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"River Proximity and Its Influence on Rural Settlement Distribution in Nashik District"

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ABSTRACT

This Study Examines The Relationship Between River Proximity And Rural Settlement Distribution, Exploring How The Distance From Rivers Influences The Location And Development Of Rural Settlements. Rivers Have Historically Played A Significant Role In Shaping Settlement Patterns Due To Their Provision Of Water Resources, Fertile Land, And Transportation Routes. Using A Combination Of Geographic Information System (GIS) Analysis And Field Surveys, This Research Analyses Settlement Data Across Nashik District, Correlating Settlement Density And Distribution With Their Proximity To Rivers. The Findings Reveal A Significant Association Between River Proximity And Rural Settlement Size And Patterns, With Settlements Often Clustering Closer To Rivers To Capitalize On Water Availability And Fertile Soils. This Study Highlights The Importance Of River Proximity In Rural Planning And Development, Providing Insights Into How Natural Features Influence Human Settlement Patterns. The Results Contribute To A Deeper Understanding Of Geographical And Environmental Factors Affecting Rural Settlement Distribution And Offer Scope For Future Rural Development Strategies That Consider The Benefits Of River Proximity.

Keywords: River Proximity, Rural Settlement Distribution, Geographic Information System (GIS), Multiplier Effect, Co-Efficient Of Correlation, T- Test

INTRODUCTION

Early Humans Often Chose To Settle Near Rivers Because These Locations Were Ideal For The Growth And Development Of Communities. Historically, Many Civilizations Have Thrived Along Major Rivers Due To The Numerous Benefits They Offer. Rivers Provide Alluvial Fertile Soil, Essential For Agriculture; A Reliable Water Source For Both Domestic And Farming Needs; And Expansive Arable Land Conducive To Intensive Cultivation. Additionally, Rivers Facilitate Access To Other Regions. These Advantageous Factors Collectively Enhance The Land's Carrying Capacity, Attracting People To Settle In These Areas. Consequently, A Significant Number Of Settlements Have Developed Along Riverbanks Or In Their Proximity.

In Nashik District, The **Godavari River** And The **Girna River** Are Significant. The Godavari And Girna Rivers Are Fundamental To Study Region Water Supply, Agricultural Productivity.

Study Area:

For This Study, Nashik District Has Been Chosen Due To Its Unique Characteristics. Located In The North-Western Part Of Maharashtra, Nashik Encompasses Parts Of Both The Godavari And Girna River Basins. The District Spans From 19˚33' To 20˚53' North Latitude And 73˚15' To 75˚16' East Longitude (Nashik Gazetteer 1983) And Includes Areas Covered By Survey Of India Degree Sheets 46H, 46L, 47E, And 47I. Situated On The Leeward Side Of The Western Ghats, Nashik Is One Of The More Developed And Populous Regions Of Maharashtra, Excluding Its Tribal Areas. Covering An Area Of 15,530 Square Kilometers, The District Features 1,922 Rural Settlements And A Diverse Elevation Range From 300 To Over 1,200 Meters.

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Objectives: The Primary Objectives Of This Study Are:

1. To Analyze The Spatial Distribution Of Rural Settlements In Nashik District.
2. To Identify Regions Of Development Influenced By River Water Sources.
3. To Assess The Impact Of River Proximity On The Growth, Size, And Spatial Distribution Of Rural Settlements In The Study Area.

Database:

Data For This Study Have Been Gathered From Secondary Sources. Information On Rivers And Rural Settlements Has Been Sourced From The Nashik District Census Handbook (2011), And Additional Data Has Been Obtained Using Google Earth And GIS Software.

METHODOLOGY

The Data Gathered For This Investigation Have Been Organized And Analyzed. Measurements Include The Distance From The River In Kilometers, The Percentage Of Area By Kilometer, And Both The Distribution Of Rural Settlements And Their Population Sizes. This Information Has Been Visually Represented Using The Choropleth Method. To Assess The Influence Of Distance From River On Rural Settlements In The Study Area, Various Statistical Techniques Were Employed. These Include Pearson's Product-Moment Correlation Coefficient, Regression Analysis, And Student's T-Test To Determine The Significance Of The Correlation Coefficient.

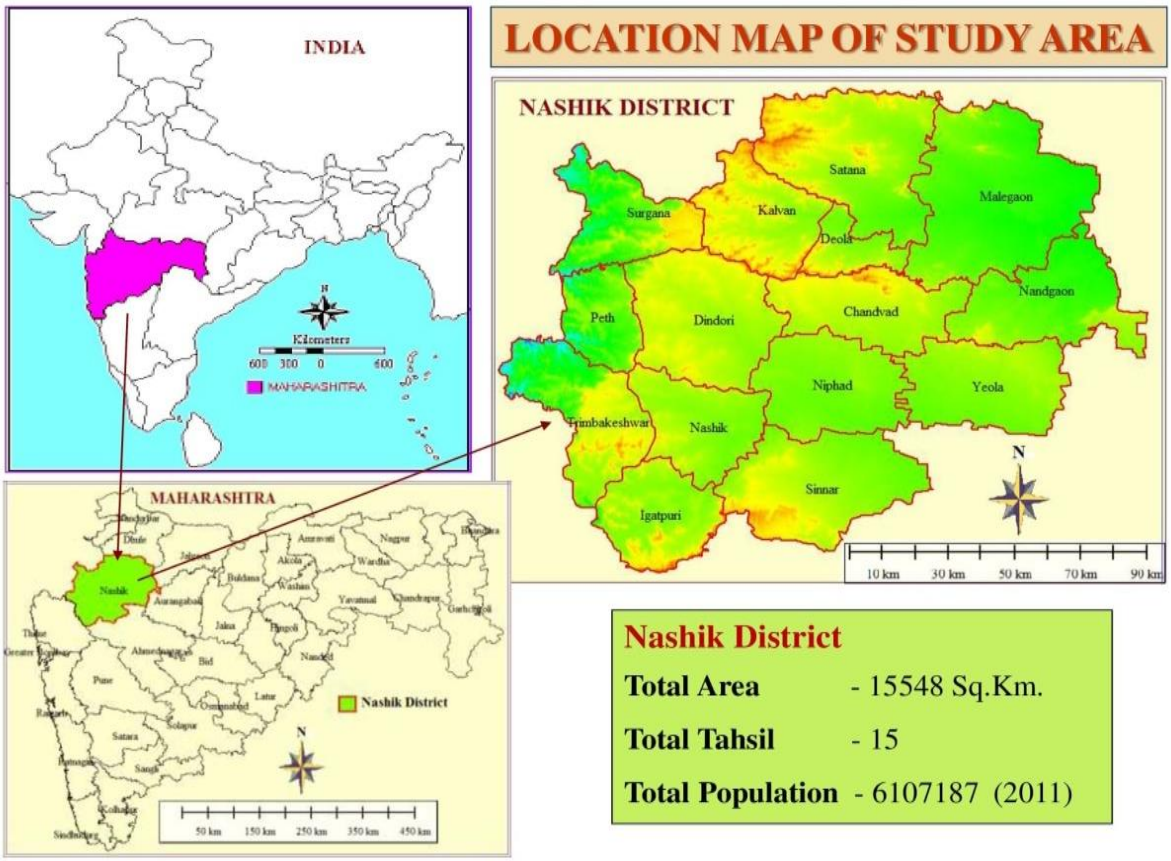

Fig. 1.1

RESULT AND DISCUSSION

Rivers And Their Tributaries Are Crucial In Shaping The Location, Growth, And Development Of Rural Settlements. In The Study Region, Major River Systems Such As The Godavari, Girna, And The West-Flowing Konkan Rivers, Including Damanganga And Vaitarna, Are Particularly Influential.

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Table No. I: 1 Distance From River And No. Of Rural Settlements

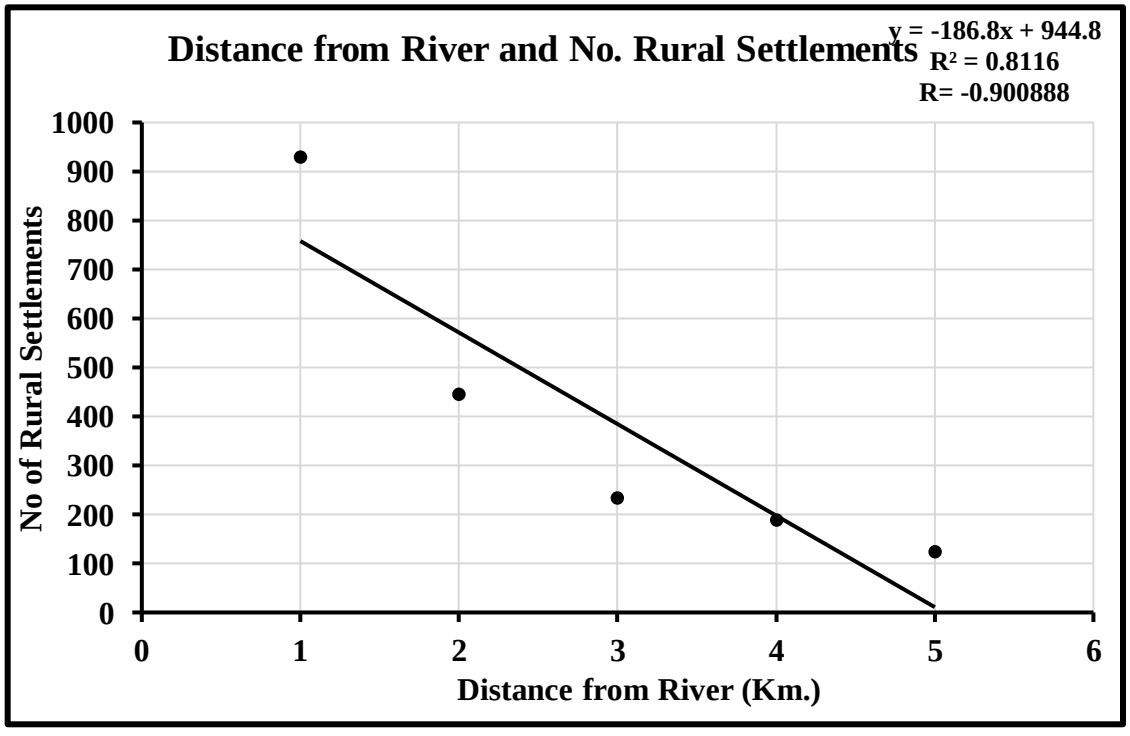
Sr. No.	Distance From River In Km.	Area Sq. Km.	Area Percentage	No. Of Rural Settlement	% Of Rural Settlement
01	1	6337.27	41.53	930	48.39
02	2	3529.47	23.13	445	23.15
03	3	2475.75	16.22	234	12.18
04	4	1287.48	8.44	189	9.83
05	5	1630.3	10.68	124	6.45
	Total	**15260.27**	**100.00**	**1922**	**100**

Source: Computed By The Researcher

An Analysis Of Table I.1 Clearly Indicates A Negative Correlation Between The Distance From Riverbanks And The Number Of Rural Settlements. As The Distance From The Rivers Increases, The Number Of Rural Settlements Declines. This Trend Is Consistent Across The Major Rivers In The Study Area—Namely The Godavari, Girna, And Vaitarna—As Well As Their Smaller Tributaries. Rural Settlements Are Primarily Concentrated Along These Rivers And Nearby Water Bodies Due To The Essential Role Water Plays In Both Human Habitation And Agriculture.

The Data Shows That 48.39 Percent Of Rural Settlements Are Located Within One Kilometer Of The Riverbanks, Emphasizing The Importance Of Proximity To Water Sources. The Area Within Two Kilometers Of The River Spans 3,529.47 Square Kilometers, Or 23.13 Percent Of The Total Rural Area. Within This Zone, 445 Rural Settlements Are Found, Accounting For 23.15 Percent Of All Rural Settlements. Overall, 71.54 Percent Of Rural Settlements Lie Within A Two-Kilometer Radius Of The Rivers, While Only 28.46 Percent Are Located Beyond That Distance.

Tehsils Such As Baglan, Sinnar, Yevla, Surgana, Peth, Dindori, And Malegaon Exhibit Fewer Rural Settlements Due To Limited Water Availability. Only 9.83 Percent And 6.45 Percent Of Rural Settlements Are Situated Four And Five Kilometers Away From River Channels, Respectively. This Pattern Illustrates That As The Distance From Rivers Increases, Both The Number And Size Of Rural Settlements Diminish—Underscoring The Vital Influence Of Rivers Like The Girna, Godavari, Mosam, Kadva, And Vaitarna In Shaping Rural Settlement Development In The Region.



Graph 1.1

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The Scatter Diagram And The Product-Moment Coefficient Of Correlation (R = -0.900888) Reveal A Strong Negative Relationship Between The Distance From The River And The Number Of Rural Settlements In Nashik District, As Illustrated In Graph 1:1. The Regression Equation Of Y On X, Given As Y=−186.8x+944.8y = -186.8x + 944.8y=−186.8x+944.8, Quantifies How The Number Of Rural Settlements Changes With Distance From The River In The Study Region. This Equation Confirms That As The Distance From The River Increases, The Number Of Rural Settlements Decreases.

Table No. I: 2 Distance From River And No. Rural Settlements According To Population Size

Distance From River In Km.	< 500	500 - 1000	1000-2000	2000-3000	3000-5000	> 5000
1	64	204	389	156	78	39
2	57	85	159	83	43	18
3	34	68	67	33	19	13
4	09	81	52	17	23	07
5	06	54	31	13	15	05

Source: Compiled By The Researcher

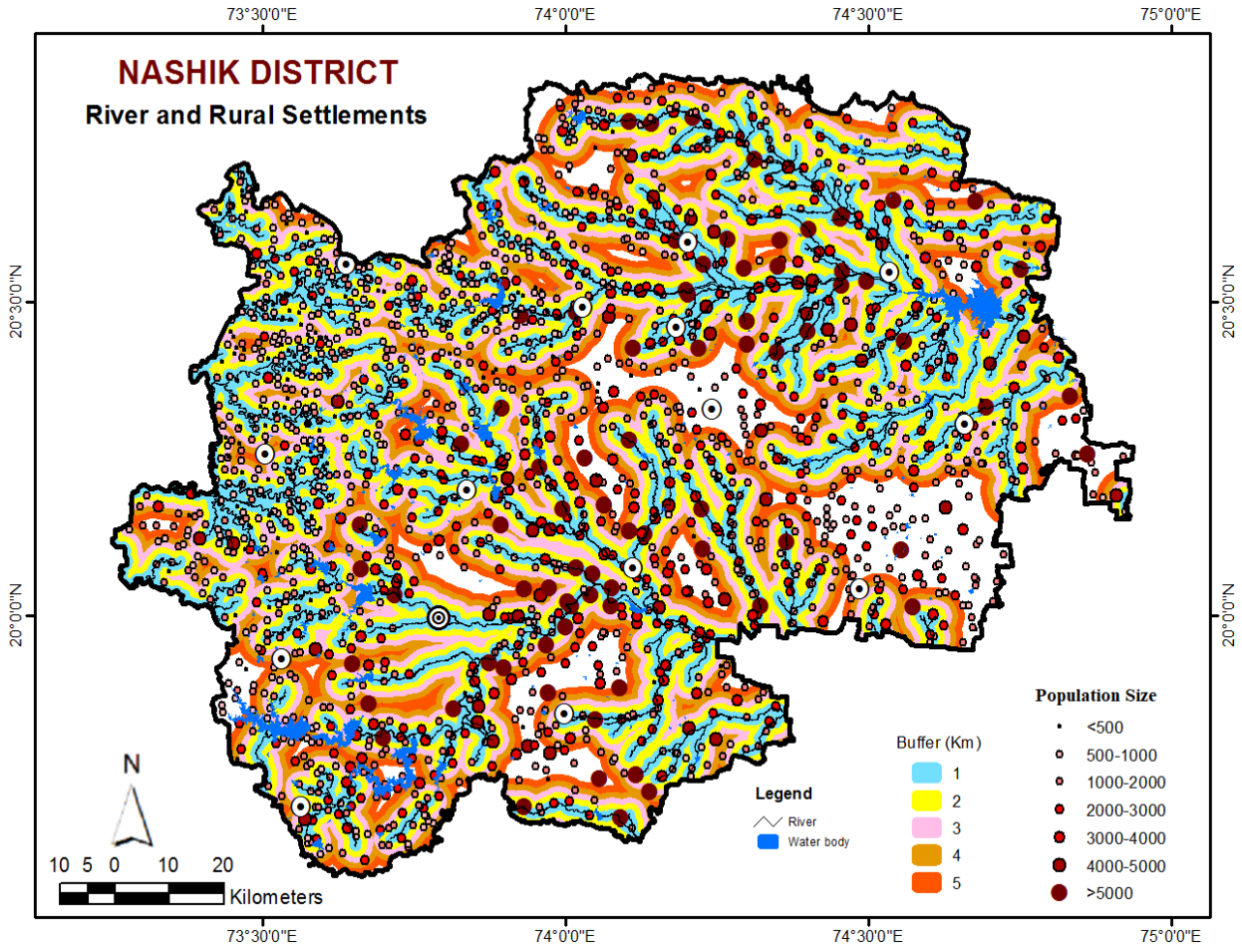

Fig. 1.2

Table 1.2 Displays The Distribution Of Rural Settlements Across Six Population Size Categories, Classified Based On Their Distance From The River. A Total Of 1,922 Rural Settlements Are Examined Concerning Their Proximity To The River. Graph 1.2 And Figure 1.2 Reveal A Clear Pattern: The Number Of Rural Settlements Steadily Decreases As The Distance From The River Increases. This Downward Trend Is Evident Across All Population Size Categories. Importantly, Large And Very Large Settlements Are Primarily Concentrated Within A Three-Kilometer Radius Of The River, With A Marked Decline In Settlement Numbers Observed Beyond This Distance.

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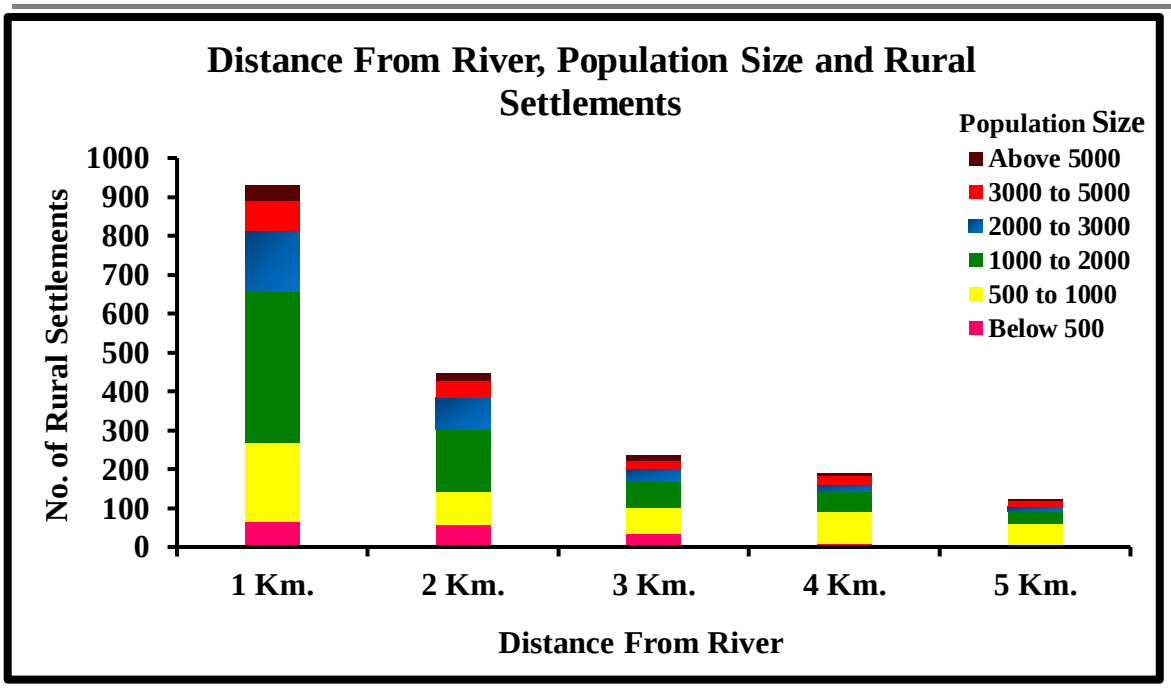

Graph 1:2

Testing The Significance Of The Coefficient Of Correlation:

The Result Shows That There Exists A Negative Relationship Between Distance From River And The Number Of Rural Settlements In The Study Region. However, Without Applying The Test Of Significance, The Observed Relationship Between These Two Variables Cannot Be Generalized. Hence, The Value Of Student's 'T' May Be Calculated From The Following Equation.

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

Where,

'N' Is The Number Of Pairs And The Degree Of Freedom Is N-2.

'R' Is Always Taken As Positive, Merely For Convenience.

Using The Above Formula, We Test The Hypothesis:

H_0 = There Is No Correlation Between Distance From River And The Number Of Rural Settlements.

H_1 = There Exists A Correlation Between Distance From River And The Number Of Rural Settlements.

To Test The Significance Of This Correlation, A T-Test Was Performed. The Calculated 'T' Value (3.59455) Is Lower Than The Table Values 5.84 Of 1% Level Of Significance. Therefore, The Null Hypothesis That The Number Of Rural Settlements Significantly Correlated With The Distance From The River. The Regression Line Also Shows A Negative Trend. ***Hence, It Can Be Concluded That River Proximity Plays A Significant Role In Shaping The Distribution, Growth, And Size Of Rural Settlements In The Nashik District.***

CONCLUSION

The Analysis Clearly Indicates That The Number Of Rural Settlements Declines As The Distance From Riverbanks Increases. This Pattern Is Consistently Observed Along Major Rivers Like The Godavari, Girna, And Vaitarna, And Their Tributaries. Most Rural Settlements Are Located Near These Rivers, Reflecting The Crucial Role Of Water Resources For Human Habitation And Agriculture. Specifically, 48.39 Percent Of

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Settlements Are Within One Kilometer Of Riverbanks, Demonstrating The Importance Of Close Water Access. Additionally, 71.54 Percent Of Settlements Are Within Two Kilometers Of The River, Highlighting A Significant Concentration In This Area. The Findings Underscore The Strong Reliance Of Rural Settlements On Proximity To Rivers For Essential Water Resources. This Spatial Relationship Emphasizes The Need To Consider Water Accessibility In Rural Planning And Development. Thus**, The Proximity To Rivers Plays A Crucial Role In Determining The Growth And Size Of Rural Settlements In Nashik District.** The Influence Of River Proximity Is Significant In Shaping The Distribution And Development Of These Settlements Within The Study Region

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