors that contribute to the marginalization of women in agriculture and the impact it has on their lives. The paper also highlights some of the initiatives taken by the government and non-governmental organizations to empower women farmers and promote their participation in agricultural activities.

Objective

- To explore the role of Indian women in agriculture.
- To highlight the challenges faced by women farmers in India.
- To analyze the cultural, economic, and social factors that contribute to the marginalization of women in agriculture and the impact it has on their lives.
- To highlight the initiatives taken by the government and non-governmental organizations to empower women farmers and promote their participation in agricultural activities.
- To emphasize the need for concerted efforts to address the challenges faced by women in agriculture and create an enabling environment that recognizes and supports their vital contributions to agriculture and rural development in India.

Methodology

This paper aims to explore the main barriers to women's development in the agriculture sector and identify methods to reduce gender differences and enhance the role of women in this field. The study is based on analytical research that utilizes various sources of secondary information to collect material for the paper. The sources include books, journals, e-papers, newspaper articles, and online material related to women in agriculture. Overall, the study employs a secondary data analysis methodology to explore the role of women in the agriculture sector and identify ways to enhance their participation and contribution in this field.

Importance of Women in Agriculture

In India, women have traditionally played a significant role in agriculture, contributing to nearly 60-70% of the total agricultural labor force. They are involved in various activities such as sowing, transplanting, weeding, harvesting, post-harvest operations, and livestock management. However, their contribution to agricultural production remains undervalued and unrecognized. Despite

being an integral part of the agricultural workforce, women farmers face several challenges that prevent them from realizing their full potential.

Challenges faced by Women Farmers in India

■ Women farmers in India face several challenges, including limited access to resources, credit, land ownership, and education.

Gender Discrimination in Agriculture in India:

■ Women play a significant and crucial role in agriculture in India. They comprise half or more of the agricultural labor force in the country. However, their contribution to the sector often goes unrecognized, and they face significant challenges in accessing resources and opportunities.

■ The labor burden of rural women exceeds that of men and includes a higher proportion of unpaid household responsibilities related to preparing food, collecting fuel, and water. Despite their important role in agriculture, women are often over-represented in unpaid, seasonal, and part-time work and paid less than men for the same work.

■ Women's work in agriculture potentially has a negative impact on household nutrition, as it reduces the time available for care work and can lead to seasonal energy deficits. In most rural areas of India, women work as agricultural and family farm laborers in addition to performing nearly all the childcare and household duties.

Furthermore, women cultivators are at a loss without land titles, as they participate in agricultural work as unpaid subsistence labor and are not recognized as farmers. Hence, they are unable to access credits and government benefits.

Increased Trafficking of Women:

Gender inequality in land ownership and security of tenure over land contributes to poverty, dependency, and risks of violence. "Women and girls are trafficked for all purposes of exploitation, including forced labor, sexual exploitation, and forced marriage."

Impact of Liberalization on Agricultural Women Workers:

Social norms affect how men and women approach and are rewarded from the market. Men are often seen as breadwinners and thus expected to be paid more at work year-round. Women, on the other hand, tend to work in seasonal or otherwise temporary jobs, which are low-wage and low-skill

positions. Women are not encouraged to compete for higher wages, and those who attempt to bargain for better wages are often viewed negatively.

MaInutrition:

Infrastructural support that can reduce the drudgery and effort/time intensity of tasks, especially cooking, as well as clean energy and drinking water, alongside strengthening child-care services, will help India move toward the United Nations Sustainable Development Goals of reducing hunger and stopping intergenerational nutritional deprivation.

Recognizing the crucial role of women in agriculture should not obscure the fact that farm women continue to be concerned with their primary functions as wives, mothers, and homemakers. Therefore, women require comprehensive support, including access to education, skills training, and credit facilities to help them improve their livelihoods and contribute effectively to the agricultural sector's growth.

Several programs started at the National Centre for Women in Agriculture and Krishi Vigyan Kendras are the right steps in this direction. The enlightenment of women will change the face of rural India and promote gender equality in the agricultural sector, leading to the overall development of the country.

Initiatives to Empower Women Farmers

To address the challenges faced by women farmers in India, several initiatives have been taken by the government and non-governmental organizations. One such initiative is the National Rural Livelihood Mission (NRLM), which aims to promote the economic empowerment of women through skill-building and capacity-building programs. NRLM provides training and support for women to engage in income-generating activities such as agriculture, livestock management, and non-farm enterprises.

The government has also implemented several schemes to provide access to credit facilities for women farmers, such as the Mahila Kisan Sashaktikaran Pariyojana (MKSP). MKSP provides financial assistance to women farmers for agricultural inputs, technologies, and equipment. This has enabled women farmers to increase their agricultural productivity and income.

Non-governmental organizations (NGOs) have also played a vital role in empowering women farmers. One such organization is the Self-Employed Women's Association (SEWA), which provides training and support for women

farmers to engage in sustainable agricultural practices. SEWA also provides access to credit facilities and markets for women farmers to sell their products at fair prices.

Conclusion

In conclusion, the paper highlights the significant role of women farmers in India's agricultural sector and the challenges they face in contributing to this sector. Despite their significant contributions to the agricultural sector, women farmers continue to face several challenges, including limited access to resources, credit, land ownership, and education. Gender-based discrimination and social norms also limit women's participation in decision-making processes related to agriculture.

The initiatives taken by the government and non-governmental organizations have enabled women farmers to overcome some of these challenges and promote their participation in agricultural activities. However, much remains to be done to create an enabling environment that recognizes and supports women's vital contributions to agriculture and rural development in India.

Suggestions

To address the challenges faced by women farmers, concerted efforts are required at various levels. The government must take more comprehensive and gender-sensitive measures to improve women's access to resources, credit, and land ownership. Educational programs should be designed to promote women's awareness of their rights and to enable them to acquire necessary skills to participate effectively in agricultural activities.

Non-governmental organizations should work with women farmers and community-based organizations to create awareness about gender issues and promote women's participation in decision-making processes related to agriculture. Women farmers should be encouraged to form self-help groups to enhance their access to credit and to share knowledge and experiences.

Finally, it is essential to change social attitudes and beliefs about women's roles in agriculture. Such attitudes and beliefs must be transformed to recognize the vital role of women in agriculture and rural development. Only by creating a supportive and enabling environment can women farmers contribute their full potential to the development of the agricultural sector in India.

References:

1. Agarwal, B. (1994). A Field of One's Own: Gender and Land Rights in South Asia. Cambridge University Press.
2. FAO. (2011). The role of women in agriculture. Food and Agriculture Organization of the United Nations.
3. Government of India. (2018). National Policy for Women 2016. Ministry of Women and Child Development.
4. Jena, D., & Behura, D. (2019). Women in Agriculture in India: A Review. International Journal of Management, Technology, and Social Sciences (IJMTS), 4(1), 42-47.
5. Kumar, R., & Rajan, S. I. (2017). Women in Agriculture in India: Challenges and Opportunities. In Women's Role in the Agricultural Sector (pp. 83-98). Springer.
6. Mazumdar, S. (2017). Women in Indian Agriculture: An Overview. In Women's Role in the Agricultural Sector (pp. 65-81). Springer.
7. Nair, K. N., & Joseph, N. (2018). Women in agriculture: a global perspective. Springer.
8. Narayan, D., Patel, R., & Schafft, K.(2000). Voices of the poor: Can anyone hear us?. Oxford University Press.
9. Singh, K. M., & Meena, M. S. (2017). Women in agriculture: A key determinant of food security. In Women's Role in the Agricultural Sector (pp. 17-31). Springer.
10. World Bank. (2020). Women, Business and the Law 2020: Scaling Up Women's Entrepreneurship. World Bank Group

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

A Geographical Case Study of Socio-Economic Conditions of Brick Kilns Workers in Dakshin Dinajpur, West Bengal -Block Level Study

***Smritikana Sarkar**,
Research scholar, Dept. of Geography.
Seacom Skills University, Birbhum.

****Dr. Subhasis Mondal**
Guide and Supervisor.

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract :

Brick is very useful component for building construction. We erect building but don't think about them who are making that useful material. A most essential part to make bricks are workers and their labor, they start work from midnight to next whole day and in the sun as well. They stay there with family during that season by making unhealthy and unhygienic slum. Their remuneration is not commensurate with their work. They belong to BPL, they suffer different health problems and don't get proper treatment for financial unstability, their children deprived from education. In my study, trying to focus and bring out to public their livelihood, life style, socio-economic conditions, education, mental health, physical health and hygiene as well as their children's health, malnutrition, education and future plannings.

Key words: Socio-economic condition, malnutrition, unhygienic, workers.

Introduction:

Bricks have been used for building construction since ancient time, since then soil was used to make bricks and till now the fundamental process is unchanged. Many workers are engaged in different fields in the brick kiln for making bricks. In a certain time, raw bricks are made to be baked. The workers who work on that period are very diligent. From deep night to next sunset, the whole day in summer season they continue their work to make bricks from soil preparation to shape of the raw bricks. But unfortunately their wages do not match with their hard work. It is observed that they are unable to change their profession due to less education status. They come to work in the kiln with their family and stay there by making unhealthy and unhygienic slum. Their

children suffer from malnutrition because they only eat food to satisfy their hunger don't intake proper nutritious food. Their children's education is also negligible.

Statement of the problems:

On the review of current living status of people in 21st century, it can be observed that some range of people are still marginalized, may be said they cannot fulfill their basic needs. Most of them could not keep on their education due to economic crisis. How much hard their life is and do their children also be deprived from education and remain will be engaged to brick kiln's workers? That point is really thoughtful, so the researcher choose the topic as… **"A GEOGRAPHICAL CASE STUDY OF SOCIO-ECONOMIC CONDITIONS OF BRICK KILNS WORKERS IN DAKSHIN DINAJPUR, WEST BENGAL -BLOCK LEVEL STUDY."**

Literature survey and review:

- Naik,P.(2017) studied Socio-Economic conditions of women workers in Brick kilns: A case study on Davangere District in Karnataka". Researcher highlighted socio-economic condition and various problems of women workers of brick kiln and how to improving their status. Researcher used field survey method. Main findings of the study is to improve their satisfactory working environment. They should be motivated, enthused and statutory facilities to be given for welfare.

- Rajvanshi , N. (2022) .Studied "Socio- economic conditions of brick kiln workers in India." Main objectives of the study are the socio-economic aspect of brick kiln workers, wages difference between male and female workers and their living and working problems. Researcher used survey method. Researcher suggested a central and state safeguard authority for the interest of brick kiln workers.

Objectives of the study:

1. To find out the socio-economic conditions of brick kiln workers.

2. To disclose the problems, suggestion of policy and action plan.

Data base:

The study has been done on the basis of primary data which collected through question answer, survey, face to face interview and questionnaire on a set of questions on the basis of response of 50 workers family of brick kiln at Gangarampur block and some secondary data

has been collected from the source of books journals and related offices for more information.

Methodology:

The researcher has applied field survey method including Pre-Field, Field and Post Field.

Location of the study area:

Our study area is Gangarampur, situated at Dakshin Dinajpur in West Bengal. This sub-division is coordinates 25.4009° N, 88.5324° E. and is located on the bank of Punarbhaba River. since the ancient time Gangarampur known as Damdama or Devkot.

Gangarampur	Area	Population	Literacy rate
Country- India **State –** West Bengal **Distict** – Dakshin Dinajpur	**Total area-** 10.29 sq. km **Elivation-**25 m (82 ft.)	**Total-**56,217 **Male**- 29,095 **Female-** 27,122 (Census 2011)	**Total-** 84.59% Male- 88.82% Female-76.26% (census 2011)

Discussion:

In Gangarampur block from Dakshin Dinajpur district, the researcher visited several brick kilns and took interviews by setting some questions to know the socio-economic conditions of about 50 brick kiln workers family to collect data. The researcher applied purposive sampling and collected data from field survey method**.**

Table and Statistical Analysis:

To see the socio –economic conditions of the brick kiln workers of Gangarampur in Dakshin Dinajpur, the information obtained by visiting the brick kiln and talking with the brick kiln workers family. The information is hereunder

Block Gangarampur	Illiterate	Literate				Total
		Primary Up to iv	Junior High V to Vii	Secondary IX & X	Above secondary	
Brick kiln workers	-	92	08	-	-	100

Source : Field Survey.

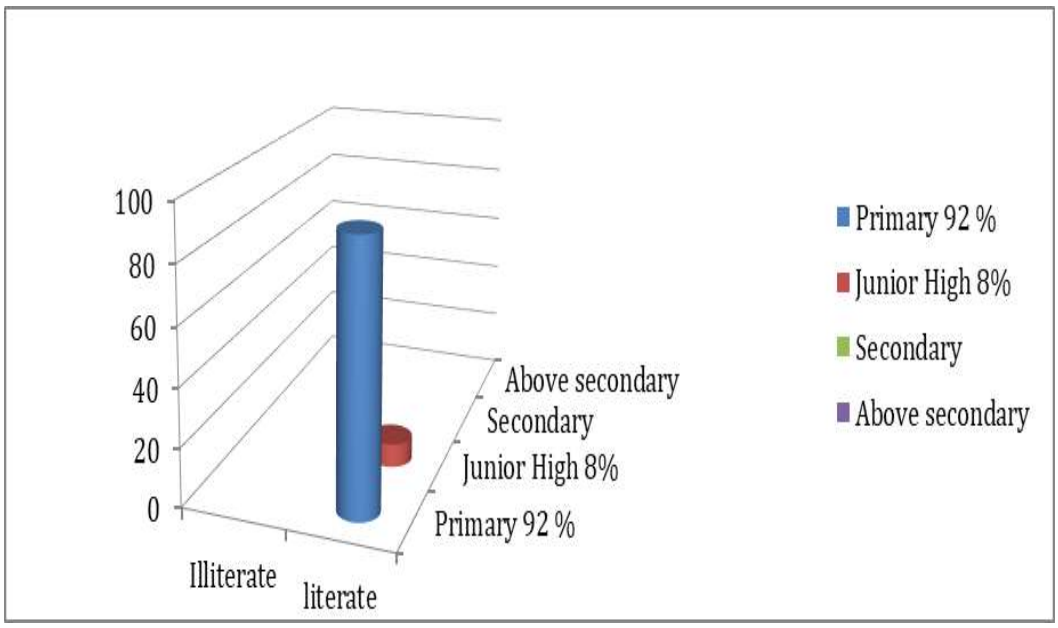


Fig no. 01 : Bar diagram showing the Educational Status (in percentage) head of the family members.

From the above table and bar diagram, only 8% workers abled to attain upper primary level of education but 92% workers could not cross over the primary level education. it is clearly visible that the workers educational status is very poor. So it is hard to switch over their profession for livelihood and better living.

Table no. : 02 Age group of the brick kiln workers. (In percentage)

Block : Gangarampur	Age Below 18	Age 18to 59	Age Above 59	Total
Brick kiln workers	Nil	100	Nil	100

Source : field survey.

The above table is presenting the age of workers. Here we can see that all workers are adult, good to see that no child is registered as labor.

Table No 3: Distribution of size of family members of the Brick kiln workers. (In percentages)

Block name	Size of the family (members)			Total
	01-03 members	04-06 members	07- 09 members	
Gangarampur	70	24	06	100

Source : field survey.

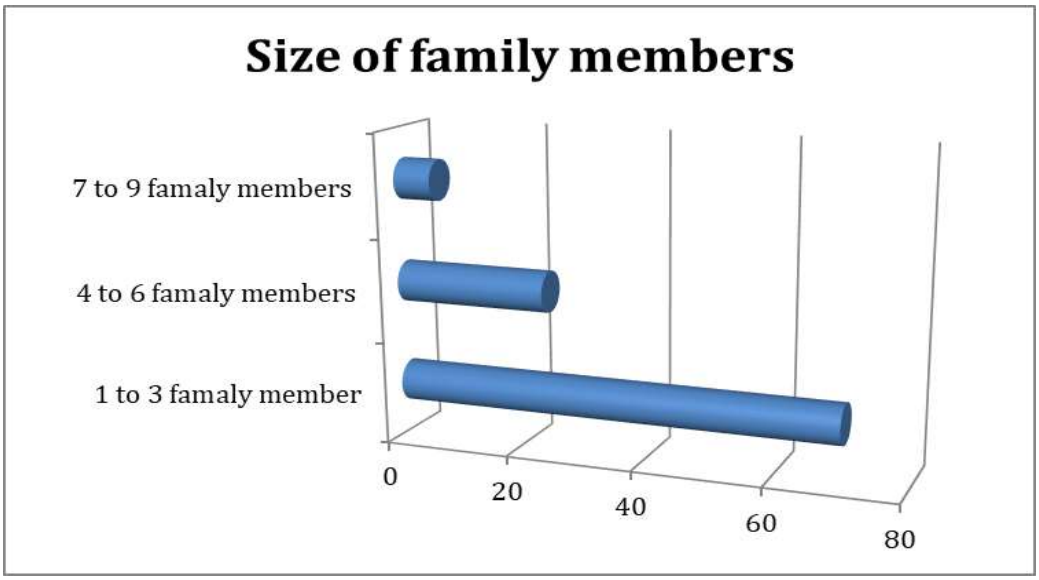


Fig no : 2 Bar diagram showing the Distribution the size of family members of the brick kiln workers.(in percentages)

The above table and bar graph presenting the family members of brick kiln (in percentage) assuming 50 workers family as 100 % , it is found that 1 to 3 members belonging families are about 70 % ,4 to 6 members belonging families are about 24 % and rest 6% family are belonging 7 to 9 family members.

Table No. 04 : Caste structure of the Brick kiln workers.(in percentage)

Block : Gangarampur	General	OBC		SC	ST	Total
		A	B			
Brick kiln workers	08	10	12	52	18	100

Source: Field survey.

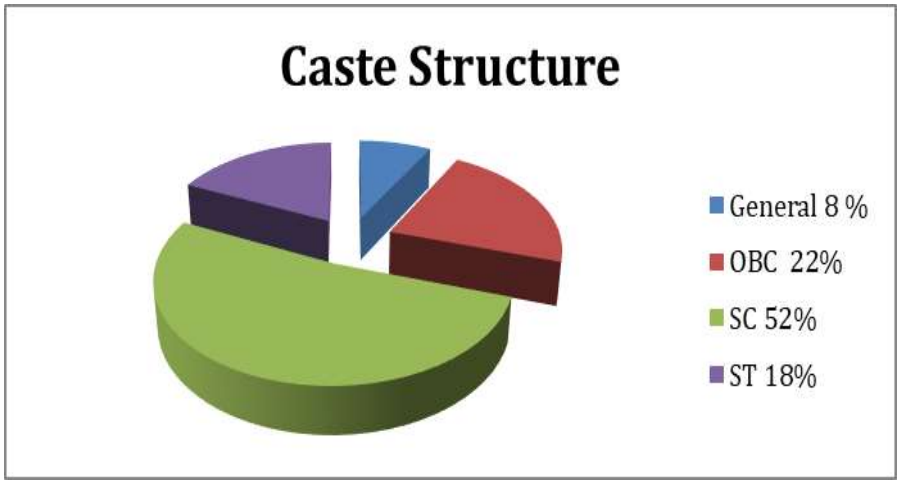


Fig no 3 : This Pie chart showing the caste structure of brick kiln workers (in percentage)

The above table and pie chart are showing the classification of caste structure of brick kiln workers in Gangarampur Block. Here all workers are divided into four category, in this classification 8% of workers belong to General caste, 22% belong to 0BC category, 52% are SC, and rest 18% ST.

Table no. 05 : Religion structure of the brick kiln workers. (in percentage)

Block: gangarampur	Hindu	Muslim	Christian	Total
Brick kiln workers	84	10	06	100

Source : Field survey.

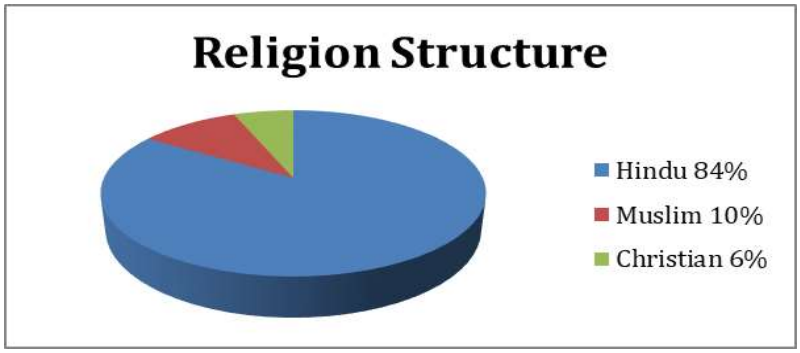


Fig no. 4: The Pie chart showing the Religion structure of the brick kiln workers. (in percentag

The above table no.04 and pie chart denoting the religion status of brick kiln workers in Gangarampur block. A large number of workers i.e. 85% belong to Hindu religion, next striking religion i.e. 10% Muslims and rest 6% belong to Christian community.

Table no. 06 : Wages rate of brick kiln workers. (In percentage)

Block name gangarampur	Type of works	Wage Rate (in Rs)	Wage Payment
Brick kiln workers.	Soil preparation for raw brick to drying in the sun.	920-980	weekly

Source : field survey.

The table denoting wages rate of workers for making bricks from soil preparation to bricks drying. per 1000 pieces raw bricks making rate sets rs.920-980. Wages disbursement period is weekly.

Table no. 07 : Housing infrastructure, kitchen and sanitation facilities:

Response and view of workers.(in percentage)

Response and view of workers.(in percentage)	**Topic**	**Infrastructure facilities**
91%	Housing infrastructure	● Housing condition is not better. ● Only one room provided. ● Just arrange the bricks one after the other to make a house. There is a tin shed on top.
98%	Kitchen facilities	● No kitchen provided for cooking. ● They use open place to cook.
99 %	Sanitation facilities	● One common toilet and latrine is present (one for every 35 families, only female use toilet and male persons go to open for defecation.) ● No separate bathroom is present.

Source: field survey.

Table no 08: Provision of drinking water or sources of

Topic	Facilities provided in the brick kiln.	workers response (in percentages)
Provision of drinking water	• Hand pump, tube-well • water tank (one for every 35 families)	99%
Food habits related	• Three times heavy meal in a day to fulfill hunger. • They take much carbohydrate type food like rice, handmade bread with some mix veg to fill stomach. • Often they take egg, meat, milk, two to four week gap they usually take such food.	98%

Source : Field survey

Major Findings:

After detailed study and as per information, we found that the education levels of workers are very poor. Most of the workers drop out from primary level education. The workers are adult, it is happy to see that no child labor is registered but sometimes children help their parents to their work. We found during survey that it was a family work. They take wages on weekly basis. It is found 84% families belong to Hindu rest are Muslims and Christian. They work and live together. Their sanitation facilities are not well. Most workers go to open defecation, only one or two hand pump provided for water source, they use open place to cook. They always want to fill their stomach with heavy food like rice or handmade bread but do not care about nutrition so their children suffer from malnutrition.

Some suggestion of policy and action plan:

1. Policy measures :

- A minimum wages rate should be fixed.
- Their work should be permanent.
- Be arranged for pension and healthcare.

2. Action plan :

- Information should be provided about Government facilities.
- Connect them with various NGOs.

- They should be provided health care facilities.

Conclusion:

Finally it can be said that their socio-economic conditions really poor, they are not much educated. If they're not aware about future planning and children's education, they will remain traditionally employed as laborers

Acknowledgement:

I feel very much grateful to acknowledge. I express my deep indebtedness to my respected guide and supervisor Sir Dr. Subhasis Mondal whose supervision, constructive thinking, positive suggestion enhanced and inspired me to make my study more interesting.

I am also thankful to the brick kiln owner and manager who allowed me to meet with the workers and their family. Lastly the protagonist of my study is 'workers', who are really very simple and helped me with immense information.

Reference:

*Mondal .S, [2019], Socio-economic Condition and Occupational Hazards of Brick Kiln Workers; A Case Study of Diamond Harbour Block-1, South 24 Parganas District . International Journal of Social Science and Humanities Research . July - September ,ISSN 2348-3164,Vol. 7, Issue 3, pp: (268-273).

*Monga,V. Singh, P.L. Bhardwaj. A. Singh, H. (2012) "RESPIRATORY HEALTH IN BRICK KILN WORKERS". April. IJPSS.ISSN: 2249-5894. Volume 2, Issue 4. https://www.ijmra.us/project%20doc/IJPSS_APRIL2012/IJMRA-PSS865.pdf

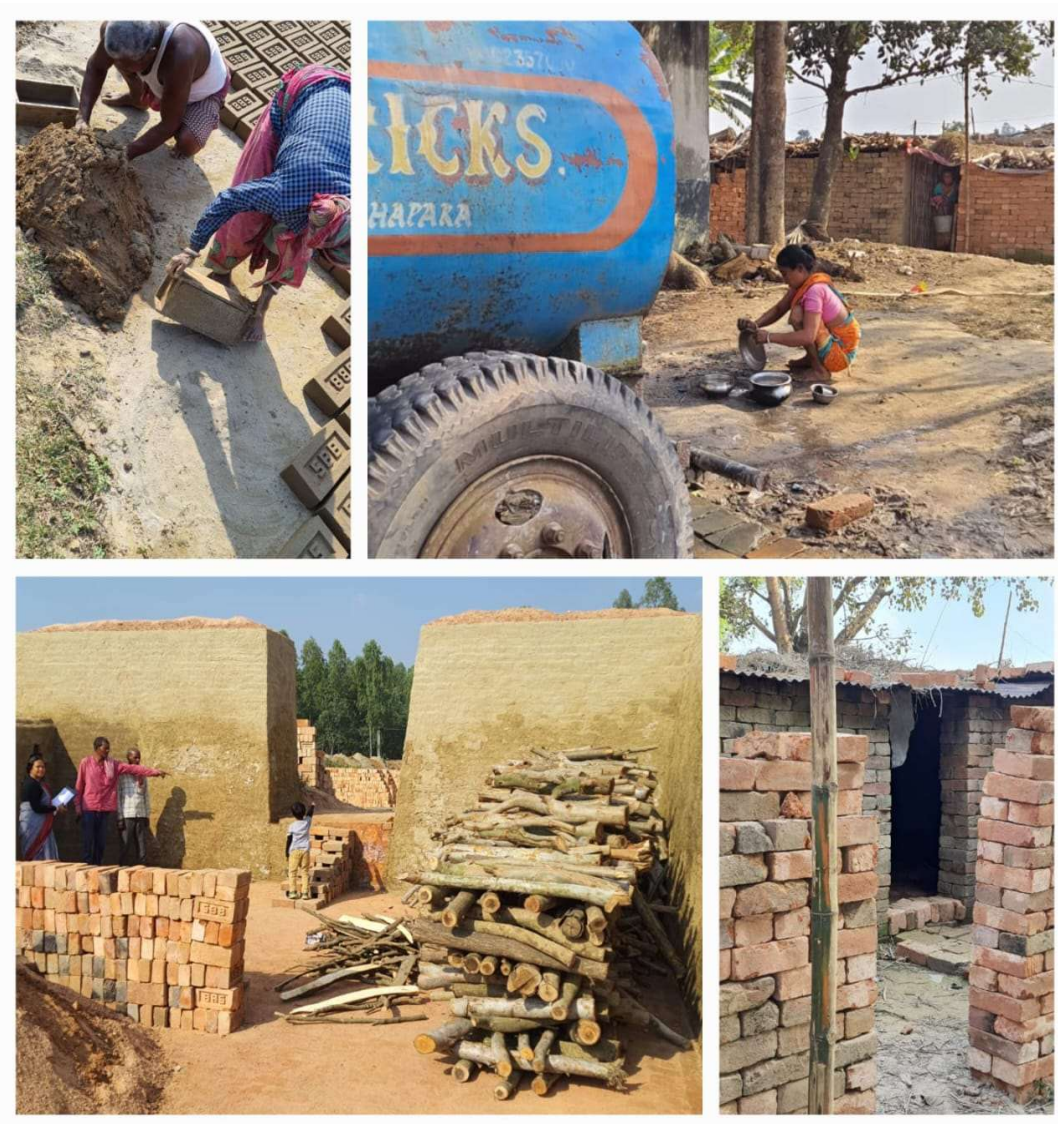
*Naik, P. (2017) . "Socio-economic conditions of women workers in brick kilns : A case study on Davangere district in Karnataka". August, ISSN: 0975-833X. Vol. 9, Issue, 08, pp.56767-56771

*Rajvanshi , N. (2022) . "Socio- economic conditions of brick kiln workers in India." February, Vol. 21(Issue2):pp. 283-292 http://ilkogretim-online.org. doi: 10.17051/ilkonline.

*Census 2011 Data – censusindia.gov.in

*Dakshin Dinajpur, West Bengal- Wikipedia.

Some pictures during field investigation :



This picture show the living conditions of brick kiln workers.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Irrigation Projects in Karnataka – A Geographical Analysis

- Dr. Prakash B. Holer,

Assistant Professor And Head, Department of Geography, Shri. Kumareshwar Arts And Commerce College Hangal Dist: Haveri- Karnataka

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Charting the evolution of irrigation in Karnataka, this article looks into the nature of shifts that have occurred over the years, and the major challenges it faces now. Under the various Irrigation projects in Karnataka villages have been submerged and work of rehabilitation is completed and shifted to Rehabilitation center. All the works including raising main, intake canal are yet to be complete / completed.

Keywords : markandeya right bank canal, doodhganga irrigation project, lifting of water, power line work, fic works, khariff season and rabi season, lift irrigation scheme, krishna river, head works, pump house, water dispute tribunal, forest department, jack well, delivery chamber.

Introduction :

The irrigation in Karnataka and the way it is managed have changed over the years though the formal institutions entrusted with water resources have not kept pace. Irrigation development in postcolonial times began with large-scale public irrigation systems. Since the 1970s, farmers have increasingly invested in groundwater wells and pumps. The ground-water and surface water sectors have always operated in silos and rarely interacted with farmers who, starting some- where in the mid-1970s, took irrigation into their own hands. Traditionally, surface water has been under the irrigation departments of different districts, while groundwater assessment has been the responsibility of the stategroundwater departments. Different irrigation projects sachems in Karnataka have been disused systematically.

Ghataprabha Project:

Under this project it is proposed to irrigate 310823 Ha areas of Athani, Chikkodi, Gokak, Hukkeri, Raibag, Ramdurg, Savadatti, Badami, Bagalkot,

Bilagi, Hunagund, Jamakhandi & Mudhol Taluks of Belgaum & Bagalkot District. Outlet potential is created. FIC works and Balance works are under progress.

Table1: Canal Details

CanalLength	GRBC	GLBC
Canal	199 Km	109 Km
Branch Canal	88 Km	210 Km
Distributaries	994 Km	494 Km

Lift schemes coming under Ghataprabha projects areas under:

- Daddinaganur
- Rustumpur
- Kotabagi

The above lift schemes are completed & FIC works are under progress.

Hippargi Irrigation Project:

Under this project it is proposed to irrigate 74742 Ha areas of Athani, Chikkodi & Jamakhandi Taluks of Belgaum & Bagalkot District. Total length of canal is 306Km.

Lift schemes coming under this project are as follows:

- Ainapur stage-I&II
- Karimasuthi stageI&II
- Halyalstage I&II
- Savalgi–Tungal.

All the lift schemes are completed. Distributaries workand FIC works are under progress.

Markandeya Project:

Under this project it is proposed to irrigate 14448 Ha areas of Belgaum, Gokak, Hukkeri, & Savadatti, Taluks of Belgaum District. Under this project villages have been submerged and work of rehabilitation is completed and shifted to Rehabilitation center. Under this project distributaries work and FIC works are under progress. All other works are completed

Murgod lift Irrigation Scheme:

This scheme is envisages lifting of water from 55th km of Markandeya right bank canal (near Malagali village) to irrigate 1939 Ha of area in 8 villages.

The headwork's are in progress and estimates for the remaining canal works are under preparation.

Chachadi lift Irrigation Scheme:

This scheme is envisages lifting of water from 34th km of Markandeya right bank canal to irrigate 2718 Ha of area. Tender for the headwork and initial 5.00 km. works are awarded on turnkey basis and works are in progress. Remaining work estimates under preparation.

Doodhganga Project:

Doodhganga Irrigation Project is an interstate project of Maharastra and Karnataka. The project envisages construction of composite dam across the river Doodhganga near village Asangaon of Ratanagari taluk in Kolhapur District of Maharastra state. This project envisages to provide irrigation benefits to 44,766 Ha. in Maharastra state and 15,167 Ha in Karnataka state.

Branch Canal Nidhori Bidari Dattawad Canal length 21.5725.15530.00

Nidhori branch canal works are completed. Bidari branchcanal works are under progress. Dattawad branch canal works are lingering because of land acquisition problem.

Hiranyakeshi lift Irrigation Scheme:

Hiranyakeshi LIS is proposed to lift 8 TMC of water from Hiranyakeshi river to feed GRBC during Khariff season. This scheme has been proposed to meet the likely shortage of water due to over utilization under GLBC. All the works including raising main, intake canal are completed. The 8MVA of power required for the project is completed and power line work is completed. Trial run will be done after testing the equipments.

Bellary Nala Project:

The Bellary nala irrigation project envisages to irrigate 8200 Ha of land in Belgaum, Gokak, Saudatti & Bailahongal taluks of Belgaum districts by constructing a dam across Bellarynala which is a main tributory to Markendaya river. Excavation for dam foundation, concreting in block 1 to 6 and 8 to 18 are partly completed. Total length of main canalis106 km, works in reach from km 44 to 106 are under progress. (Except km 1 to 10 & 32 to 40, which is under forest area?)

Sri Rameshwara Lift Irrigation Scheme:

This lift Irrigation is proposed to irrigate 13800 ha area in of Gokak, Ramadurga and Savadatti Taluks of Belgaum District by utilizing the 2.2 TMC

of water. The water will be drawn from Ghataprabha River by suitable intake structure. Outlet potential is created. FIC works are under progress.

Kinaye Project:

It is proposed to construct Kinaye dam across Mangothri river near Kinaye village in Belgaum District. It is proposed irrigate an area of 1200 Ha in Khariff season and 275 Ha in Rabi season. In the first phase tenders for the dam and allied works are awarded and the works are under progress. After completion of dam and allied works, the works related to canal network will be taken in the second phase.

Malikwad lift Irrigation Scheme:

This scheme comprises of rehabilitation work including filling of tanks of Yadanwadi, Vadagol and Bainakwadi villages of chikodi Taluka and also including rejuvenation of lift irrigation scheme of Malikwad village. The works are nearing completion.

Filling of Shiragaon Basavanna Tank:

The lift irrigation scheme is proposed to provide water to Basavanna Percolation Tank near Shiragaon village by lifting water from Dudhganga River in Chikkodi Taluka Belgaum District to improve ground water table. The works are entrusted on Turnkey Basis & are nearing completion.

Filling up of Kadapur Tank:

The lift irrigation scheme is proposed to fill Kadapur Tank near Kadapur village, Chikkodi Taluka by lifting water from Krishna River. The work is entrusted on Turnkey Basis & is nearing completion.

Filling Up of 22 Tanks from Hiranyakeshi River:

(18Tanks of Huk-Keri Taluka & 4 Tanks of Chikodi Taluka)

The project envisages lifting of water from Hiranyakeshi River to fill 22 tanks in Hukkeri taluk. The work is entrusted on turnkey basis and works are under progress.

Tubachi Babaleshwar Lift Irrigation Scheme:

The lift irrigation scheme is proposed to irrigate 52,700 ha areas of Vijayapur, Athani & Jamakhandi of Vijayapura, Belagavi & Bagalkot District by utilizing the 6.30 TMC of water from Krishna River during Kharif season. The Head work is entrusted on turnkey basis and the work is under progress.

It is proposed to irrigate 31,436 ha of land through west canal and 21,264 of land through east canal. West canal works are under tendering process.

Basaveshwar (Kempwad) Lift Irrigation Scheme:

The lift irrigation scheme is proposed to irrigate 27462 Ha of 22 draught affected villages coming under Athani Taluka Belgaum District, utilizing 4.00 TMC of water from backwaters of Hipparagi Barrage during rainy season. The tender is awarded on turnkey basis and the works are under progress.

Veerabhadreshwar Lift Irrigation Scheme:

The lift irrigation scheme is proposed to irrigate 17,377Ha of Mudhol and Ramdurga taluk by utilizing 2.40 TMC of water during Khariff season & filling up of tanks in the command by utilizing 0.10 TMC of water. Tenders for the construction of headwork's, pump house, erection of pumping machinery and raising main are awarded and the works under progress.

Venkateshwar Lift Irrigation Scheme:

The lift irrigation scheme is proposed to irrigate 7200Ha of area in 4 villages of Mudhol and 6 villages of Jamakhandi taluk. Tenders for the construction of headwork's, pump house, erection of pumping machinery and raising main are awarded and the works are under progress.

Malaprabha Project:

Malaprabha project envisages to irrigate 2,20,028 Ha areas of Belgaum, Dharwad, Gadag & Bagalkot District by constructing a dam across the Malaprabha river near Munolli village of Savadatti Taluk. The Dam & Canal works are completed and FIC works are under progress. Canal details:

Table 2

CanalLength	MRBC	MLBC
Canal	150 Km	142 Km
Numberofdistributaries	58	60
KolachiBranhCanal:64Km		

Lift Irrigation Schemes:

10 No.s of foreshore Lift Irrigation Schemes are taken upto provide irrigation facilities to the rehabilitated people alongthe foreshore of the reservoir.

Amargol LI Sand Gobbargumpi LIS:

The Amargol Lift Irrigation Scheme has been taken up to irrigate suffering at the Sub Distributaries 17L of D-6 Distributaries of Nargund Branch Canal by lifting water from Bennehalla near Amargol village. And the Gobbargumpi Lift Irrigation Scheme has been taken up to irrigate suffering atchkat of the D-6 Distributaries of Nargund Branch Canal by lifting water from Tupparihalla, a sub distributaries of Bennehalla near Gobbargumpi village. The works are in progress.

Harinala Irrigation Project:

Under this project it is proposed to irrigate 3,480 Ha areas of Bailahongal taluk of Belagavi District by constructing a dam across the Harinala River, a tributary of Malaprabha River. The project is completed and the. R&R works are also completed.

Kalasa Nala and Banduri Nala Project:

These two projects envisage diversion of 7.56 TMC of water to Malaprabha dam by construction of dam across the Kalasa & Bandura nalas. This project is delayed due to objections from the State Government Maharashtra and Goa. Forest clearance for these projects is obtained. Presently, the issue is in the Mahadayi Water Dispute Tribunal and the works will be taken only after the final verdict of the Tribunal.

Bandura Nala Diversion Project:

Since, the dam site falls under the reserve forest, the works shall be taken up after the approval of CWC, Forest Department and clearance from Mahadayi Water Dispute Tribunal.

Javala halla Lift Irrigation Scheme:

Under this project it is proposed to irrigate suffering at chkut of 1917Ha of Shirasangi distributary of Naragund Branch Canal of Malaprabha Right bank canal by lifting water from Javalahalla located near Kittur Village, Ramdurg Taluk, Belagavi District. Construction of Bandhara, Intake channel, Jack well, Delivery chamber, pump hose and raising main is completed. Fixing of air valves, construction of thrust blocks is to be taken up. The estimate for the balance works is under preparation.

BennihallaLiftIrrigation Scheme:

It is proposed to irrigate the suffering atchk at of 3,868 Ha under Nargund branch canal by constructing series of weirs at Banahatti, Kuralageri, Surkod, Khanapurand Radder

Naganur.Lift schemes coming under this project are as follows:

- Banahatti:
- Kuralageri,
- Surkod
- Khanapur
- RadderNaganur

All the lift schemes are nearing completion.

Kolachi Lift Irrigation Scheme:

It is proposed to irrigate the suffering atchkat of 1538Haunder Kolachi right bank canal by lifting water from Bennehalla in Rona Taluk of Gadag District. The works are nearing completion.

Konnur Lift Irrigation Scheme:

It is proposed to irrigate the suffering atchka of 1578 Ha under Naragund Branch canal by lifting 0.39 TMC of water from Malaprabha River in Nargund Taluk of Gadag District. The works are under progress and have been delayed due to Land acquisition problem.

Shiggaon Lift Irrigation Scheme:

The scheme is proposed to irrigate 9900Ha by sprinkler and 3600Ha by drip irrigation and tank filling & provide drinking water facility to Shiggaon, Savanur and Hanagal taluks of Haveri district by utilizing 1.5 TMC of water. 9900 Ha area of potential is already created by sprinkler irrigation. The diversion weir works are under progress. Further, preparation of estimate for providing drip irrigation facility for the balance 3600 ha of land is in progress.

Savanur Lift Irrigation Scheme:

The lift irrigation scheme is proposed to irrigate 15500 Ha areas in 30 villages of Savanur taluk and also filling of 11 tanks by lifting the 1.5 TMC of water from Varada River near Kalasuru village of Savanur Taluk.Out of 1.5T MC of water, 1.35 TMC of water is utilized for providing micro irrigation,

0.091 TMC for filling of 9 MI Tanks and 0.059 TMC for drinking water. The head works work is entrusted on turnkey basis and the works are in progress.

Upper Tunga Project:

Upper Tunga project envisages construction of new dam across Tunga River at 100.00 meter downstream of existing Tunga Anicut near Gajanur in Shimoga Taluk and construction of Upper Tunga Main Canal for a length of 270.00 km. It includes construction of tunnel of 4.00 km length and also distributary network. Under this project it is proposed to irrigate 80,494 Ha areas of Shimoga, Davanagere and Haveri Districts by utilizing 12.24 TMC of water from River Tunga. Dam work is completed in all respect. Canal and distributary network up to km 223.00 is completed and balance works are under progress.

Tunga Lift Irrigation Scheme:

It is proposed to lift water from Tunga River near Shivamogga to provide water to Haihole, Barehalla and Goudana kere tanks and to fill 29 tanks in down stream of Goudana kere. The works are assigned on turnkey basis and works are nearing completion.

Basapura Lift Irrigation Scheme:

It is proposed to lift 0.60 TMC of water from River Varada near Basapura village in 2 stages to irrigate 2000 Ha of areas of 13 villages of Hangal Taluk, Haveri District. Stage I works are completed to irrigate 890 ha. Stage-II works entrusted on turnkey basis and works are under progress.

Itagi-Sasalwad Lift Irrigation Scheme:

It is proposed to lift water from Tungabhadra River near Itagi village, Shirahatti Taluka, Gadag District to irrigate 1983Haof Khariff & semi dry crops of Shirahatti, Mundargi and Haver Taluk. The project is completed.

Guddada mallapura Lift Irrigation Scheme:

It is proposed to lift 1.0 TMC of water from Varada River near Guddada Mallapur Village, Byadagi taluka to irrigate 5261 Ha of areas of Byadagi taluk of Haveri district. The project is completed. FIC works are under progress.

Ubrania mruthapura Lift Irrigation Scheme:

It is proposed to fill of 57 Tanks of Tarikere Taluk & 89 Tanks Channagiri Taluk. This project comprises of 2 stages and works under both stages completed & project is commissioned. Filling of additional tanks through pipeline work is in progress.

Sanyasikoppa Lift Irrigation Scheme:

It is proposed to construct anicut across Kumudavathi River near Sanyasikoppa village in Shikaripura Taluk, Shimoga District and lift water to irrigate 1791 hectares. The works are entrusted on turnkey basis and works are almost completed.

Dandavathi Project:

It is proposed to construct dam across Dandavathi River near Soraba Taluk of Shimoga District to irrigate 3642 Ha areas of Soraba and Shikaripura taluks of Shimoga districts. Further a provision is made to provide drinking water facilities to small village & filling of MI tanks within the command area. The work is awarded and works are to be started.

Tiluvalli LiftIrrigation Scheme:

It is proposed to lift 0.26 TMC of water from Varada River to irrigate 1011 Ha areas of Hanagal taluk of Haveri District and rejuvenation of Thiluvalli Doddakere, Siddanahonda, Yethinahalli, Chikkatti and Hiriyara tank and canals. Under this scheme 1st stage is completed and 2nd stage is nearing completion.

Modernization of the Tunga Anicut Project:

Administrative approval for the Modernization of Tunga anicut, left and right bank canal is accorded by the Government amounting to Rs. 309.00 crores during June 2012. Clearance from CWC is also received for theproject.1st Phase of work from 0 to 32 km of LBC is under progress &for the balance portion from 32 km to the tail end is under tender process.

Kachavi Lift Irrigation Project:

Kachavi LIS is proposed near village Kachavi in Soraba Taluk of Shimoga District by Lifting 0.15 TMC of Water from Varada River to augment scarcity of water in 11 villages by feeding 21 tanks in these villages. The estimates are sanctioned and are under tender process.

Anjanapura/Ambligola Reservoir Project:

Ambligola Reservoir Project has been constructed at Ambligola across Kumudvathi River during 1954-65 at the Junction of Sallur Halla joining Kumudvathi River.Anjanapura Reservoir Project located in Shikaripura taluk, Shimoga District. Both projects are completed. Modernization works are under progress.

Huchcharayana Kere:

Huchcharayanakere tank located at Shikaripur Taluka, Shivamogga District. Works are completed long back. Construction of Pushakarni, Gardening and Beautification works are completed. Development and modernisation works are being taken up.

Sheelavanthana Koppa Kere:

Sheelavanthana koppa tank is constructed across Jambur water stream near Ambarkoppa (Sheela-vantanakoppa) village, Shikaripur Taluka, Shivamogga District. The project is completed long back and presently certain development and modernization works are being taken up.

Madag-MasurTank Project:

Madag-Masur tank is constructed across Kumudvathi River near Masur village, Hirekerur Taluka, Haveri District. The project is completed long back and presently development and modernization works are being taken up.

Dharma Project:

Dharma Dam is constructed across Dharma River near Yemgalli village, Mundagod Taluka, Uttara kannada District. The project is completed and outlet potential of 7692 Ha has been created. Presently modernization works are under progress.

Bhadra Reservoir Project:

Bhadra reservoir is constructed across Bhadra River near Lakkavalli village, Chikkamagalur District. The project is completed and outlet potential of 105570 Ha areas of Chikkamagalur, Davangere and Shivamogga Districts has been created. Modernization of Bhadra Canal System works are taken up and almost completed.

Gondi Anicut(Bhadra) Project:

Gondhi Anicut is constructed across river Bhadra, near Gondhi of Shivamogga Dist. The anicut was constructed long back with storage capacity of 0.37 TMC to irrigate an area of 4600 Ha. The modernization of the whole canal system is taken up under ADB assistance and is under progress. Works are under progress and scheduled to be completed in 2018.

Hodirayanahalla Diversion Scheme:

Jambadahalla Reservoir is located near Duglapura village, Tarikere Taluk of Chickmagalur district. It is proposed to irrigate the suffering 1296 ha

of area by diverting surplus water from Hodirayanahalla. The works are under progress.

Ranikere Feeder Canal:

This project is proposed to take up in two stages. In I stage it is proposed to regularize the water supply for areas already created to an extent of 590 Ha. In II stage it is proposed to create on additional irrigation potential of 3827 Ha. Atpresent modernization and renovation of Ranikere feeder canal are nearing completion.

Bheemasamudra Tank:

Bheemasamudra tank is constructed 500 years ago to irrigate 1235Ha.areas of Bheemasamudra village, Chitradurga Taluk and district. In order to increase the storage capacity of this tank it is proposed to construct dam across Bettada nagenahalli and Jogerahalla and through feeder canal it is proposed to fill the tank. The works are completed.

D B.Kere Pick-Up Project:

D.B. kere pick-up project is located in the atchkut of Bhadra project. It is constructed across Haridra River and Shyagalli stream near Devarabelakere village of Harihara Taluka of Davanagere District. The project is completed and outlet potential of 4280 Ha of area is created.

Davanagere 22 Tanks (Rajanahalli Lift Irrigation Scheme):

It is proposed to lift water from Tungabhadra River near Rajanahalli village, Harihara Taluka, Davanagere District to fill 22 tanks located in Davanagere, Jagaluru and Harapanahalli Taluka. The works are entrusted on Turnkey basis and have been completed. Further, the scheme has been extended for filling up tanks of Bharamasagara Dodda kere, Sanna kere and Yemmehatti kere in Chithradurga Taluk and the work are in process.

Construction of Link Canal from Hebbehalla to Mada- Gadakere:

Due to scanty rainfall in recent times, the required quantity of water is not being stored in Madagada Tankin Kadur Talukof Chikaamaglur district. In order to augment suffering atchkat of Madagada kere it is proposed to divert the water from Habbehalla to Madagada Kere. The survey works and preparation of DPR is under progress.

Construction of Bridge across Tunga River near Mattur Hosahalli in Shimoga Taluk:

It is proposed to construct bridge across tunga river connecting Mattur & Hosalli village in Shivamogga Taluka. The works are entrusted on turnkey basis, works are almost completed.

Construction of Bridge across Bhadra River near Gondhi in Bhadravathi Taluk:

The Government vide. Letter No. WRD 05: MMB 2012 Dt 31.12.2013 has instructed to take up this work through Karnataka Neeravari Nigam.Furtheron10.03.2015 Government has instructed to resubmit the proposal to take up this work during 2015-16 depending upon the availability of grant. Action is being taken to take up the work during 2017- 18.

Bennithora Project:

Bennithora dam is constructed across Bennithora River near Herura Village, Chittapur Taluka, Kalaburgi. It is proposed to irrigate 20234 Ha area of Kalaburgi District. Dam construction works are completed. Government has accorded administrative approval for canal network modernization work and the works are under progress.

Bhima LiftIrrigation Scheme:

Barrage is constructed near Sonna village Afzalpur Taluk in Kalaburgi District. It is proposed to irrigate 24,292 Ha area. The project will utilize 6.0 TMC of water and at present the project is nearing completion.

Gandorinala Project:

Dam is constructed across River Gandori nala, a tributary to River Bennithora. It Is proposed to irrigate 8094 Ha are under this project by utilizing 1.97 TMC of water. Dam, Canal and Distributary works are completed. FIC works are under progress.

LowerMullamari Project :

Dam is constructed across River Mullamari a tributary to River Bhima in Krishna basin. Project is located near Nagaral village in Chincholi Taluk of Kalaburgi District. It is proposed to irrigate 9713ha area by using 2.61 TMC of water. Dam, Canal and Distributary works are completed. Works related to strengthening of right bank canal are nearing completion. Survey works for Modernization are under progress.

Amarja Project:

Dam is constructed across the River Amarja, a tributary to River Bhima in Krishna Basin, near Sangolgi village in Aland Taluk of Kalaburgi District to store 1.544 TMC of water. It is proposed to irrigate 8903 Ha area of Alanda and Afajalpur Taluka. Works are nearing completion.

Chandram palli Project:

Chandram palli Project is constructed across Sarnala (Krishna Basin) near Chandrampalli village, Chincholi taluka in Kalaburgi District. Outlet potential of 5223 Ha in chincholi taluka of Kalaburgi District is created. Rejuvenation and modernization works under the assistance of AIBP are in progress.

Hattikuni Tank Project:

Hattikuni Tank Project is located on Hattikuni stream near Hattikuni village about 12 Kms, from Yadgir Town. Outlet potential of 2145 Ha in Yadgir district is created. Rejuvenation and modernization works under the assistance of AIBP are in progress.

Soudagar Tank Project:

Soudagar tank is constructed across Soudaga Nalanear Shamnapur village of Yadgir District. Outlet potential of 1417Ha in Yadgir district is created. Rejuvenation and modernization works are under progress.

Karanja Project:

Karanja project is located near Byalahalli village in Bhalki Taluk of Bidar District across River Karanja. It is proposed to irrigate 29,227 ha.of Bhalki, Bidar and Humnabad taluka of Bidar. Works are under progress.

Upper Mullamari Project:

Dam is constructed across Mullamari River. Outlet potential of 3279 Ha has been created in Humnabad, Basavakalyana, Kalaburgi Talukas of Bidar & Kalaburgi Districts. The project is completed. Estimates for rejuvenation and modernization works are under preparation.

Chulkinala Project:

Chulkinala Project is located near Mustapur village in Baswakalyan Taluka of Bidar District with Outlet potential of 4047 ha of Basavakalyana Taluka of Bidar Districts. The project is completed.

Tungabhadra Project:

The Tungabhadra Project comprises of Tungabhadra Dam across the river Tungabhadra, atributary to river Krishna,near Mallapuram in Hospet taluk, Bellary District, with canals on both banks to provide irrigation to an extent of 3,62,938 hectares(Karnataka portion only). This is an interstate (Karnataka-Andrapradesh) multipurpose project. The project is completed and Tungabhadra Left Bank Canal modernization works are under progress. A part of the modernization of the Tungabhadra Project Canal system is proposed to be taken up under the Asian Development Bank assisted, Karnataka Integrated & Sustainable Water Resources Management Investment Program (KISWRMIP) Tranche-2. At present the revised DPR of the project is under the review of the CWC and the work is proposed to be taken up during the year 2017-18.

Hirehalla Project:

The Hirehalla Project comprises a reservoir across the Hirehalla, a tributary to the river Tungabhadra near Kinnal village of Koppal Taluk of Koppal District, to provide irrigation to an extent of 8330 Ha in Koppal Taluk. The Dam, canal and distributary works are completed. R & R works are under progress.

Singatalur Lift Irrigation Scheme :

It is proposed to irrigate 107380 Ha (19,587 Ha of Flow & 87,793 Ha of Drip) of Huvinahadagali, Koppal, Yalaburga, Gadag, Mundargi talukas of Bellary, Koppal & Gadag Districts. Barrage construction works are completed. Lengthof right bank canal is 40.13Km and is completed. Length of left bank canal is 166.44Km. The proposal for providing drip irrigation for 10088 ha of left bank is under tender stage.

Katharaki LIS:

It is located near Katarki village of Manvi Taluka of Raichur District. Under this project it is proposed to irrigate suffering atchkut of Tungabhadra project. The project is completed.

Bailmarchad LIS:

It is located in Bailamarchad village of Manvi Taluka of Raichur District. Under this project it is proposed to irrigate suffering atchkut of Tungabhadra project. The project is completed.

YKaggal LIS:

It is proposed to lift water from Hagari River to irrigate 2690Ha of Bellary taluk. Due to change in scope of work, the work is stopped. The revised estimates for the balance work is under examination.

Karur Lift Irrigation Scheme:

It is proposed to lift water from Doddahalla streamnear Karur village. Under this project it is proposed to irrigate suffering atchkut of Tungabhadra project. Works are under progress.

Ola Bellary Lift Irrigation Scheme:

Under this project it is proposed to irrigate 2542 ha of suffering atchkut of Tungabhadra project located near Sindhanur taluk of Raichur District. Works are under progress.

Modernization of Vijayanagar Canals:

The Vijayanagara Channel system is spread over 3 districts namely Bellary, Raichur and Koppal. Originally,Vijayanagara Channels are the run-of-the river irrigation channels and are historically important project serving the irrigation needs of six taluks (11222 ha). They have been built during Vijayanagara dynasty. The modernization of the Vijayanagara Channels is proposed to be taken up under ADB assistance. The work is proposed to be tendered during the year 2017-18.

Rajoli Banda Project:

Under this project 2380 Ha outlet potential is created from regenerated water from Tungabhadra project. The project is completed and modernization works are proposed to be taken up.

Maskinala Project;

Under this project outlet potential 3001ha of 10 villages of Lingasuguru Taluka of Raichur Districtis created. The project is completed.

Filling Up Of 10 Tanks Huvina Hadagali Taluk From Tunga-Bhadra River:

The work of filling up of 10 tanks in Huvina Hadagali constituency was entrusted on turnkey basis. The work of 3 jack wells & raising main works are under progress. Further, feeding water through PSC pipes is also under progress.

Alvandi Betageri LIS;

Under this project, it is proposed to provide irrigation facility to 5,990 acres of land in the drought prone areas of Koppal taluk and the works are under progress.

Varahi Project:

It is proposed to construct Diversion Weir across Varahi River at Horriabbe near Siddapura Village of Kundapur Taluka of Udupi District to create irrigation potential to an extent of 15,702 Ha. (38,800 acres) in 33 villages in Kundapura Taluk and 35 Villages in Udupi taluks of Udupi District. The works are under progress.

Conclusion:

The government of India and state governments are spending crores of rupees for creating irrigation facility through developing major, medium and minor irrigation projects, ever since the launching of the first Five Year Plan in 1950-51.The growth of irrigation under various sources in the Karnataka state, it was fund that total gross irrigated from different sources grew at the rate of 13062 hectares in Karnataka stateas a whole. Among the Bijapur district significant positive improvement is there in the irrigation development.

References:

1. Irrigation Department Government of Karnataka,I rrigation Projects in Karnataka (Major and Medium), Report 2012, pp12-31.

2. Government of Karnataka, Water Resources Department (Major & Medium Irrigation) Annual Report, 2006-07 pp31-40.

3. Government of India Ministry of Water Resources, Report of the Working Group on the Water Resources for the XI Five Year Plan (2007-12) New Delhi, Dec-2006.

4. Government at India Ministry of Water Resources Central Ground Water Board, Ground Water Information Booklet Bijapur District, Karnataka, South Western Region Bangalore, 2003, pp89.

5. Government of Karnataka Water Resources Department (Major and Medium) Performance Budget Report, 2009, pp50-53.

6. Eleventh Five Year Plan Agriculture, Rural Development, Industry, Service and Physical Infrastructure Planning Commission Government of India, *Oxford UniversityPress* New Delhi. 2007-2008-2012; 3:58.

7. Evaluation Study on Accelerated Irrigation Benefits programme, Programme Evolution Organization Planning Commission Government of India, New Delhi Nov-2010.

8. Agriculture and Allied Activates, Economic Survey of Karnataka, 2010-11 PP-221.

9. http://des.kar.nic.in/ecsurvey0910/Chapter4-2009-10(En

g).pdfaccessedon31October2011.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Potentialities and Challenges of Ecotourism at Kazirznga National Park : An Analytical Study

- Mr. Hemanta Chetia,
Assistant Professor, Dept. of Sociology, Brahmaputra Degree College, Assam

---

Received Paper: 01/05/2024 **Edited Paper: 15/05/2024** **Accepted Paper: 11/06/2024**

Abstract :

Ecotourism is a new form of tourism based on the idea of sustainability. It is a preserving travel to natural areas by not disturbing the integrity of the ecosystem. It is a conservation tool and a community based tourism strategy. Among the ecotourism destination, Kaziranga National Park enjoys special status since it is endowed with a large number of bio-spots or natural ecosystem where there is immense potential for ecotourism to flourish. It is currently recognized as the fastest growing segment of the tourism market (Yadav 2002). Presently ecotourism comprises 15-20% of international tourism. The growth rate of ecotourism and nature based activities is higher than most of the other tourism segments (Kundari and Chandra, 2004). This paper argues that Assam is rich in ecotourism resources but is lacking in infrastructure and a strategic outlook. This paper is an attempt to study the opportunities and challenges being faced by Kaziranga National Park.

Keywords : Ecotourism, Sustainability, Potentialities, Challenges, Ecosystem, etc.

Introduction:

The term “Eco” on tourism comes from the Greek word ‘oikos’ meaning house. The term ‘ecotourism’ simply means ecologically sound tourism or ecologically sensitive tourism. According to the International Society, “Ecotourism is a responsible travel to natural areas which conserves the environment and improves the well being of the local people” (TIES,1990). Ecotourism reduces the adverse effect of tourism on nature and environment. It appreciates the natural and cultural heritage of an area. Ecotourism focuses on recycling, energy efficiency, water conservation, socially responsible travel

and creation of economic opportunities for local communities. It is based on the two objectives of conserving environment and improving the welfare of local people.

Assam the gateway of north east region of India, is famous all over the world as the home of the Indian one horned Rhinoceros with which is almost inextricably linked the name of the Kaziranga National Park(KNP). KNP is one of the major places of tourist attraction in the North East India. The Park extends over an area of 430sq.km with its proposed additional areas of 429.49sq.km.up to 6th addition. It is bounded by the Karbi Anglong Hills on the south and Brahmaputra River on the north. It is said that KNP is a tourist friendly National park. Elephant safari and jeep safari are the two ways to explore the wild in the wilds. The vast open country makes KNP very accessible and wild life viewing fairly pleasurable. KNP is located on the banks of the mighty Brahmaputra River in the far north east of India, Assam. KNP is charmed with its swamps and tall thickets of elephant grass making in the ideal habitat for Indian one horned Rhinos. Kaziranga is a vast expanse of tall elephant grass; marshland forest crisscrossed by four major rivers, including the Brahmaputra River and has a numerous small bodies of water. KNP is now a protected area of global significance.

It was declared a forest reserve in the year 1908, making it one of the oldest protected areas in the World. In 1916 it was declared a Game sanctuary and was opened to visitors in 1937. Because of limitless hunting and poaching, leading to an alarming depletion in the number of Rhinos, it was declared a Wild life Sanctury in 1950. In the year 1974 it was declared as a National Park. Later in 1985, the park was designated as a natural World heritage Site, by UNESCO on the basis of its outstanding universal value representing significant ongoing geological processes, biological evolution and mans interaction with his natural environment and for conserving important and significant habitants where threatened species of plants and animals of outstanding universal value from the point of view of science and conservation still survive (Mathur, 2005).

In 2007, the park was also given the status of Tiger Reserve Forest. The park is divided in to Central, Eastern and Western sector, consisting of semi evergreen forest high land, rivulets, marshes and extensive plains covered with tall elephant grass. The park is mainly famous for one horned Rhinoceros. It is also the home of variety of wildlife like, Wild buffalo, Elephant, Swamp deer, Hog deer, Barking deer, Samber, Wild boar, Tiger etc. The Park has

recorded 34 numbers of mammals and 480 species of birds, out of which 18 numbers of birds are globally threatened. Birds like the Egnets, Pond herons, River tern, Black necked storks, Pelican Partridges, Bengal florican stock, Pied horn bill, Fishing eagle, etc. are found in abundance.

Objectives:

The main objectives of this paper are:

1. An attempt to make an in depth study of the potentialities and challenges of Kaziranga national park.

2. It also tries to highlight the inflow of both domestic and foreign tourist in the park and emphasizes the constraints relating to the development of ecotourism.

3. To suggests some effective measures for attaining the desired development of ecotourism in Assam, etc.

Methodology:

The present paper is descriptive paper; data are collected from the secondary source i.e. published literature of the subject concern. Moreover data also collected from the Directorate of KNP, Assam, and Directorate of tourism, Assam, various journals, newspaper, website, official document and different reference books, etc.

Result And Discussion:

Potentialities of Kaziranga National Park:

(A) Flora:

Four main types of vegetation exist in the park. These are alluvial inundated grassland, alluvial savanna woodlands, tropical moist mixed deciduous forest, and tropical semi-evergreen forests. The main characteristics of flora in Kaziranga are the dense and tall elephant grass intermixed by small swamplands left behind by the receding flood waters of the river Brahmaputra. The marshes of Kaziranga National Park have an abundant cover of water lilies, water hyacinth, and lotus which provide a beautiful look to the surroundings of the park.

The common trees and shrubs are Albizia procera, Duabanga Grandiflora, Lagerstromia speciosa, Crateva unilocularis, Sterulia urens, Grewia serrulata, Mallotus philippensis, Bridelia retusa, Aphania rubra, Leea indica and Leea umbraculifera. Common tall grasses are sugarcanes, spear grass, elephant grass and the common reed. Numerous forbs are present along

with the grasses. Amidst the grasses, providing cover and shade are scattered trees-dominant species including kumbhi, Indian gooseberry, the cotton tree and elephant apple.

Thick evergreen forests, near the Kanchanjhuri, Panbari, and Tamulipathar blocks, contain trees such as Aphanamixis polystachya, Talauma hodgsonii, Dillenia indica, Garcinia tinctoria, Ficus rumphii, Cinnamomum bejolghota, and species of Syzygium. Tropical semi-evergreen forests are present near Bagari, Bimali and Haldibari.

(B) Fauna:

KNP is universally acknowledged for its importance as one of the most recent intact habitat of the great Indian one horned rhinoceros. It is just because of the efforts taken by the conservation that in 2009 domiciles 2048 rhinoceros, about 70% of the world's total wild population. Apart from rhinoceros, it also as a home to world largest population of Asiatic Wild Buffalo. The rare swamp deer is also found here in Kaziranga. According to the recent census conducted in the year 2011 Kaziranga contained as many as 1163 wild Indian elephants. There are also near about 479 species of wetland, grassland, and woodland birds, of which 18 are globally threatened. KNP has the rare distinction of being one of the very few places in the world which contained breeding populations of three different species of tiger outside Africa namely the Royal Bengal Tiger, the Indian Leopard and the Clouded Leopard. KNP had a population of around 40 Royal Bengal Tiger during the 1978 census, which grew 265% to 106 in the 2010 census, distinguishing Kaziranga with the highest ecological density of tiger in the world. The population of Asiatic wild buffalo in KNP was 610 in 1978 census, which grew 218% to 1937 in 2008 census, and it is the largest population of Asiatic wild buffalo in the world. KNP had also a population of 773 wild elephants in 1978, which also grew 50.45% to 1163 in 2011 census. KNP is also home to the last surviving population of eastern swamp deer. According to the 1978 census the population of the eastern swamps deer were697 which falls 44.19% to 389 in 1999 census. The decrease in the swamp deer population may be reflection of the increasing tiger population.

Other significant population of large herbivores in KNP includes Gaur and Samber. Smaller herbivores include Indian Muntjak, Hog Deer, Barking Deer and Wild Boar. KNP is also home to Sloth Bears, Jungle Cat, Fishing Cat and Leopard Cat. There are some other mammals like Hispid Hare, Indian

Gray Mongoose, Small Indian Mongoose and Large Indian Civet, Small Indian Civets, Bengal Fox, Golden Jackal, Chinese Pangolin, Indian Pangolin, Hog badger, Chinese Ferret Badger, Parti-colored Flying Squirrel bates, etc. are also found in the park.

Inflow of both Domestic and Foreign Tourists in the KNP:

KNP is open for the visitors from November to December and From January to April every year. In this period Kaziranga witness an unprecedented rush of tourists. The number of visitors and revenue collection in KNP is shown in table:

Year	No of Visitors		Total visitors	Total revenue(Rs)
	Indian	Foreigner		
2001-2002	44162	2144	46306	3494084
2002-2003	59811	2055	61866	5360425
2003-2004	57864	3772	61636	6138657
2004-2005	68412	5147	73559	6675037
2005-2006	49116	5210	54326	7615169
2006-2007	67968	5748	73716	7980949
2007-2008	53640	6106	59746	8734185
2008-2009	100384	5767	106051	11220698
2009-2010	105264	7580	112844	12167974
2010-2011	112392	7447	119839	13673482

Challenges of Kaziranga National Park:

(A) Erosion

The Brahmaputra River, along the northern boundary of KNP, is infamous for the ravaging erosion during the annual floods. The land area of the park eroded by floods has already been reduced considerably, especially during the last three decades. The intensity of erosion is heavy near Erasuti and Moklong camp of the park.

(B) Flood

Floods are always considered to be a dreaded period for Kaziranga National Park and its animal life but since last decade the increasing level of

multi wave flood is really threatening the future of the park and not only the Rhinos. Due to various reasons, mainly deforestation in the upper catchments area of the Brahmaputra, the intensity of the flood is continuously on the rise. During flood most of the animals including the rhinos have to migrate from the park and take shelter on the adjacent high grounds in Karbi Anglong Hills or wherever they may find shelter. These areas are populated and protection of the animals during the period of migration from and back to the park becomes an uphill task as enforcement network is almost non-existent in such areas. Many animals, especially the deer and particularly the young, old and infirm lose their lives by drowning, poaching or run over by vehicular traffic on the National Highway.

(C) Habitat Degradation

Consequent to recurrent flood, several water bodies or beels in the park have shrunk in size due to siltation. Besides, deposition of sand in short grass areas has also degraded the suitability of such areas for the herbivores. The grasses growing in such areas have to emerge through the sandy deposits and are coarse, thick and not very palatable to the foraging animals. The invasion of weeds like water hyacinth in water bodies and mikenia, mimosa in prime grassy areas is also a serious threat to the park and its denizens. Since siltation of the water bodies is one of most prominent contributory factors towards Habitat degradation, desiltation of the water bodies in Kaziranga National Park needs to be taken up a priority basis.

(D) Poaching

Poaching of Rhinos has been the major threat to the Kaziranga National park and will continue to do so as the superstition belief regarding the aphrodisiac and medicinal value attributed to the Rhino horn persists. It has been observed and experienced that the intensity of poaching increased mainly due to escalation in high value of the horn consequent to imposing ban on its trade.

(E) Impact of land use change

Impact of the land use change due to population pressure and agricultural development is another challenge to the conservation of the park. Increase of the land use changes around the park increase the risk that the resident population of tigers and other animal species become genetically isolated.

(F) Crop Raiding

The animal depredation on crop and property and occasional cattle lifting by large predators cause considerable hardship to the poor people who reside on the fringe of the National park. These people depend on their crop for living and most work their land with plough animals. When their crops are destroyed by animals or their plough animals killed by predators, their economy is shattered. No amount of preaching and education on conservation can retrieve the situation. Thus it is essential for the department to provide some material help to these people through compensation for crop losses and loss of livestock because of animal predation.

(G) Threat from Numaligarh Oil Refinery

The *Numaligarh refinery*, situated nearby the KNP in Golaghat district has already been identified as a possible threat, being positioned upstream from the park on the *Dhansiri* River. The oil exploration activity around the park thus poses a tremendous challenge to conserving the value of this World Haritage Site.

(H) Shortage of Staff and Infrastructure

There is shortage of existing sanctioned staff and infrastructure for managing the KNP. Further, with more areas added to the KNP, additional staff and infrastructure is needed for effective control over the KNP.

Some suggestions for sustainable eco-tourism development at Kaziranga National Park:

i) The recurring flood and erosion of river Brahmaputra, Poaching, Stray Rhino, pollution of the neighboring areas etc. are the major threats for conservation of biodiversity of this world heritage site. Priority should be given for the protection and conservation of wildlife and natural resources of this park.

ii) In order to earn benefit of eco-tourism, infrastructure development, especially road, transport, power, accommodation should be developed and enhanced.

iii) State government should take serious steps for the development of the tourism of this destination.

iv) Stress should be given on publicity in national and international level.

v) Co-operation between state tourism department, forest department and N.G.Os. is needed for boosting up of tourism at this area.

Conclusion:

KNP is a unique place for its diver's flora and fauna and it attracts large number of tourists every year. It is an ideal tourist spot in Assam. KNP needs systematic and scientific approach for long term sustainable tourism development. The importance of conservation of KNP is related for the enhancement of agricultural production, ecological balance, mitigation of environmental pollution and natural calamities. The Kaziranga national park has been recognized as an ideal tourist destination. We need concerted effort from all section of people of the society for conservation of rich biodiversity of this world heritage site.

Reference:

1. Bora,Dr. Bhaskarjyoti; Bio-Diversity Conservation and Sustainable Eco tourism- case study of Kaziranga National Park.

2. Goswami, Dr. Bipin Chandra; Alternative Tourism Practices for Kaziranga National Park- A case study.

3. Das, Dr. Dinesh; Tourism Industry in North East Indian States: Prospects and Problems.

4. Devi, Meena Kumari; Ecotourism in Assam: A Promising Opportunity for Development.

5. Das, Runumi; Prospects and Problems of Tourism in Assam.

6. Chutia, Surjya; Prospects and Problems of Tourism Industry in Assam.

7. Website.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Archaeological Significance of Kovilakam Parambu Palace Compound at Nenmeni, Palakkad district, Kerala

*** Dr. V. Sanalkumar**
Principal, Sneha Arts and Science &
Teachers Training College Attayampathi,
Govindapuram,Palakkad District: Kerala

**** Dr. Rajaram Patil**
Associate Professor
A.& C College Phondaghat,
District: Sindhudurg.

Received Paper: 01/05/2024 **Edited Paper: 15/05/2024** **Accepted Paper: 11/06/2024**

Abstract :

Survey conducted by the researcher in the ancient Venkundranadu Kovilakam Palace Compound site at Nenmeni, Kollengode, Palakkad District of Kerala brought to light a large number of historically significant monuments and cultural heritage archaeological remains. That consists of ruined, open and closed stone pillared halls, stone well, stone and terracotta sculptors, coins, inscription, temple remains, hero stones and structural shrines. The archaeological descriptions of the distribution and its significance of the Kovilakam Parambu Palace compound site is the Abstract of the research paper.

Introduction

1) Kovilakam Parambu (Palace compound)- Nenmeni

The Kovilakam Parambu (Palace compound) site of Nenmeni is situated about 24 km south of the Palakkad town in Kollamkodu Panchayath of Chittur taluk). It lies enroute to Nenmeni - Thekkinchira, about 2 km away from Kollamkodu town. The total extent of the Kovilakam Parambu is about 5 acres. Kundukulam (Deep pond) and a stone well are found in the southeastern corner of the major Kalmandapam. Earlier Kovilakam Parambu and the surrounding agriculture area at Nenmeni were under the control of the Brahmins. The place was believed to be the seat of Vira Ravi race of Venkundranadu, the forefather of the Venginadu rulers. Now it has become a site of ruins and monuments. The Kovilakam Parambu site is littered with granite slabs and the local people report the discovery of granite stones and *ponpanams* (gold coins) of the historical period while digging this area. If excavated, the authenticity of the

story of Vira Ravi race can be established. When the existing Venginadu (Kollamkodu) palace was constructed, granite slabs taken from Kovilakam Parambu site were used, after cleansing them with special prayers and rituals. The site, which is disturbed now, comprises the archaeological remains of Kalmandapams, a Well, Kundukulam, Mundiyan kavu, Perattukavu and Tharappadam. The royal settlement might have continued here after the 4th century AD and existed up to the to 17th century.

The Aims and Objectives :

The following are the main Aims and objectives of the study

1. To identify the archaeological and Cultural Heritage Significance of the Kovolakam Parampu Palace Compound.

2. To extract the Historical identity of the - Palace compound of at Nenmeni.

3. To establish the identity of ancient Venkundranadu Kingdom site.

Methodology

1. .Field visit for collecting Primary Data

2. Orally collected details from elderly people about the oral traditions, legends and mythological stories pertaining to the study area.

3. Sought the assistance of geographers, archaeologists and historians.

4. Analyzed Archaeological excavation reports.

5. Analysis of stone and terracotta sculptures, inscription, coins, monuments and temple Adhisthanas

Archaeological Description of Kovilakam Parambu Palace Compound

1. (a) *Open Kalmandapam*:

The Kalmandapam (Pillared hall) site is located on the northeastern corner in the Kovilakam Parambu in Nenmeni. This square shaped west facing *Mandapam* measured 2.70 m in length and 2.60 m in width from the bottom of the plinth to the top and has no wall portion. The stone *adhisthana* is of simple *manchaka* type, comprises of *paduka, jagathy and kumuda pady*. The L-shaped four supporting pillars of the roofs measure 1.45 m in height and 0.30 m in width, rest on top of the *adhisthana* with 4 *podikas* measuring 0. 44 m in length and 0.22 m in height. Eight single stone slabs have been placed on the top of the roof with 4 stone rafters. The roofs are strengthened with lime and stucco mortar and the *Mandapam* might be a domical structure above the roof. The inner shrine and the outer shrine complexes have been disturbed.

The *Kalmandapam* faces west. The idol and balustrade was missing. The plain *pranala* measures 1.08 m in length, below which is placed a rare banyan leaf shaped granite stone known as *Thali Thampu,* which measures 1.35 m in length and 0.90 m in breadth with inside carvings measured 0.66 m in length and 0.61 m in width. The period of the open *Mandapam* could be date back the 8th century A.D.

2. Closed Kalmandapam:

The *Kalmandapam* is located about 10 m south of the open structured *Kalmandapam* in the northwestern corner of the Kovilakam Parambu at Nenmeni. It is a square on shape measuring 2.60 m in length and 2.60 m in width. The west facing shrine is built of partly of rectangular shaped granite stone, and bricks. Perhaps it was renovated with bricks in the later period. The stone *adhishthana* measured 0.96 m in height and 2.60 m sq. in area. It is of the *manchaka* type and consists of *paduka, jagathy and kumuda padi* which can be noticed in the early *mantrika* shines of Tulunadu, Siva temple of Draksharama and Bhimavaram in Andra Pradesh. The *sopana* measuring 0.48 m in height and 0.80 m in length is of *hasti hasta* (elephant trunk bearing) type on a plain granite slab with only a narrow line without any decoration, which indicates its antiquity. The roof of the shrine is covered with 7 pavement slabs and measured 2.60 m in length and 0.30 m each in height and width placed on the L- shaped *potika* and measures 23 cm in height , which was installed on the four pillars measured 1.47 m in height. Above the pavement slabs burnt bricks and lime mortar are used. The *bhitti* is made with lime mortar and stucco with 3 *thorana* type niches. Oral tradition says that the shrine belonged to the e*katalagopura* and the remnants were noticed there. Inside the shrine a *pita* and a broken idol was there. The torso of the image was excavated from the nearby well and it perfectly fits with the broken idol from the *Kalmandapam*. The idol is identified as Durga. The *pranala* is of plain granite channel. The temple remnants of *pranala* and *bhalikal* were obtained from the well, signify the destruction of the shrine. The temple architecture of the closed *Kalmandapam* indicates the Pallava or Pandya influence of early medieval period of the 8th century A.D.

2. Closed Kalmandapam:

The *Kalmandapam* is located about 10 m south of the open structured *Kalmandapam* in the northwestern corner of the Kovilakam Parambu at Nenmeni. It is a square on shape measuring 2.60 m in length and 2.60 m in

width. The west facing shrine is built of partly of rectangular shaped granite stone, and bricks. Perhaps it was renovated with bricks in the later period. The stone *adhishthana* measured 0.96 m in height and 2.60 m sq. in area. It is of the *manchaka* type and consists of *paduka, jagathy and kumuda padi* which can be noticed in the early *mantrika* shines of Tulunadu, Siva temple of Draksharama and Bhimavaram in Andra Pradesh. The *sopana* measuring 0.48 m in height and 0.80 m in length is of *hasti hasta* (elephant trunk bearing) type on a plain granite slab with only a narrow line without any decoration, which indicates its antiquity. The roof of the shrine is covered with 7 pavement slabs and measured 2.60 m in length and 0.30 m each in height and width placed on the L- shaped *potika* and measures 23 cm in height , which was installed on the four pillars measured 1.47 m in height. Above the pavement slabs burnt bricks and lime mortar are used. The *bhitti* is made with lime mortar and stucco with 3 *thorana* type niches. Oral tradition says that the shrine belonged to the e*katalagopura* and the remnants were noticed there. Inside the shrine a *pita* and a broken idol was there. The torso of the image was excavated from the nearby well and it perfectly fits with the broken idol from the *Kalmandapam*. The idol is identified as Durga. The *pranala* is of plain granite channel. The temple remnants of *pranala* and *bhalikal* were obtained from the well, signify the destruction of the shrine. The temple architecture of the closed *Kalmandapam* indicates the Pallava or Pandya influence of early medieval period of the 8th century A.D.

***Iconographic Study of Durga Idol*:**

The upper part of the broken idol encountered at the depth of 2 m of excavated well, fits with the broken lower part of the Idol found on a pita inside the closed Kalmandapam shrine. The total height of the Idol measures 110 cm and the measurements of other parts are *kireeda* 12 cm, face 7 cm, height up to naval 43 cm, portion of leg in the *peeta* 2 cm, and height of the *peta* 3 cm. The *kireeta* is of *karantamakuta* type and measures 12 cm in height with decorations of 5 layers in the front portion. *Gopithilaka* is on the forehead and eye brows are in oval shape. Both the ears have *kundalas*. There are *khandabharanas*, a square type pendant below the *kujabandha*, and *sirachakra*. The Idol is made of *anchale* Style. The iconographic analyses suggest that it belonged to the 9th-10th centuries A.D.

3.(d). *Kundukulam (Deep Pond):*

The site of the Kundukulam (Deep pond) lies in the northeastern corner of the Kovilakam Parambu. The pond covers about 25 m in radius. It is reported

that originally the pond was built with granite blocks, which were taken away by the local people. This pond seems to have some historical significance. According to oral tradition during an invasion, a fully pregnant Brahmin lady committed suicide in the pond to escape from the attackers. Through proper excavation more valuable historical relics can be obtained from this deep pond. Nearly 75 years ago, the forefathers of a local family unsuccessfully tried to dig and trace out the bottom level of the pond. After the external invasion of the Tippu Sulthan, the settlers of this area might have migrated to other parts of Kerala for safety and the forefathers of the royal family might have dumped the treasures in the well and pond according to the local belief.

***1.(e) Excavation and the Chera Coin)*:**

The stratigraphy excavation was conducted by the State Archaeology Department to trace out the archaeological remains from the nearby open Kalmandapam site. A trench of 3 m in length and 1.50 m in width was excavated. At a depth of 0.50 m, stones, charcoals, and bangle fragments made of glasses were encountered. At a depth of 1 m a number of burnt bricks were found. The excavation was further continued up to a depth of 2 m where a circular shaped copper coin of early or medieval Cheras was discovered.

***4.(f).Mundiyankavu Animal and stone sculptures*:**

Mundiankavu is situated about 200 m west of the Kalamandapam at Kovilakam Parambu, in Nenmeni. Mundiyankavu is a shrine dedicated to animal worship. The site has a square *adhisthana,* which measures 3.60 m in length and 3.60 m in width. The west facing structure is maintained by local people. The main deity of the Mundiyan kavu is an image of bull/Nandi made of stone, which measures 0.65 m in length and 0.56 m in height. A damaged male figure in standing pose with arm, which might have a representation of Mundiyan or early chieftain of the territory is also found.. There are about 25 offerings of stone animals such as cow, bull, buffalo and pig in stone measuring about 33 cm in length and 22 cm in height. These stone images are not decorated. Around 100 terracotta findings of cow, bull, buffalo, goat of different periods and size are found in the corner of the shrine. Even today many people visit this age old shrine and most of them are of from the remote areas of Tamil Nadu. They pray for the well being of their cattle and other farm animals through offerings. The chronology of this animal shrine is difficult to estimate. It is to be noted that animal worship was prevalent in India from the Neolithic and in the historical period onwards. Animal worship and rituals were practiced during

the reign of Emperor Asoka. There are 3 stone images of hermit and hero stones found at Mundiyankavu. One stone image of a human image has a sharp with a conical shaped crown, second one is in *anjali hasta* (praying pose), the third image looks like a hermit. Each measure about 35 cm in length and 20 cm in width. The images are not fixed on the *Peeta*.

5.(g). *Perattukavu Bhagavathy*:

Perattukavu Bhagavathy at Kovilakam Parambu is situated about 150 m north of Mundiyankavu in Nenmeni. The site is under the control of the descendants of the Pulikuthi Mannadiyur family who was the soldier of Venkundranadu ruler. On plan, the east-facing Perattukavu Bhagavathi consists of a square shrine chamber with a stone pillar, *agramandapa, vaadilmadam,* a cloister, idols and stone slabs. The *adhisthanam* measures 5.30 m each in length and width and 0.75 m in height without any decoration. It has 3 layers and belong to of *manchaka* type consists of *Paduka, Jagathy and Padi.* The *sopana* is of plain and *hasti hasta* with narrow carving. The plain *Pranala* was just a channeled stone has the shape of a *gajamukha* measuring 35 cm in length and 16 cm in width. Granite slabs were fixed on the cloister. The granite compound wall has been destroyed and only foundation stones are visible when excavated. The well is built of granite measuring 1.30 m in radius and a huge pond is found to the north east of the shrine near by a pond. On the northern side around 10 slabs of (menhirs) and an *linga* measuring 40 cm in length and 20 cm in width were found.

***Ancient Idol*:** An ancient idol was installed in the south-western corner of the Bhagavathy Kavu in a separate *mandapa*. Local people consider it as Lord Ayyappan, but the iconographic features do not resemble that of *Ayyappan,* and appears very old in style (Plate No.3.13.a.). The idol measures 45 cm in length and 22 cm in width and it was built of granite rock. It is seated on a circular pedestal in *Lilasana*. The hair *Jathabharam is* spread out below the shoulder. Both the ears have *Pathrakundalas*. There are one *kataka valaya* and *keyura valaya* each in both the hands and *anklets* (chilankas) in the legs. The left hand rests on the left thigh and the right hand is placed on the right thigh holding a lotus flower. Layers of *necklace* are found in the neck and the chest. There are also an *udharabandha* with an *arapatta* (waist belt). The eyes are closed indicating in *dhyana* pose. The idol might be of an ancient chieftain or sage.

6. Tharappadam (Nayapettambalam) :

Tharappadam Siva temple also known as Nayapettambalam and it lies half a kilometer west of Kovilakam Parambu Perattukavu Bhagavathy shrine at Nenmeni . The site lies in a 5 acre area with a huge lotus pond. The temple is east facing and consists of a square *garbhagraha* and *namaskaramandapa..* The square shaped *adhisthana* measuring 5.40 m sq. in length and width and 0.90 m in height consists of *padukam, jagathy, vrithakumuda, kumudapdy, kampas, galam, galapady, galam with flower motif and pady*. All the moldings above the *kumuda* are highly recessed. Above the *Vedi* raises the *bhitti* with 8 niches, which have been renovated. The *sopana is of thorana* type. The *pranala* measures 0.90 m in length of *vyali mukha* has a dwarf figure. The *namaskaramandapa* is built of granite stones. A number of ruined stone pillars and slabs of temple remains are found. Two images of Hanuman measuring 50 cm in length and 28 cm in width are found on two stone pillars. The lotus flower measuring 40 cm in length and 20 cm in width may be the part of the top portion of the pillar and a *dwarapalika* image also seen. A small well built of granite slabs is visible to the northeast of the main shrine. Oral tradition says that an underground passage tunnel connecting the well and pond with the royal palace exists. The surrounding plateau areas may have the possibilities of habitation site of early medieval period.

1.(i).Hero stones:

There are three hero stones, a *siva linga and nagas with chithrakoodakal* are found about 300 m south of Tharappadam shrine. Two hero stones and a siva linga are erected on a horizontally arranged monolithic slab measuring 0.96 m in length. The two hero stones measure 0.44 m in length and 0.22 m in width and the third stone is supposed to be depicting the mythical story of Siva measures 0.32 m in length 0.19 m in width. The evidence of inscription about the hero stones is found on the stone slab and is not readable as it is damaged. A stone figure of *naga* and a *chithrakudakal* are found about 30 m south of the hero stones. Another hero stone with praying pose 0.38 m in length and 0.26 m in width was found about 50 m south of the other hero stones. All these 3 hero stones are located parallel and facing to Perattukavu .

References:

1. A Geographical Analysis of Ancient Venginadu Kingdom Region of Palakkad, .V.Sanalkukar,2008,PhD Thesis submitted in the Department of Studies in Geography, University of Mysore.

2. The Venganad Nambities - there two fold importance in Kerala,1976, K.V. Krishna Iyer, - Bulletin of the Ramavarma Research Institute, Thrissur.

3. Report of the Kollamkodu Excavation, 1998-99, Kerara Archaeological Survey, Thiruvanthapuram S A.D Report p.5

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Micro-Watershed Protection Strategy for Natural Resource Conservation

- Dr. Avinash Narayan Shelar
Associate Professor, Department of Geography,
MES' Abasaheb Garware College (Autonomous), Pune MS

Received Paper: 01/05/2024 **Edited Paper: 15/05/2024** **Accepted Paper: 11/06/2024**

Abstract-

Watershed management includes protection, conservation, and improvement of land for more efficient production by accelerating measures to conserve soil and moisture on lands and forests. The terms watershed, catchments, basins, and sub basins are often used interchangeably as water becomes concentrated within a particular location. In India watersheds, a geo-hydrological unit area has long been recognized as desirable units for planning and implementing developmental program for the protection and conservation of water, forest, and soil. In many parts of Western Ghats, pressure on land and water have adversely affected the water and vegetative cover which has further led to accelerated soil erosion. The study area selected for the present research is a biodiversity rich part of western ghats. In the watershed 28.89% of land and 16.17% forest degradation was noted. Lots of work regarding watershed management have done here which has given decent result. Changes in land cover in the study area shows that there is a scope to conserve and manage these resources on sustainable level. Here an attempt has been made to suggest an effective management plan for conservation of water, forest, and land on micro watershed scale.

Key words- Basin, biodiversity, sustainable, watershed, western ghats

Introduction-

A watershed is a geo-hydrological unit, which drains water at a common single point. The terms watershed, catchments, and basins are often used interchangeably as water becomes concentrated within a particular location. It

is an area delineated with a well-defined topographic boundary and outlets. Within the topographic boundary or water divider, watershed comprises a complex of soils, landforms, vegetation, and land uses (Vora K., 2011).

Integrated watershed development projects (IWDP) are being implemented in India in the plains and hilly areas to improve the productivity potential of the target area in the states evolving watershed treatment technologies through community participatory approaches. Integrated watershed development projects had been operational in Punjab, Haryana, Himachal Pradesh, Uttaranchal and Jammu and Kashmir, states of the country since 1999 (Meenu A. 2003). In these regions project has significantly contributed to decrease soil erosion, increasing water availability and alleviating poverty in the project area. The major objective of the IWDP is to conserve and protect the natural resources base and related degradation through active participation of people. The aim of this project was to improve the quality of life of rural people through various demands driven intervention. Today all over in India, this project is being implemented at grass root level by the village development communities (VDC) and village forest committee (VFC) by people participation. VDC and VFC members are trained with well-designed compressive courses training material to manage effectively the implantation of the project.

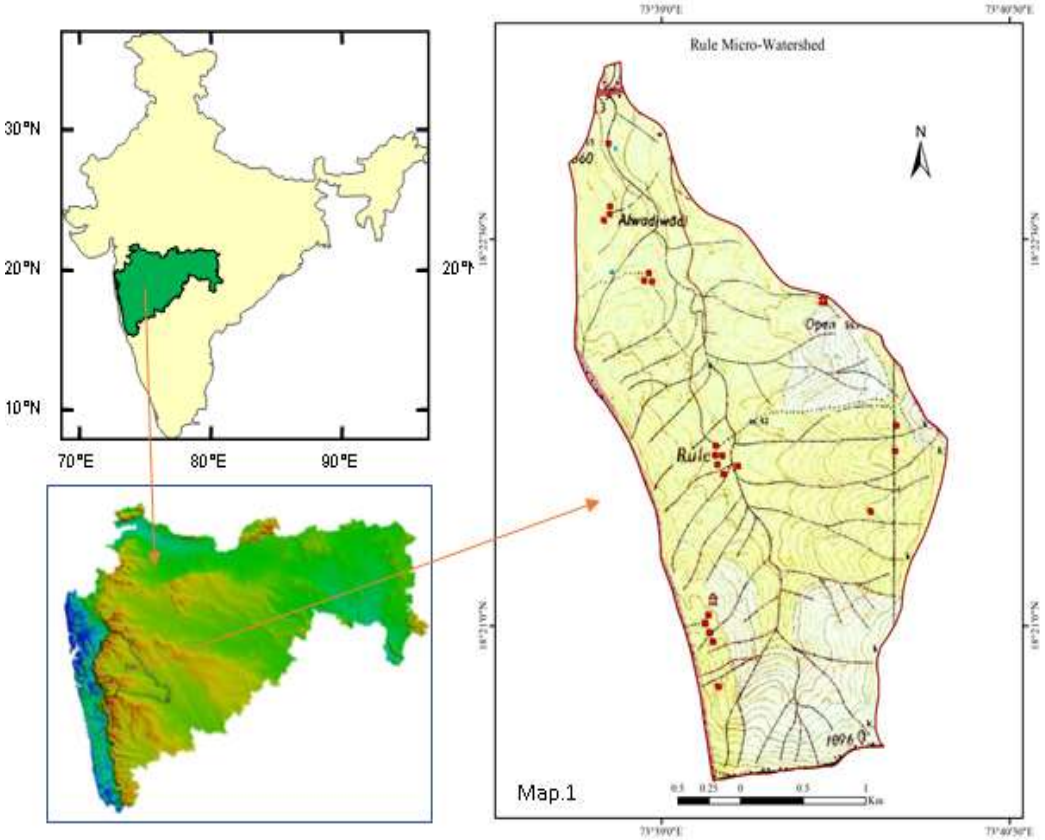
In western parts of Pune district, pressure on hills and lands have adversely affected the water storage, vegetative cover and led to accelerated soil erosion. Various measures to reverse this degradation process and increase the biomass production through afforestation and augmentation of natural regeneration besides soil conservation measures and drainage line treatment have been initiated. Watershed development projects have done excellent work on various aspects in remote and difficult terrain of western ghats in a very short period. Land treatment measures suggested by the projects have reduced run off soil erosion, increased recharge rise of water level and improved agriculture and pasture productivity in target areas. It is an integrated participatory program hence it helps for rural development. When watershed management activity became a long-term activity, it is effective, excellent, and noticeable results will be seen in project areas. Erosion control and water conservation will be useful to specify catchment area tackled for construction of check dams, brush dams, loose rock dam, dry stone dam and drop spill way under the guidance of techniqual experts.

Objectives of the study-

Major objective of the present study is to study, form and implement the micro-watershed treatment and management plan using mechanical and biological measures. Certain engineering measures have suggested to reduce the exploitation of the resources on scientific approach.

Study area-

Rule micro-watershed is situated in western part of Pune district (Fig 1). This watershed is a part of western ghats and located on eastern flanks of Sahyadri. It covers around 6 km^2 area of Velhe tehsil of Pune district. The extent of the watershed is 18°20¢39² to 18°23¢18² N latitudes and 73°38¢59² E to 73°40¢23² E of longitudes. The rainfall observed here varies from about 70 cm to 350 cm. Geologically this region is made up of basaltic lava flows which is also known as Deccan trap. In the study area, 'aa' formations of basaltic lava flows are observed (Fig 2). Rule watershed shows undulating topography with high altitude and steep slopes. Around 1600 population lives in this region (Census 2011



Evergreen and semi evergreen forests are observed in the watershed. Soils are black, fertile, and used for paddy and Nachani cultivation in monsoon and summer season respectively. Towards the low altitude clayey, clay loam soils are observed whereas in high altitude gravelly clay and gravelly sandy clay loam soil texture is observed (Fig 3).

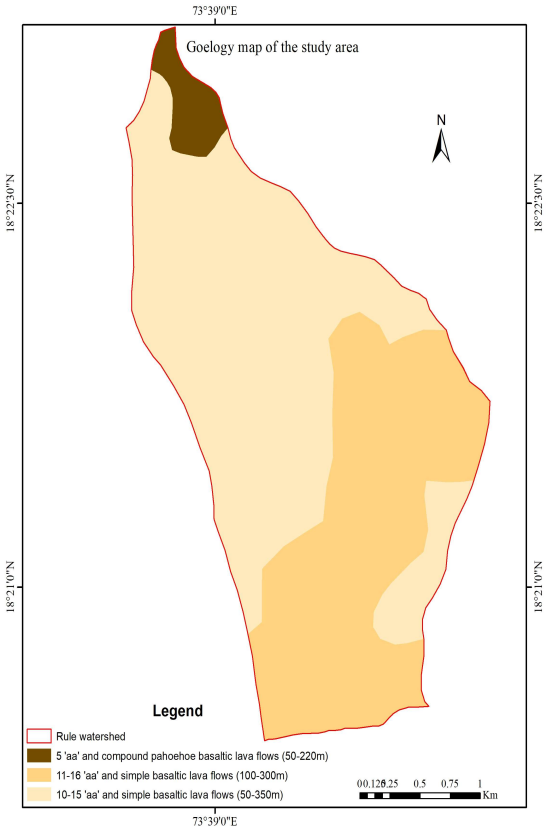


Fig 2. Geology map

Fig 3- Soil Texture Map

Methodology

The broad detailed methodology is adopted to achieve the objective of the present study. LISS III satellite data on 23.5m spatial resolution was obtained from NRSC Hyderabad and unsurprised classification method is used to generate the land use land cover data. Survey of India (SOI) toposheet 47F11 on 1:50000 scale has been collected. Geology (Fig 2) and soil texture map (Fig. 3) of the study area is obtained from soil survey department. Preparation of basic themes like contour map. Watershed boundary, drainage map (Fig 7) are prepared from digitizing the SOI toposheet.

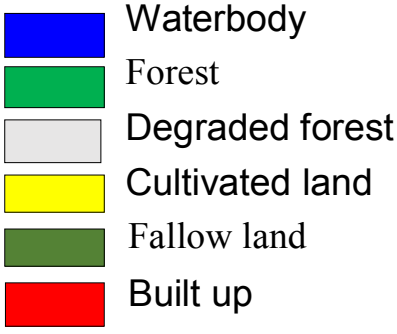
Contour (Fig.7) and slope maps (Fig.5) are prepared using digital elevation model (DEM) of the study area. Land use land cover data of the study area is obtained from unsupervised classification method.

Results and Discussion-

Watershed management includes protection, conservation, and improvement of land for more efficient production by accelerating measures to conserve soil and moisture on farm lands and vegetative areas. Programs related to management of natural resources, watersheds have gained more importance as it is a land area which drains into a stream system, upstream from its mouth and is surrounded with a divide. Study area has extremely rich flora and fauna including some rare endangered species (Ingalhalikar S. 2005). Western ghats is recognised as one of the worlds eight hottest hotspots of biological diversity in the world. Renowned Sinhagad fort is located on the same mountain range and more than 550 plant species, 200 bird species, 65 butterfly species, 40 species of reptiles and 25 other animal species noted near Sinhagad fort region.

Land use is the term that is used to describe human uses of land, or immediate actions modifying or converting land cover (Sherbinin A.D. 2002). **Table 1** shows the land use land cover statistics generated through the unsupervised classification method of satellite data (Fig 6). It shows that in 2018, around 38.51% of geographical area of the watershed is under forest whereas 14.27% land area is under cultivation. In 1997 this proportion was 50.89% and 41.10% respectively (Shelar A, 2014). Degradation of forest in the watershed is rapid and forest areas are now thinned dominated by spars vegetation cover. Similarly, proportion of cultivated land has

Table 1- Land use land cover data (2018)



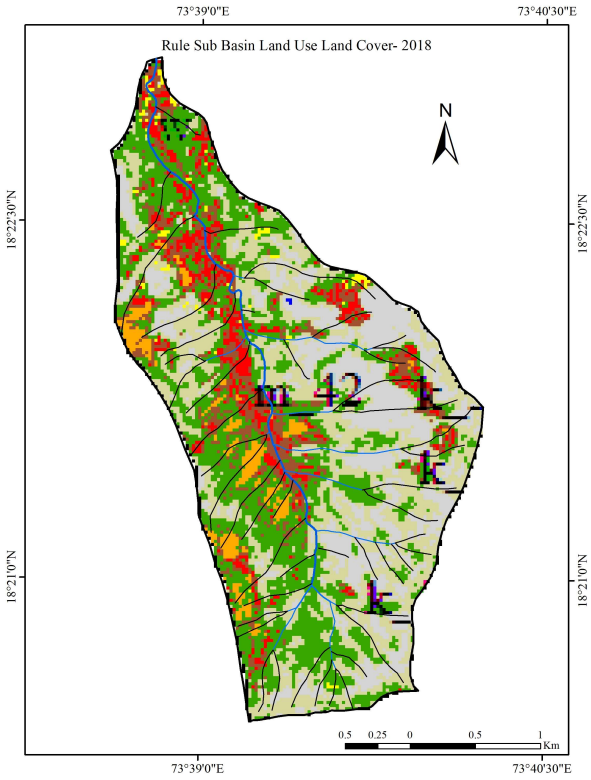


Fig 6 Land Use Land Cover map (2018)

gone down and most of the cultivable land is converted in other land cover classes. Census 2011 shows that 130 ha land not cultivable. The loss of the forests and soil results in soil erosion, sedimentation and siltation of dams, and further water shortages. The selected watershed lies in the vicinity of Panshet, Warasgaon and Khadakwasala catchment constructed on eastern flanks of western ghats. It is biodiversity rich region. Negligence to the biodiversity is the biggest threat as many plant species of this region are on the verge of extinction. In the study area *Acacia auriculiformis, Acacia catechu, Adina cordifolia, Aegle marmelos, Albizia lebbeck, Albizia procera, Anogeissus latifolia, Bauhinia racemosa, Bassia Longifolia, Dalbergia latifolia, Eucalyptus camaldulensis, Flacourtia latifolia, Terminalia alata, Terminalia chebula* etc. tree species are abundantly and prominently observed (Shelar A, Gaikwad S, Kandekar A, 2017). *Eupatorium odoratum, lantana camara, cosmos bipinnatus, alternanthera sessills, ipomoea hederifolia* are some of the exotic weeds found here. Indian pangolin, Indian pigmy shrew, stripped hyena, buthid scorpion, barking dear, Indian porcupine, wild boar, Indian jackal, leopard cat, are some of the animals which are under threat now.

No	Land cover Class	Geographical Area (2018)	
		Hector	Percentage
1	Waterbody	1.24	0.2
2	Forest	235.16	38.51
3	Degraded Forest	98.82	16.17
4	Cultivated Land	87.24	14.27
5	Fallow Land	176.53	28.89
6	Built-up	12.02	1.96
Total		**611.01**	**100**

Suggestions-

In western Maharashtra, rapid urbanization has put the hills under pressure and accelerated the loss of biodiversity and soil. In any watershed, where soil erosion is prominent, surface control can be achieved by constructing drains and terraces. Bench terracing is useful on account of soil and water conservation. These can be constructed with a 1:100 gradient and inward sloping which allow water to travel at a non-erosive velocity to a protected structure (Fig 7 & 8). Shallow rotted annual and biannual crops can be planted on these terraces. Deep rooted trees like *Mangifera indica* (Mango), *Tamarindus indica* (Chinch) can be planted on steep sloping lands to reduce soil erosion (Shelar A, 2014). Stone terracing is useful along the rough contours of upper slopes. Retaining walls or gabion weirs, or concrete structures with weep holes can be applied affected areas. These are most flexible than concrete and the packed boulders allow for dissipation of the pore water pressure (Shelar A, 2014). Use of water ponds for micro irrigation for growing vegetable crops and plastic mulches can be used for conservation of water.

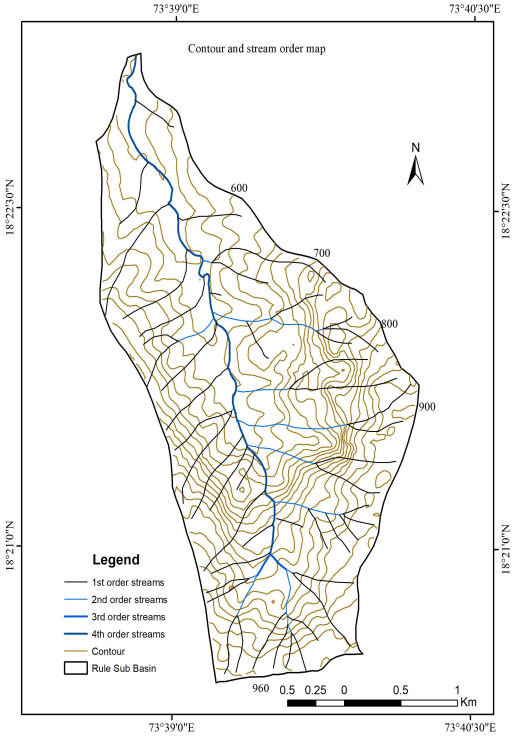


Fig.7 Contour and Drainage Map

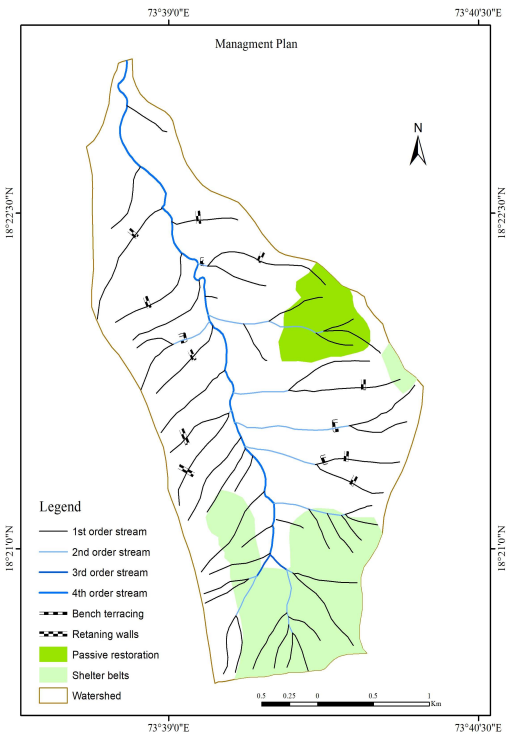


Fig.8 Management Plan map

Afforestation drives were initiated by the forest departments Pune Forest division with local bodies, industrialist, educational institutes agricultural departments and social forestry under the joint forest management program. Passive restoration and shelter belts method is found to be more useful. In passive restoration disturbed sites are protected and allows natural growth process to restore the ecosystem. Rows of trees planted at right angles to the prevailing wind help to reduce wind erosion. Thrust has given more on local fruiting plants. Many industries as their part of corporate social responsibility (CSR) are contributing in this forestry program. The GIS and RS has lot of potential in natural resource management activities and this needs to be fully integrated into the information management. Today consultants for these areas help in planning, prioritization and selection of project sites which helps in executing project activities

Reference-

Meenu A. (2003)- Integrated watershed development projects (HILL-II), Employment news.

Ingalhalikar S. (2005), Flora and fauna of Sinhagad- A pocket guide to Plants, Birds, Butterflies, Reptiles and Animals, Corolla Publication, Pune

Shelar A (2014), Appraisal of Forest Resources in Lake Catchments of Khadakwasala Irrigation Project Division, Western Maharashtra.

Shelar A, Gaikwad S, Kandekar A, (2017), Integrated Approach for Sustainable Management of Natural Resources for Rural Development International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887 Volume 5 Issue X, October 2017- Available at www.ijraset.com

Sherbinin A. (2002), Land-Use and Land-Cover Change, A CIESIN Thematic Guide, Center for International Earth Science Information Network (CIESIN) of Columbia University, Palisades, NY, USA

Vicente P., Juanito M and Danilo C- Land Use Planning Strategies on Watershed Management and Disaster Reduction in the Philippines

Vora K, (2011) Application of remote sensing & GIS in watershed land use development- ME (WRM), LDCE, National Conference on Recent Trends in Engineering & Technology, 13-14 May 2011

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Literacy: A Study on Human Resources of Purulia District of West Bengal

- Dr. Sudipta Mahato

Principal, Deben Mahato Teachers Training Institute, Purulia, West Bengal

---

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract:

Human resources are the most precious of all resources. Human resources play a vital role in the development of a region. Any development plans and policies are related to the components parts of Human Resources. There are two aspects of human resources qualitative and quantitative. Qualitative dimensions including Education and Health are the two major components of human resource development. Literacy is considered a fairly reliable index of socio-cultural and economic development. Among the many variables, education, and literacy are the greatest tools in human resource development.

The Purulia district has been selected as a study area which is located between 22^{p} 422 353 to 23^{p} 422 003 north latitude and 85^{p} 492 223 to 86^{p} 542 373 east longitude. It extends over an area of about 6259 square kilometers and the total population is 2930115 of which the male and female populations are 1496996 and 1433119 respectively. It is bounded on the north, west, and south by the state of Jharkhand; the eastern side is covered by the districts of Bankura and Midnapur of West Bengal state. There are 20 C.D. blocks in this district. According to the census 2011, the literacy rate of this district is 64.48%, and the male and female literacy is 77.86% and 50.52% respectively. The literacy of the Purulia district is characterized by sharp differences between the literacy rate of males and females; of rural and urban areas; and various population sub-groups.

The trends in literacy are considered an index of the pace at which the socio-economic transformation of society is taking place. It is an important variable affecting demographic behavior concerning marriage, fertility, mortality, migration, as well as participation in the labor force. So, the major objectives of the present

study are to analyze the factors that determine the literacy rate and spatial-temporal variation of literacy rate in the Purulia district. The study is mainly based on secondary sources.

Key Words: Literacy, Human resource, Male Female Difference.

Introduction:

It is remarked that "Literacy skills are fundamental to informed decision making, Personal, empowerment active and passive participation in local and global social community" (Stromquist, 2005, P.12). It contributes to better health, higher productivity, greater income, human freedom, capability, and esteemed living, increases participation in community life. According to the Indian Census definition 'Literacy' means a person who can read and write a simple message in any language with understanding is considered literate'(Census of India 2011). It is one of the sensitive indicators of the progress of any society. Human Resource Development is the process of increasing the knowledge, skills, and capabilities of all the people in a society. Among the many variables, education, and literacy are the greatest tools in human resource development.

Study area:

The Purulia district has been selected as a study area which is located between 22° 422 353 to 23° 422 003 north latitude and 85° 492 223 to 86° 542 373 east longitude. It extends over an area of about 6259 square kilometers. According to the 2011 census, the total population of the district is 2930115 of which the male and female populations are 1496996 and 1433119 respectively. It is bounded on the north, west, and south by the state of Jharkhand; the eastern side is covered by the districts of Bankura and Midnapur of West Bengal state. Its physiographic location is also distinguished as an area of transition between the young alluvial plains of West Bengal and the ancient plateau of Chotanagpur. There are 20 C.D. blocks in this district and most of the blocks come under the backward class. As per the census 2011, 87.25 % population resides in rural areas and almost 60 % of the population is engaged in Agriculture either as a cultivator or agricultural laborers. According to the census 2011, the literacy rate of this district is 64.48%, and the male and female literacy is 77.86% and 50.52% respectively.

LOCATION MAP

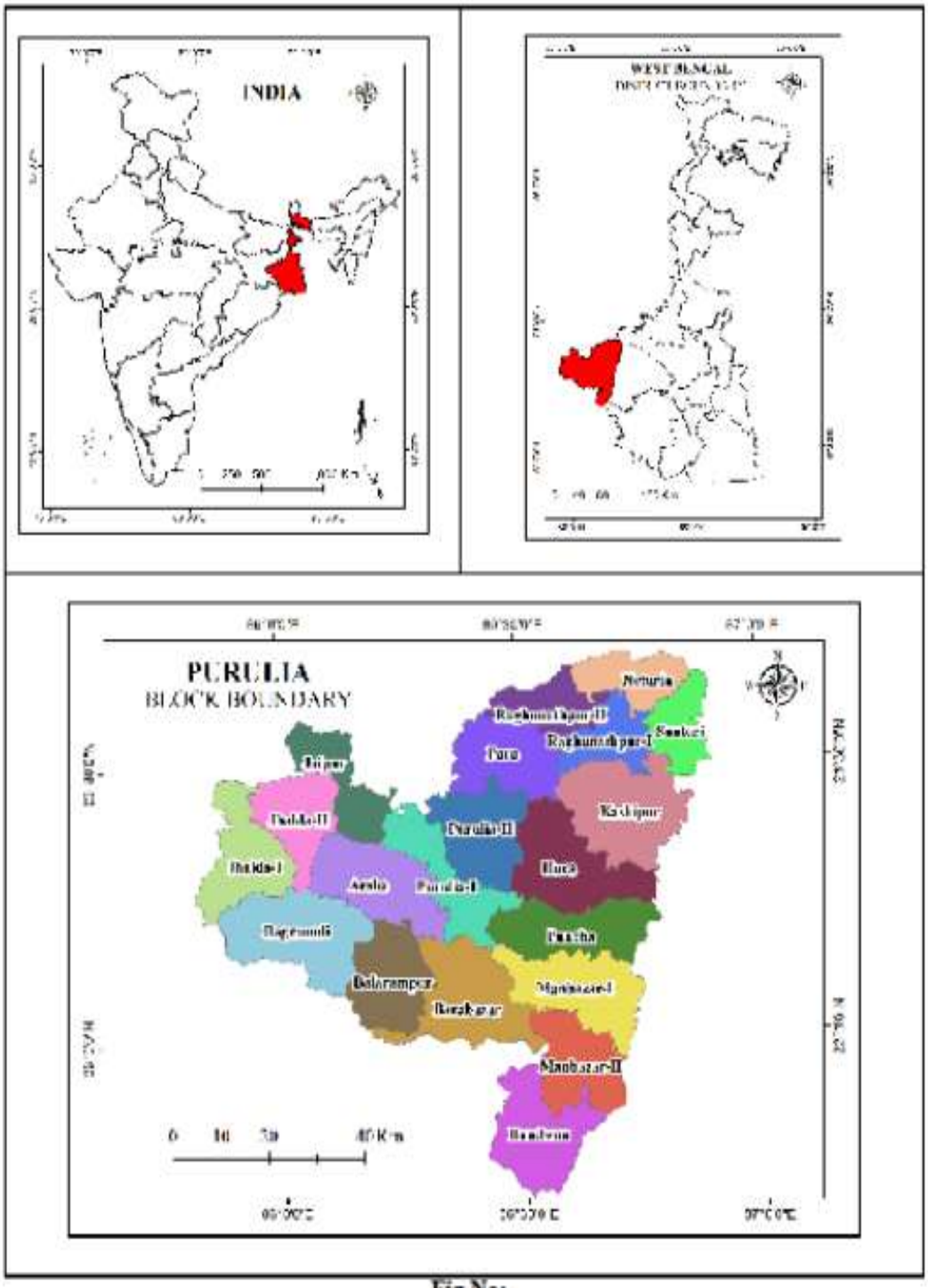


Fig No:

Objectives:

The major objectives of the present study are

1. To study the spatial and temporal pattern of literacy rate in the study area.

2. To analyze the factors that determine the different literacy rates at the block level and how it is related to economic activities.

3. To examine the changing pattern of male and female literacy rates.

4. To study the causes of identifying the blocks suffering from backwardness.

Methodology:

The research work is mainly based on secondary sources such as the Census Handbook, Research Papers, and District Statistical Handbook to analyze the disparity. The male-female differential index has been calculated by the formula used by Krishan & Shyam (1978)

$$MFDI=\frac{MLR-FLR}{TLR}$$

Female literacy rate %, Total literacy rate %

Growth of literacy:

Literacy in the area is increasing trend of total literacy rate as well as literacy for both males and females. Despite that literacy in Purulia (64.48%) is lower than the state level (76.26%) and national level (74.08) as per the census 2011. State and national male literacy rates as per the census 2011 are 82.67% and 82.1% respectively. While it is 77.86% in Purulia District. The female literacy rate in the district standing at 50.52% as per the census 2011 is strikingly low as compared to the state (71.16%) and national (65.5%) female literacy rates.

Comparative decadal literacy rate (%)

Years	India	West Bengal	Purulia
1961	28.30	34.50	20.50
1971	34.50	38.90	25.10
1981	43.60	48.70	33.70
1991	52.20	57.70	43.30
2001	64.80	68.60	55.60
2011	74.08	76.26	64.48

Source: Census of India

For a long time (1961-2011) the literacy rate in the study area is low in comparison to West Bengal and India. This aspect of the district calls for serious attention because no society could achieve sustainable growth without literacy and education. However various central and state govt. programs have been launched all over India but still, the district displays low literacy.

The statistics on literacy rates of rural and urban populations for 1991 were 40.30% and 70.60% respectively. In 2001 the literacy in rural areas was 53.20 % and the literacy rate in urban areas was 75.40% while it was 62.73% in rural areas and 76.18% in urban areas in 2011. Thus, the latest inter-censual period of 2001-2011 has narrowed this gap. The rural-urban literacy difference among females was wider than among males. In 2011 the urban areas 84.63% of males against 67.15% of females were recorded as literate. In 2011 the literacy rate of females in urban areas 84.63% males against 67.15% females are recorded as literate. In 2001 the literacy rate of females in urban areas was just half of the female literacy of rural areas.

Block wise distribution of total literacy:

The block showing literacy above 70% has been put in the category of comparatively high literacy. Only C.D. Block Three Municipality is in this category. These municipalities are Jhalda M, (76.78%) Purulia M (82.09%), Raghunathpur M (77.07%), and one C.D.Block Kashipur (71.06%). In general, the high literacy of this municipal area is greatly influenced by urban function. However, the rate of urbanization is very poor in this district. However, the urban influence has resulted in a relatively high degree of social and economic conditions. Also, urbanization has raised the social status of women explains the higher literacy rate. The facilities to get educated are concentrated more in the urban part. The C.D. Block showing literacy of 50 to 60% in 2001 were Barabazar, Joypur, Jhalda I, Hura, Manbazar, Puncha, Purulia, Neturia, Para, Raghunathpur, Santuri. Most of the blocks of the district come moderate category showing a literacy rate of 60 to 70% in 2011. While relatively low literacy is found in the blocks of Arsha, Baghmundi, Jhalda II, Balarampur, and Bandowan. These were five blocks below the 50% literacy rate in 2001. However, these blocks crossed the critical limit for literacy in 2011. Most of the people of the Purulia District are engaged in Primary activities for which their living standard is very low. The economy of the study area is Agro-based and agricultural economies do not have any specific demand for education. So, the people of this district keep adopting the traditional method of agriculture. There is another reason

for the low literacy in those areas is unemployment. It becomes difficult for families living below the poverty line to invest money in their children's education. It is also important that the parents of the rural belts are not aware benefits of education for their children. Under such circumstances, children are treated as potential wage earners rather than pupils.

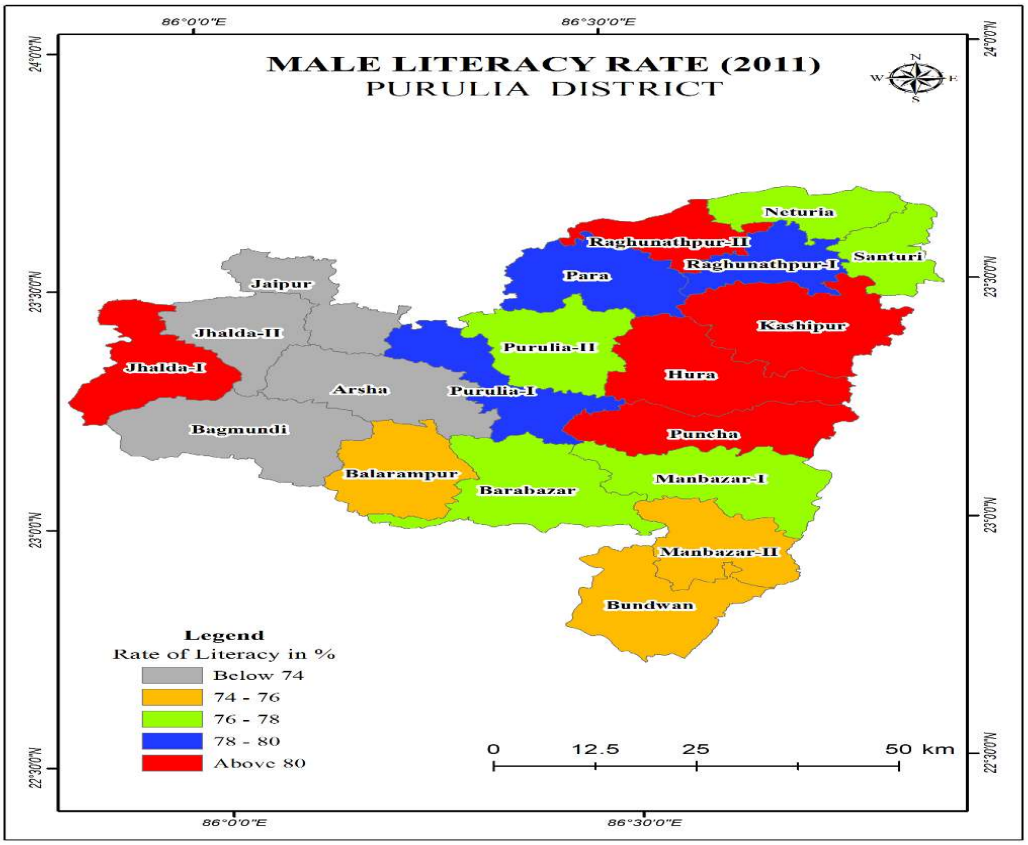
Block wise literacy rate of Purulia District (2001-2011)

The following table shows the block-wise literacy rate of Purulia District 2001-2011

C.D. Block/Municipality	2001			2011		
	Total	Male	Female	Total	Male	Female
Arsha	46.00	67.40	23.60	54.78	70.36	38.75
Baghmundi	46.90	67.60	25.10	57.17	72.14	41.42
Balarampur	49.80	68.30	30.20	60.40	74.18	45.82
Barabazar	52.60	72.70	32.00	63.27	77.84	48.37
Joypur	50.10	71.30	26.90	57.94	72.06	42.80
Jhalda I	53.80	73.70	33.20	66.18	80.15	51.61
Jhalda II	43.80	68.00	18.40	54.76	72.53	36.29
Jhhalda (M)	73.70	84.60	61.80	76.78	85.49	67.50
Bandowan	47.70	66.50	28.50	61.38	74.61	48.03
Hura	59.00	76.40	41.20	68.79	81.95	55.27
Manbazar I	55.10	74.00	35.90	63.78	77.88	49.38
Manabazar II	53.50	73.00	33.40	60.27	74.64	45.76
Puncha	57.30	75.30	39.10	68.14	81.16	54.82
Purulia I	54.40	73.80	33.50	64.77	78.37	50.37
Purulia II	56.20	75.50	35.70	63.39	76.72	49.51
Purulia (M)	77.10	85.60	67.80	82.09	88.40	75.39
Kashipur	64.20	79.80	47.90	71.06	82.83	58.91
Neturia	57.70	73.00	41.30	65.14	77.38	52.06
Para	58.10	76.40	38.50	65.62	79.61	50.73
Raghunathpur I	58.90	73.60	43.30	67.36	78.73	55.14
Raghunathpur II	54.80	72.20	36.50	67.29	80.95	52.79
Raghunathpur (M)	69.00	80.40	58.70	77.07	84.96	68.67
Santuri	56.50	72.00	40.00	64.15	76.32	51.45

Block wise distribution of male literacy:

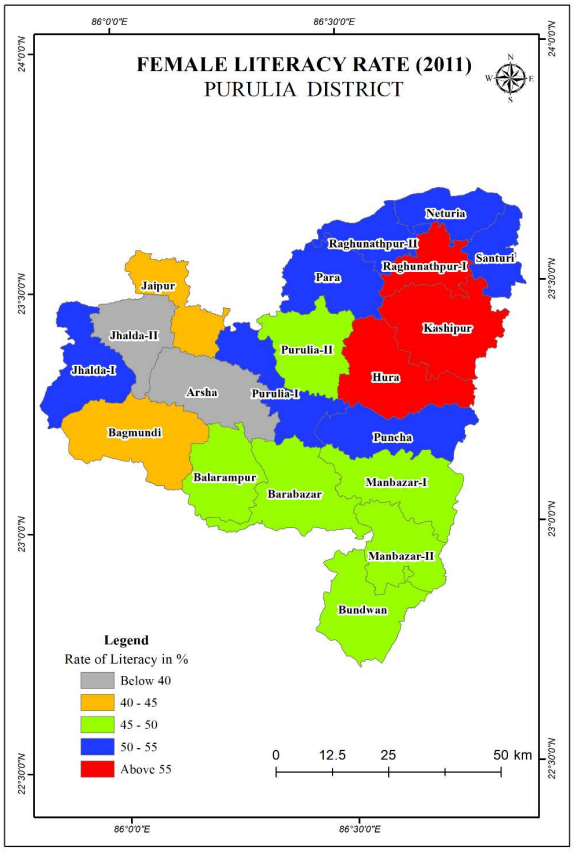
The male literacy in the Purulia district was 45.41% in 1981, which increased to 62.20% in 1991, and 73.70% in 2001. As per the census, in 2011, 77.86 % of the district's total male population could read and write. A low male literacy rate (Below 55%) was found in the blocks of Bandwan, Arsha, Manbazar I, & II, and Jhalda II, in 1991. The main cause of low literacy is poverty and their consciousness towards literacy and education is very low. But in the decade 2001 -2011, no block is found at this level. Due to educational facilities male literacy went up tremendously. In 2011, these blocks showed male literacy Arsha (70.36), Bandwan (74.61), Manbazar I (77.88), Manbazar II (74.64), Jhalda II (72.53%). While very high literacy rate was found in municipalities areas, Raghunathpur II, Kashipur, and Puncha block of the district in 2011. The male literacy rate of all blocks of the study area crossed 70% during 2001-2011. The change in this literacy indicates the social attitude of the people toward the importance of education.



Block wise distribution of female literacy:

The condition of female literacy in the Purulia District is much worse. In India, females are considered housewives. There is no opportunity for them to participate in the economic struggle. In addition to this the factors are general poverty, the practice of early marriage, and prejudices against their mobility, and girl children are put to domestic work are the main factors for low literacy in the district. The female literacy rate is not uniform in rural and urban areas of the study area. The average literacy of the district is 50.52 percent only.

Women are lying far behind than man. A very low literacy rate of females was found in Jhalda II, Arsha, Baghmundi, Balarampur, Bandwan, Barabazar, and Manbazar in 2001. Fortunately, Purulia recorded a quantum jump in its literacy during 2001-2011 in the case of females. The situation of female literacy is improving with govt. efforts. The change in female literacy during 2001-2011 is impressive. It is a great pleasure that the various schemes of state and central govt. promote female education. In the study area, female literacy was 23.20% in 1991, and 36.50 in 2001. In 2001, low female literacy in the blocks of Arsha, Jhalda II, Baghmundi, Joypur, and Bandwan, showed below 30% female literacy rate. In 2011 the average female literacy of the district rose to 50.52 %. While in 2011 these blocks recorded female literacy rates such as Arsha (38.75), Jhalda II (36.09), Baghmundi(41.42), Joypur (42.80), Bandwan (48.03),. While very high female literacy was observed in the town area, Kashipur (58.91), Puncha(54.82), Ma



I(55.14), Hura (55.27), Neturia (52.06). It is a fact that without the progress of female literacy, total literacy could not have reached the mark. A literate mother is more serious about the education needed by her child. She is more sincere about enrolling her children in the education system.

blockwise distribution of male-female differential literacy:

The male-female differential index has been calculated by the formula used by Krishna & Shyam (1978). With the help of the methodology, the block-wise distribution of male and female literacy is calculated as follows

The male-female differential in literacy, 2001, 2011

Block/municipality	2001	2011
Arsha	0.95	0.57
Baghmundi	0.91	0.54
Balarampur	0.77	0.47
Barabazar	0.77	0.47
Joypur	0.89	0.51
Jhalda I	0.75	0.43
Jhalda II	1.13	0.66
Jhalda M	0.31	0.23
Bandwan	0.80	0.43
Hura	0.60	0.39
Manbazar I	0.69	0.45
Manbazar II	0.74	0.48
Puncha	0.63	0.39
Purulia I	0.74	0.43
Purulia II	0.71	0.43
Purulia M	0.23	0.16
Kashipur	0.50	0.34
Neturia	0.55	0.39
Para	0.65	0.44
Raghunathpur I	0.51	0.35
Raghunathpur II	0.65	0.42
Raghunathpur M	0.31	0.21
Santuri	0.57	0.39

(M=Municipality)

Discussion & Findings:

The male-female differential index is associated with the gap between male and female literacy rates. Most of the blocks of the district have a large illiterate female population. In Purulia District, this gap was very broad in the past and present. There is an astonishing gender gap in literacy, 77.86 % of males are literate and for females, the figure is only 50.52%, gender gap being 27.34. The percentage of male-female literacy gap was 39 in 1991, and 37.2in 2001 which moved up to 27.34 in 2011. The gap between male and female literacy is very broad due to the rapid growth of male literacy only in the study area. However, the gap between male and female literacy decreased in 1991. The index value of literacy differential between males and females varies broadly in different parts of the district. It ranges from 0.23 in Purulia M to 1.13 in Jhalda II in 2001 and it is 0.16 to 0.66 in 2011. This index value was high in Arsha, Baghmundi, Balarampur, Joypur, and Manbazar II, in 2001. From the above table, it is clear that the male-female difference index of the study area has narrowed between two decades. After going through the detailed availability literacy variables and data of the Purulia district and its comprehensive study some important and key features have been found which are discussed below

As various programs have been launched by the state and central govt., some changes have been observed which can be seen in terms of its decadal growth rate of literacy.

If one goes through and block level literacy discussion, it can be observed that female literacy is consistently low and slow in comparison to male counterparts in the district.

Another very important feature of the Purulia district is of large rural population which has created tremendous obstruction towards achieving higher literacy in both the male and female components of the district.

Though the district has shown some improvement in terms of health and education over the last decade, Purulia has a poor status and position in the whole of the state. As such the district has a long way to go to achieve 100% female literacy which can be possible when another sphere of the social and economic sectors of the district progresses.

Conclusion:

According to UNESCO "Literacy is a human right, a tool of personal empowerment and a means for social and human development. Education opportunities depend on literacy. It is at the heart of the basic education for all, and essential for eradicating poverty, reducing child mortality, curbing population growth, achieving gender equality, and ensuring sustainable development peace, and democracy". (UNESCO 2010). Education is the most powerful tool for changing the position in society. It leads to the formation of human capital and is an important investment for the development process. The study area shows an increasing trend in literacy. Municipalities' areas are characterized by a high level of literacy. The literacy picture of the Purulia district is not satisfactory especially for female literacy till now. To reduce the gap between male and female literacy, female literacy should be improved in rural areas. Though the district lags far behind other districts of West Bengal, significant change in literacy is observed due to various efforts of govt. of West Bengal. 'Kannyashree project is highly successful in reducing the dropout of females from district school.

REFERENCES:

- Bhende, Asha A. & Kantikar, Tara (2011) Principles of Population Studies, Himalaya Publishing House, Mumbai
- Chamling, Meelan (2013) Literacy overview: A Case Study of Purulia District West Bengal, The Journal of Social Science Today, Volume-I No III.
- Chandna, R.C (2010) Geography of Population: Concept, Determinants and Pattern, Kalyani Publishers, Ludhiana.
- Chattorak, Dr Kuntal Kanti and Chand Susanta, Literacy Trend of West Bengal, and Its

Differentials: A District Level Analysis. IOSR Journal of Humanities and Social Science (IOSRJHSS, VOLUNIE 20, Issue 9 Ver. III (Sep 2015).

- District Statistical Handbook, Purulia (2017-18) combined, Bureau of Applied Economics Department of Statistics Programme Implementation, Government of West Bengal
- Saha, Sanchita & Debnath, Gopal Chandra: Status of literacy in West Bengal: A Geographical appraisal, International Journal of Applied Research, 2016:2(8) 657-664.

■ Sinha, Braj Raj Kumar (2012) Dimensions and Human Resource Development: concepts and Approaches, Alexandru Ioan Cuza University of IASI, VOL. LVIII, s II-c, Geography series.

■ West Bengal Human Development Report (2004): Development and Planning Department, govt. of West Bengal.

■ Yadav, H. L (2010) Uttar Bharat Bhoogol Patrika, The Association of North Indian Geographers, Gorakhpur (U.P), Vol. 40, No.1.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Agro-Tourism and Farm Stay as an Avenue to attain Rapid Rural Development: Evidence from Karnataka

*** Dr. Prasanna B. Joshi,**
Associate Professor & Head,
Department of Studies in Economics,
Rani Parvati Devi College, Belagavi, Karnataka

**** Dr. Abhay M. Patil,**
Associate Professor & Principal,
Department of Studies in Geogrpahy, Rani Parvati Devi College, Belagavi, Karnataka

---

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract :

In today's era of liberalization and globalization travel and tourism is extensively recognized as an important civil industry worldwide which provides major potential for economic growth and development. Agro-tourism is a form of tourism which capitalizes on rural culture as a tourist attraction. Agro-tourism is becoming an important income source for farmers in industrial countries facing over production. However, how farming and agri-tourism activity should be integrated into farm management has not yet been fully studied. It is similar to ecotourism except that its primary appeal is not the natural landscape but a cultural landscape. It is a growing niche sector which offers tourists an authentic experience embedded in local food and culture and combines "rural aesthetics" with agricultural production into a dynamic tourist package. It gives the travellers an opportunity to experience the environmental, cultural and agricultural activities, creating income for farmers. Agro-tourism offers an additional economic advantage to hundreds & thousands of agricultural enterprises while diversifying their production activities. The development of the agro-tourism business industry can help stabilize and make agriculture more lucrative and create employment opportunities both at the production and marketing stages. Indeed, the study followed some objectives to express its views on agro-tourism in Karnataka. Karnataka has a greater potential to develop agro-tourism, because of natural opulence and various types of agro-based products. Nearly 38 percent of population living in urban segment would like to enjoy rural life and it is a good opportunity to develop an agro-

tourism business in Karnataka. Very significantly agriculture departments of the state government and agricultural universities should try to create awareness about it and also provide some creative ideas regarding agro-tourism. Government and other organizations should try to aid such firms for their income efficiency.

Key Words : Agro-tourism, cultural landscape, agro-tourism potentials, agro-tourism firms, rural life, rural culture, agripreneurs etc.

INTRODUCTION:

In today's era of liberalization and globalization travel and tourism is extensively recognized as an important civil industry worldwide which provides major potential for economic growth and development. For many developing countries it is one of the main sources of foreign exchange income and the number one export category, creating much needed employment and opportunities for development. In over 150 countries, tourism ranks among the top five export earners, and in over 60 countries it ranks first in export category. (India's 12th Five Year Plan Report, 2011). Tourism is indeed well recognized as a vital engine of growth in the various economies in the globe. It is termed as an instrument for employment generation, poverty alleviation and sustainable human development.

The world tourism organization has estimated that tourism industry is growing at the rate of 4 percent a year, whereas Indian tourism industry is growing at 10.1 percent which is 2.5 times more than the world tourism growth rate. Agro tourism is one such form of tourism which has recently emerged in the Indian Tourism Industry. It is a field with a potential to develop the rural India and is a way of sustainable tourism development and multi-activity in rural segments through which the visitor has an opportunity to experience the real enchanting and authentic contact with real life explore the know-how of the agricultural areas, agricultural operations, relish the traditional food, experience the daily life of the rural people, as well as the cultural elements and traditions. Moreover, this activity brings visitors closer to nature and rural activities in which they can participate, be entertained and feel the pleasure of touring. Various nations have transformed their economies by developing their agro-tourism potentials. Tourism has a significant capacity to generate large scale employment and thereby generating additional income sources to the skilled and unskilled people.

OBJECTIVES OF THE STUDY:

Agro-tourism is a growing niche sector which offers tourists an authentic experience embedded in local food and culture and combines "rural aesthetics" with agricultural production into a dynamic tourist package. It gives the travellers an opportunity to experience the environmental, cultural and agricultural activities, creating income for farmers. Agro-tourism offers an additional economic advantage to hundreds & thousands of agricultural enterprises while diversifying their production activities. The development of the agro-tourism business industry can help stabilize and make agriculture more lucrative and create employment opportunities both at the production and marketing stages. Indeed, the study followed some objectives to express its views on agro-tourism in Karnataka, The objectives of this study highlights,

1. The Scope and cultural landscape of agro-tourism.
2. Brief scenario of agro-tourism in Karnataka.
3. The problems and the suitable resolution techniques for success of agro-tourism
4. Issues and challenges of agro-tourism

SCOPE OF AGRI-TOURISM AND FARM STAY:

Agro tourism as a multi-disciplinary area of study has a fairly developed literature covering many aspects of the subject matters. A number of terms are used to describe the concept of agro tourism in the literature. These include agricultural tourism, Agri-Tourism, farm tourism, farm vacation tourism, wine tourism and Agri-entertainment. In general, these terms refer to small-scale farm enterprises and community events that showcase the activities and produce of rural families and the agricultural heritage of farming regions to the traveller. Agro tourism provides 'rural experiences' to travelers with the goal of creating livelihood and generating revenues for farmers and surrounding communities. Agro tourism as a unique tourism product ushers the visitor to farming rural areas, generally for educational and recreational purposes. This rural experience typically includes a wide range of attractions and activities that take place in agricultural areas in the countryside. Among the salient ingredients of these 'rural experiences' include open spaces, low level of urban and industrial development, and opportunities for visitorsto directly experience different varieties of agricultural, pastoral, and natural environments. Agro tourism as a distinctive field covers rural environment with its agricultural products, processing and packaging, agro based services, rural community

and their culture and belief system. Agriculture in its modern sense is divided into two as urban agriculture and rural agriculture. Agro-tourism, however, is the launch of activities aiming at the economic and social development of rural regions in particular and country in general. The location of agro tourism broadly covers land areas not covered by industrial parks, cities, towns, urban areas and suburbs. Such locations are called country, countryside and hinterlands invariably. Agro tourism combines agricultural or rural settings and products within a tourism experience. The scope of agriculture encompasses through farming for human foods, beverages, fodder and fiber; livestock products; hunting, fishing and forestry. When it comes to agro tourism, the scope of the subjectexpands to include agro-based small-scale-industries located in the countryside, traditional services in agricultural areas including the culture, beliefs, and value systems in the same areas. Some striking general features of such geographical locations are remoteness, small scale production units, low density of human settlements and low degree of specialization. A number of agro tourism activities need only a small team of farm labors in order to be successful. For example, farm tours, farm stay with bed and breakfast, tractor or bullock cart rides, picking of apples, pineapples, grapes, mangoes and other horticulture items, farm zoos, and many other activities may be operated with little additional expenditure on labour (Taware 2009). In its purest sense, agro tourism refers to travel which combines rural settings with products of agricultural operations – all within a tourism experience that is paid for by visitors. Examples of these experiences include: visiting farmers' markets to purchase farm fresh products, taking part in orchard and floral garden tours, using farm bed and breakfast accommodation, and participating in harvest festivals.

The full range of agro-tourism product and service development options can be categorized within three broad themes: Fixed attractions, vents and services. All require careful management and supporting development resources.

FARM STAY: THE CONCEPT

Farm stay service is a type of rural accommodation within the various kinds of accommodation in rural areas. Homestead accommodation, country-stays, rural home-stays, and rural bed and breakfast seem to be most common and most tied with countryside and rurality. The above accommodation categories are quite specific for agri tourism; however the differences between

them are minor. Farm Bed and Breakfast in usual is a “unique term” for a variety of hosted accommodation in farms that includes a bed for the night and a breakfast in the morning. There are also some specific Agri tourism forms of accommodation such as sleeping on the hay, camping barns or bunkhouses. However, such accommodation services cannot be offered on a mass scale. Further, Farm stays are connected with some threats both for the farm (damages by the visitors, fire) and for visitors (low sanitary condition, low facilities). Today it is not true that farm accommodations are cheap. However, staying on a farm may be an advantage for a visitor. It is a different experience with fresh food, water and air. The degradation of the environment, poverty and human misery have beenresponsible for the challenge, quest and clamour for rural development. Thus, a plethora ofacademics and policy makers have been enmeshed in the search for measures aimed at areversal. World Bank (1990) acknowledged that over 80 percent of the over 1.15 billion people living below poverty line (US $ 350 per annum) in developing countries reside in the rural areas. The condition under which these people live is unimaginable and as a result rural residence is perceived by many as synonymous with deprivation and destitution. Rural areas are characterized by features such as poverty, low income, poor infrastructure, increasing population, low productivity, low entrepreneurship, homogeneous culture, illiteracy, agricultural economy, traditional practices and poorly utilized natural resources (Ijere, 1992; Chambers, 1983; Peil, 1978). Most of these features have been the bane of rural development. Thus, it could be hypothesized that the more evident the features are in a rural community, the more the level of under-development. Rural development is the process of rural modernization and the magnetization of the rural society leading to transition from traditional isolation to integration with the national economy (World Bank, 1975). Diejomaoh (1973) conceptualized rural development as the “process of not only increasing the level of per capita income in the rural area but also the standard of living of the rural population”. Olayide (1979) defined rural development as the process whereby concerted efforts are made in order to facilitate significant increases in rural resources productivity in rural communities. Rural development entails general improvement in all facets of rural living-resource utilization, productivity, monetization income, food, nutrition, health, education, among others. In pursuit of these goals, various policies and programmes were designed and tried while some are still in place to emancipate the rural poor from the pangs of backwardness. Rural backwardness is a paradox in India, especially when the

superfluous natural endowments of the country sides are considered. The irony has been a widening gap in possession and access by the majority (the poor) and the few (the privileged).It is, however, unfortunate that the avalanche of development programmes, approaches and strategies put in place by past and present governments have not made appreciable and resounding impacts on rural conditions and livelihood. The vicious cycle of poverty persists.

REQUISITES OF SUCCESSFUL FARM STAY BUSINESS

Hospitality

The most important service in farm stay is **hospitality**. It is intangible and all the visitors expect highest hospitality from the host. Some assessment of personal qualities and entrepreneurial skills is necessary to see if these businesses are a good match for you and your family. The common factor across the bed and breakfast industry is hospitality: it is the key ingredient to any successful guest business. The host must enjoy meeting people and welcoming them into the farm on a regular basis. The feeling of welcome goes beyond a handshake, and there is much host can do to increase it. The hosts should be friendly. It is customary to spend time with the guests upon arrival and at breakfast.

Management Policies

When you share your home with guests, you have the right to determine allowable activities and limits. To avoid misunderstandings, it is a good idea to state these policies in your brochure and post them in the rooms. If the accommodation type is cabana or cottage, most of the below given policies can be applied. Make decisions about the following items:

- Smoking restrictions
- Use of alcoholic beverages (soft liquor such as beer or vine can be allowed)
- Whether children or babies are welcome
- Use of credit cards/payment apps
- Whether pets are allowed
- Arrival and departure times etc.

Uniqueness

The host must be careful to identify a unique selling point of the farm stay. Why guests should visit your farm accommodation, rather than someone else's? What do you have to offer them that they can't get anywhere else? The

farm bed and breakfast or farm vacation facility can be anything from contemporary to historic. It does not need to be a mansion. It does not always have to be old or of historical importance. It should however always be comfortable, clean, distinctive, and pleasant. Your farm house should be unique and reflect your family, the people who live there. One of your selling points is "environment" - the look or feel of your home. Analyze why you think paying guests would find your farm house a place where they want to stay. Look at your house and its architecture, furnishings and consider what may be needed to make them more attractive, and contribute to the smooth functioning of your business.

Activities to do and Places to see

Visitors who are coming to the farm stays like to involve in farming or other activities related to countryside and they further like to see interesting places close to the farm stay. Fishing, boating, trekking, hiking, or horse or pony riding are some examples of activities. Tourists also like to know that if they feel adventurous during their stay, what the places of interest close at are. So therefore farm stays owners need to mention these popular tourist places on their website and brochures. These places are a draw-card for the location, which creates another level of interest as to why visitors should book your farm accommodation.

Promoting and advertising

Promoting is a very important factor for the success of your farm accommodation. Some farm stays have very attractive websites, but unfortunately they are with less numbers guests. This is because your website is hidden. Your farm stay is best farm accommodation to offer, but then millions of other farm stay owners around the world think so too. Therefore, you have to understand competition is severe. Everyone is trying to compete with others and sell own. Today there are a number of accommodation guides in the internet which you also can use to market / advertise your property. Few of these are trip advisor, booking.com, agoda, budget travel, Asia rooms, etc. It is important to note that the photos that you post on your website or the accommodation guides must be not exaggerated ones. They must show the real situation of your farm stay.

CONCEPT OF AGRO- TOURISM:

Agro – tourism comprises two concepts, - agriculture and tourism. The Chambers Universal Learners Dictionary (1980) simply defined tourism as

the industry dealing with tourists. Tourists were defined as people who travel for pleasure. Okoroafor (1995) remarked that a visitor remains a tourist whether the objective of his mission is to transact business, participate in sports, appreciate the culture of his host destination, visit the people's museum and monuments for his intellectual enrichment, participate in conferences, conduct research, fulfil religious obligations, visit a friend or a relative, observe unique flora and fauna in their natural habitats or simply to have a good time. Agriculture on the other hand is the science or art of cultivating land to raise crops; farming: the production of crops, livestock, fishery or poultry and the diverse processes of finance, research, education, communication, engineering, conservation, processing, storage, distribution and marketing (Onweagba, 2000). Agricultural exploits and potentials could be show - cased for aesthetic values and attraction. The scenery at markets, horticultural and floricultural gardens could glue the sight of a passerby for hours and entertain him to the extent of forgetting his worries and troubles permanently or temporarily. Agro – tourism by mere logic is the practice of agriculture for tourism. It is the practice of utilizing the art and science of producing crops and animals for aesthetics and pleasure. It is the process of creating imagery and ornamentals from agriculture for the appreciation of mankind. Agro – tourism could take people including farmers to attraction centres like game reserves, dams, festivals / exhibitions, farm sites /structures, among others. Indeed, agro- tourism holds prospects for the economy.

AGRO- TOURISM POTENTIALS FOR RURAL DEVELOPMENT

Agro – tourism has multifarious contributions to make to rural development. The attendant consequences of under-development inflict untold hardship on the citizenry. To allay their indisposition and monetize the economy at a relatively short period, there is need for diversification of opportunities both for the individuals and government. Agro – tourism is one of such areas that should be explored. The potentials include the following:

As an Invisible Trade -

Agro – tourism is a good source of foreign exchange. People are attracted nationally and internationally to tourist centres. These visitors pay to have access to the sites. Invisible trade in tourism could be used to balance payment in visible trade in other sectors, thus putting the economy on a stronger footing. Sometimes, tourists could purchase some of the produce or products of the centres. According to Okoroafor (1995), the prospects of tourism for

foreign exchange earning places it next to the oil sector. Ovation (2000) remarked that the great foreign exchange potentials of tourism necessitated the establishment of International Tourism Exchange Centre in Berlin, Germany. In Nigeria, between 1986 and 1989, tourism provided foreign exchange to the tone of $249 million to the federal government and $1187m to Africa (Okoroafor, 1995). This implies that with articulate policy planning and management, agro-tourism would contribute more meaningfully to the economy, and thus, help to improve the standard of living of the citizens.

AGRO-TOURISM AND FARM STAY IN KARNATAKA:

India exhibits diverse form of art and culture entrenched through a rich heritage, which makes India the most sought-after global tourist destination. India has a thriving tourism industry, which contributes over 6% to the national GDP and 8% of the total employment. Karnataka is one of the major tourist destinations in the country and there is a large scope and great potential to develop agro-tourism. Very significantly, agriculture is one of the vital components of the Indian economy, and it is also the primary occupation of Karnataka. As on 2017 about 14 percentage of GDP was from the agricultural sector only. Recently there has been a paradigm shift in Karnataka from pure-agriculture to agriculture-based-tourism. There are a number of agro-tourism destinations in the state which can act as abreakthrough to the conventional agriculture and tourism in the Karnataka state.

IMPORTANCE OF AGRO-TOURISM IN KARNATAKA:

Agro-tourism has the significant potential to change the economic course of traditional agriculture upto a certain extent. The benefits of Agro-tourism are manifold. It would bring many direct and indirect benefits not only to the farmers and rural people but also to the tourists at their destinations. Hence, some of the vital benefits are as follows:

· It brings the major primary sector, agriculture, closer to the major service sector, tourism. This convergence is expected to create a win-win situation for both the sectors.

■ It provides employment opportunities to the farmers, their family members and other local youths.

■ It provides information about the rural handicrafts, languages, culture, tradition, dresses and life style.

■ It provides supplementary income sources to the farmers.

- It enhances the required job skills.
- It helps in order to understand about the rural life and know about the agricultural activities to urban people.

PROBLEMS OF THE AGRO-TOURISM AND FARM STAY IN KARNATAKA:

Karnataka has a greater capacity for the development of the Agro-tourism centers due to the good natural and climatic conditions. Though there are some problems in the development process of agro tourism in Karnataka, major problems are as follows.

1. Lack of adequate capital to develop basic infrastructure for the agro-tourism.
2. Lack of perfect knowledge and sufficient awareness about the agro-tourism.
3. Weak communications and lack of commercial approach of the small and remote farmers.
4. Problems associated with ensuring hygiene and basic needs for urban visitors.
5. Majority of farmers have small size holdings, low quality land and little or no access to credit and irrigation.

CONCLUSION:

Undoubtedly agro-tourism has a lot of potential to improve rural incomes and can play a very significant role in creation of employment for rural youths**.** A well-developed agri-business system in any country can enable millions of farmers and agripreneurs to capitalize the emerging opportunities of the agriculture and allied sector. The development of agri-business sector is the need of future in order to strengthen rural employment, food security and to improve living standard of the people in the country.Karnataka has a greater potential to develop agro-tourism, because of natural opulence and various types of agro-based products. Nearly 38 percent of population living in urban segment would like to enjoy rural life and it is a good opportunity to develop an agro-tourism business in Karnataka. Very significantly agriculture departments of the state government and agricultural universities should try to create awareness about it and also provide some creative ideas regarding agro-tourism. Government and other organizations should try to aid such firms for their income efficiency. Karnataka is the Information technology hub of India hence it can also be agro-tourism hub of India. It can utilise and implement technological tools to improve effectiveness and efficiency of agro-tourism (Online booking, services etc.). There is a need for required support from local

community and government for a sustainable growth in this sector as opportunities need to be exploited in strategically planed manner. Finally, agro-tourism is a form of tourism which capitalizes on rural culture as a tourist attraction. It is similar to ecotourism except that its primary appeal is not the natural landscape but a cultural landscape.

REFERENCES

1. CENTAD (Centre for Trade and Development) (2007) Agribusiness and Trade, NewDelhi, April-June.

2. Chadha, G. K. and Ashok Gulati (2007) Performance of agro-industry in India:Emerging issues and prospects, in Agricultural Diversification and Smallholders in South Asia, edited by P. K. Joshi, Ashok Gulati and R. Cummings (Jr), Academic Foundation, New Delhi, pp. 349-84.

3. Dev, Mahendra S. (1996), Agricultural Policy Framework for Maharashtra, IGIDR Mumbai.

4. Hamilpurka, S. 2012. Agri-Tourism in Karnataka - Issues, constraints and possibilities.International Journal of Research in Commerce, Economics & Management, 2(7):106-111.

5. James, Gracious (2012) Farm based rural tourism in Kerala, , Kurukshetra 60(7),7-10.

6. Karabati, S., Dogan, E., Pinar, M., &Celik, L. M. (2009). Socio-economic effects of agritourism on local communities in Turkey: The case of Aglasun. International Journal of Hospitality & Tourism Administration, 10(2), 129-142.

7. Okorafor, C.N. (1995), Tourism in Nigeria: Progress, Problems and Prospects, Owerri,African Educational Services Ltd.

8. Onweagba, A.E. (2000), " General Agriculture An Over View" In: Nnadi.

9. Pandurang, M. (2009). Agro Tourism Innovative Supplementary Income Generating Activity for Enterprising Farmers.

10. Singh, Sukhpal (2007) Agribusiness in South Asia: A Fact Sheet, Make Trade Fair Campaign, www.maketradefair.com.

11.Thomas, K.V et.al (2013) Problems faced by agro tourism sector in Kerala:a study with special reference to Idukki district ,Marian Journal of Commerce and Management (2),50-58.

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Use & Need Of Geographical Information System

- Dr. Khakre. R. D.
Dept. Of Geography, Jaikranti Arts Sr. College, Latur.

Introduction

We are presently positioned at the beginning of the twenty-first century with fast-growing trends in computer technology, information systems, and virtual worlds. These advancements allow us to obtain data about physical and cultural environments, facilitating research and solving practical problems. Modern digital and analog electronic devices enable resource inventory and rapid execution of arithmetic or logical operations. These information systems can now create, manipulate, store, and use spatial data much faster compared to conventional methods.

An information system is a collection of data and tools for working with that data, containing analog or digital information about real-world phenomena. Our perception of the world through selection, generalization, and synthesis provides us with information, and the representation of this information constitutes a model of those phenomena. Thus, the database, a physical repository of varied views of the real world, represents our knowledge at a point in time. Information is derived from individual data elements in a database, transformed into information through thought processes and intuition. Consequently, data, information, and knowledge are differentiated in a database context. Data's value increases as we progress from data to information to knowledge. Data, which has various origins and forms, can be:

1. Real (e.g., terrain conditions)
2. Captured (e.g., digital data from remote sensing satellites or aerial photographs)
3. Interpreted (e.g., land use from remote sensing data)
4. Encoded (e.g., recordings of rain-gauge data, depth of well data)
5. Structured or organized (e.g., tables about conditions of particular watersheds)

History of GIS

The history of GIS dates back to the 1960s when computer-based GIS emerged, with manual procedures existing 100 years earlier. Initial developments originated in North America with organizations like the US Bureau of the Census, the US Geological Survey, and the Harvard Laboratory for Computer Graphics and Environmental Systems Research Institute (ESRI). In Canada, the Canadian Geographic Information Systems (CGIS) and in the UK, the Natural Experimental Research Center (NREC) and Department of Environment (DOE) were notable. The Harvard Graduate School of Design's Laboratory for Computer Graphics and Spatial Analysis and the State University of New York at Buffalo achieved worldwide recognition. Commercial agencies, such as ESRI, Intergraph, Laserscan, and Autodesk, began developing and offering GIS software.

In the early 1970s, sound and stable data structures for storing and analyzing map data became dominant, leading to the introduction of topology in GIS. Topology and related graph theory provided efficient tools for consistent two-dimensional data representations. The 1980s saw the rise of personal computers, making it possible to execute programs previously run only on mainframes. Minicomputers and later workstations became widely available, with relational database technology becoming the standard. Research on spatial data structures, indexing methods, and spatial databases progressed tremendously. The 1990s marked the breakthrough of object-orientation in system and database design, recognition of geoinformatics as a professional activity, and spatial information theory as GIS's theoretical basis.

In India, significant developments over the last decade were driven by the Department of Space, emphasizing GIS applications for natural resources management. Notable projects include the Natural Resource Information System (NRIS), Integrated Mission for Sustainable Development (IMSD), and Biodiversity Characterization at the National Level. The Indian Institute of Remote Sensing (IIRS) plays a significant role in GIS through education and training programs. Recently, commercial organizations in India have realized GIS's importance for applications like natural resource management, infrastructure development, facility management, and business/market applications.

With the rise of the World Wide Web, new Internet protocols (e.g., HTTP), easy-to-use interfaces (e.g., browsers), and languages (e.g., HTML, XML, Java)

have made the network the system. Internet applications and Internet GIS are the future systems.

Concepts of Space and time in Spatial Information Systems

Spatial information is always related to geographic space, i.e., large-scale space. This is the space beyond the human body, space that represents the surrounding geographic world. Within such space, we constantly move around, we navigate in it, and we conceptualise it in different ways. Geographic space is the space of topographic, landuse/landcover, climatic, cadastal, and other features of the geographic world. Geographic information system technology is used to manipulate objects in geographic space, and to acquire knowledge from spatial facts.

Geographic space is distinct from small-scale space, or tabletop space. In other words, objects that are smaller than us, objects that can be moved around on a tabletop, belong to small- scale space and are not subject of our interest.

The human understanding of space, influenced by language and cultural background, plays an important role in how we design and use tools for the processing of spatial data.

In the same way as spatial information is always related to geographic space, it relates to geographic time, the time whose effects we observe in the changing geographic world around us. We are less interested in pure philosophical or physical considerations about time or space-time, but more in the observable spatio-temporal effects that can be described, measured and stored in information systems.

GIS Objectives

- Maximize the efficiency of planning and decision-making
- Provide efficient means for data distribution and handling
- Eliminate redundant databases and minimize duplication
- Integrate information from many sources
- Conduct complex analysis/queries involving geographically referenced data to generate new information

Spatial Information Systems

Handling spatial data typically involves processes of data acquisition, storage, maintenance, analysis, and output. Traditionally, this was done using analog data sources, manual processing, and producing paper maps. Modern

technologies have increased the use of computers and information technology in spatial data handling, primarily through geographic information systems (GIS).

A general motivation for GIS use can be illustrated by a planning task requiring different maps and data sources. Conventional analogue procedures involve collecting maps and documents from various sources (e.g., mapping agencies, geological surveys) in different scales and projections, which must be manually converted into uniform working documents. This process is time-consuming and expensive.

With GIS, maps are stored in digital form in a database using world coordinates (e.g., meters, feet), eliminating the need for manual scale transformations. Conversion between map projections is easily handled by GIS software. GIS's spatial analysis functions expedite planning tasks and allow easy modifications to the analysis approach.

Spatial Analysis

GIS technology supports decision-making processes in areas such as natural resource utilization, sustainable development, disaster management, waste disposal site selection, and route alignment. It enables the creation of maps, information integration, scenario visualization, problem-solving, idea presentation, and effective solution development. GIS is now a multibillion-dollar industry employing hundreds of thousands of people worldwide.

GIS performs a variety of spatial analyses, including overlaying feature combinations, analyzing network flows, proximity analysis (e.g., buffer zoning), and defining districts based on spatial criteria. Its applications span facility management, planning, environmental monitoring, population census analysis, insurance assessment, health service provision, hazard mapping, and more. The potential of geoinformatics is vast, with applications such as:

- Agricultural development
- Land evaluation analysis
- Vegetation change detection
- Deforestation analysis
- Vegetation health monitoring
- Percentage vegetation cover mapping
- Crop acreage and production estimation
- Wasteland mapping

- Soil resources mapping
- Groundwater potential mapping
- Geological and mineral exploration
- Snow-melt runoff forecasting
- Forest fire monitoring
- Ocean productivity monitoring

References for Further Reading

1. “Principles of Geographical Information Systems for Land Resource Assessment” by P.A. Burrough

2. International Journal of Geographical Information Science

3. “Geographical Information Systems - Principles” Vol.1 by Goodchild

4. International Journal of Remote Sensing

5. Geocarto International

6. GIS Asia Pacific (magazine)

7. GIS India (magazine)

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Impact of Mission Nirmal Bangla on Health of Rural People in Bolpur Sub-Division – Case Study of A Village

*** Dr. Rakesh Baidya,**
Research Scholar

**** Dr. Subhasis Mondal,**
Asst. Professor, Dept. of Geography, Seacom Skills University

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract:

It has existed formerly delineated that, the juveniles and babies are affected in subjective and all people in universal mature to unclose defecation. Unclose defecation creates environmental defilement. The governance of India and Government of West Bengal is important apprehensive about open wellness. ascertaining the derelictions of public defecation, entire sanitation crusade existed embarked. It existed renamed as Nirmal Bangla Abhiyan and presently it is understood as Mission Nirmal Bangla. Though the firsthand aspiration of this crusade existed just contriving latrines and toilets at pastoral regions, it existed widened and embrace gutting crusade at pastoral and civic regions. erection of latrines and toilets are presently portion of this agenda. Especially, beggarly sanitation, defiled drinking water and deficient habitudes are many of the cases for wellness cases and queer wellness in their regions. Unexpectedly, it's stressed that there are no drainage installations in numerous of the townlets as articulated by a adept maturity of the repliers, many of the repliers are jilting scrap on the ways or hand of drainages, it shows that they're ignoring open cleanliness.

Keywords : Eco sanitary, unclean environment, polluted drinking water, Mission Nirmal Bangla Abhiyan, cleanness and hygiene, open defecation and poor-sanitation.

Introduction:

On 2nd of October 2014, the Government of India restructured the erstwhile Nirmal Bharat Abhiyan as Swachh Bharat Mission with the mandate of making the country ODF by2ndOctober,2019. Government of westbengal had already started its journey towords

achieving ODF and become a front liner in rural sanitation. It has steadily contributed to the list of ODF districts. After the lunch of Swachh Bharat Mission by the Government 0f India,the state Government decided to converge its efforts with the new restructured programme towards realizing a common objectives of achieving ODF and to make a cleanlier environment and surroundings under the state brand name of 'Mission Nirmal Bangla. For reaching the objectives, an all-out effort was started through constituting a state Mission under the panchayats and rural Development Department in the state

Government. Mission Nirmal Bangla has the following major thrust areas-

All the households to have access to sanitation all members of all households use the toilets all places of public congregation to have community has sanitation facilities the village surroundings are to be kept clean.

Across India, many villages have been declared as ODF. Various states have also declared themselves as ODF. Reaching ODF status is a complicated process involving through behavior change. However, even after reaching ODF status, Sustenance is often a challenging task involving focused and continued efforts of the community. It has been observed in the past that various villages have slipped back to open defecation even after achieving ODF status. For this purpose, a close monitoring of the verification indicates of ODF is required to be carried out frequently. The necessitates close engagement within the local authority as well as the community. Some activities related to plus status are as follows.

Statement of Problems:

The main problems of the study area were as follow-

According to 2011 census 68% rural people have no latrine. Open defecation is one of the causes of water pollution in the rural area. The rich families have toilet and safe drinking water but the poor families have no toilet and safe drinking water. The females and children of poor families are more affected by water borne diseases due to the poor condition of rural sanitation. The above importance and problems have promoted the investigator to select the topic and the study area(i.e. Bolpur Sub-division) to have an intensive study.

Literature Review:

Badra and Sharma(2015), They studied "Management lessons from Swachh Bharat Mission."

They find out the measures to increase Participation and effectiveness of Swachh Bharat drive.

Rao and Subbarao (2015), They studied "Swachh Bharat : some issues and concerns."

They find out the opportunity and responsibility of the citizens, media, social media,civil society, organizations, professionals, youths, students and teachers to declare their ownership of compaign by simply reporting the instances of manual scavenging.

Majumdar. S. (2018), He studied "Technology interventions in sanitation."

He find out the high dependency on oil, mostly imported, means that rising oil prices, due to its cascading effect affects the prices of essential commodities.

Chaudhary. A. (2017), He studied "Swachh Bharat Mission"- Need, objective an impact.

He find out the need, objectives and impact of Swachh Bharat Mission on overall economic development of India.

Objectives of The Study:

The main objectives of the study were as follows :-

i) To observe the rural people who have no toilet and safe drinking water.

ii) To find out the relationship between water borne diseases and socioeconomic characteristics of rural people.

iii) To uncover the problems and suggest policy measure and action programme.

Data Base:

[1]. Secondary data which is collected from different reports,various journals, and e- journal.Collection available literature. Observation were made based on news reports, some officials, NGOs, travel agencies etc.

[2]. Primary data which is collected through field investigation.

Methodology:

Methodology is an organization of the analysis of the reality, identifying the type of analytical techniques and appropriate instrument to be used. Two methods have been employed to analyze the primary and secondary data that have been collected from different sources in order to fulfill the basic objectives of the study. These includes– **Statistical methodology and Cartographic**

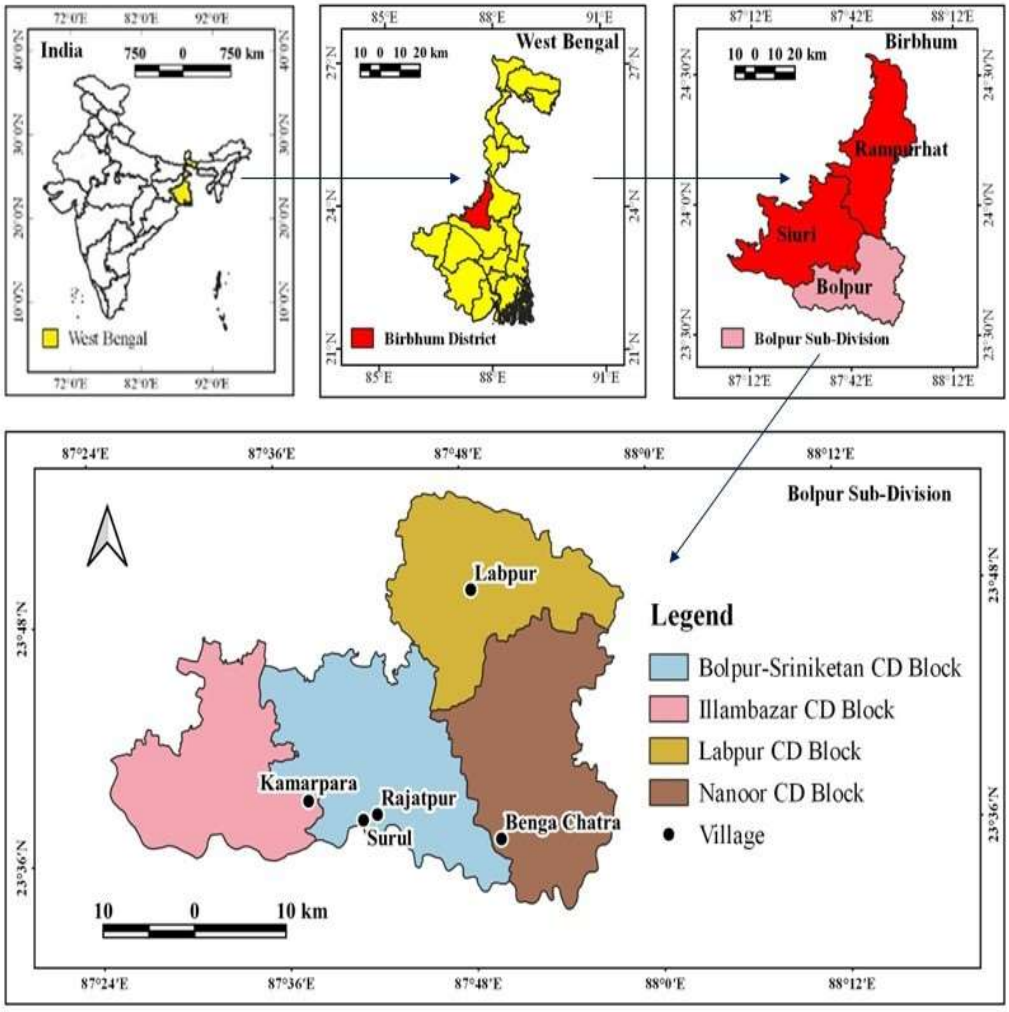
methodology. Researcher have Sample Villages are selected by purposively sample techniques.

Location of The Study Area:

Bolpur sub-division is located at the south eastern part of the Birbhum district, West Bengal. The total area of Bolpur sub-division is 1275.93 sq. km. It extended from 230 32’ 30" to 230 53’ 00" north latitudes and from 870 23’ 30" to 870 57’ 30" east longitudes.

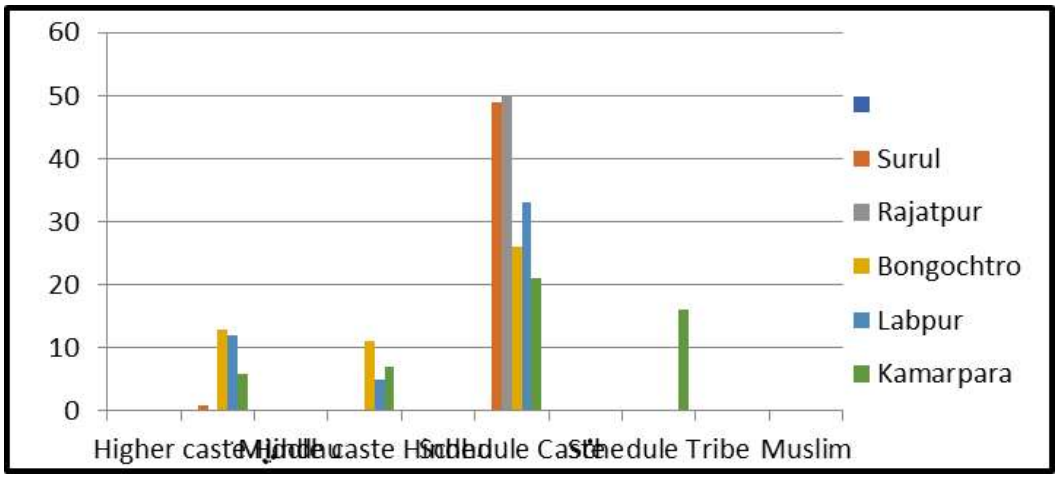
Bolpur sub-division comprises four (4) blocks Viz Illambazar in the west (261.54 Sq. Km area).

Bolpur-sriniketan in the middle (334.58 sq km area), Nanoor block in the east (311.83 sq area, labpur in the north (367.98 sq km area).



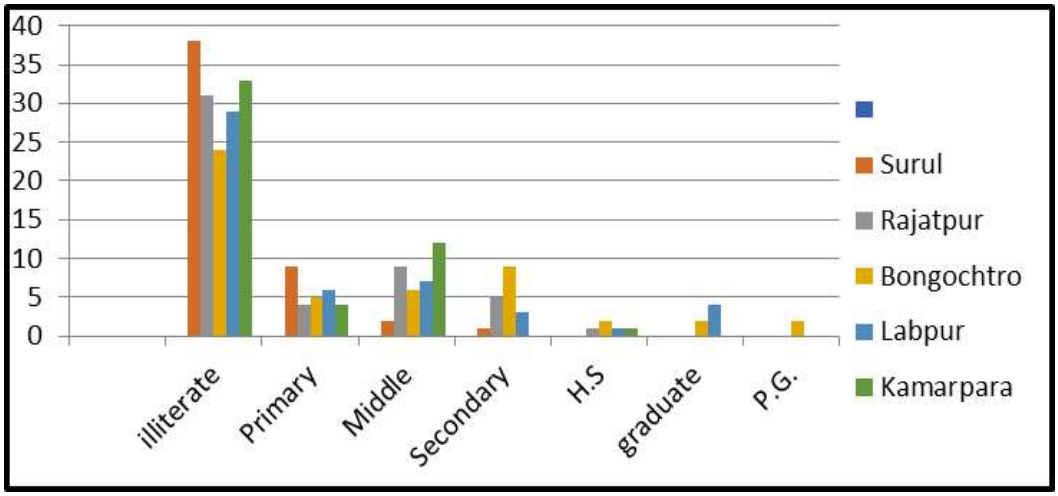
Analysis of Data:

[i]. CASTE STRUCTURE IN DIFFERENT STUDY VILLAGES:



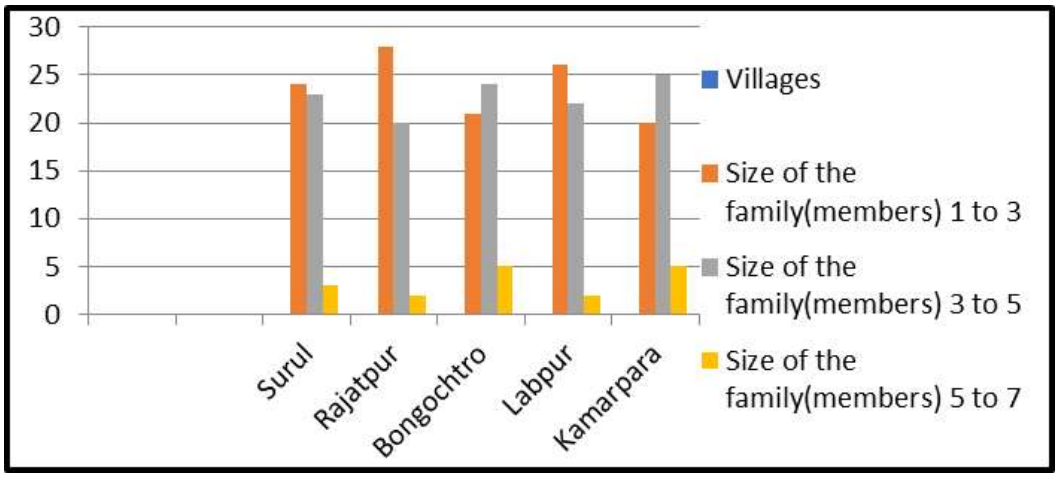
Above table made it clear that, is the 13 of the male highest repliers have belonged to Higher caste Hindhu of Bongochtro village, followed by 1 repliers have lowest Higher caste Hindhu of Surul villages. On the other hand, 11 repliers have highest Middle caste Hindhu belonged to Bongochtro villages, and 5 repliers have lowest Middle caste Hindhu belonged to Labpur villages. As a 50 repliers have highest schedule caste belonged to Surul villages, and 21 repliers have lowest schedule caste belonged to Kamarpara villages. On the other hand only 16 repliers have highest schedule tribe belonged to Kamarpara villages.

[ii]. Educational Status In Different Study Villages:



It is observed from the table that, 38 repliers have highest illiterate belonged to Surul villages, and 24 repliers have lowest illiterate belonged to Bongochtro villages. Then 9 repliers have highest completed their primary education belonged to Surul villages, and 4 repliers have lowest primary education belonged to Rajatpur villages. Then 12 repliers have highest completed their middle education belonged to Kamarpara villages, and 2 repliers have lowest completed their middle education belonged to Surul villages. That 9 repliers have highest completed their secondary education belonged to Bongochtro villages, and 1 repliers have lowest completed their secondary education belonged to Surul villages. Then 2 repliers have highest completed their Higher secondary education belonged to Bongochtro villages, and 1 repliers have lowest completed their Higher secondary education belonged to Rajatpur, Labpur, Kamarpara villages. As a 4 repliers have highest completed their graduate education belonged to Labpur and 2 repliers have lowest completed their graduate belonged to Bongochtro villages. Then only 2 repliers have highest completed their Post graduate education belonged to Bongochtro villages.

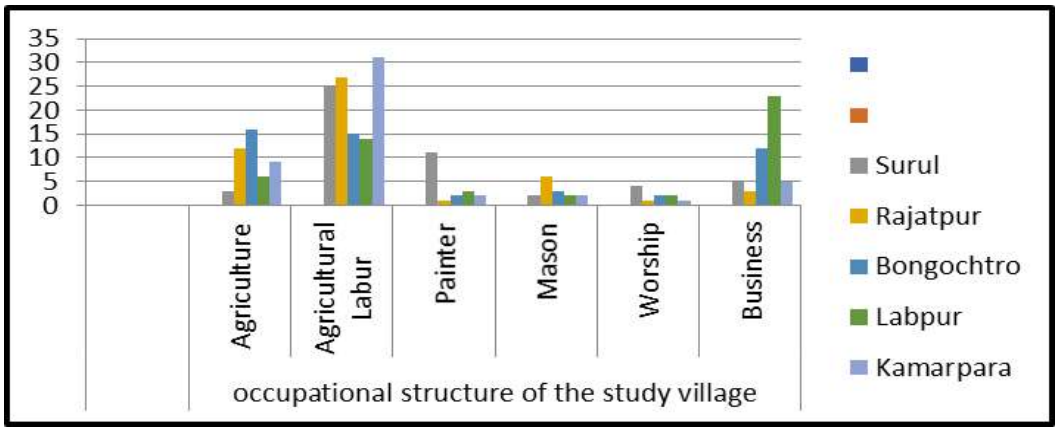
[iii]. <u>Distribution Of Family Sizes In Different Study Villages:</u>



It observed that, the family members of male 28 repliers have highest belonged to 1 to 3 times of Rajatpur villages, and 20 repliers have lowest belonged to 1 to 3 times of Kamarpara villages. Then 25 repliers have highest belonged to 3 to 5 times of Kamarpara villages, and 20 repliers have lowest belonged to 3 to 5 times of Rajatpur villages. On the other hand, 5 repliers have highest belonged to 5 to 7 times of Bongochtro and Kamarpara villages,

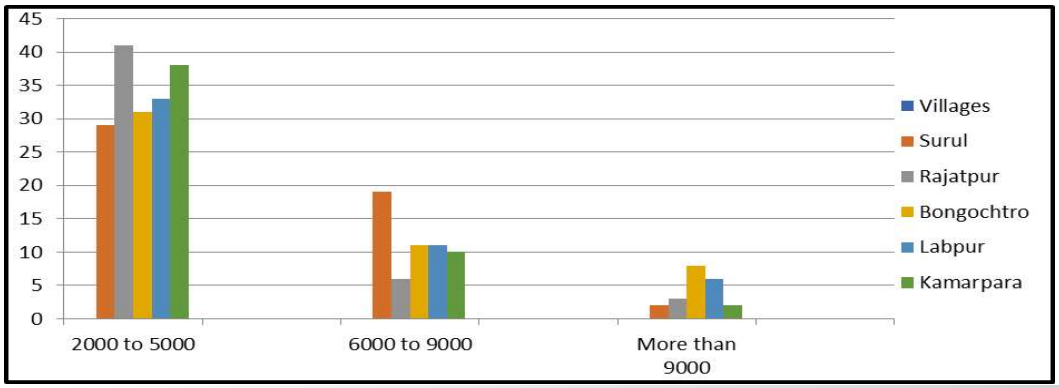
and 2 repliers have lowest belonged to 5 to 7 times of Rajatpur and Labpur villages.

[iv]. <u>Distribution Of Occupational Structure Of The Family In Different Study Villages</u>:



As a stated by repliers family occupation of 16 highest repliers is agriculture by Bongochtro villages, that of 3 repliers are lowest engaged in agriculture by Surul villages. Then 31 repliers are highest engaged in agriculture labur by Kamarpara villages, and 14 repliers are lowest engaged in agriculture labur by Labpur villages. Then 11 repliers are highest engaged in painter by Surul villages, and 1 repliers are lowest engaged in painter by Rajatpur villages. Then 6 repliers are highest engaged in mason by Rajatpur villages, then 2 repliers are lowest engaged in mason by Surul, Labpur, and Kamarpara villages. Then 4 repliers are highest engaged in worship by Surul villages, and 1 repliers are lowest engaged in worship by Rajatpur and Kamrpara villages. It observed that 23 repliers are highest working engaged in business by Labpur villages, and 3 repliers are lowest working engaged in business by Rajatpur villages.

[v]. Monthly Income Of Different Study Villages:



The monthly income of 41 repliers are highest earning Rs 2000 to 5000 in per month their Rajatpur villages, then 29 repliers are lowest earning Rs 2000 to 5000 Rs in per month their Surul villages. That 19 repliers are highest earning Rs 6000 to 9000 Rs in per month their Surul villages, and 6 repliers are lowest earning Rs 6000 to Rs 9000 Rs in per month their Rajatpur villages. Other hand, 8 repliers are highest earning more than Rs 9000 in per month their Bongochtro villages, and 2 repliers are lowest earning more than 9000 in per month their Surul and Kamarpaa villages.

Major Findings:

[1]. It is also found from the study areas that the system of drainage has reached such a bad condition that water does not drain well in normal conditions and when it rains after rains, water stagnation causes diseases due to which many people suffer from various water related diseases.

[2]. It has also found from the study areas that due to the long distance of the water tank, many houses get water slowly from the taps. The water pipes initially provided good water but now due to the increase in the number of connections, the water supply has decreased.

Sugestion:

[1]. Again, every person in the family should wash their hands well with soap after using the toilet and also wash their hands well before eating. Here all the people who have bathrooms in their houses but do not have water, water service should be arranged in those houses.

[2]. Again, science most of the people here also use the toile or latrine outside to prevent the toilet from getting dirty, they have to make arrangements for the construction of toilet or latrine at the quickly initiative of the local village panchayat.

Conclusion:

Development of proper planning strategies and perfect implementation are the systematic observation to overcome the discrepancies of health care system in Bolpur sub-division. Better implementation of various governmental plans such as National Rural Health Mission Scheme, Scheme of universal Health Coverage for the infrastructural attainment is required . But other than governmental plans and policies, Public-Private joined venture in this regard always become an effective step. More than that, better health awareness among common people and socio-economic reforms are required not only for

the development of health care system but also for the all-round development of the society.

References:

[1]. Badra and Sharma (2015),"Managements lessons from Swachh Bharat Mission, "*International Journal of Advance Research in Science and Engineering"* vol. No.4, special issue(01), March 2015

[2]. Rao and Subbarao (2015), " Swachh Bharat ; some issues and concern, " *International Journal of Academic Research*" ISSN : 2348-7666 : vol. issue-4(4), October-December, 2015

[3]. Majumdar. S. (2018) : Technology Interventions In Sanitation, *Kurukshetra*, vol.67, No.2, pp. 32-35

[4]. Chaudhary. A. (2017) : Swachh Bharat Mission- Need, objectives And Impact, *Kurukshetra,* vol. 66, No.1, pp. 40-66

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Urban settlement pattern and its Development : A case study on Bolpur Town

*** Arijit Ghosh**,
Research Scholar, Dept. of Geography.
Seacom Skills University, Birbhum

**** Dr. Subhasis Mondal**,
Guide and supervisor

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract-

At 1921 Union board was established in Bolpur. In 1951 Bolpur Municipality was formed.Before that Bolpur was a rural area, some area like Bandhgora, Bolpur, Makarampur were merged and made a municipal settlement called Bolpur Municipality. Being a rural area the settlements were not planned and also the roads were narrow some where it is too much.

So researcher observes that there are no footpaths and that's why the common people walks through the main road, if a big vehicle enter traffic problem will arise. Mainly at the office time, the people of this town facing a big traffic problem. Some roads like station road, Ramkrisna road, Chowrasta, Chitra more etc. are very congested. From long time the side of the roads and drains are occupied by the hawkers and illegal shops.

In recent days District administration and Bolpur Municipality, taking action against the illegal constructions. They are trying to recover the roads, drains, and govt. properties. In both sides of the 25% of the road were occupiedby the hawkers. If the road will restored many problems will solved.

Key Words- Rural, Municipality, Traffic problem, Illegal Construction, Footpath.

Introduction

A settlement pattern is defined as the distribution of buildings and houses in a geographic region.Pattern of settlement has been defined by Emrys Jones, as the relationship between one house or building and another and to isolate this relationship he refers to a large scale map .He thinks that often pattern is cleared to site and site may have little or no bearing on pattern.

Bolpur is a city and a municipality in Birbhum district in the state of West Bengal, India. It is the headquarters of the Bolpur subdivision. Bolpur municipal area includes Santiniketan, Sriniketan,Makarampur, Layek Bazar , Surul ,Muluk and Prantik. It includes 22 wards. The city is known as a Cultural and Educational hub of West Bengal.

Bolpur was a small rural town prior to the 20th century. Its geographical location 145 KM away north from Kolkata situated at the south border of Birbhum District, The main economic activities of the people of Bolpur at that time were purely based on agriculture. There were 19 (nineteen) rice mills in this small town at that time; some of the mills are still functioning today.

Bolpur town was connected with rail line from Howrah (Kolkata) to Sahibganj loop line constructed by the East India Company in the year 1859. This rail line divided the Bolpur town into two parts. The east part of the town was the main economic / business centre of Bolpur &called as Old Bolpur, from every side of the Bolpur town is growing rapidly. The Bolpur Town is growing faster with the rhythm as the Santiniketan grows now. Bolpur is became an educational hub not only educational hub but tourist hub also.

Some eminent personalities, educationalists, social workers of Bolpur had also played a great role for the faster and rapid development of Bolpur town. With the endless efforts few educational institutions, Colleges, Town Library, Primary Health Center, Basic Primary School, High Schools and in recent age one state University and a Public university and a Medical College were established in the out skirts of Bolpur town.For giving better civic amenities to the people of Bolpur Union Board Office was established in the year 1921. The Bolpur town was declared as Municipality from Union Board in accordance with the provision of the West Bengal Municipal Act 1932 with a notification issued by the then local self Govt. (L.S.G) Government of West Bengal with effect from June 1950.

Statement of Problem

The main problem of the area is congestion of roads, the main road named Bolpur chowrasta is very congested, and there is footpath from chowrasta to hat tala. Netaji road is so narrow near Dangalai Kali tala more .On the other side Dangali kali tala more to Horogouritala road is also narrow.From the eastern part of lalpul to Trisula patty road is also narrow, apart from this road is also very busy the turn near electric substation is dead end. At Chitra more the road condition is very poor this part of the road is wide but

different types of vehicles, building materials block the sides of the road, so in this part traffic is very slow in all time. There is no alternative road between sayambati to Bolpur station, sothose people who want to go to Bolpur station they are facing big problem day by day.

In this town we see there are no footpaths and that's why the common people walks through the main road, if a big vehicle enter traffic problem will arise. Mainly at the office time, the people of this town facing a big traffic problem. Some roads like station road, Ramkrisna road, Chowrasta, Chitra more etc. are very congested. From long time the side of the roads and drains are occupied by the hawkers and illegal shops.

Literature Survey-

Roy. A. (2018) studied "Settlements pattern" The Author observed that A settlement pattern comprises the physical distribution of a population, spatially and over time. It reflects the impact of basic ecological interactions as well as social and cultural factors that influence spatiotemporal order.

Harris. C.D. (1970) studied " Cities of the Soviet Union) The Author observed that the Soviet Union is rapidly becoming a land of great cities, Moscow with more than 4 million inhabitants Leningrad with more than 3 million are among the great cities of the world.

This paper is a study of growth , functions, distribution of the cities of the soviet union . Since the 1939 census of the soviet union has enlarged its territory annexation of a strip on a western border

Dey .F. (2016) Studied "Changing pattern of settlement structure in rural West Bengal"He found the Temporal effect over spatial dimension has been a long standing issue for the geographers to study settlement pattern both in rural and urban areas across the world.

Objective of the Study-

1) To understand the width of road in relation to traffic frequency.

2) Uncover the problem, Policy, and action programme.

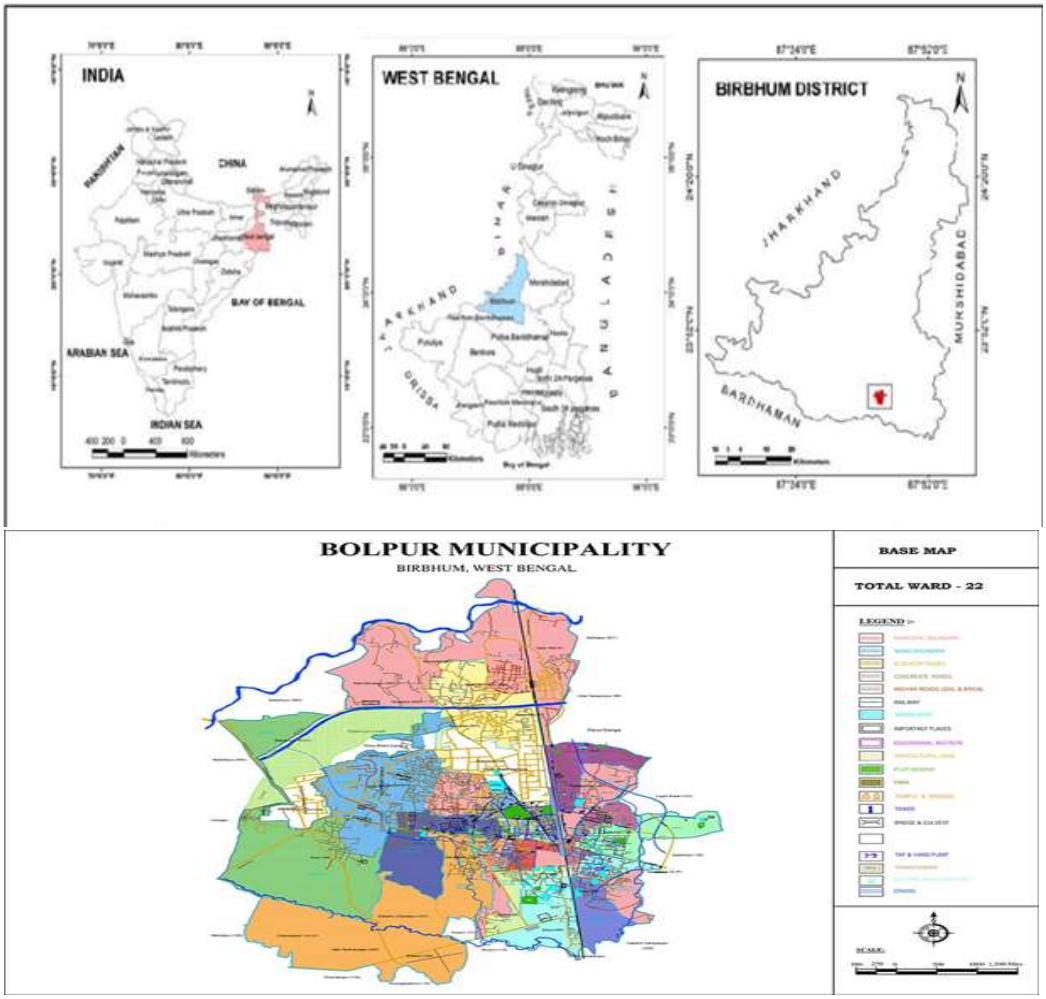
Data Base-

Research Methodologyis the specific procedures or techniques uses to identify,select,process, and analyze information about a topic. this study has been done on the basis of primary data collected through survey, face to face interview on the base of some common people of Bolpur Town.

Location of the study area-

Bolpur is a city and a municipality in Birbhum district in the state of West Bengal, India. It is the headquarters of the Bolpur subdivision. Bolpur municipal area includes Santiniketan, Sriniketan,Makarampur, Layek Bazar , Surul ,Muluk and Prantik. It includes 22 wards. The city is known as a Cultural and Educational hub of West Bengal.

Bolpur is located at 23.67°N 87.72°E.Bolpur covered an area of 35.94 km^2 (13.88 sq mi). In the map of Bolpur-Sriniketan CD block on page 718 of District Census Handbook Birbhum (Part A), while the area covered by Shantiniketan is shown as a part of Bolpur, Sriniketan is shown as a part of Surul, a census town.



Location Map of Bolpur Town

Discussion-

Researcher has visited 12 major roads of Bolpur town. This survey reflects the old and unplanned settlement Pattern and roads of this town. It is a famous educational and cultural town all over India.

Analysis-

from the ancient age the settlement was dispersed because all over the town jungles and bushes over there. After that the people were concentrated at Kalikapur, Makarampur, ukil patty, Nichupatty, Suri Para. When Sahebganj loop line was introduced, people were settled Hat tala, Kachharipatty ,Nildanga. When VisvaBharati University was formed the town was increased rapidly. The people from various places came to settled here.In this time Union Board was formed.After 30 years Bolpur Municipality was formed with 12 wards, now the size of the town extend and the number of ward increase into 22.

Table- 1

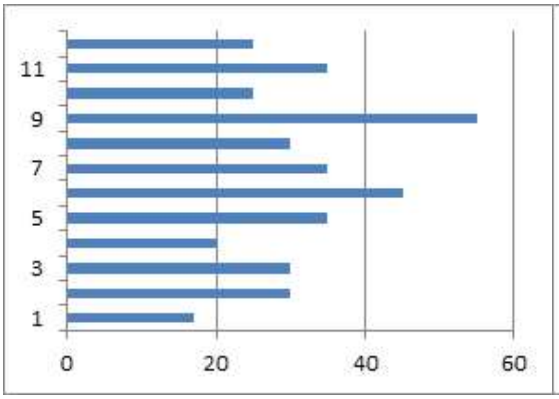
Road Mark	Width (In Feet)	Length of the Road (In feet)
Chowrasta- Rail Station	17- 22	2600
Chowrasta- Bandgora	30-35	3200
Chowrasta- santiniketan Post Office	30- 35	8000
Chowrasta- NichupattyAratiCenema Hall	20-25	4200
ChitraCenema Hall - Layek Bazar	30-35	11500
Bolpur Tourist Lodge- Jambuni Bus Stand	45-50	3200
Jambuni Bus Stand - Sriniketan Bazar	35-40	7500
Trishula Patty- Dangali Kali tala	30-35	3200
Lalpool - Makarampur check post	30-35	5900
Jambuni - Kashipur Bypass	55-60	5300
Kashipur By pass- Rail Station	25-30	4000
NichupattyAratiCenema Hall - Layek Bazar	25-30	3200

Source: Field Survey

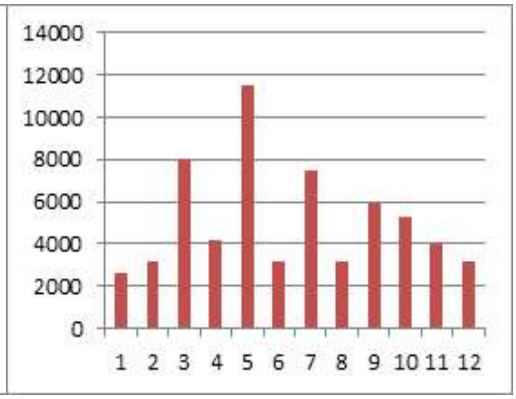
Table- 2

Road Mark	Foot path (In Feet)	Footpath occupied (In feet)
Chowrasta- Rail Station	4	3
Chowrasta- Bandgora	20	12
Chowrasta- santiniketan Post Office	20	10
Chowrasta- NichupattyAratiCenema Hall	6	4
ChitraCenema Hall - Layek Bazar	8	4
Bolpur Tourist Lodge- Jambuni Bus Stand	14	6
Jambuni Bus Stand - Sriniketan Bazar	16	6
Trishula Patty- Dangali Kali tala	6	3
Lalpool - Makarampur check post	6	3
Jambuni - Kashipur Bypass	8	4
Kashipur By pass- Rail Station	8	4
NichupattyAratiCenema Hall - Layek Bazar	10	4

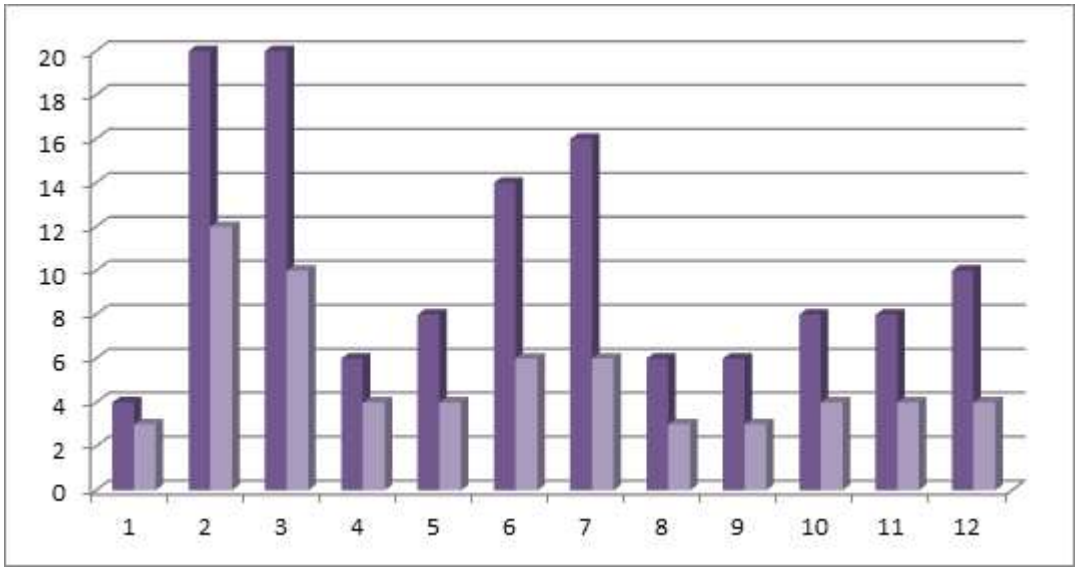
Source: Field Survey



Width of Roads (In Feet)



Length of Roads (In Feet)



Width of Footpath and Foot path Occupied by the people

Major Findings-

In this table we can see the width of the roads are not so much except the Jambuni Bypass road.The station road is to much narrow in width,the houses beside the road is too old and the road is always very busy because of railstation and daily market.Every class of people use this road for their own purpose.There is no footpath and hawkers sail their products by occupying the road side e-rickshaw,bikes,cycles make this road always congested.

At Netaji road near Dangali Kalitala more and Chowrasta, these roads are also congested most of the time mainly in the office time.Because

more than three roads join in this place. Chowrasta is the main central area of the town for various things.Always two-three traffic police maintain the traffic.Here we can see linear pertain of settlement beside the road the settlements are very closed to each other.

The width of Santinikatan road and Sriniketan roads are good but the illegal hawkersoccupai the footpath and these roads become narrow. In front of Primary Health Center and Bolpur Girls High School at Srinikatan Road and near Electricity office at Chitra more one-third road were occupied by the hawkers,they also occupied the main drains so the water cannot pass through,so in all raining time the area was logged by dirty water

At Chitra more to Makarampur and Trishulapatty, the roads mainly occupied by the toto, auto and the building materials. In those place (Chitra more and Makarampur)the road conditions are to worst basically in these roads the people make height infront of their houses and shops,there are no high drains so in the raining time the roads getting water logged and the peoples facing big trouble to go through the road the accident probability in this road are very much high for the bad road condition.

At Jambuni to Srinikatan and Jambuni to Lodge more the width of the roads are quite well the settlements are planned,some new houses add flats are going beside the roads.High drains are also there.

Jmabuni to Kasipur bypass (RabindraBithi Bypass) is new in respect to other roads. These a two way road and it is the bypass road of Ilambazar and Durgapur, the road is well maintained.

Arati more to Lyek bazar is also a bypass road of Bolpur,Palitpur people who coming through Palitpur road they omit the narrow, congested Netaji road Chowrasta in some area if a big vehicle enter the road will blocked apart from this totos also make traffic jam by moving whimsical. when trains come the traffic would slower after some time it would be normal.

Being a rural area at a time the roads of Bolpur are not much good in width but the administrative body always try to give facilities to the people of Bolpur. The road condition is much better.The sub roads are concrete,the footpaths are furnished with tiles,everywhere street lights are shown footpaths are recovered by the municipality from the illegal hawkers they demolish illegal construction and making footpaths for the walkers the occupied also restore and cleaned up.For a longtime the covered drains are cleaned so in every heavy rain the whole town are water logged

I think there is also a big problem in waste management. There are some open vats all over the town,The vats and dust bins are not cleaning every day so the garbage scattered here and there.

Some road condition at Bolpur


Congested roads at Bolpur


Demolishing Illegal construction by Pay loader at Bolpur


Road sides are cleaning after demolishing illegal constructions

Policy Measure-

1) The road should maintain properly.

2) Waste management should be done in daily basis.

3)Cleaning of sewage.

4) Street light should maintain.

5) To think about the evacuated hawkers. They should rehabilitated by the administration body.

Conclusion-

Researcher observed that the illegal hawkers who were evacuated by the administrative body, they further sit beside the road.

The number of E-rikshaw has been increase enormously. More than 2500 E-rikshaw are in the town. They do not maintain the traffic rules so the people are facing problem for them. This huge figure of the vehicle is the head ache for Municipality and administration. if it is not maintained people will face big trouble.

Apart from these problems the town is growing faster .The people enjoying many facilities. Shopping malls, amusement parks, recreation and amenitycenters, English medium schools,Colleges, University, medical collegehave been created.

That's why we can say social well being of the people of this town is good enough, and day by day the town is developing with newly features and facilities. In future town will convert into world class city.

Acknowledgement-

I would like to extend my sincere and heartfelt thanks towards all those who have helped me in completion of the present publication work. I owe my deepest gratitude to my Supervisor Dr. Subhasis Mondal whose inspiration, guidance, stimulating encouragement and suggestions throughout the entire course of this investigation enabled me to accomplish this study.

I also acknowledge with a deep sence of reverence, my gratitude towards the people of Bolpur for their valuable suggestions given to me in completing this publication work.

Reference-

1) https://bolpurmunicipality.org

2) Mukhopadhhay.S. Bolpur ekti sohorer itibrittya (1991) Kolkata. pp51-54

3) Roy.B. Birbhumi Birbhum.VOl-4 Deep Publication.Kolkata. pp238-240

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Changing Pattern of Literacy in Belagavi City-A Spatio-Temporal Analysis

- Dr. M. S. Kurani
Associate Professor of Geography, RPD College, Tilakwadi, Belagavi

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract :

Literacy rate is the literate population of the age group 7 years and above divided by the total population of the same age groupThe census of 2011 reveal that there has been an increase in literacy in the country. The literacy rate in the country is 74.04 per cent, 82.14 for males and 65.46 for females. Kerala retained its position by being on top with a 93.91 per cent literacy rate, closely followed by Lakshadweep (92.28 per cent) and Mizoram (91.58 per cent).

In the present study we have made an attempt to analyse and understand to decadal variation of literacy ratio and also to understand the ward wise pattern of literacy in the study area.The required data for present study have been obtained by both primary and secondary source.

Keywords- Literacy ratio, Urban growth, Demographic processes, Education standard

Introduction

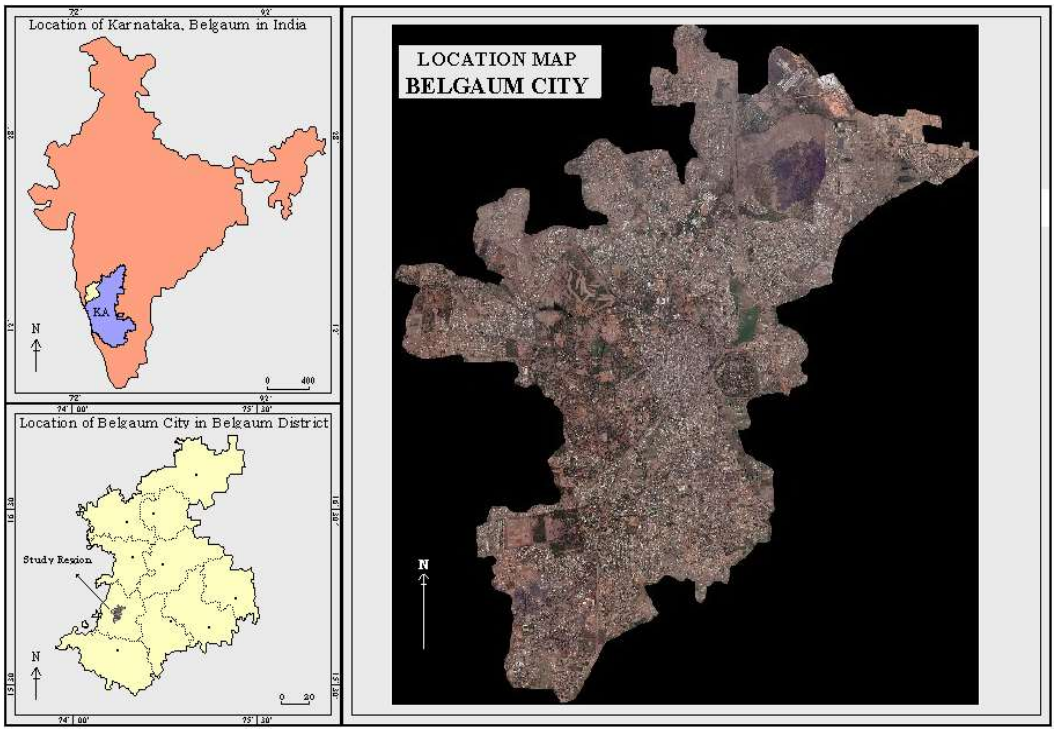
The population commissioner of the United States Considers the ability to both read and write a simple message with understanding in any language a sufficient base for classifying a person as literate.

Literacy is essential for eradication of poverty and mental isolation, for cultivating peaceful and friendly international relations and for permitting the free play of demographic processors (chandana and sidhu 1980) Illiteracy on the other hand takes away from man his dignity, perpetuates ignorance, national relations and free democratic process and hamper social advancement, economic growth and political maturity

II. AREA UNDER STUDY

Belgaum is referred to as “venugram” (bamboo village) in the early inscription of 12th and 13th centuries . It is located in sourth western part of Belgaum district and extended between 15 - 15’ north latitude to 74 -31’ east longitude at an height of 710 mtrs above the mean sea level . the total geographical area of the city is about 94.08 sq.kms , It is fifth biggest city among the cities of Karnataka state in terms of area and poplutation and also district and divisional head quarters of the state.

Fig No **1 Area Under Study**



Objectives

. The study has following objectives.

1. **To Know the decadal variation of Literacy ratio in Belagavi city**
2. **2.To analyze ward wise pattern of literacy ratio in the study area.**

Data Source And Methodology

The present study is aims at to know the **d**ecadal variation of Literacy ratio in Belagavi city and also to analyseward wise pattern of literacy ratio in the study area. The required data for present study have been obtained by

both primary and secondary sources. The primary is collected through field observation and survey. The collected data have been classified, processed and presented in the form of charts, maps and graphs by applying cartographic skills.

Decadal Variation Of Literacy In Belagavi City:

In the present study an attempt has been made to understand the growth of literacy in Belgaum city as well as Belgaum cantonment from 1961 to2001. The growth of literacy is one of the important indicators of urban growth.In 1961 the effective literacy of Belgaum city was 57.54per cent out of which, male literacy rate (62.62%) was more than the female literacy (37.37%). For the year 1971 the total literates were 1,17,179 persons out of which were 60.37 per cent male literates and 34.96 per cent female literates in the city

Decadal Variation of Literacy in Belgaum City (Mc) 1961-2001

(Fig in Bracket indicates percentage)

Decades	Total Pop	Literates			Illiterates		
---	---	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
1961	1,27.885	46,087 (62.62)	27,507 (37.37)	73,594 (57.54)	21,692 (39.95)	32599 (60.04)	54291 (42.45)
1971	1,92,427	70,750 (60.37)	46.429 (39.62)	117179 (59.69)	30840 (40.98)	44408 (59.01)	75248 (39.09)
1981	274430	105781 (58.78)	74158 (41.21)	179939 (65.56)	37670 (39.86)	56821 (6.13)	94491 (34.43)
1991	326399	131454 (56.56)	140554 (43.43%)	232380 (71.19)	37500 (39.88)	56519 60.11)	94019 (28.80)
2001	399653	167741 (54.40)	140554 (45.59)	308295 (77.14)	36857 (40.34)	54501 (59.65)	91358 (22.85)
2011	432000	200000	180000	380000 (87.96)	30000 (57.69)	22000 (42.31)	52000 (12.04)

Source: (Census of India, Percentage is computed by researcher).

Source: (Cantonment Board, Percentage is computed by researcher)

During 1981, Belgaum city had 1,79,939 (65.56%) literates, out of which 55.56 per cent male and 39.86 percent female literates in Belgaum city.

During 1991, the total literates increased to 232380 (71.19%) persons, this was mainly due to introduction of new schools and reform in education policy. Out of 71.19 per cent of literates 56.56 per cent of literates belong to male population and 43.43 per cent were female literates. Again by 2001 the number of literates increased to 30,8295 persons. Out of which, 54.40 per cent belong to male literates and 45.59 per cent are female literates.during 2011 the literacy is increased to 87.96 percent in the study area.

Generally the female population in the city has increased from 1961-2001. The growth in the literacy ratio of male & female was due to growth of educational institutions. The growth in the female literacy was due to the support from government and parents also.

Pattern Of Ward Wise Literacy Ratio In Belgaum City:

In the present analysis an attempt has been made to understand the ward wise Literacy ratio of Belgaum city during 2001..

According to 2001 census there were 308295 literates of which 167,741 males (54.41%) and 140554 Females (45.59%) in the city. In the study literacy of Belgaum city has been continently classified into five categories on the basis of literacy rates. The classified categories are namely, Areas of very High literacy, Areas of high literacy, Areas of very medium literacy, Areas of low literacy and Areas of very low literacy.

1) AREAS OF VERY HIGH LITERACY.

There are two wards under the category of very High literacy ratio in the city namely ward No 6 and 7. In ward 6 the literacy rate was about 86.49per cent, out of which 87.96per cent male and 52.95 per cent female literates. Whereas ward no.7 the literacy ratio was 87.96 per cent, which was, the highest literacy ratio among all the wards in the city. Out of 87.96 per cent of total literates 51.39 per cent male and 48.60 per cent female literates. These wards comprises the areas of Bhagyanagar, RPD college road, and Tilakwadi. This high literacy rate was mainly due to high-class people and most of them are literates.

2) AREAS OF HIGH LITERACY.

The wards falls under this category are having literacy rates ranging from 81.00 to 85.0 per cent It includes wards of 32 (84.94%) 15(84.89%) 31 (84.81) 16 (84.47) 43(83.21%) 22(83.20%) 33(83.12%) 8 (82.91%) 25(82.59%) 53(82.54%) 14(82.47%) 42(82.33%) 38(81.89%) 24(81.38%) These wards comprise the areas of chougulewadi, Lingraj college area,

Hanuman Nagar, T.V Centre area Railway Station shahapur, V. Nagar, court area etc.

High literacy in those areas mainly due to the fact that most of these wards are also inhabited by the Educated & the rich class families and also concentration of schools and colleges, other infrastructural facilities besides these are developed in residential areas.

3) AREAS OF MEDIUM LITERACY.

23 wards fall under the category of areas of Medium Literacy with literacy rate ranging from 76.00 per cent to 80.00 per cent. The name of the wards are included in this category are ward No 2(79.39%) , 3(78.41%) 4(77.25%) 10(77.25%) 18(77.39%) 36(75.82) 40(75.66) 44(79.78) 46(79.83) 51 (78.27) 17(80.86) 27(80.09) 28(80.90) 39(80.33) 41(80.31) 45(80.14) 47(80.78) 50(80.53). (Fig No 3.5)

Medium density in these wards are mainly due to the fact that they are inhabited by medium class people and covers older part of the city.

4) AREAS OF LOW LITERACY.

Two wards fall under the category of Areas of Low literacy rate with rate of 71.75 per cent. Ward No 52(70.93) 54(70.37) 35(70.31) 1(71.01) 13(71.74) 30(72.81) 21 (73.48) 13(73.71) 37(73.91) 49(74.73) 9(74.80) are the important wards fall in this category.

5) AREAS OF VERY LOW LITERACY.

There are 8 wards falls under very low literacy ratio of less than 70.0 per cent literacy, ward no 5(69.80) 12(68.09) 20(67.10) 55(69.02) 56(61.59) 57(68.67), 58(69.04) and 48(62.12).

Very low literacy rate have been observed in these wards are mainly responsible for older part of the city area and recently some villages have been included in the city area.

Conclusion

It has been observed from the present study analysis that the literacy in the study area is incresed tremendouly mainly due to the growth of the educational institutions and awreness amont the people.The female literacy ratio in the city has increased from 1961-2011. The growth in the literacy ratio

of male & female was due to growth of educational institutions. The growth in the female literacy was due to the support from government and parents also.

References

A Weber (1969)	The growth of cities in 1954-century New York, Greenwood presses publishers.
Janaki V.A (1967)	Some aspects of population pattern in different functional groups of town in Gujarat, Geography research paper series No. 3 M S University Baroda
Jogendra Sahai (1980)	Urban complex of an industrial city, Chugh publication Allahabad 1980, PP.223
Jatashankar Verma (1985)	Population migration in relation to economic development in Gorkhapur – National association of geographers India, May 1985, PP 109
Kammar K.L (1995)	Growth of an industrial town – Dandeli – M. Phil dissertation Karnataka University Dharwad.
Kumbhar A.P (1999 – 2000)	Growth pattern of Satara town – A case study of Khindawadi Suburb – A research project
Mehta S (1967)	India's rural female working force and its occupational structure, The Indian geographers Vol No.12, No.1 - 2
Munshi S.K (1972)	Spatial and temporal disparities in urban growth in West Bengal – Geographical review of India Vol No.34
Mohan, Rakesh & Chandrashekar Panth (1982)	Morphology of urbanization in India, some results from 1981 census – Economic and political weekly Vol No.17
Mehto Kailash (1985)	Spatial pattern of population growth - a case study of Eastern India – journal of NAGI – May 1985, PP.107
Mondel P.B. (1982)	"Spacing of Urban Places in Bihar" Indian Geographical research Billetin No.2, 1982..

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Analysis of Long-Term Rainfall Trends and Hydrological Extremes in Santhal P Ragana, Jharkhand.

*** Deepika Bharti, ** Suryadev Pushpam, ***Abhay Krishna Singh, ***Surajit Dutta.**

University Dept. of Geography, Dr. Shyama Prasad Mukherjee University, Ranchi, Jharkhand.

Received Paper: 01/05/2024 Edited Paper: 15/05/2024 Accepted Paper: 11/06/2024

Abstract

Climate Change and its impact is not a global issue. It has diverse impacts which affect the ecosystem and human existence. Climate change has an impact on ecosystems and human existence, including floods, groundwater potential, and commercial exploitation. Variability in rainfall is necessary for real-time observation and forecasting of flooding incidents. Over 80% of India's yearly precipitation occurs during the monsoon season, yet climate change has affected over 68% of the country's land area. Remote sensing and GIS-based research have enabled comprehensive accounts of land use change data and land transition. The tropical monsoon zone influences climate and agriculture, with high R2 values indicating linear rainfall and low R2 values indicating non-linear rainfall. The present study is an attempt to analyze how rainfall is crucial, particularly for agriculture and the Indian economy in general.

Keywords: Rainfall, Long-term, Hydrological Extremes, Climate, Crop, Land use, Land Transition.

Introduction:

The main supply of water in India is rainfall, which is seen as vital to the country's economy, particularly for agriculture. Rainfall is still a major factor in the agricultural productivity of over 60% of India. It is believed that rainfall is a significant hydrological phenomenon. It is a climate parameter that determines the number of organisms, the flora and fauna, and every facet of the ecological system (Obot et al. 2010). The main natural variables influencing people's lives and economies are rainfall patterns, amounts, and variability (Gadgil, 2002).

Because rainfall is one of the most significant and noticeable atmospheric phenomena and has a direct bearing on the survival of all forms of life, it has always drawn the greatest interest from natural philosophers and meteorologists (Pant and Rupa Kumar, 1997).

Long-term average weather patterns, which include temperature, humidity, wind, precipitation, atmospheric pressure, and the number of air particles, are referred to as climate. Global concerns about climate change include its effects on ecosystems and human existence. Rainfall type and distribution in catchments impact floods, groundwater potential, and commercial exploitation. In India, the southwest monsoon impacts Kharif and Rabi crops, while positive spatial correlation increases insurer losses and costs of maintaining reserves. Variability in rainfall is necessary for the real-time observation and forecasting of flooding incidents. Variations in precipitation patterns make long-term output reductions and short-term crop failures more likely, endangering the world's food security. India receives more than 80% of its yearly precipitation during the monsoon season; throughout the past century, precipitation has decreased over 68% of the country's land area.

Predicting when it will rain is difficult, particularly in the current world where global warming is an issue. Earth's changing albedo, which causes more air to sink and less precipitation, is linked to micro-level climatic changes in terms of temperature and rainfall patterns. Comprehensive accounts of land use change data and land transition throughout time, tracking its relationship with rainfall and temperature, have been made possible by remote sensing and GIS-based research. Urbanization and population growth are unavoidable, but they can be controlled with careful planning and administration for the benefit of human civilization.

Objective:

To examine the monthly, seasonal, and annual long-term temporal variations of rainfall in Santhal Pargana.

To assess rainfall patterns and instances of extreme precipitation in the Santhal Pargana.

Study area:

As the name signifies, Santal Parganas has a rich historical past to be proud of. The British administration designated the region in 1855 to commemorate the historic "Santal Hul" or "Santal Resurrection." The term

"Santhal" refers to a significant tribe that resides in the area, and "Pargana" is a Persian administrative unit that was mostly utilized by medieval kings. These two phrases combine to form the name Santhal Pargana. Six district administration entities, referred to as the divisions of Jharkhand state in eastern India, make up the Santhal Pargana division. One of Jharkhand's divisions is Santhal Pargana. Its main office is located in Dumka. Six districts currently make up this administrative division: Godda, Deoghar, Dumka, Jamtara, Sahibganj, and Pakur.

Location Map of the study area

Methodology :

Fig. 1

The six districts that make up the Santhal Pargana region—Godda, Deoghar, Dumka, Jamtara, Sahibganj, and Pakur—were the focus of the present study. In the Santhal Pargana, long-term temporal rainfall variability and extreme rainfall events were studied using annual, seasonal, and daily precipitation data. The seasonal precipitation data covered the summer months of March to June, the monsoon months of July to October, and the winter months of November to February.

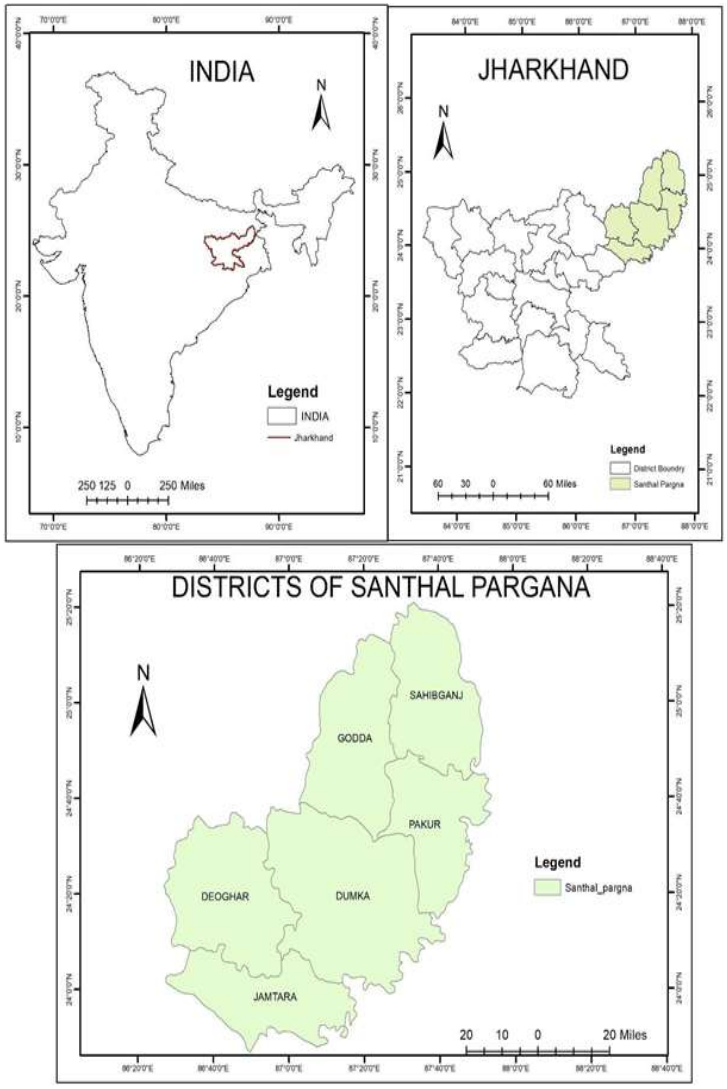


Table 1.- provides state-specific rainfall data along with information on data sources and periods.

Table 1.- lists the sources of rainfall data for the various Santhal Pargana districts.

Sl. No.	Name of Districts	Period	Data source
1.	Godda	1951-2022	IMD
2.	Deoghar	1951-2022	IMD
3.	Dumka	1951-2022	IMD
4.	Jamtara	1951-2022	IMD
5.	Sahibganj	1951-2022	IMD
6.	Pakur	1951-2022	IMD

Source: Indian Meteorological Department.

The Indian Meteorological Department (IMD) has provided district-specific statistics for the years 1951–2022. The source of this IMD data was Climate Research & Services, Pune (imdpune.gov.in). Seasonal and monthly rainfall data were analyzed using the districts of Godda, Deoghar, Dumka, Jamtara, Sahibganj, and Pakur in Santhal Pargana for the years 1951–2022. Statistics, namely the average and the R2 coefficient of correlation using graphs. ArcGIS 10.4 has been used to extract point data from this gridded data. These points' latitude and longitude are listed in Table 2. To analyze the daily rainfall data, the total number of wet days, heavy rainfall days, and extremely heavy rainfall days for each year were counted. According to Balling et al. (2016), a daily rainfall analysis classifies rainfall that is greater than or equal to 10 mm as heavy rainfall and more than or equal to 20 mm as very heavy rainfall.

Table: 2. Shows the longitude and latitude of the extreme rainfall study region.

Sl. No.	Name of Districts	Location of point data	Longitude	Latitude
1	DEOGHAR	DEOGHAR HQ	86°41'40"E	24°29'17"N
2	JAMTARA	JAMTARA HQ	86°48'49"E	23°57'15"N
3	DUMKA	DUMKA HQ	87°14'46"E	24°16'05"N
4	GODDA	GODDA HQ	87°12'07"E	24°50'00"N
5	SAHIBGANJ	SAHIBGANJ HQ	87°38'11"E	25°14'30"N
6	PAKUR	PAKUR HQ	87°49'58"E	24°39'06"N

Result and Discussion:

Analysis of Santhal Parganas seasonal and monthly rainfall

The average and standard deviation of the monthly rainfall analysis for the Santhal Pargana region from 1951 to 2022 were computed. July saw the highest average, while December saw the lowest average. It demonstrates that there is low rainfall in December and heavy rainfall in July. The months of July and December saw the maximum and least SD, respectively. It demonstrates that rainfall is less consistent in July and more consistent in December (Table 3).

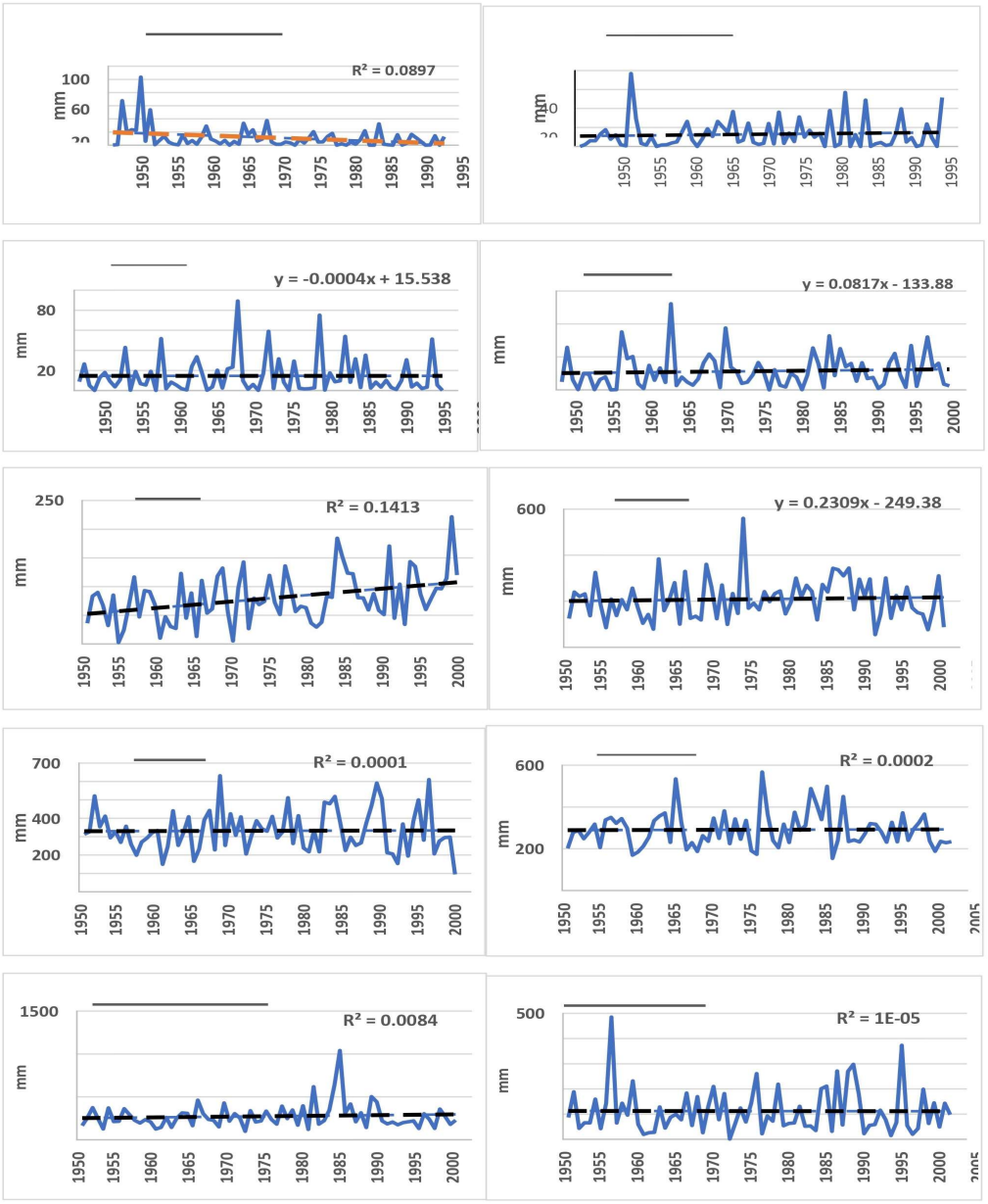
Table: 3. Monthly rainfall analysis of the Santhal Pargana region (1951-2022).

S.NO.	Month	Average	SD
1	Jan	11.210	7.54
2	Feb	12.842	5.91
3	Mar	14.651	7.63
4	Apr	28.314	18.49
5	May	80.041	26.00
6	Jun	209.308	26.26
7	July	331.704	44.05
8	Aug	291.002	34.82
9	Sep	273.740	56.52
10	Oct	111.772	29.62
11	Nov	9.216	10.24
12	Dec	4.177	5.35

Source: Indian Meteorological Department.

The monthly analysis was conducted between 1951 and 2022 The years with the highest and lowest rainfall in January are 1957, 1976, 1990, 1999, 2006, 2007, 2018, and 2021. 1961 saw the most rainfall in February, while 1951, 1974, 1999, 2001, 2004, 2006, and 2017 saw the least amount. The year 1982 saw the most rainfall in March, while 1966 saw the least amount in 2022. The years with the most and least rainfall in April were 1971, 1960, and 1989. The years with the greatest and lowest May rainfall were 2021 and 1957, respectively. The year 1968 saw the most rainfall in June, while 2009 saw the least. The month of July saw the most rainfall in 1977 and the least in 2022. The years with the most rainfall in August were 1987 and 2000. The months with the most rainfall in September were 2000 and 1982. The years with the most and least rainfall in October were 1959 and 1981, respectively. The most

rainfall in November was recorded in 1995. The year 1991 had the most rainfall in December. In May, the R2 value was high, indicating that the rainfall during that month was linear. In January, February, March, April, June, July, August, September, October, November, and December, the R2 value is low, indicating that the rainfall during those months was non-linear. The pace at which the slope changes is highest in March, indicating a high rate of variation in rainfall, and lowest in September, indicating a low rate of variation in rainfall.



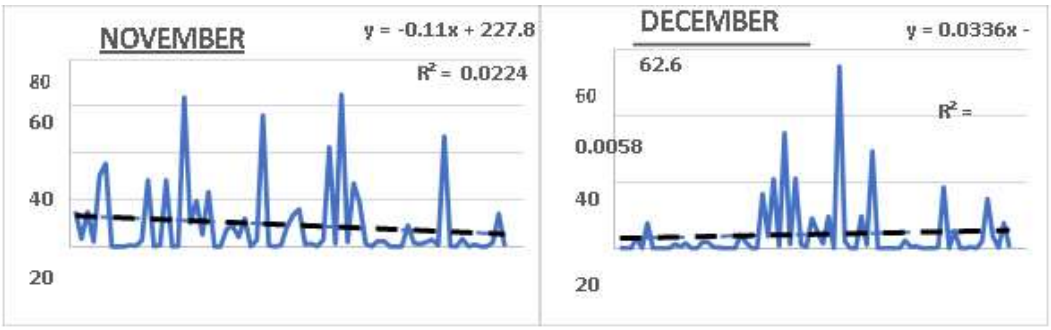


Fig. 2. Average monthly hyetograph of Santhal Pargana (1951-2022)

The trend line in the Santhal Pargana seasonal study for the years 1951–2022 indicates that there was an increase in rainfall during the summer season. The year 1984 saw the highest rainfall, while 1972 saw the lowest. The trend line for the monsoon indicates an increase in rainfall between 1951 and 2022. The year 1999 saw the most rainfall, while 1966 saw the least. The trend line indicates a modest decrease in rainfall throughout the winter season between 1951 and 2022. Rainfall peaked in 1927 and decreased in 1999.

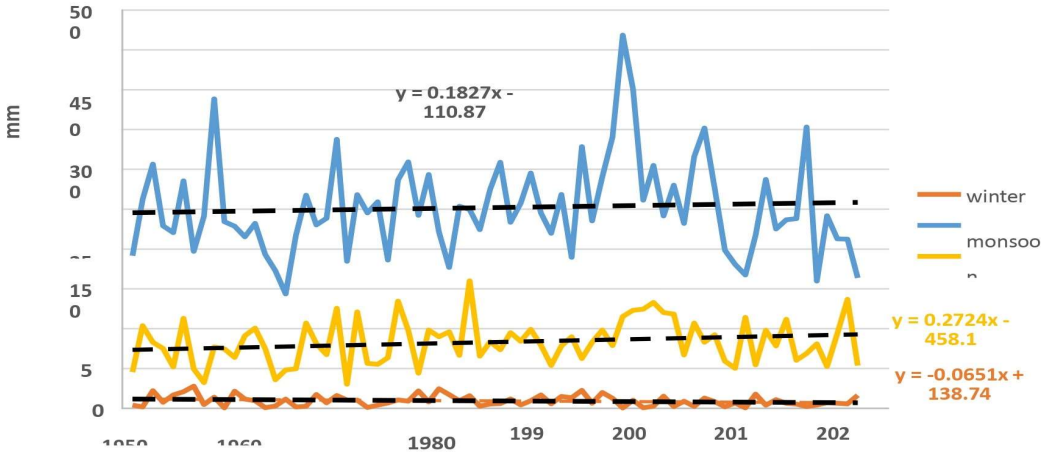


Fig. 3. Variation in average seasonal hyetograph of Santhal Pargana (1951 to 2022).

The summer season had a higher R2 value, indicating linear rainfall from 1951 to 2022, whereas the monsoon season had a lower value, indicating non-linear rainfall. Higher slope change rates during the summer correspond to higher rates of rainfall, while lower slope changes during the monsoon correspond to lower rates of rainfall.

DECADAL VARIATION IN RAINFALL OF SANTHAL PARGANA DISTRICT'S

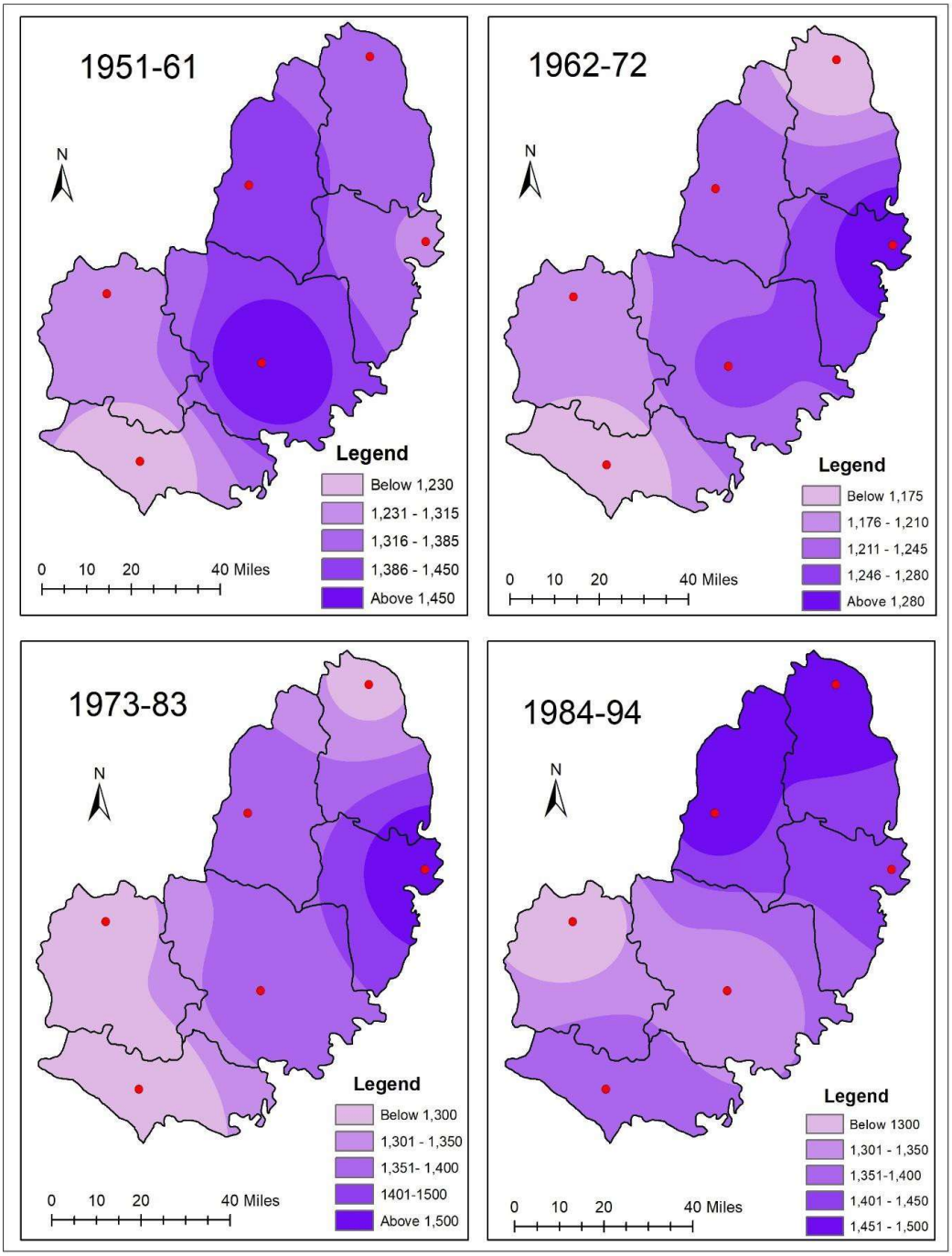


Fig. 4. Maps showing the variation of rainfall from 1951-1994

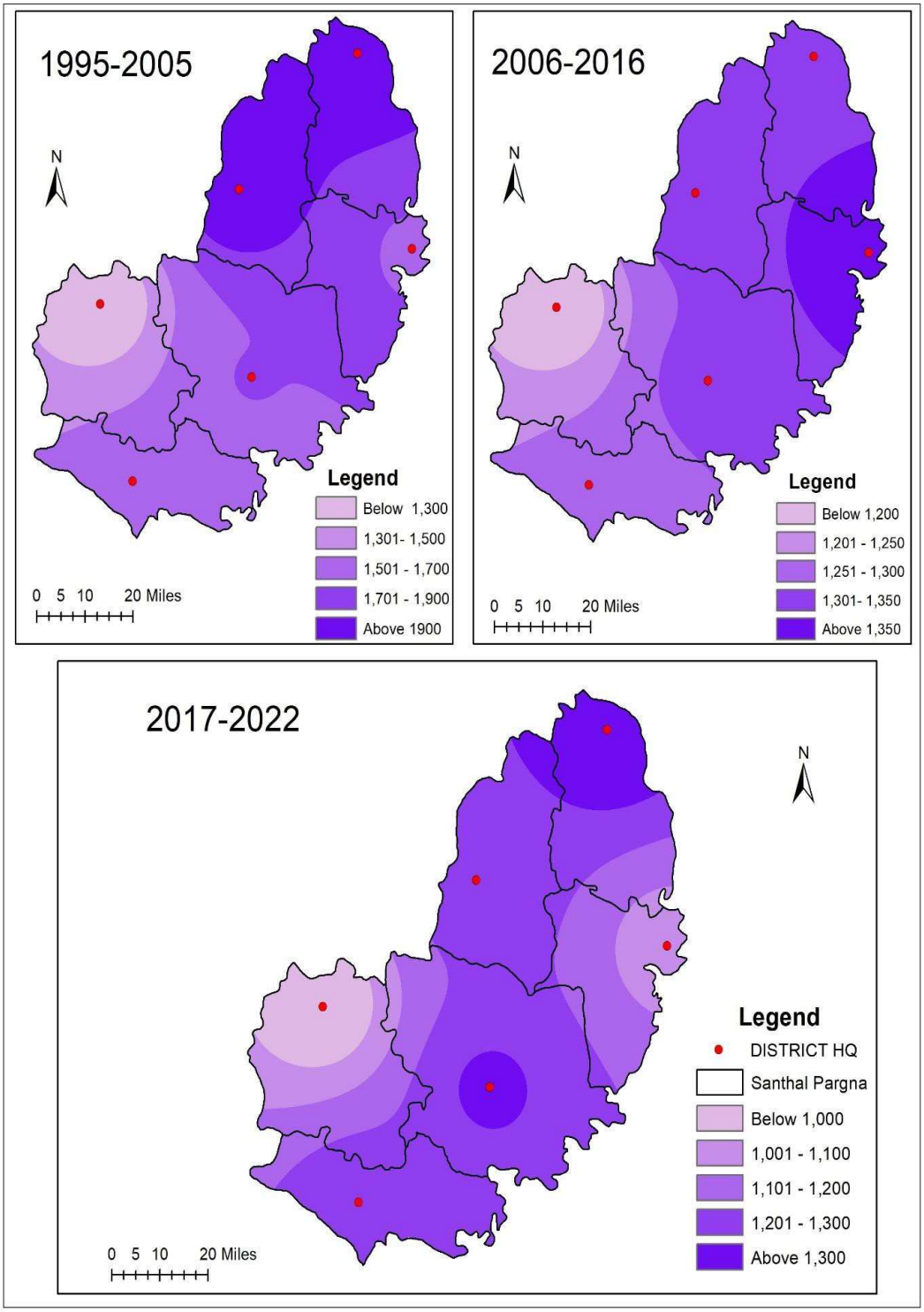


Fig. 5. Maps showing the variation of rainfall from 1995 - 2022

Conclusion:

The tropical monsoon zone, which covers this area, significantly influences the type of climate and agriculture. In this area, the monsoon is critical to agriculture and related activities.

In May, the R2 value was high, indicating that the rainfall during that month was linear. In January, February, March, April, June, July, August, September, October, November, and December, the R2 value is low, indicating that the rainfall during those months was non-linear. The pace at which the slope changes is highest in March, indicating a high rate of variation in rainfall, and lowest in September, indicating a low rate of variation in rainfall.

R2 was larger during the summer, indicating linear rainfall from 1951 to 2022, and lower during the monsoon, indicating non-linear rainfall. The rate of change in rainfall is higher in the summer due to the higher rate of slope change.

References:

1. A. Abraham, N. S. Philip, and D. Steinberg, “Rainfall forecasting using soft computing models and multivariate adaptive regression splines”, IEEE Transactions: Special Issue on Fusion of Soft Computing and Hard Computing in Industrial Applications, February 2001

2. Cantelaube, P., & Terres, J. M. (2005). Seasonal weather forecasts for crop yield modeling in Europe. Tellus A: Dynamic Meteorology and Oceanography, 57(3), 476-487. https://doi.org/10.3402/tellusa.v57i3.14669

3. Dzupire, N. C., Ngare, P., & Odongo, L. (2020). A Copula-based bi-variate model for temperature and rainfall processes. Scientific African, 8, e00365.

4. Gadgil, A., 2002. Rainfall characteristics of Maharashtra. In: Diddee, J., S.R. Jog, V.S. Kale and V.S. Datye (Editors), Geography of Maharashtra. Rawat Publications. Jaipur, pp. 89-102.

5. Ghosh, S. (2010). Modeling bivariate rainfall distribution and generating bivariate correlated rainfall data in neighboring meteorological subdivisions using Copula. Hydrological Processes, 24(24), 3558-3567.

6. Kulkarni B.D. and Munot, A.A., 2002. Some aspects of inter-annual variability of rainfall over the Godavari River basin. Mausam, v. 52, pp. 233-248

7. Meher-Homji, V. M. (1994), ‘Climate changes over space and time: the repercussions on the flora and vegetation’, Paleobotanist 42, 225–240.

8. Mesbahzadeh, T., Miglietta, M. M., Mirakbari, M., Soleimani Sardoo, F., & Abdolhoseini, M. (2019). Joint modeling of precipitation and temperature using Copula theory for current and future prediction under climate change scenarios in arid lands (case study, Kerman province, Iran). Advances in Meteorology, 2019.

9. Nelsen, R. B. (2007). An Introduction to Copulas Springer Science & Business Media.

10. Obot, N.I., Chendo, M. A. C., Udo, S. O. and Ewona, I. O. 2010. Evaluation of rainfall trends in Nigeria for 30 years (1978-2007). International Journal of the Physical Sciences. v. 5, No. 14, pp. 2217-2222.

11. Olesen, J. E., & Bindi, M. (2002). Consequences of climate change for European agricultural productivity, land use and policy. European journal of agronomy, 16(4), 239-262. https://doi.org/10.1016/S1161-0301(02)00004-7

12. Pant, G.B. and Rupa Kumar, K., 1997. Climates of South Asia. John Wiley and Sons, New York.

13. Sarma, V.V.L.N., Murairishna, G., Hema Malini, B., and Nageswara Rao, K. (2001), 'Land use/Land cover change detection through remote sensing and GIS on Godavari delta region, its climatic implications', Journal of Indian Society of Remote Sensing 29 (1), 85–91.

14. Skees, J. R. (1999). Opportunities for improved efficiency in risk sharing using capital markets. American Journal of Agricultural Economics, 81(5), 1228-1233.

15. Zscheischler, J., Orth, R., & Seneviratne, S. I. (2017). Bivariate return periods of temperature and precipitation explain a large fraction of European crop yields. Bio geosciences, 14(13), 3309-3320.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Agricultural Productivity, Cropping Pattern and Sustainability of Arable Land of Case Study of A Village

Md Noor Hossain,
Research scholar, Dept. of Geography.
Seacom Skills University, Birbhum.

Dr. Subhasis Mondal,
Guide and Supervisor.

Received Paper: 01/06/2024 Edited Paper: 15/06/2024 Accepted Paper: 11/07/2024

Abstract :

Agricultural land use has decreased in Mayureswar village, the production has decreased compared to before, the soil has become acidic. Production of most farmers have decreased, while consumption has increased. The price of chemical fertilizer and pesticides, insecticides is increasing day by day and the quantity is decreasing. Excessive application of chemical fertilizers in Mayureswar is the main reason for the decrease in production of agricultural products. Large Farmers are increasing their profits but poor farmers are not. However, even if the production of large farmers is more, if it continues, this success cannot be sustained for long. So this village shows the importance of sustainable agriculture, which is important for future generation and public health. This paper shows the importance of using organic fertilizers instead of chemical fertilizers.

Keywords: Agricultural productivity, Bio Agriculture, Cropping pattern, sustainability, Arable land, fertilizer, Pesticides.

Introduction

Agriculture means cultivating plants and raising Animals. Agricultural productivity is a quantitative measurement of the capacity of agricultural land. Sustainable agriculture that focuses on producing long-term crops and having minimal effects on the environment. The study will focus on the crop type, cropping pattern, extension of sustainable agriculture and agricultural productivity of Mayureswar. The main purpose of this study is relationship between the Socio economic condition of the study area and cropping pattern. The entire region is dependent on agriculture. Primary economic activities are

the main source of income in this area. The economy of this region is dependent on agriculture. Agriculture is very difficult nowadays because the price of Manure means that the prices of fertilizers, pesticides, insecticides are increasing day by day. At the same time, the farmers have suffered greatly as the production has not increased proportionately. It has been seen that the use of agricultural land has decreased in this Village, the production has decreased compared to before, the soil has become acidic. Large farmers are increasing their profits but poor farmers are not. However, even if the production of large farmers is more, if it continues, this success cannot be sustained for long.

Excessive use of fertilizers is not only harmful to the soil, it can also be harmful to the human body. The amount of chemical fertilizers being used day by day can create a deplorable situation in the future. So this village shows the importance of sustainable agriculture, which is important for future generation and public health.

Mayureswar village of Birbhum district is heavily cultivated. Three types of cropping patterns can be observed in Mayureswar. These are Kharif, Rabi, Zaid. The various crops grown in this region are paddy, wheat, potato, jute, onion, mustard, til, muskmelon, cucumber, Vegetables , betel leaf etc. This area three crops of paddy are grown in a year. These are Aus, Aman, and Boro etc.In present Sustainable agriculture is essential. Not only is sustainable agriculture essential in this region. I think it is essential in every Region of India.

Statement of The Problem:-

Agriculture is very difficult nowadays because the price of Manure means that the prices of fertilizers, pesticides, insecticides are increasing day by day. At the same time, the farmers have suffered greatly as the production has not increased proportionately. Because if demand and supply are equal then profit can be made. If demand and supply are not equal, so many farmers face loss at an inversely proportional rate. Farmers have received many incentives but are still unable to increase their production. Because of the level of use of pesticides, chemical fertilizers cause soil erosion and degradation. Day by day the production is decreasing not only the production but the upper layer of the soil is also remove. Fertile land is turning into barren land. Fertile agricultural land is becoming underdeveloped due to the use of chemical fertilizers. As a result production is decreasing every year. Small and marginal farmers use less chemical fertilizers and pesticides as compared to large farmers, so the production of small and marginal farmers is very low. So, small and marginal

farmers have better soil fertility due to less use of chemical fertilizers. But the production of both large farmers and small farmers is declining. Chemical fertilizers are being used more but why is agriculture production decreasing day by day? Large farmers are increasing their profits but poor farmers are not. Why is soil acidity increasing in Mayureswar ? Will this agricultural land be able to use enough water and chemical fertilizers in the future? Is there any problem in seed of crop? Is it necessary to change the seed? These points are really thought provoking, so the researcher chose this topic….**AGRICULTURAL PRODUCTIVITY, CROPPING PATTERN AND SUSTAINABILITY OF ARABLE LAND OF——CASE STUDY OF A VILLAGE.**

Canal conditions during summer

Literature Survey & Review

Literature review is a very important part of any research for better and clear understanding of the perspectives of the research problem**.**

Mahdi SS, etc. al (2010) examined that bio fertilizers play an important role in ensuring soil fertility and sustainability. Many studies have proven that it is more environmentally friendly due to increased soil fertility, reduced pollution and improved plant and animal biodiversity.

Babar, N, (2012) in their paper entitled “Sustainable Agricultural Development and Organic Farming in India” published in the Journal of Golden Research Thoughts, Vol, 1. Issue. XI, PP.1-4, discusses the agricultural situation in India and how challenging it has become at present.

Objectives

The present study is based on the following objectives

1.To analyse the socio economic characteristics of farms, farmers and the villages.

2.To the suggest policy, measure and action Programme.

Data Base:- The present Studies in based on both primary and secondary data base. The study is based on primary data collected through questionnaire, survey, face-to-face interview and questionnaire based on responses of 50 farmer families of village Mayureswar and some secondary data. For further information collected from book journals, website and related office sources.

Methodology:- Methodology is very important part .The entire work will be carried out in three phases-i.e. pre field work, field work, post field work .Some secondary data were collected from different secondary sources such as sub-divisional agriculture office, District census handbook and some other govt. office. In the post field collected data maps and different figures and charts will be prepare through proper statistical and cartographic method with diagram.

WATER SUPPLY PROJECT MAYURESWAR IRRIGATIONSUB DIVISIONAL OFFICE

Photograph taken: sample village will be visited to see the cropping pattern there& taken various photograph.

Location of The Study Area:-

Mayureswar is located in the region of Birbhum district in west Bengal, india. Mayureswar situated 23°59´13.2´´ north latitude and 87°45´49.8´´ east longitude. The Mayureswar is part of the Brahmani –Mayurakshi basin. It is located 9.6 km from sub-district headquarters Kotasur .The total geographical area of the village is 766.09 hectares. Mayureswar has a total population of 11,142, of which the male population is 5,650 and the female population is 5,492. The literacy rate of Mayureswar village is 58.53% of which 64.50% are males and 52.39% are females.

Discussion:-Researcher has visited 50 farmer family of Mayureswar village by a question answer method. This survey reflects agricultural productivity of this village. This village is under Mayureswar Panchayat and Mayureswar ii

block .The researcher applied purposive sampling and collected data from field survey method.

Table And Statistical Analysis:

In Mayureswar village, cultivation used to be more, production was more. Different types of crops were produced. But now crop production has decreased. Large farmers are increasing their profits but poor farmers are not able to increase their profit margin.

Table No 01: Distribution of size of land holdings (in Bigha) of the farmers in Mayureswar village (In percentage), (sample based not whole)

village	Size of land holdings(in bigha)			Total
Mayureswar	<7.5	7.5-22	>22	100
	Percentage of farmers			
	64	30	6	

Source: Field Survey

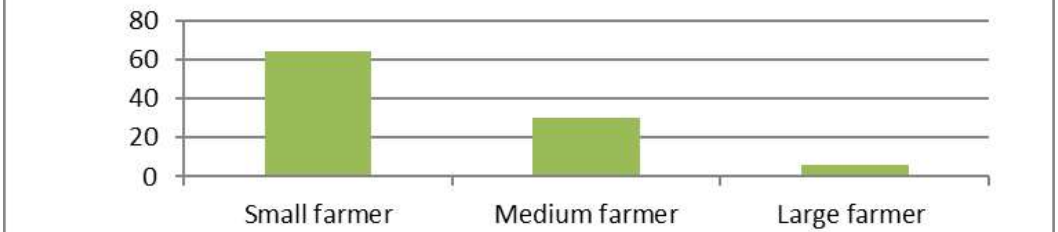


Fig no. 01: Bar diagram showing the size of land holding...

In this figure, the number of large farmers medium farmers and small farmers of Mayureswar village in Birbhum district is showing with separate columns. As there is also difference between the land holdings of large farmers, there is also a different in the length of the bar. Here it is clearly understood that in this village, the number of small farmer is the highest, the number of medium farmers is moderate and the number of large farmers is the least.

Table No 02: Cropping intensity of Mayureswar village (in percentage)

Village	Cropping intensity value			Total
Mayureswar	100-130	130-170	170-200	
	Percentage of farmers			
	30	28	42	100

Source: Field Survey

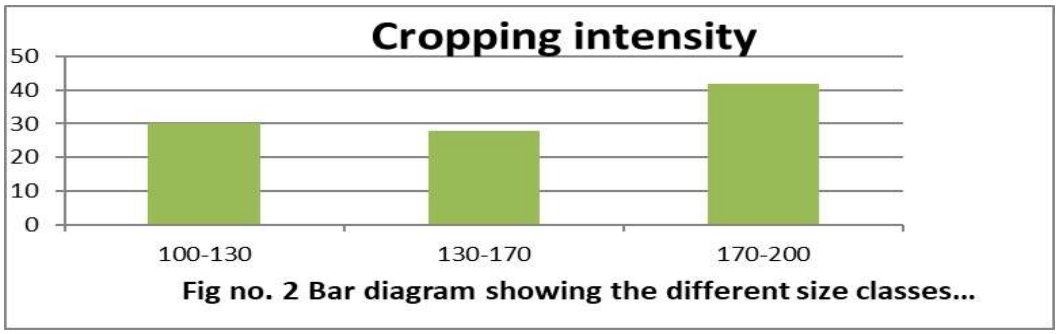


Fig no. 2 Bar diagram showing the different size classes...

The figure given is the total gross cropped area and net cropped area obtained from 50 samples of Mayureswar village. On the basis of these statistics the crop intensity of the land of Mayureswar village has been determined. Crop intensity depends mainly on relief, soil nature, human effort, temperature, rainfall, ground water, organic, chemical fertilizer, pesticides use etc. Moreover, the farmers of this area get benefit of water irrigation. Crop intensity is high in Mayureswar due to the availability of land, fertile soil and irrigation facilities. Cropping intensity values between 100 to 200 were found in this village.

Table No. 03: Caste structure in study village(in percentage)

Village: Mayureswar	General	OBC A	OBC B	SC	ST	Total
		6	14			
FARMERS	76	20		4	0	100

Source: Field Survey

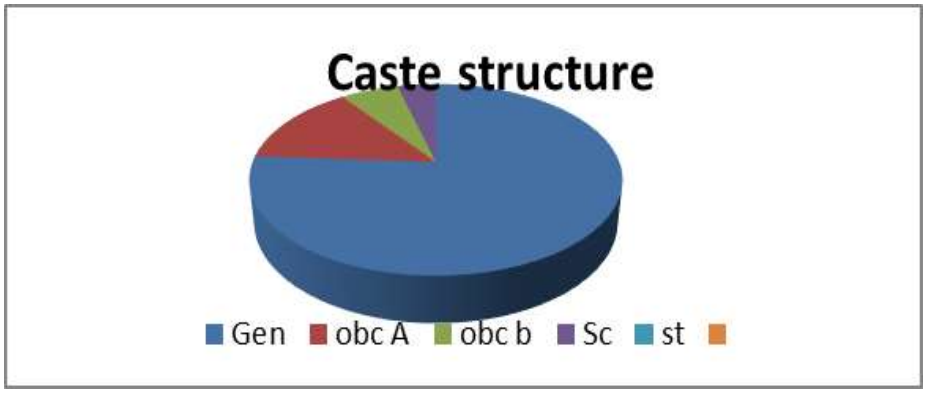


Fig no. 3: This Pie chart showing the Caste structure of farmers (in percentage)

The above table and pie chart are showing the classification of caste structure of farmers in Mayureswar village. Here all farmers are divided into three category, in this classification 76% of farmers belong to General caste, 20% belong to OBC category, and 4% are SC. Generally tribal communities prefer to live in forested areas but Mayureswar village has less population due to lack of such natural conditions. The number of general caste population is relatively high.

Table No. 04: Distribution of size of the family member of the farmers in study village (in percentage)

Village	Family size			Total
Mayureswar	1-3	4-6	6-10	100
	Percentage of farmers			
	32	56	12	

Source: Field Survey

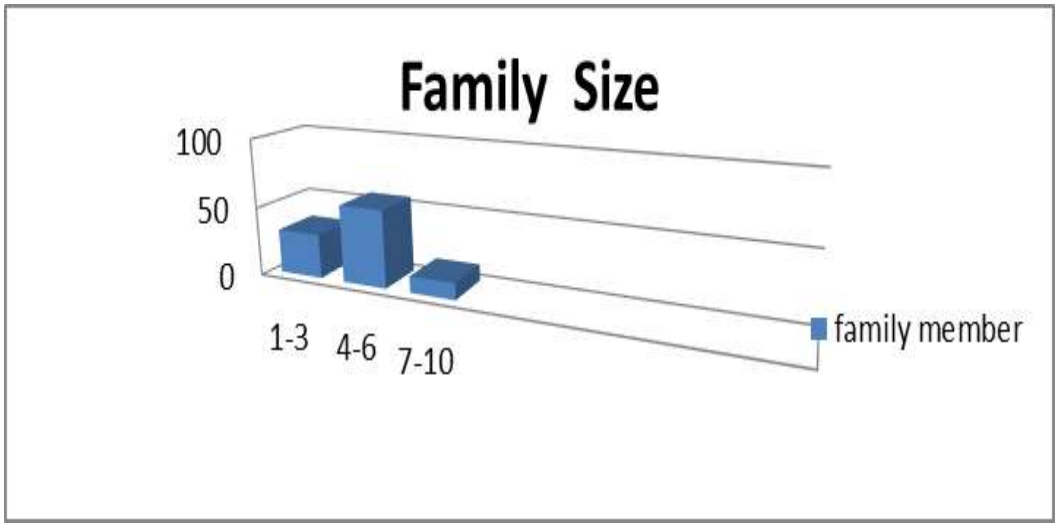


Fig no. 04: Bar diagram showing the family size of the farmers

The above table and bar diagram presenting the family members of farmers family(in percentage) assuming 50 farmers family as 100% it is found that 1 to 3 members belonging families are about 32%, 4 to 6 members belonging families are about 56% and rest 12% family are belonging 7 to 10 family members.

Table No. 05: Distribution of educational status of heads of the farmers family in the study village (in percentage)

Village	Illiterate	Literate						total
Mayureswar		Primary (1-4)	Junior high (5-9)	Secondary	H. S	Graduate	P. G	
	6	12	30	14	14	22	2	100

Source: Field Survey

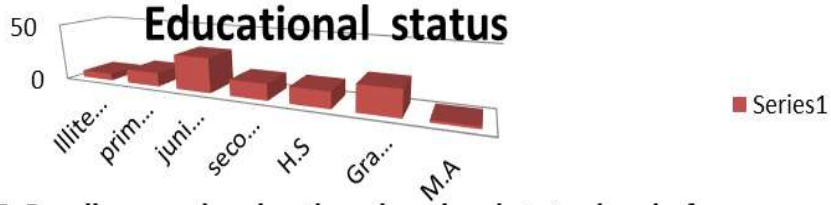


Fig. no: 5: Bar diagram showing the educational status head of...

From the above table and bar diagram, only 6% farmers are illiterate, and 94 % farmers are literate. But 12% farmers could not cross over the primary level education. Moreover The study shows that there are 30% farmers education is 5 to 9 class, 14%farmers are secondary level, 14% farmers are H.S level, 22% farmers are Graduate and 2% farmers are Post Graduate level. Some cultivators engaged in business and employment other than cultivation.

Major Findings:- After detailed study and as per information, researcher found that the major problems faced by the farmers are availability of laborer, irrigation facilities, and availability of finance..

Various Crops in Mayureswar:Paddy, Sesame, Betel nut, Vegetables




The soil here has become more acidic than before. There are more marginal farmers here. This study also found that agricultural productivity is affected. The price of chemical fertilizer and pesticides, insecticides is increasing day by day. The soil of large farmers' lands have become acidic, while the soil of small farmers' lands are less acidic and less eroded. Large farmers are using a lot of chemical fertilizers compared to small farmers who cannot buy chemical fertilizers so they use less.

Big farmers are increasing their production due to heavy use of chemical fertilizers, but now production is not increasing. Because the soil has degraded, the quality of the soil has deteriorated.

The soil has become acidic, increasing the amount of bacteria and fungi. Bio fertilizer use is less by large farmers but more by small farmers. Soil pollution Land degradation is more by large farmers but less by small farmers. As a result the soil health of their land is better than big farmers. Marginal and moderate farmers use a lot of their organic fertilizers and dung means homemade fertilizers, pesticides.

Large farmers grow one or two crops but small farmers grow a variety of crops. As a result, crop diversification is more common among small farmers. Because they lack technology and money. They can't take Ricks. Big farmers have done more damage to the environment.

Therefore the Big farmers are using hybrid seed and change it every year. It requires more water and fertilizer, while poor farmers use indigenous seed. Indigenous seed requires less fertilizer and water and less pest attack. Pesticides should be given less. Health of the land of the big farmers has suffered more.So this village shows the importance of sustainable agriculture, which is important for future generation and public health.

Some Suggestion of Policy and Action Plan:

1.Policy measures:

- Government, should improve awareness among the farmers.
- The farmers should also be advised about the need to change the cropping pattern.
- A policy of leaning towards sustainable agriculture should be adopted.
- Use of cow dung and bio fertilizer should be increase.
- Farmers need to aware of soil P.H.
- Analyzing the impact of food systems on public health and nutrition.

■ Farmers should be made aware of the importance of using indigenous seeds.

2.Action Programme:

· The land of the big farmers is acidic and the soil is degraded. So it is very important to restore it. If we follow a few methods, we can minimize this problem. Through crop rotation. Cultivation of mustard, gram, cotton after rice cultivation will increase the fertility of the land.

· Use of chemical fertilizers should be reduced to half of chemical fertilizers and half of bio fertilizers. Bio pesticides should be used.

·Organic fertilizer factories should be built around.

·Providing sufficient loan is quite improvement to encourage the farmers.

Conclusion:

Small and marginal farmers use less chemical fertilizers and pesticides as compared to large farmers. The more chemical fertilizers, pesticides, Insecticides a farmer uses, the faster his land becomes polluted. His land will become more acidic and soil health will deteriorate. He will see these problems. Excessive application of chemical fertilizers in Mayureswar is the main reason for the decrease in production of agricultural products. Therefore, the study aims to find strategies to improve the sustainability of agriculture in the region. So this village shows the importance of sustainable agriculture, which is important for future generation and public health.

Acknowledgement

I would like to extend my sincere and heartfelt thanks towards all those who have helped me in completion of the present publication work. I express my deepest gratitude to my Supervisor Dr. Subhasis Mondal whose inspiration, guidance, stimulating encouragement, constructive thoughts and positive suggestions throughout the entire course of this investigation enabled me to accomplish this study.

I am grateful to the farmers of Mayureswar who gave me time and allowed me to meet their families. Finally the hero of my study is 'farmer', who is really very ordinary and helped me with a lot of information.

Reference:

1.Birbhum District statistical Hand book (2017), government of west bengal, (P.p i-87).

2.Masjid Husain (2007): „Systematic Agricultural Geography , Rawat Publication, Jaipur, (P.p. 17, 18, 20-21, 45, 217-18, 164-65, 170, 176-78, 180- 82). , (P.p 35-37).

3.Babar, N, (2012) "Sustainable Agricultural Development and Organic Farming in India" Vol, 1. Issue. XI, PP.1-4,

4. Mahdi SS, etc. al (2010) Bio-fertilizers in organic agriculture

5. Bose.Sugata. (1993) 'Agricultural development in Bengal and evidence of a change'

6.Census 2011 Data – censusindia.gov.in

7.Birbhum, West Bengal- Wikipedia.

8.https://en.wikipedia.org/wiki/Mayureswar_II

9.https://birbhum.gov.in

10.Roy.B. Birbhumi Birbhum.VOl-1 Deep Publication.Kolkata. pp308-316

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Challenges in Sports in Sindhudurg District of Maharashtra

- Prof. Jayasing Yashvant Naik
Physical Director, Br. B. K. College, Vengurla

Received Paper: 01/05/2024 Edited Paper: 25/06/2024 Accepted Paper: 11/07/2024

Abstract:

Today when almost all nations are making their mark in sports, our country despite of population of more than 125 crores has not made any great presence in world competition and Olympic, Other sports and games also in more pathetic condition. We are responsible for such a situation in all sports and games. In India the budget allotted for growth and development of sports and games is very less that we can't expect high level of sports performance. In India lack of latest facilities like ground, equipment's, modern techniques, and strategies, Lack of international level coaches, trainers, psychiatrist and physiotherapists. Lack of chances of jobs through sports and physical education. So, negligence from the family members. Children are always motivated to join some job or business

Lack of proper physical educational syllabus at primary, secondary school level as well as in colleges. There should be required a monitoring council who could monitor the every physical education institute. Lack of uniformities of physical education courses in different states. Sport activities could improve one's life of physical fitness and mental health. The participation of parents and children in sport activities is crucial in preventing the children from involvement in negative activities. The main theme of this paper examined the challenges of students in sports activities in Sindhudurg district

Keywords: Sport, Physical Fitness, Pathetic Condition.

Introduction:

There are at least 10 professional colleges of physical education affiliated to or run by Mumbai universities. These colleges/departments are having sports facilities as per the norms and standards laid down by the National

Council for Teacher Education (NCTE). Professional courses leading to degree and P.G. degree in Physical Education are conducted by these colleges. Some of the leading colleges in the country can be identified by the Sports Authority of India and there should be schemes to utilize these colleges for the training of the budding sports persons. These colleges have potential power to contribute substantially to the promotion of sports environment in the country. They need to be properly revamped, courses of shorter duration be replaced by long duration courses, with wider range of subjects and their specialization. Vocational or self-employment or career oriented courses be launched in these colleges.

In our country the budget allotted for growth and development of sports and games is so less that we can't expect high level of sports performance. Partiality is another drawback for our lower performance. Those who are not qualified but have contacts often dominate the deserving candidates. This phenomenon is so common even at national level that we can't imagine about the condition at lower level.

Keywords - Sport, quality of life, leisure time, student

Introduction

Students nowadays are broadly exposed to many sport activities. With the awareness of healthy life style and the facilities provided surrounding their living areas, most students could choose the best sport that suit them well. However, there are several barriers to stop students from actively involved in sport. These include the current life style whereby more students are interested in playing game online instead on the real field. As this world becomes the world without the limit, students tend to enjoy their life by using computer, ipad, hand phone, play station and ignoring the real world around them. Therefore, many of them live in imaginary world by playing football, tennis, ping pong, squash and many other games that could be done through online. They have their own online community and live without the need to go out from house or without ever move their feet from their room to enjoy the games. By having food and drinks besides their table, students could spend hours and hours in front of the computer playing games, surfing, watching movies, chatting and others. By having this of habit, soon or later these students might encounter health problem such as back ache, blurry eyes, and headache and dizziness. Other than that, they

might also exposed to pornography, gdents nowadays are broadly exposed to many sport activities. With the awareness of healthy life style and the facilities provided surrounding their living areas, most students could choose the best sport that suit them well.

The Objective of The Study:

The objectives in this study are as follows:

1] To study the challenges in Sports in Sindhudurg district.

2] To study impact of challenges on sports activities of youth at school level.

3] To study facilities available in selected area of research and their effect on performance.

4] To provide the appropriate suggestions to overcome the problems caused by challenges.

Hypothesis:

1] There will be significant effect on sport activities due to challenges.

2] There will be significant effect of environment of Sindhudurg on sport activities.

3] There will be significant effect of diet on performance of players in Sport.

Limitation of Study:

1] Daily routine, diet, Leisure time, and rest of students cannot be controlled by researcher.

2] Collection of such large data will not be possible single handedly the researcher will take help from a number of qualified professional from the field of sports and games.

3] Although psychological variables will be assessed during this study, the related factors of the players during assessment testing period cannot be controlled.

Study Area:

Due to physiography condition, climate, beaches and availability of all resources Sindhudurg district is selected as a study region. Sindhudurg district lies in western part of Maharashtra state. This is one of the famous tourist destination in India. Absolute location of Sindhudurg district is 15 36' to 16 40' North latitude and 73 19' to 74 13' East longitude. The adjoining parts are Sahyadri Ghats to its East. Arabian Sea to its West, Ratnagiri district to its North and Goa state to its South. The geographical area of this district is 5200

sq.km. The district has wet and warm climate, with an average rainfall ranging from 3200 mm to 3400 mm. Average length from north to south is 280 km and width from west to east is 65 km. The occupational structure of district indicates that agriculture is the main occupation of people.

Methodology:

The present study depends on mainly primary and secondary data. The researcher will collect the primary data from questioners which will be filled by various respondents. Respondents includes Principle, Sport Teachers and Coaches of various sports & games as well as Students. Secondary data related to present study will be collected from various sources namely annual reports of various Colleges, college Magazines, Sport Journals, books, Internet, libraries, NGOs, magazines, newspapers, government officials, economic surveys, census Survey etc. Tools and Techniques of Analysis and Interpretation of data using computer software's such as SPSS will be used for the analysis and interpretation of the data. Tables, charts will be used to present the collected data.

Conclusion:

Based on the research findings, it could be concluded that generally there are many alternatives to ensure that teenagers' especially secondary school students could spend their leisure time in a right way, for example by doing physical activity. Many facilities should be provided to make them interested in sport activity. This study also found that respondents need extra facilities in their community such as swimming pool and bowling center.

Nowadays, the issues of the students' involvement in loitering and smoking activities become popular because they spend more time with their friends rather than family. Parents should know with whom their son make friend and also what kind of activity they had spent together. In order to improve

the quality of life among secondary school students, more attention must be given especially to those students that identified are interested in loitering, entertainment, smoking and other negative activities. More physical activities which mcould motivate them should be carried out such as sport carnival, open tournament and sport competition by school or community. Although the number of students that areinterested in negative activities is not serious yet, an immediate action has to be done as early as possible in These are the findings which are got from the sports teacher

collection and it should be possible to understand each and every aspects of emerging challenges in sports at secondary level school. Most of the Sports teachers / coaches responded in favour of only for some competition and no, not available and not available for any competition and yes, available. Most of the Sports teachers / coaches responded in favour of geographical, problems and passive role of parents and economic condition and all the above. The researcher tried to find out the answer about problems and awareness of teachers on their sports activates at secondary level schools. Self-made questionnaire have been used as a tool of research. This research is done under survey research methodology.

Based on the research findings, it could be concluded that generally there are many alternatives to ensure the college students could spend their time in a right way, for example by doing physical activity. Many facilities should be provided to make them interested in sport activity. This study also found that respondents need extra facilities in their community such as swimming pool and bowling center. Nowadays, the issues of the students' involvement in loitering and smoking activities become popular because they spend more time with their friends rather than family. Parents should know with whom their son make friend and also what kind of activity they had spent together. In order to improve the quality of life among secondary school students, more attention must be given especially to those students that identified are interested in loitering, entertainment, smoking and other negative activities. More physical activities which could motivate them should be carried out such as sport carnival, open tournament and sport competition by school or community. Although the number of students that are interested in negative activities is not serious yet, an immediate action has to be done as early as possible.

Recommendations:

- Students must be played for International and national level sports in Kokan.
- Sports Teachers / Coaches must be taken all sports player in school.
- Maximum Sports Teachers / Coaches must be giving time for sports
- Sports Teachers / Coaches faces problems regarding sports competition in all yearly sessions but government must be changing the games requiring the geographical situation in the school.

References:

- Sherina Mohd Sidik, Lekhraj Rampal. (2009). The Prevalence and Factors Associated with Obesity among Adult. Asia Pacific Family Medicine, pp.2.
- Carmichael D (2008), Youth Sport vs. Youth Crime Evidence that youth engaged in organized sport are not likely to participate in criminal activities, Retrived from http://activehealthylinks.com.
- B.D. Kirkcaldy, R. S. (2002). The Relationship Between Physical Activties an
- B.D. Kirkcaldy, R.S.(2002).The Relationship Between Physical Activties and fitness.Beyond The Blues by Aakash Chopra
- Carmichael D (2008), Youth Sport vs. Youth Crime Evidence that youthengaged in organized sport are not likely to participate in criminalactivities, Retrived from http://activehealthylinks.com.
- Dr. M. L. Kamlesh, "Physical Education", Khel Sahitya Kendra, New Delhi, 2009.
- Paul W. Drast , Robert P Pengarzi ,Dynamic Physical Education for Secondary School., 6th Edition 2008
- Rules of Games and Sports 2024 (Updated Version) Paperback – 1 January 2023
- Sherina Mohd Sidik, Lekhraj Rampal. (2009). The Prevalence andFactors Associated with Obesity among Adult. Asia Pacific FamilyMedicine, pp.2.
- Tohomas & Nelson "Research Methods in Physical Education" Champaingn II : Huma Kinetics, 2001

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

Analyzing Psychological Trauma in Saadat Hasan Manto's "Khol Do" During the Partition of India

- Prof. Shubham Sharad Modi
Assistant Professor & Head Department of English,
Acharya University, Uzbekistan

Received Paper: 01/07/2024 Edited Paper: 15/07/2024 Accepted Paper: 27/07/2024

Abstract :

Saadat Hasan Manto is revered as one of the twentieth century's foremost short story writers, his work providing a poignant depiction of the collective madness during and after the Partition of India in 1947. As a prominent Urdu writer from Pakistan, Manto unflinchingly tackled controversial subjects such as sex, violence, and body politics. His stories are renowned for their stark portrayal of human behavior. Notably, Manto's story "Khol Do" (1948) provides a powerful account of the trauma experienced by ordinary people during the Partition. This paper examines the psychological trauma experienced by the characters in "Khol Do," aiming to identify and explore the sources of their trauma to gain a deeper understanding of their experiences.

Keywords: Psychological Trauma, Trauma Studies, Sexual Violence, Patriarchy

Introduction

The Partition of India, often referred to as the "Great Divide," was a tragic event in the subcontinent's history, leading to the deaths, displacement, abduction, migration, and suffering of millions. Saadat Hasan Manto, a witness to the violence and killings during the Partition, utilized his imaginative prowess to vividly portray the psychological trauma and war memories of the victims. Manto's writings expose the British Raj's shameful project of Partition, leaving him deeply saddened and rebellious. Having migrated from India to Pakistan during the communal riots, Manto personally experienced the devastating effects of Partition. Although many writers have depicted the trauma of Partition,

Manto's unique approach delves deeply into the psychological scars left by the event, illustrating a collective neurosis that persists across generations. This paper aims to explore the psychological and emotional impact of Partition through Manto's short story "Khol Do," written in 1948, focusing on the psychological trauma and war memories of the traumatized characters. Utilizing the theoretical framework of trauma studies, the paper seeks to highlight the psychological trauma caused by Partition.

Saadat Hasan Manto, a renowned short story writer in Urdu literature, wrote in a language with roots in Persian, Arabic, Old Hindi, and Old Punjabi. Manto's narrative structure and works are often compared to those of Guy de Maupassant, a 19th-century French short story writer representing the Naturalist school. However, this comparison fails to capture the depth of Manto's experiences during Partition. Critics often disapproved of Manto's depiction of perversity and violence, but he defended his work as a realistic observation of India's harrowing days. In his Partition stories, Manto conveys the senselessness that emerged from the subcontinent's division in 1947, highlighting the widespread violence, death, and displacement that ensued.

Objectives

- To analyze the psychological trauma experienced by the characters in Saadat Hasan Manto's "Khol Do."
- To identify and explore the sources of trauma in the story.
- To understand the impact of the Partition of India on the mental health and behavior of the characters.
- To highlight the broader societal and psychological implications of Partition as depicted in Manto's work.

Study Area

This study focuses on the literary and psychological analysis of Saadat Hasan Manto's short story "Khol Do," set against the backdrop of the Partition of India. The research examines the historical context of the Partition, the depiction of trauma in literature, and the psychological impact of violence and displacement on individuals and communities.

Research Methodology

This research employs a qualitative approach, utilizing literary analysis to examine the psychological trauma in Saadat Hasan Manto's "Khol Do." The

methodology involves a close reading of “Khol Do” to identify key themes, symbols, and narrative techniques related to trauma. The theoretical framework incorporates trauma studies, including concepts from Sigmund Freud and Cathy Caruth, to interpret the characters’ experiences and behaviors.

Trauma Studies

The term “trauma” originally referred to a physical injury but has evolved to describe a psychological wound. Sigmund Freud suggested that traumatic events could be so overwhelming that they remain inaccessible to conscious awareness, re-emerging in nightmares, flashbacks, or repetitive behaviors. Freud’s ideas on trauma, based on his observations of adult emotional disorders like hysteria, proposed a three-part process: a traumatic event, the individual’s experience of that trauma, and psychological defenses against it, such as repression (Freud 12).

Freud’s research on hysteria revealed that traumatic experiences could be buried in the unconscious mind, manifesting in anxiety, depression, or physical symptoms. Some individuals explicitly remember the trauma, while others show implicit memories through emotional or physical reactions to triggers. Neurologically, trauma occurs when an overwhelming event or stressor results in excess stimuli and excitement in the brain, leading to defense mechanisms like psychological numbing or dissociation. Under extreme stress, dissociation can involve separating part of oneself from the experience, potentially resulting in multiple personalities or amnesia (Caruth 4).

Trauma Novels

Trauma theory studies literature that explores themes of trauma and violence. Various approaches analyze trauma in literature, considering it intergenerational, transhistorical, unspeakable, unpresentable, or related to specific places. These approaches are evident in “trauma novels,” which depict intense fear or profound loss on individual or collective levels. The defining feature of a trauma novel is the transformation of the self after a terrifying experience, shedding light on the process of coming to terms with memories that reshape perceptions of oneself and the world. Trauma novels use narrative techniques like landscape imagery, temporal shifts, silence, or the omission of graphic details to convey extreme emotional states. The protagonist represents a group experience, whether historical or imagined (LaCapra 5).

Discussion

The Partition of India, a significant historical event, led to immense loss of life, abandoned children, and raped women. Manto's "Khol Do" is set in post-Partition Lahore, following Sirajuddin as he searches for his daughter amidst the chaos. He finds her in a relief camp hospital in a semi-conscious state, traumatized and dissociated from reality. Her mechanical response to the doctor's command to "open it" suggests a dissociative disorder, where she detaches from her physical and emotional experience. Manto's depiction of the delayed effects of traumatic violence, particularly sexual violence during Partition, is evident in Sakina's dissociative state. Her disconnection from language and numb response highlights the psychological impact of repeated violations by supposed rescuers.

In a patriarchal society, women are seen as objects to be protected by men, and during Partition, they became victims of this mentality. However, "Khol Do" shocks by revealing that the men meant to rescue Sakina were her attackers. Manto critiques the hidden motives of those who feign ideological selflessness but exploit the vulnerable. The volunteers, symbols of hope and selflessness, use their position to harm Sakina (Manto 57).

Sakina's experience of sexual assault fundamentally changes her. Initially shy and covering herself, she later mechanically obeys the command to "open it" without emotional response, reflecting the trauma's impact. She becomes emotionally numb, acting like a robot providing sexual service on command. Her experience shows how sexual violence erodes a person's sense of agency and bodily autonomy (Herman 3).

When Sirajuddin sees Sakina disrobing, he is overjoyed that she is alive, prioritizing her survival over societal norms regarding purity and honor. Conversely, the doctor's reaction of breaking into a cold sweat suggests discomfort with Sakina's condition as a rape victim. This contrast highlights societal attitudes towards women's honor and reactions to its violation. Despite her victimization, Sirajuddin's love for his daughter surpasses societal expectations, while the doctor represents societal norms disturbed by the violation of purity (Manto 58).

Conclusion

Saadat Hasan Manto's "Khol Do" serves as a harrowing exploration of the psychological trauma experienced by individuals during the Partition of India. Through the character of Sakina, Manto highlights the profound impact

of sexual violence on a person's psyche, illustrating how trauma can lead to dissociation and a loss of agency. The story also critiques the societal norms and patriarchal attitudes that exacerbate the suffering of victims. Manto's unflinching portrayal of the horrors of Partition, combined with his deep empathy for the victims, underscores the enduring psychological scars left by this historical event. By examining "Khol Do" through the lens of trauma studies, this paper sheds light on the complex interplay between individual trauma and collective historical memory, emphasizing the need to understand and address the lasting effects of such traumatic events.

References

1. Caruth, Cathy. *Unclaimed Experience: Trauma, Narrative, and History*. Johns Hopkins University Press, 1996.

2. Freud, Sigmund. *Beyond the Pleasure Principle*. Translated by James Strachey, Norton, 1961.

3. Herman, Judith. *Trauma and Recovery: The Aftermath of Violence—from Domestic Abuse to Political Terror*. Basic Books, 1992.

4. LaCapra, Dominick. *Writing History, Writing Trauma*. Johns Hopkins University Press, 2001.

5. Manto, Saadat Hasan. "Khol Do." *Black Margins: Stories by Saadat Hasan Manto*, translated by M. Asaduddin, Katha, 2003.

6. Tal, Kali. *Worlds of Hurt: Reading the Literatures of Trauma*. Cambridge University Press, 1996.

□ □ □

THE KONKAN GEOGRAPHER
Vol. No.32 Jun/july 2024 ISSN No. 2277- 4858
Impact Factor *(IIFS)* 7.125
(Interdisciplinary Peer Review Refreed Research Journal)

LANDSLIDE HAZARD ZONATION MAPPING OF DARJILING DISTRICT IN WEST BENGAL USING REMOTE SENSING TECHNIQUE

*** Dr. Paromita Majumdar**
Associate Professor, Department of Geography, Vidyasagar College For Womem, 39 Sankar Ghosh Lane, Kolkata 700006 parogeo@gmail.com

**** Smt Priyanka Sanpui Gayen**
Research Scholar JIS University Agarpara Kolkata-109
psanpui10@gmail.com

Received Paper: 30/06/2024 Edited Paper: 27/07/2024 Accepted Paper: 28/07/2024

ABSTRACT:

Landslide is the most pervasive of natural problems that undermine the economic and cultural development of the Darjiling hills. Rapid population growth and anthropogenic activities on earth is changing the natural environment profoundly. With rapid urbanisation in Darjiling district pressure on the land is mounting rapidly. This leads to deforestation and use of even steep slopes for human habitation. This in turn is further causing rapid soil erosion especially after heavy rainfall and ultimately to major slips and slides. Thus sliding which was a minor physical phenomenon in Darjiling district has been appearing quite frequently leading to huge loss of life and property. Diversity of slope, site and situation, geology, climate, soil with its physical and chemical properties, vegetation with differential canopy and root system, unplanned growth of settlement, road and sewer systems have led to recurring landslides.. Hence, an attempt has been made in this paper to identify from multispectral remotely sensed data (TM & ETM+) landslide prone zones and preparation of hazard zonation map of the district using different criteria together with remote sensing and geographical information system (GIS). The key in landslide hazard mapping is the assessment and ranking of risk. Combining the various individual maps such as geology, soil, slope, relative relief, drainage density, rainfall, road density, landslide occurrences and recent land use map a landslide hazard zonation map has been prepared. Landslide susceptible map can be used

for prediction of the occurrence and severity of the landslide and also planning developmental activities in this mountainous region.

Keywords: Land use changes, Remote Sensing, G.I.S, Landslide Hazard Zonation Map, TM& ETM+.

INTRODUCTION:

Darjeeling District is the northernmost district of the state of West Bengal in eastern India in the foothills of the Himalayas. The district touches three international boundaries- with Nepal, Bhutan and Bangladesh. Its boundary also touches the north eastern state of Sikkim and the Jalpaiguri district of West Bengal. Located between latitude 27° 13' N to 26° 27' N and longitude 88°53' E to 87°59' E, Darjeeling district is spread over 3149 square kilometers. The terrain in the district is both hilly and plain. The temperature ranges between 24 °C to 14°C in summer, and between 8°C to 5° C in winter. The hill areas get heavy rainfall in the monsoons. Streams and rivulets belonging to the Tista, Mahananda, Ramman, and Rangit river systems flow in the north of the district. Most of the north of the district is under tea plantations. Geographically, the district can be divided into two broad divisions, the hills and the plains. The entire hilly region of the district comes under the Gorkhaland Territorial Administration, a semi-autonomous administrative body under the state government of West Bengal. This body covers the three hill subdivisions of Darjeeling, Kurseong and Kalimpong. Darjeeling district has a length from north to south of 18 miles (29 km), and a breadth from east to west of 16 miles (26 km). The Darjeeling hill area is formed of comparatively recent rock structure that has a direct bearing on landslides. Heavy monsoon precipitation contributes to the landslides. Soils of Darjeeling hill areas are extremely varied, depending on elevation, degree of slope, vegetative cover and geolithology.[1] The land use/land cover pattern of a region is an outcome of natural and socio-economic factors and their utilization by man in time and space. Land is becoming a scarce resource due to immense agricultural and demographic pressure. Hence, information on land use/land cover and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare.[2]

STATEMENT OF THE PROBLEM:

Population growth and urbanisation are interdependent functions of a closely related system. Rapid urbanisation damages the environment by converting agricultural land into industrial sites or residential premises.

Environmental degradation due to misappropriate population growth and increasing urbanisation is one of the problems in the developing world. The urban areas are facing serious environmental hazards particularly air, water and solid waste pollution. The need of the hour is to develop strategies to mitigate adverse impacts on the ecology and environment.[2,] The study area i.e. the Darjiling District has been facing high degree of environmental pollution due to urbanisation and population growth since the third quarter of the last century[3]. Increase in population growth has led to rapid deforestation, soil erosion and ultimately to landslides. The area is also experiencing a rapid change in land use pattern due to growth of settlement and depletion of forest cover. Since the dawn of human civilization, man-environment relationship has been an inseparable entity. In mountainous areas, this is more pronounced and fragile as terrain inaccessibility, climatic hostility, soil infertility, scarcity of basic amenities make life insecure. With rapid urbanisation in Darjiling district pressure on the land is mounting rapidly. This leads to deforestation and use of even steep slopes for human habitation. This in turn is further causing rapid soil erosion especially after heavy rainfall and ultimately to major slips and slides. Thus sliding which was a minor physical phenomenon in Darjiling district has been appearing quite frequently leading to huge loss of life and property[3]. Landslide is the most pervasive of natural problems that undermine the economic and cultural development of the Darjiling hills. Diversity of slope, site and situation, geology, climate, soil with its physical and chemical properties, vegetation with differential canopy and root system, unplanned growth of settlement, road and sewer systems have led to recurring landslides. Record since 1849 shows a sharp increase in the rate of devastating landslide occurrences leading to great loss of life and heavy damage to land and property. Extensive and heedless deforestation, non renewed age old tea plantations, haphazard construction, inadequate drainage have led to serious degradation of the environment. Heavy and torrential rainfall has aggravated the problem further. The situation has deteriorated further in recent times and especially the last two decades have witnessed many devastating landslides in the Darjiling hills.

BRIEF DISCUSSION OF THE STUDY AREA:

This Darjiling district is located between latitude 27° 13' N to 26° 27' N and longitude 88°53' E to 87°59' E with an area of 3149 sq Km. Geographically, the district can be divided into two broad sub region, the hills region and the

plain regions. The Darjeeling hill area covers an area of 2476 sq Km spanning 3 sub division of Kalimpong, Kurseong, Darjeeling and 13 mouzas of Siliguri subdivision. The entire hilly region of the district comes under the Darjeeling Gorkha Hill Council, a semi-autonomous administrative body under the state government of West Bengal. The foothill of Darjeeling Himalayas, which comes under the Siliguri subdivision, is geographically well known as the Terai. The districts consists of ten blocks, i.e Naxalbari, Mirik, Matigara, Phansidewa, Kurseong, Kharibari, Kalimpong I, Kalimpong II, Darjiling Pulbazar, Jorebanglow Sukiapokhri and Gorubathan (Fig 1). The prime objective of the paper is to prepare landslide hazard map of Darjeeling hill. The area of study is primarily composed of erosional landforms produced by southerly flowing streams, which have exposed a full cross section of different tectonic units. In the higher reaches of the Darjeeling hill areas, basically Daling Series and Darjeeling Gneiss are found which are highly metamorphosed rocks. Brown Forest soil of Darjiling hilly region is of least structural stability and least clay content due to excessive amount of rainfall (annual rainfall of 228 cm -254 cm). The Darjeeling hill area is formed of comparatively recent rock structure that has a direct bearing on landslides. The causes of the landslides vary from one locality to another. Heavy monsoon precipitation is however a very common cause of these disasters. More over soils of Darjeeling hill areas are extremely varied, depending on elevation, degree of slope. As human population expands in the hills, forests are being depleted for the extension of agricultural lands, introduction of new settlements, roadways etc. The growing changes coming in the wake of urbanization and industrialization leave deep impression on the hill ecosystem disrupting normal functioning and triggering more landslides especially during monsoon.[3]

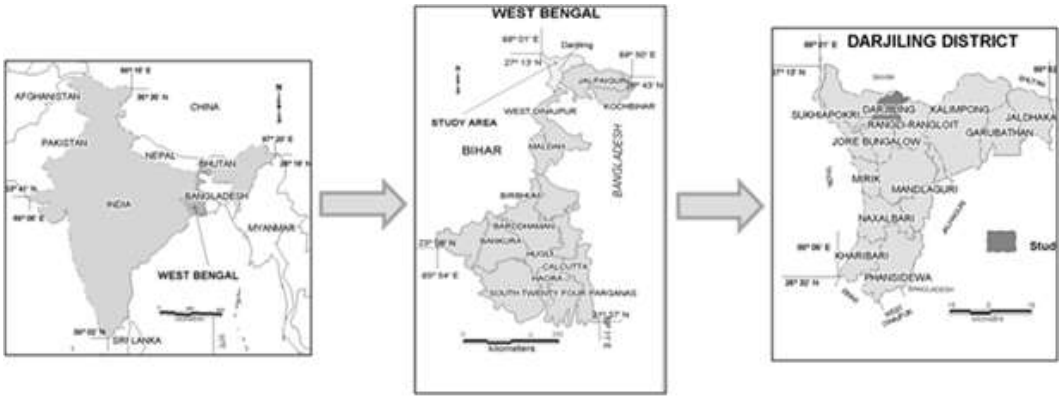


Fig-1: Location Map of the Study Area

METHODOLOGY

Data collection*:* The Primary Data has been collected from the site of Earth Explorer/USGS and Landuse/ Landcover map has been developed for the total study area from Landsat TM Satellite Images 2014 mainly to find out changes in nature of landuse.

Table 1: Satellite Imagery Acquired:

Date of Acquisition	Path	Row	Satellite Sensor	No. of Bands
27.09.2014	139	41 &42	LC8 (OLI)	2,3,4,5,6,7,8
07.01.2003	139	41 &42	Landsat ETM+7	2,3,4,5,6,7,8
03.03.1989	139	41 &42	Landsat 4 TM	1,2,3,4

Data for the preparation of temperature and rainfall zonation maps has been collected from IMD. Data for the preparation of slope and relief maps has been collected from the site of Earth Explorer/USGS /ASTER- DEM. For the preparation of soil map and geological maps data has been collected from Soil Research Department and GSI respectively.

Data Analysis*:*

ERDAS 9.1 and Arc GIS software have been used to represent spatial data into organized format, for sub setting of the study area from satellite images generating Landuse map. With the help of Arc GIS digitization and reclassification technique particular weightage has been given to each parameters in each category map to develop the entire reclassified maps i.e. soil map, geological map, relief and slope map, drainage and road density map, temperature and rainfall zonation map.

RESULT AND DISCUSSION

Landslides Hazard Zonation: Landslide of Darjiling area though quite frequent and common during the monsoon months, cannot be treated in isolation. It would be difficult for any planner to identify the cause of landslides of Darjiling. It may be an effect of urbanisation or a natural disaster. The growth of urban population in India in the last few decades has been phenomenally high and Darjiling district is no exception (Table 2). The silent growth of landslide problem in Darjiling district in recent years (1980-2014) may be due to (i) increased urbanisation of some areas of the district without corresponding development of infrastructural facilities like controlled drainage system, (ii) failure to observe municipal building rules, (iii) failure to stop rapid deforestation in tea gardens with old age tea bushes and (iv) absence of a perfect zone map of geologically weaker areas within urbanized sector with increased

commercial and other activities in different sectors. Thus the natural phenomenon like heavy rainfall could leave its impact in a more permanent way as against it used to happen earlier. In spite of all attempts from different sectors, landslide continued through years endangering the life of the people in the hills during every rainy season. This has also affected the communities from carrying out their regular business as well as other related activities during peak commercial seasons.

Year	Population of Town	Growth %	Population of District	Growth %
1901	16924	+19.65	249117	+11.6
1911	19005	+12.30	265550	+6.6
1921	22258	+17.12	282784	+6.5
1931	21185	- 4.82	319635	+13
1941	27224	+28.51	376369	+17.7
1951	33605	+23.44	445260	+18.3
1961	40651	+20.97	624640	+40.3
1971	42873	+5.47	781777	+25.16
1981	57603	+34.36	1024269	+31.02
1991	73062	+26.84	1299919	+26.91
2001	107197	+46.72	1605900	+23.54
2011	118805	+10.82	1846823	+15.00

Source- District Census Handbook, Darjiling 1951-2011,
Bengal District Gazetteer Volume –B Darjiling District Statistics 1911-1912 to 1920-1921

Types and Causes of Slope Failure:

Over the years, Darjiling district has witnessed various types of slope failures. It has been observed that each landslip has its own characteristics and therefore it is necessary to learn the nature by types, their mechanism and causes if one has to handle this menacing problem. In scientific literature, there are several classifications on slope movements which have been proposed since the beginning of this century. Most recent classifications try to emphasise both the processes leading to the development of a landslide and the materials involved. Varnes proposed his first subdivision in 1958. He distinguished

gravitational phenomena as falls, slides, slumps, flows and complex movement. Subsequent elaboration of this scheme was carried out in 1978 and 1996 and at the moment, this classification is universally accepted. The main criterion used by the author in the identification of the landslide categories is the type of movement whereas a further subdivision is made on the basis of the type of material. Table 3 illustrates in detail the type of landslides according to Varnes (1978) & Cruden and Varnes (1996).[4]

The major types of slope failures observed in Darjiling P.S are Creep, Soil Creep, Debris Slide, Rock Slides and Mud rock flow.

1. Creep- In geomorphology the term creep is applied to slow movement of rock and soil along down slope solely under the influence of gravity. Creep may develop on the slope formed of unconsolidated materials such as residual soil or rock debris within pre-slide areas which may be followed by another creep. [5] It is a common feature in lower slopes of tea gardens in Darjiling.

2. Soil Creep - Soil slips occur in small magnitude and mainly along lower slopes.

3. Debris slide- Debris slides occur in greater magnitude and are quite common as well as devastating too. Most of the slides in the study area are of this type. Major debris slides may be noted in tea gardens of Rishihat, Phoobsering, Tukvar, Arya, Singtom, Bloomfield and also in Darjiling town.

4. Rock Slide- Rock slides occur along certain definite planes. They may be bedding planes, foliation planes, joints and also shears or other planes of weakness of a tectonic belt. For slips to occur such planes should be steeper than the slope and their inclination should be sufficient to counteract the resistance offered by the rock face. In Darjiling P.S, some of the devastating slides of this nature occurred in Aloobari, Bannockburn, Pandam, Happy Valley and Arya tea estates.

5. Mud Rock Flow- Most slips found in and around Darjiling town is confined to the slopes formed of talus material and where slope angle is slightly more than 40°. Slips in most materials occur by seepage pressure of percolating water as a result of heavy rain storm. After a slip starts, the saturated material rushes down transporting big blocks of rocks eroding the channels of its own. These are known as mud-rock-flows. Mud rock flow is a common feature in and around the town particularly along natural and artificial waterways.

Table 3: Types of Landslides (after Varnes, 1978 and Cruden and Varnes, 1996)

Type of movement	Type of material		
	Bedrock	Engineering soils	
		Debris	Earth
Fall	Rock fall	Debris fall	Earth fall
Topple	Rock topple	Debris topple	Earth topple
Slide- Rotational	Rock slump	Debris slump	Earth slump
Slide- Transitional	Rock slide	Debris slide	Earth slide
Lateral spread	Rock spread	Debris spread	Earth spread
Flow	Rock flow	Debris flow	Earth flow
Complex	Combination of two or more principal types of movements (e.g., rock fall, avalanche		

The causes of many landslides and related types of down slope movement can be examined by studying relations between driving forces (those which tend to move earth materials down a slope) and resisting forces (those which tend to oppose such movement). The most common driving force is the down-slope component of the weight of the slope material including anything superimposed on the slope, such as vegetation, fill material, or buildings. The most common resisting force is the shear strength of the slope material acting along potential slip planes.[6] Slope stability is evaluated by computing a safety factor (SF) defined as the ratio of the resisting forces to the driving forces (Keller, 1988). If the safety factor is greater than one, the resisting forces must exceed the driving forces and the slope is considered stable. If, on the other hand, the safety factor is less than one, then the driving forces exceed the resisting forces and a slope failure can be expected. Of course, anything that reduces the resisting forces or increases the driving forces will lower the safety factor and thus increase the chances of a landslide or other type of down slope movement. Driving and resisting forces are not constant; rather, they tend to change with time. Thus, depending on chances in local conditions, the safety factor may increase or decrease (Keller, 1988).

Landslides may take place due to several reasons, some of which include causative factors whereas others are either triggering or catalytic in nature facilitating the occurrence of this phenomenon. Such factors have been discussed and elaborated by Deoja et al (1991), Bandyopadhyay (2001), Bhandari (1987), Agrawal et al (1997), Starkel and Basu (2000), Yudhbir, (2000)

and Shah (2001). Following are some of the factors generally found to contribute to most of the landslide events;

Internal factors

- Increase in pore water pressure and decrease in cohesion of the slope material.
- Pressure due to expansion of clay minerals like koalinite, illite and montmorillonite in the soil of slope exaggerate slipping in wet condition.
- Coincidence of dip direction of steeply dipping bedding plane of strata with slope direction.

Structural factors

- Presence of thrusts and faults.
- Presence of multiple sets of joint planes and fracture planes.
- Polyphase deformation often resulting into multigeneration isoclinals and/or recumbent and/or overturned folds whose hinge and limbs are weak enough to sustain the load of slope materials of up-hill region.
- Presence of other discontinuity surfaces, which present planes of weaknesses within rock masses across which the rock material is structurally discontinuous.
- In a bedded and jointed rock mass with inclined bedding planes, the critical slope angle depends upon their orientation in relation to the slope and the orientation of joints. In such situations, the relation between the angles of shearing resistance (O) along a discontinuity, at which sliding would occur under gravity and the inclination of the discontinuity (a) is important. If a <O, the slope is stable at any angle and with O <a, the gravity would induce movement along discontinuity surface.

Triggering factors

- Gravity of the slope materials and other structures present on slope acting vertically downward.
- Prolonged heavy rainfall which is very common in the summer monsoon (middle of May to middle of September).
- Melting of snow in the high altitude area.
- Seismic waves propagation (both natural shocks i.e. earthquake and blasting) give rise to induced landslides.

■ Excavation undercutting of toe portion of landslide body, either due to river erosion or man made action.

■ Violent storm and cloud burst with heavy and persistent rain.

■ Supersonic sound waves produced by thunderbolts in a period of heavy and prolonged rain.

Anthropogenic factors

■ Intensive deforestation for fuel wood, fodder for livestock, timber and other non-timber forest produce (NTFP) extractions.

■ Improper land use, agricultural practices on steep slopes, overgrazing, irrigation on steep and vulnerable slopes, quarrying for construction material without considering the condition of the terrain and land capture for building or road construction.

Landslide in relation to Terrain Parameters:

Landslide is the ultimate result of a wide variety of processes which include geological, geomorphological, botanical and meteorological factors. The factors responsible for slope stability can be broadly grouped into active and passive factors. The active factors are the triggering factors like rainfall, earthquake and anthropogenic factors which are essential to initiate a slide while passive factors include factors like slope, lithology, relief, drainage, geological structure and land use pattern.[7] Since the terrain factors have their own contribution in producing

This includes:1. Geological Map of the District

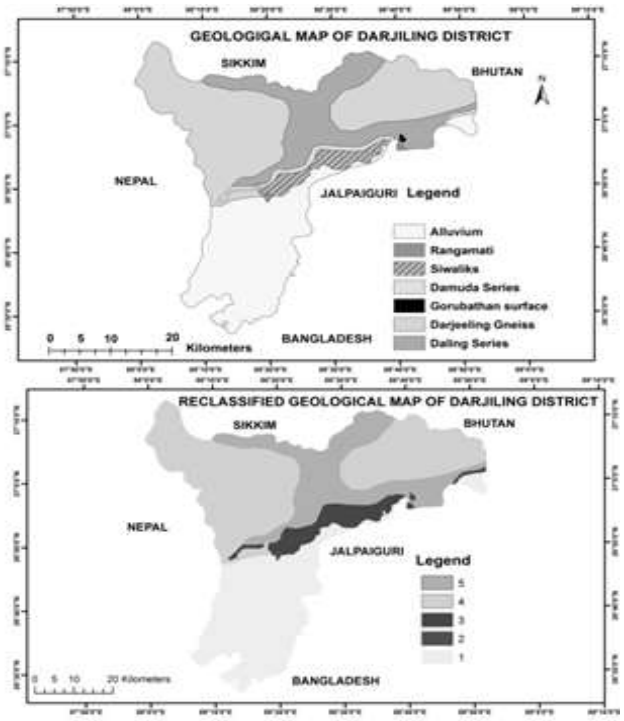


Fig- 2a : Geological Map of Darjiling District

2b : Reclassified Geological Map of Darjiling District

different types of slide, individual slide differentiation is thus dependent on terrain parameters of a particular area. To reveal the importance of terrain parameters on landslide occurrences, a systematic study has been carried out. The parameters selected to study the terrain in relation to slope stability are lithology, relative relief, drainage density, slope, temperature, rainfall, soil and land use pattern.[8] To study the spatial distribution of the different classes of these parameters, several maps are generated through GIS.

1. Relief Map of the District

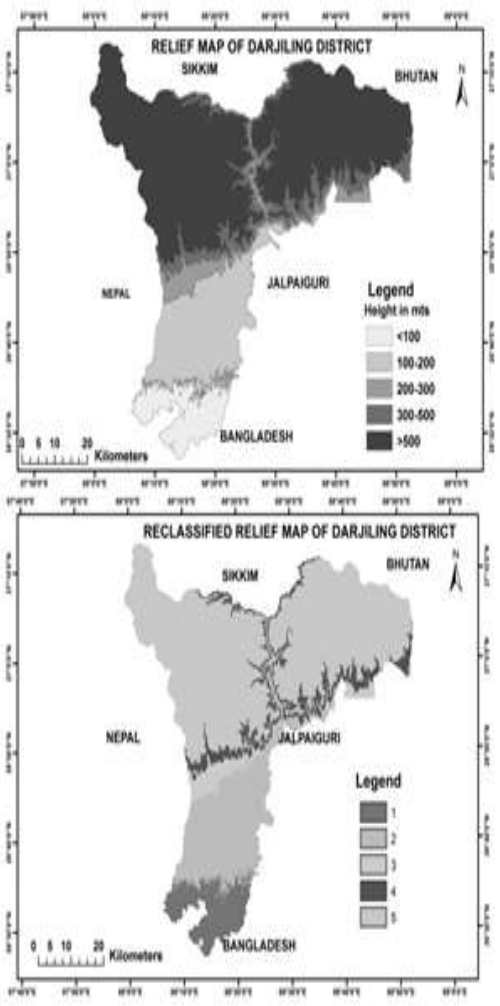


Fig- 2a : Geological Map of Darjiling District
2b : Reclassified Geological Map of Darjiling District

3. Slope Map of the District

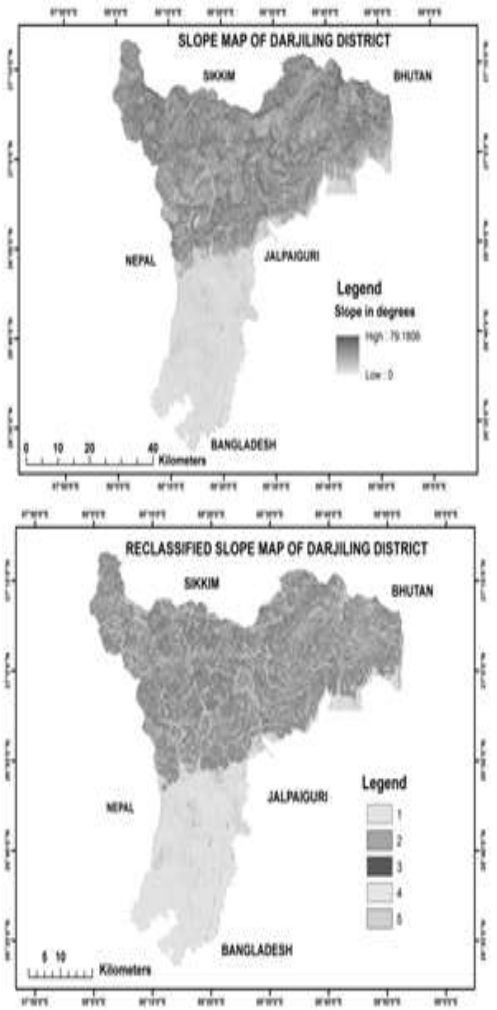


Fig- 4a : Slope Map of Darjiling District
4b : Reclassified Slope Map of Darjiling District

4. Drainage Density Map of the District

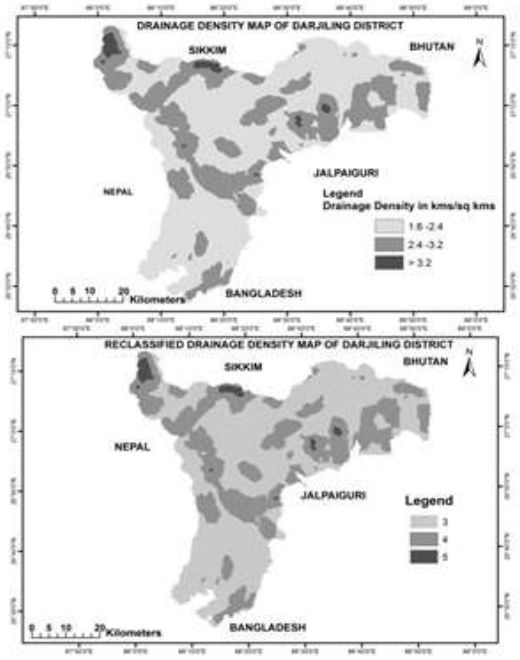
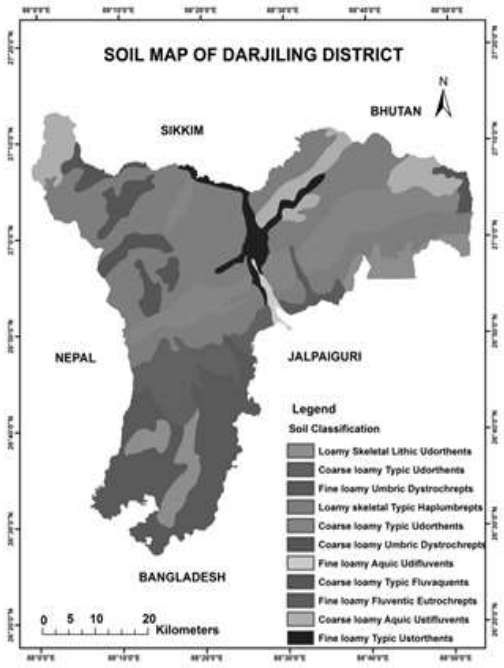


Fig- 5a : Drainage Density Map of Darjiling District 5b : Reclassified Drainage Density Map of Darjiling District

5. Soil Map of the District



6. Temperature Zonation Map of the District

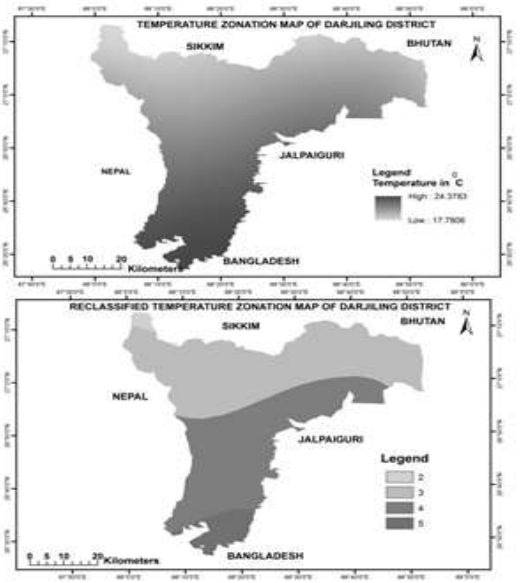


Fig- 7a : Temperature Zonation Map of Darjiling District 7b : Reclassified Temperature Zonation Map of Darjiling District

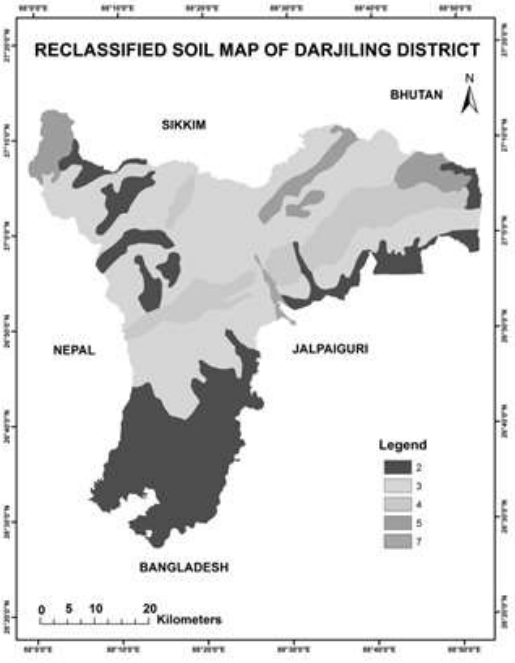


Fig- 6a : Soil Map of Darjiling District 6b : Reclassified Soil Map of Darjiling District

7. Rainfall Zonation Map of the District

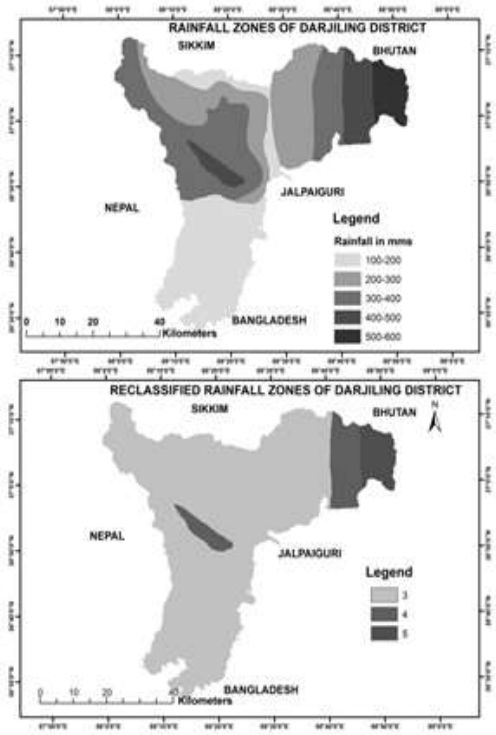


Fig- 8a : Rainfall Zones of Darjiling District
8b : Reclassified Rainfall Zones of Darjiling District

8. Land Use Map of the District

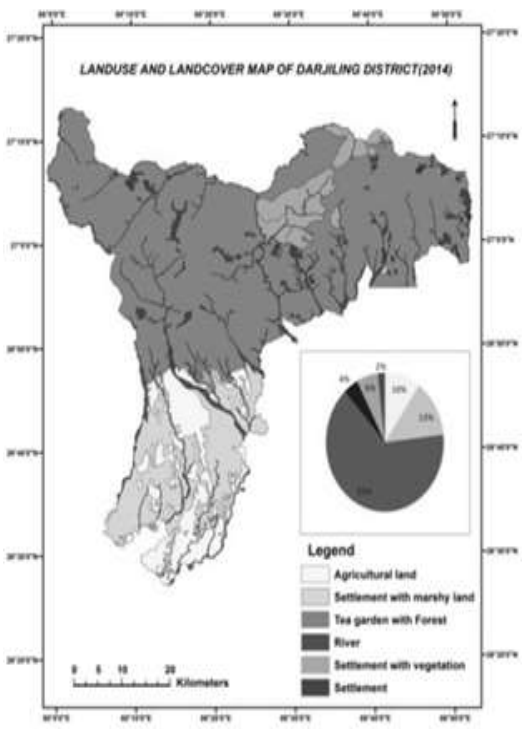


Fig-9 : Landuse and Landcover Map of Darjiling District

9. Road Density Map of the District

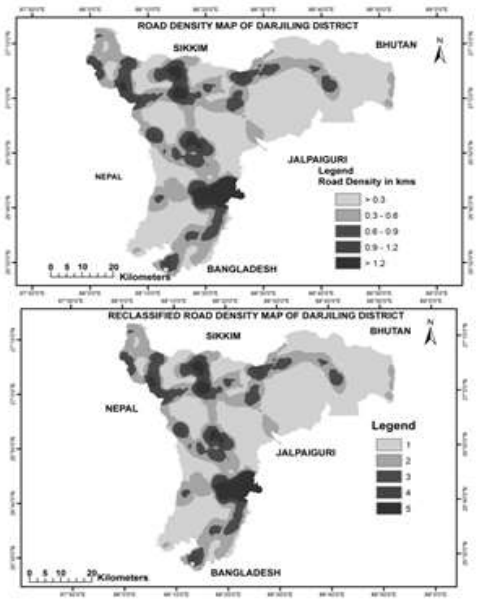


Fig- 10a : Road Density Map of Darjiling District
10b : Reclassified Road Density Map of Darjiling District

The lithological map is based on the geological map of Sikkim- Darjiling area (Acharya & Ray 1989) and modified after limited cross checks in the field by Kanungo & Sarkar (2002). The rock types present in the area are Darjiling gneiss, Paro gneiss, Lingtse granite gneiss, Feldspathic greywacke and Quartzite's of the Paro sub group and Reyang group. The Lingtse granite gneiss are strongly foliated and sheared in nature showing very high weathering state at most locations. Paro gneiss and Darjiling gneiss are very similar except the former is more coarse grained.

Quartzites are comparatively much stronger than other rocks in the area. Apart from inherent characteristics, all these rocks are folded, faulted and sheared to a varying degree and also subjected to high weathering along the drainage channels. Landslides are the result of interaction among several terrain parameters. Therefore it is always necessary to study different terrain parameters which contribute to slope instability in a hilly terrain in order to understand the landslide phenomena.

The relief map of the district shows, that the height of the district increases from north to south and from south east to north west. The average elevation in the south is about 200-300 mts while it increases to more than 1000 mts in the north.

The slope shows maximum frequency for gentler slopes (15º-20º) followed by slopes of 20º-25º, >30º and then 25º-30º. The higher slope areas have low landslide frequency. This may be explained by the fact that in lower slope areas (spur areas), landslide frequency may be due to toe cutting/bank erosion and for harder and more resistance litho-types, slope generated is found to be more than 30º and are not prone to sliding. Thus it can be stated that landslides may occur at even lower slope angles where possibly other controlling factors are responsible.

The relationship between landslides and drainage density shows maximum landslide number frequency occurring in high drainage density (>2.4-3.2). This is true for the region as most of the landslides are due to erosional activity associated with drainage.

Rainfall zones points out that higher rainfall areas are prone or subject to higher landslide vulnerability while lower rainfall generally have less probability of slides.

Landslide in relation to land use also shows a very high value of landslide frequency for barren slopes and a minimum value for thick forest. The intermediate landslide frequencies are for agricultural land with settlement followed by built up area, tea garden and open forest. This is an expected trend as landslides are less probable in the areas covered by thick vegetation and more probable in areas which are barren. Hence it can be inferred that the type of land use has a strong influence on landslide occurrences in the region.

The important terrain factors that control landslides are lithology, structure, drainage, slope, land use, vegetation and geomorphology. A complete landslide

zonation map of the study area requires a careful analysis of all these factors. These data have helped in mapping landslide prone zones.

Landslide Hazard Zonation:

The term zonation is applied in a general sense to categorise the land surface into areas and arrange them according to degrees of actual or potential hazard from landslide or other mass movements on slopes (Varnes, 1984). The landslide zonation map at regional scale has been attempted in different parts of the world for the past two / three decades (Nilsen and Brabb, 1973, De Graf, 1978; Varnes, 1981, 1985). In the Himalayas landslide zonation has been attempted by several workers of Geological Survey of India (Majumder, 1980; Chatterjee, 1986; Gupta, 1998; Gairola and Shukla, 1990; Sharan 1992; Chandra 1992; Sharma and Kandpal, 1996 etc.) who have based their studies on the preparation of different thematic maps showing data in regard to drainage, slopes, lithology, landform, land use and landslide incidence. The Bureau of Indian Standards (BIS), 1998 proposed a guideline for Landslide Hazard Zonation Map (LHZ).

Hazard zone mapping involves a detailed assessment and analysis of the past occurrences of landslides in terms of their location, magnitude and frequency with respect to various geo environmental factors that influence landslides and mass movements.[9] The factors that affect slope instability are varied and their interaction processes are complex depending on terrain set-up and climatic characteristics. The various individual factor maps such as lithology, slope, soil, land use, relative relief, drainage density, temperature, rainfall have been prepared on GIS platform (Fig 2a, 3a, 4a, 5a, 6a, 7a, 8a, 9, 10a).[10, 11] Data supplementation was done using remote sensing products. A landslide hazard zonation map has been prepared for the study area which are calculated and rated accordingly in each of the 105 grids of 30 sq km area. After assigning the rating value for different categories in each grid a cumulative total is calculated and each parameter are reclassified according to their re-class Value or Weightage Index (Table: 4, Fig 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9 & 10b). Each grid then has a computed total value which helps to produce a zonation map. Based on values obtained, the area has been classified into three zones of high hazard, medium hazard and low hazard zone and as illustrated in Fig.-11.

Sl No	TYPE	RECLASS VALUE
1	GEOLOGY	
	Granite	1
	Quartzite, Schists, Shale/Biotic Gneiss, Schists	2
	Sandstone, Shale, Boulder bed	3
	Hard Crust Laterite	4
	Young Flood Plain/ Fan &Flood Plain/ Sand, Silt Clay/Alluvium	5
2	Elevation in mts	
	<100 mts	1
	100-200	2
	200-300	3
	300-500	4
	>500	5
3	Slope	
	<10º	1
	10º- 20º	2
	20º-30º	3
	30º-40º	4
	>40º	5
4	Soil	
	River/Settlement	0
	Typic Fluvaquents & Aquic Udifluvents/Aeric Haplaquepts & Typic Ustorthents	1
	Aquic Udifluvents & Typic Fluvaquents/Typic Haplumbrepts& Typic Fluvaquents	2
	Fluventic Eutrochrepts & Aquic Udifluvents/ Umbric Dystrochrepts & Fluventic Dystrochrepts	3
	Typic Haplumbrepts & Typic Ustorthents/ Umbric Dystrochrepts & Typic Ustorthents	4
	Typic Ustorthents & Typic Dystrochrepts/ Lithic Udorthents	5
5	Drainage Density in kms/sq kms	
	0-0.8	1
	0.8-1.6	2
	1.6-2.4	3
	2.4-3.2	4
	> 3.2	5
6	Road Density in kms/ sq km	
	<0.3	1
	0.3-0.6	2
	0.6-0.9	3
	0.9-1.2	4
	>1.2	5
7	Landuse	
	River/Waterbody	1
	Agricultural land/ Built up Area/Tea Garden	2
	Settlement with Vegetation/Sand Bar/ Dense Vegetation	3
	Degraded Vegetation	4
	Fallow land	5

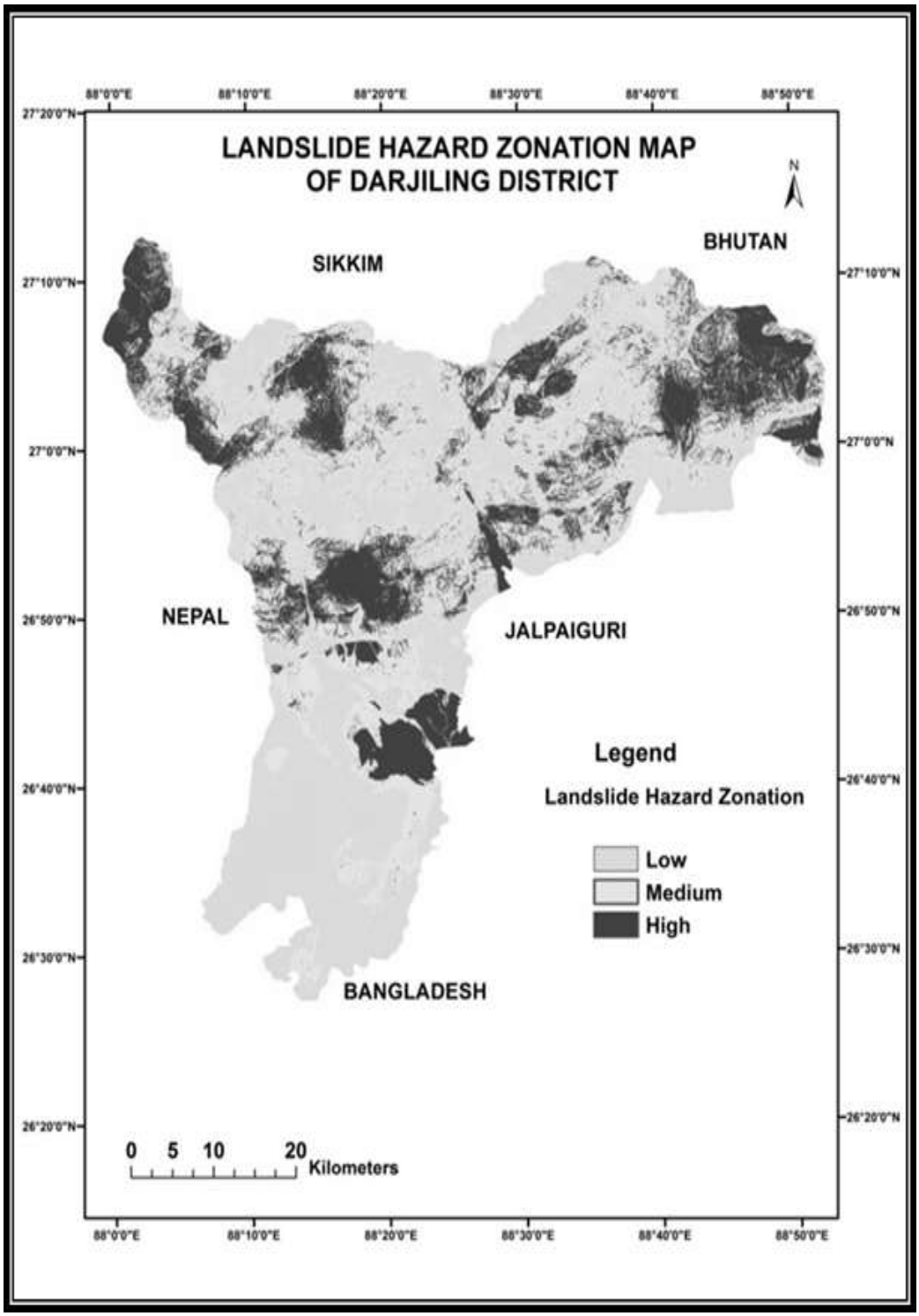


Fig-11 : Landslide Hazard Zonation Map of Darjiling District

High Hazard Prone Zones: cover major areas in Darjiling- Phulbazar, Naxalbari, Matigara, Kurseong, Mirik, Jorebungalow- Sukhiapokhri, Gorubathan and Kalimpong I blocks. Geologically the areas are characterized by rocks with highly developed foliation, bedding, cleavage, lineament etc. Landslide frequency in this area is the highest and these are the most vulnerable zones in the study area.

Medium Hazard Prone Zones: cover small areas in Darjiling- Phulbazar, Naxalbari, Matigara, Kurseong, Mirik, Jorebungalow- Sukhiapokhri, Gorubathan and Kalimpong I and II blocks. Steep slope and fragile rock types with weak geological structures are characteristic features of this zone. This area also shows a relatively high value of landslide frequency and may contain some pockets of unstable slopes.

Very Low Hazard Prone Zones: This zone covers only small plain land areas with relatively lesser slope areas of Rangli Rangliot, Phansidewa, Kharibari blocks of Darjiling district. The total area is mainly confined to the valleys of rivers in the north and south. It also covers a major part of blocks which is under forest cover. These are the most stable zones and development schemes may be planned and executed safely in these regions.

For better planning and detail study the villages having high and medium risk of landslide in each block of Darjiling district has been categorised in Table 5:

Table 5: List of Villages with high and medium vulnerability of Landslides in Darjiling District (Block wise)

Name of the Blocks	Name of the Landslide Prone Villages	
	HIGH	MEDIUM
Naxalbari	Kamalpur, Uttar Bagdogra (CT), Bhujia Bani, Dakshin Bagdogra, Rajajhar, Lalman, Rupsing, Batlabari	Kamala, Kilaram, Dayaram, Nandalal, Chota Chenga, Manjha Tea Garden, Marpur, Kadma, Pantapari Forest, Barabhita, Dalkajhar Forest
Rangli Rangliot	N.A	Baramungwa, Dawaipani, Tukdah, Pubong Khasmahal, Lingding Khasmahal, Mangpu Cinchona Plantation, Reshop Bazar, Manedara,Rong Chong Khasmahal
Mirik	Manjua Forest, New Fallodi Tea Garden(Ghyabari), Pantong Tea Garden, Lohagar Forest, Singbuli Tea Garden, Sourinibasti	Panighata,Bara Chenga, Paschim Phuguri Tea Garden, Mirik Khasmahal(P)
Matigara	Pelku,Thiknikata, Khwakari, Matigarahat, Bara Mohansingh, Bairatisal(CT), Banikhari, Udaysing, Salbari Chhat Pratham Khanda, Guria, Nengtichhara, Lalsara,Jitu, Kalam, Siliguri (M.C), Gourcharan, Bara Gharia, Tomba, Mathapari, Ujanu(P), Daknikata, Mandlaguri	Kalkut, Nimai, Rangia, Lachka, Dumuri Guri Chhat, Khaprail, Bara Adalpur Dwitiya Khanda, Khoklong, Khoklong Chhat, Rajpairi, Chamta, Mahatram, Pankha Kulguri, Rangia

Phansidewa	Chota Pathuram, Kalaram, Jabarali Chhat	Sannyasithan, Sannyasithan Chhat, Singihor, Harising, Harising Chhat, Bhaishdubi, Liohakaichi, Abhiram, Raghunath Chhat, Turibhita, Bara Pathuram, Dwarabaksa, Narayan, Mahammadbaksha, Nirmmal, Kashiram, Liushi Pukuri, Sahananda, Kadmi, Guabari, Bandar Gachh, Dhama Gachh, Mahipal, Uttar Bansgaon Kismat, Jogibhita, Molani, Ambari, Paschim Bansgaon Kismat, Bara Paikpara Arazi, Lahugaon, Chota Paikpara Arazi
Kurseong	Karbia Tea Garden, Spring Sidi Tea Garden, Castleton Tea Garden, Gidda Pahar, North Shibkhola Tea Garden, Rohini Tea Garden, Selim Hill Tea Garden, Simulbari Tea Garden, Sepoy Dhura Tea Garden, Kurseong(M), Tindharia Tea Garden, Gayabari Tea Garden, Shibkhola Forest (Paglajhora), South Shibkhola Tea Garden, Bara Shibkhola forest, St. Marys, Montiviot Tea Garden, Jungpana Tea Garden, lizziepur Tea Garden, Gitingy Tea Garden, Nurbang Tea Garden, Malotar Tea Garden	Garidhora Tea Garden, Raki High Forest, Longview, Bamonpokhari Forest, Lama gumba Forest, Sukna Forest, Paharu, Kanyan, Chota Forest, Choklong Forest
Darjiling Pulbazar	Singalila Forest, Majua, Kankibong, Chongtong Tea Garden, Soom Tea Garden, Lebong Tea Garden, Tukvar Tea Garden, Phub Sering, Pandam Tea Garden, Alubari Tea Garden, Alubari Basti, Bloomfield, Pattabong Tea Garden, Sum Forest, Darjiling(M), Singtam, Liza Hill Tea Garden	Hatta, Namla, Badamtam Tea Garden, Lebong & Mineral Spring Tea Garden, Ging Tea Garden, Singla Tea Garden, Barnesbeg Tea Garden, Rishihat Khasmahal
Jorebanglow Sukiapokhri	Simana Basti, Parmaguri Forest, Senchal Forest, Darjiling (M), Jorelhatta (P)	Mim Tea Garden, Ghoom Pahar Forest, Sukia Pahari, Dooteria Tea Garden, Moonda Kotee Tea Garden, Gopal Dhara Tea Garden, Seyok Tea Garden
Gorubathan	Ruka Forest, Today Tangta Khasmahal, Paten Godak Khasmahal, Mo Forest, Eastnar Forest, Pankhasari Khasmahal, Paren Forest, Rango Forest, Kumai Forest, Nim Khasmahal	Thousum Forest, Rechila Forest, Samabiyong Tea Garden, Pashiting Khasmahal, Dalinkot Forest, Lehti Forest, Gorubathan Khasmahal, Sakam Forest, Westnar Forest, Samsing Khasmahal, Pagrang Bong Khasmahal

Kalimpong I	Yokprintan Khasmahal, Slokbhir Khasmahal, Singlibong Khasmahal, Panbu Forest, Yang Mahum Khasmahal, Homes St. and Graihms	Kalimpong Khasmahal, Kal Dansong Forest, Mangber Forest,Tashiding Forest, Ringking Pong Forest, Riyong Forest, Birik Forest, Mangpong Forest, Lish Forest, Churanthi Forest, Ramthi Forest, Samther Forest, Pemling Forest, Nimbong Khasmahal, Nobgaon Khasmahal, Paringar Khasmahal, Icha Khasmahal
Kalimpong II	N.A	Most of the villages are at medium risk of Landslide Hazard.
Kharibari	N.A	N.A

CONCLUSION:

The Darjiling Himalayas is economically one of the least developed regions in India. Its backwardness can be attributed to environmental/ physical constraints like rugged topography, harsh climate varying altitude with steep slopes and above all, political instability which makes life painstaking and hazardous. Besides these, unprecedented demographic threats coupled with a host of other factors like landslides etc, have inflicted incalculable damage on this part of the Himalayas. Moreover, demographic pressure has led to a major change in the land use and land cover of the area threatening the environmental safety of the area. It therefore seems that there is an urgent need to work out a comprehensive regional planning strategy which will be capable of addressing the economic, demographic and environmental issues in this fragile yet strategic region in order to bring about sustainable development and issue based growth. Landslide disaster like other natural hazard such as earthquake and flood is difficult to be predicted to where and when it will happen. However, landslide can be systematically managed even though cannot be completely prevented. The intensity of impacts from landslide hazard can be minimized if the hazard zones can be predicted and mapped before any development activity takes place. Results from this project can be used by the local authority to manage properly, systematically and plan development within their areas.[12] Multi-criteria decision making together with GIS is a powerful tools which can be applied to predict and map landslide hazard zones. Further research is needed especially on the use of appropriate model/s to accurately map landslide risk areas particularly in the Darjiling context.

REFERENCE

1. Bhattacharya, Animesh. et al (2000). *Geotechnical assessment and hazard evaluation of landslides on 7th July 1998, Kurseong Hills Darjiling District,* West Bengal Journal of Engineering Geology- Vol XXVII Nos 1-4, Engineering Geology Division, Eastern Region 77-79.

2. Bhutia, Sherap. (2015*). Economic Development and Environmental Issues in Darjeeling Himalaya of West Bengal, India:* A Theoretical Perspective International Journal of Humanities and Social Science Invention . Volume 4 Issue 3

3. Khawas Vimal (2002). "*Environment and Rural Development in Darjiling Himalaya: Issues and Concerns"* Centre for Environmental Planning and Technology, Ahmedabad, India.

4. Varnes, D.J (1978). *Slope movement types and processes*- Chap 2 In: R.L Schuster & R.J. Krizek (Eds)- Landslide analysis & control, special report 176, Transportation Research Board, NRC, National Academy of Sciences, Washington D.C. 11-33.

5. Zaruba Q., Mencl, V (1982). *Landslides and their control,* Elsevier Scientific Publishing Co, New York. 74-133, 145-146.

6. Smith Keith. (2006). *Environmental Hazards: Assessing risk and reducing Disaster*, 4th edition, (Routledge, London and New York, 2006) 123- 141.

7. Kanungo, D.P, Sarkar, S (2003), *Landslides and Terrain Parameters in Darjiling Himalaya*- Himalayan Geology Wadia Institute of Himalayan Geology, Volume 24(2) Dehradun, 55-62.

8. Kanungo D. P., (2009*). Landslide Susceptibility Zonation (LSZ) Mapping* - Journal of South Asia Disaster Studies, A Review Vol. 2 No. 1 June 2009

9. Othman, Ainon Nisa. (2011). *GIS Based Multi-Criteria Decision Making for Landslide Hazard Zonation*, Asia Pacific International Conference on Environment-Behaviour Studies, Salamis Bay Conti Resort Hotel, Famagusta, North Cyprus, 7-9 December 2011.

10. Sangrawee1 Phattaraporn. (2007). *Landslide Hazard Zonation using Multiple Criteria Analysis with GIS and Remote Sensing Technique* Geo-informatics and Space Technology Development Agency (Public Organization)

11. Kiran, V.S.S: (2013). *Change Detection In Landuse/Landcover Using Remote Sensing & G.I.S Techniques: A Case Study of Mahananda Catchment, West Bengal:* International Journal of Research in Management Studies (IJRMS), Vol. 2, No. 2, October 2013

12. Nad Chiranjib (2013). *Landslide Hazard Management of Darjeeling Hill*: A Critical Need For Inhabited: International Journal of Research in Management Studies (IJRMS), Vol. 2, No. 2, October 2013 68 ISSN 2321-1830.

□ □ □

Life Membership Form

KONKAN GEOGRAPHERS' ASSOCIAITON OF INDIA

House no 1015, Janavli Tal : Kankavli Dist: Sindhudurg, 416602 (MS)

Reg. No. F3341 sindhudurg dated 12/07/2010

To,

The Secretary,

Konkan Geographers' Association Of India.

Sir,

I would like t enroll my name as Life Member of the Konkan Geographers' Association of India. Herewith, I am submitting an amount of Rs.2000/-(Two Thu. Rupees only) by Cash/D.D. No._____dated_____ towards membership. I have gone through the bye-law rules of the association and state that I will abide them.

Name Dr/Prof/Mr/Ms _____

Qualification _____ Designation_____

Teaching Experience _____ years Date of Birth_____

Official Address _____

_____Phone No_____

Residential Address_____

_____

Mobile No_____ email_____

Date: Yours Sincerely,

Place:

Signature of Applicant

For office use only: Application received & accepted on_____

Receipt No_____ dated_____ Secretary_____

.....

Deposit Money into our Bank. Name of A/C- **Konkan Geographers' Association**

Bank Name –**BANK OF MAHARASHTRA** Branch- Kankavli **A/C –No.60052935481**

IFSC No. MAHB0001397. After receipt of your membership payment & form, the membership certificate, pay receipt & journal volume will be posted on your address**.**

For any details contact- Secretary- Dr. R. B. Patil 09421148078-drrajaram75@gmail.com

THE KONKAN GEOGRAPHER

(NATIONAL INTERDISCIPLINARY JOURNAL)

National / International Peer Review Committee (Year : 2020 to 2025)

THE KONKAN GEOGRAPHER

(National Level Interdisciplinary and Peer Reviewed
Research Journal of the
Konkan Geographers' Association of India
Registration No. 3341/2010, Sindhudurg)

ISSN 2277- 4858 (Impact Factor – 7.125)

Form IV

Place of Publication	**-Kankavli (Sindhudurg)**
Periodicity of the Publication	**-Half Yearly**
Printers Name	**-Supreme Printers, Kankavli**
Publishers Name	**-Dr. R. B. Patil**
Nationality	**-Indian**
Address	**-Teachers' Colony, Havelinagar, Phondaghat Tal:Kankavli Dist:Sindhudurg. MS (India)**
Editors Name	**-Dr. R. B. Patil**
Nationality	**-Indian**
Adress	**-Teachers' Colony, Havelinagar, Phondaghat Tal:Kankavli Dist:Sindhudurg. MS (India)**
Name of the Owner & Address	**-Dr. R. B. Patil Secretary, Konkan Geographers' Association of India**

I, Dr. R. B. Patil herby declare that the particulars given above are true to the best of my knowledge and belief.

sd/

Date – 30/07/2024 **Dr. R. B.Patil**