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Origin and Spatial Patterns if Rural Settlements in Vijayapura District, Karnataka: Using Gis Technquies

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ABSTRACT

A settlement is a permanently occupied human dwelling place that signifies a community of dwellings and associated buildings, ranging from a hamlet to a metropolis or megalopolis. The origin of human settlements is shrouded in countless stories of the past. However, some factors that influence the settlement of humans in a particular place can be easily predicted. These factors include the site of the settlement, the natural availability of water, soil fertility, micro-climate, accessibility, elevation, and the availability of forest and mineral resources. Settlement pattern denotes the shape or arrangement of settlements in relation to natural or man-made features such as streams, ridges, canals, and roads. In the study of settlement patterns, two fundamental considerations must be taken into account. First, the pattern should be abstracted from the habitat. Second, the pattern should also depend on the kind of houses people wish to construct, which may include cattle sheds, granaries, and out houses.

The area around the five rivers in the old Bijapur district served as the home for the activities of the Old Stone Age man. Implements belonging to the early Stone Age are found in numerous places in the vicinity of the River Krishna and its tributaries, Ghataprabha and Malaprabha. In the river basin of Ghataprabha, Anagavadi, Honnihalli, Sindagi, Edahalli, Kovalli, Asangi, Padasalagi, etc., are important Old Stone Age sites. Similarly, places like Kolhara, Beerakabbi, Sangam, Alamatti, Sitimani, Yalaguru, etc., on the bank of the River Krishna also have remains of Early Stone Age settlements. Among the Early Stone Age settlements discovered in the district, Khyad on the banks of Malaprabha and Anagavadi on the banks of Ghataprabha are very important.

The present investigation is based on primary and secondary data. Secondary data were collected from the census of Vijayapura district in 2011 and topographical maps and Google Earth Pro Software and GIS techniques have been employed to know actual status of the settlement patterns. Different patterns of settlements are found in the study area, such as Linear Pattern, Square Pattern, Rectangular Pattern, Triangular Pattern, Semi-Circular Pattern, Star Pattern, L-Shaped Pattern, Y-Shaped Pattern, and Other Shaped Patterns like C, H, I, S, T, X, Z patterns, etc. Additionally, some village patterns have shapes similar to or approaching related shapes.

Keywords: Google Earth, Q-GIS, Software, Pattern, settlements,

Introduction:

Perpillou (1986) states that a settlement is man's first step towards adapting himself to his environment environment. A settlement is essentially a unit consisting of groups and arrangements of houses and roads. The origin of human settlements is shrouded in countless stories of the past. However, some factors that influence the settlement of humans in a particular place can be easily predicted. These factors include the site of the settlement, the natural availability of water, soil fertility, micro-climate, accessibility, elevation, and the availability of forest and mineral resources. Depending on the quality and availability of these factors, settlements can be either temporary or permanent. Temporary settlements include things such as refugee camps, and some temporary settlements have become permanent over time. A settlement could range from an isolated farmhouse to a mega city (a settlement with over 10 million people). Settlements that are planned are primarily urban in nature and often originate from unplanned rural settlements.

The word 'pattern' is often equated with the word 'shape'. However, there are geometrical dissimilarities between these two terms. “A closed curve has a shape, whereas a non-closed collection of points has a pattern". The pattern of points is a zero-dimensional object whose pattern is operationally determined by the relative distances or spacing of the points with respect to one another. According to basic properties, patterns can be classified into three categories: (i) those having the patterns of Euclidean geometry, (ii) those which are independent of scale and density, and (iii) those which may be expressed by the relative spacing of the individuals in the distribution. In this context, it may be noted that a single distribution may have different patterns at different quadrant sizes.

Study area

Vijayapura district forms a part of North Karnataka plateau. The district lies between 16° 20' to 17° 28' North latitude and 75° 16' to 76° 28' east longitude. The district covers a geographical area of 10,498 sq kms (2011). The area under study consists of twelve tehsils, 692 villages and twelve statutory towns. The study area surrounded by Gulbarga district on the east, Bagalkot district on south and Belgaum district on the South-West of Karnataka state and Sholapur and Sangli districts of Maharastra state on north and North-West respectively. According to 2011 census Vijayapura district, has a population of 21,77,331, of which 11,11,022 and 10,66,309 were male and female respectively.

Objectives

The present investigation is outlined with the following specific objectives.

- To study the origin and factors responsible for the evolution of rural settlements.
- To examine the spatial patterns of rural settlements with the help of Geo-Spatial techniques.
- To evaluate the factors influencing the emergence of different patterns of settlement.

Data base and Methodology

The present study is based on primary and secondary data collected from the district census handbook (2011), toposheets and Land Record department. Primary information has been gathered through GPS locations of all settlements. An attempt has been made to find out the actual status of the settlement patterns using GIS techniques. For the analysis of patterns of rural settlements in the study area, topographical maps and Google Earth Pro Software have been used. To find out the settlement pattern of the area, topographical sheets at a scale of 1:50,000 have been utilized. The study of the sitting and

geometrical patterns of rural settlements was complemented by field-based observations and discussions with some of the local people in the study area.

Methods Employed

The research, utilizing an explanatory research model, focuses on settlement patterns. The village boundaries of each taluk in the Vijayapura district were digitized with the help of Google Earth Pro and Q-GIS software and imported into the 'Q-GIS' software. The villages were tagged with names and unique codes, including the polygons of each settlement. The adopted projection system was 'Lambert Conformal Conic (LCC)' with WGS 1984 datum. The shape file of the village boundary was exported to KML format using 'Add polygon tools in Google Earth Pro software'. The KML file of the village boundary was imported into "Google Earth" and "Q-GIS" software, and the features of the extent of settlements were delineated. The measurement of the extent of the built-up area of each settlement was done using the ruler tools in 'Google Earth Pro'. The KML file was imported into 'Q-GIS' as a 'shape file' for further analysis and map composition

Results and Discussion:

Origin of Rural Settlements in Vijayapura District

Vijayapura district is rich in natural resources essential for early human activities. The Kaladgi and Beema rock cliffs contain Quartzite, Chert, and Chalcidony, crucial for making stone tools. The fertile lands around the Krishna River and its tributaries—Bheema, Doni, Malaprabha, and Ghataprabha—have supported numerous Stone Age settlements.Prehistoric humans preferred riverbanks and valleys, as evidenced by excavations in North Karnataka. British geologist Bruce Foote, the father of archaeology, first reported prehistoric findings in Khyad and Danakasirur (Badami taluk) in 1888, discovering stone tools from the Old Stone Age. This marked the beginning of prehistoric studies in the district.

In 1949, Zainer F.E. of London University examined archaeological sites at Khyad (Badami Taluk) and Menasagi (Ron Taluk). Scholars like Sankalia H.D., Joshi R.V., Sundra A., and others have studied the river valleys of Malaprabha, Ghataprabha, Krishna, Bheema, and Doni, uncovering numerous archaeological sites. Sundara A. contributed significantly to the district's archaeological research, shedding light on the lives of its prehistoric inhabitants.By comparing prehistoric settlement stages in the district with global settlement patterns, we gain insights into the region's environmental conditions. Early human settlements evolved from cave dwellings to more structured communities, adapting to the terrain and engaging in economic and social activities. This process laid the foundation for the development of villages, marking the beginning of human civilization.

The area around the five rivers in the old Bijapur district was home to Early Stone Age activities. Stone tools from this period are found along the River Krishna and its tributaries, Ghataprabha and Malaprabha. Key sites include Anagavadi, Honnihalli, Sindagi, and Kovalli along the Ghataprabha, and Kolhara, Beerakabbi, and Alamatti along the Krishna. Many of these sites are not original settlements, as stone tools were displaced by river floods and accumulated on lower banks. Important Early Stone Age sites include Khyad on the Malaprabha River and Anagavadi on the Ghataprabha. Khyad contains numerous red quartzite tools such as hand-axes and scrapers. Many settlements are found along the river plains, where water for drinking and agriculture was readily available. The environmental conditions of the Early Stone Age seem to have continued into the Middle Stone Age, with people living along riverbanks and cliffs. Middle Stone Age sites are found in Almatti, Yalaguru, Sitimani, and Beerakabbi,

among others. These settlements indicate a shift toward agriculture and increased food production. In the Bheema-Doni river basin, around 105 sites across 91 villages in Indi, Sindagi, and Muddebihal taluks show evidence of this cultural progress, including the use of pottery and animal husbandry.Notable sites include Dhulakheda, Chenegaon, and Nagarahalli, located on small hillocks. However, these sites represent various sub-stages of cultural development and not a single time period. In total, 32 settlements have been identified along the Krishna, Malaprabha, and Ghataprabha rivers, with Salavadagi, Matakadevanahalli, and Kuchabala identified as factory sites.Further settlements along the upper Bheema River include Masli, Gogihala, and Khyadagi, while the lower Bheema and its tributaries feature sites like Marihala, Sungatrana, and Votihala. Sites in the Malaprabha area, such as Adavihulagabala and Arasanala, also reveal cultural remains.These settlements, often located on riverbanks and rocky peaks, show the community's shift toward agriculture, irrigation, and improved crop production. This period marks significant progress, representing the Bronze Age and the development of advanced settlements.

Spatial Patterns of Rural Settlements in Vijayapura District

The analysis of village patterns has been a primary concern for scholars for a long time. The Epics (Ramayana and Mahabharat), Jatkas, Puranas present descriptions of villages with different types like rectangular, square, semi-circular, semi-elliptical, or L, T, I-shaped plans (Tiwari, 1981). However, Meitzen (1895) was the first to introduce the scientific analysis of village shapes in the field of settlement geography. Later on, similar attempts were made by Hewitt (1899), Bowen (1926), King (1927), Hall (1931), Demongeon (1933), Trrewartha (1946), Ahmad (1952), Singh (1955), Sinha, V.N.P. (1976), and several others. Based on these techniques, the following broad patterns can be identified in the study area such as Linear Pattern, Square Pattern, Rectangular Pattern, Triangular Pattern, Semi-Circular Pattern, Star Pattern, L-Shaped Pattern, Y-Shaped Pattern, and Other Shaped Patterns like C, H, I, S, T, X, Z patterns, etc. Additionally, some village patterns have shapes similar to or approaching related shapes.

1. Linear Pattern

The linear pattern of settlement features houses arranged along a line or series of lines, with the settlement extending in one direction and limited in another due to physical features. This pattern is often found in flood-prone areas or along rivers, where the land is narrow between two streams. Additionally, metalled or unmetalled roads and railway lines can cause villages to elongate, as people settle along these routes. While the threat of attack from troops or robbers once prevented settlements along roads, today, many market villages are found along transport lines.

In the present study, rural houses are built on one or both sides of a road, forming a linear pattern of villages. The study area consists of 685 settlements, of which 50 represent a linear pattern, accounting for 7.30% of the total settlements (Table. 1). The distribution of these patterns varies widely across the taluks. In Babaleswar taluk, four villages exhibit a linear pattern, while Basavana Bagewadi taluk has two such villages. Chadachan taluk has one village with a linear pattern. Devara Hipparagi taluk and Indi taluk together have ten villages in a linear pattern. Other notable examples include one village from Kolhar, ten from Muddebihal taluk, two from Nidagundi taluk, nine from Sindagi taluk, one from Tikota taluk, and three from Vijayapura taluk. These villages are not perfect examples of the linear shape;

rather, some are approaching a linear pattern (Fig.1&2). **An example of a linear pattern of settlements is shown below.**

Peerapur (Talikoti Taluk)

Aheri (Vijayapura Taluk)

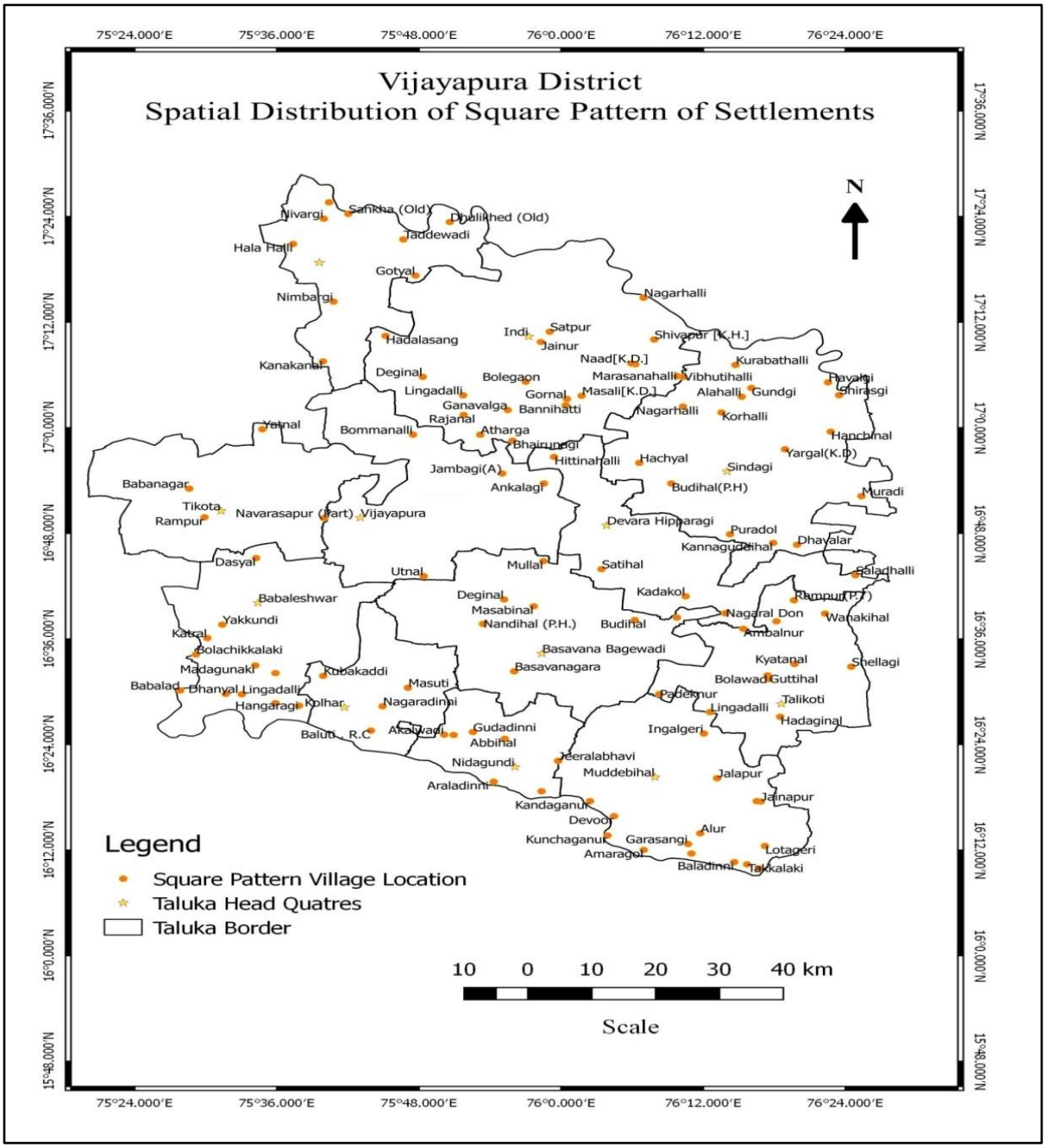

Vijayapura District
Spatial Distribution of Square Pattern of Settlements
N
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
Nivargi
Sankha (Old)
Dpalikhed (Old)
Jaddewadi
Hala Halli
Gotyal
Nimbargi
Nagarhalli
Indi
Satpur
Jainur
Shivapur [K.H.]
Hadalasang
Naad[K.D.]
Kurabathalli
Kanakanal
Deginal
Bolegaon
Marasanahalli
Vibhutihalli
Havalgi
Lingadalli
Gornal
Masali[K.D.]
Alahalli
Gundgi
Shirasgi
Ganavalga
Bannihatti
Nagarhalli
Korhalli
Rajanal
Yetnal
Bommanalli
Atharga
Hanchinal
Bhairunagi
Hittinahalli
Hachyal
Yargal(K.D)
Jambagi(A)
Sindagi
Babanagar
Ankalagi
Budihal(P.H)
Muradi
Tikota
Rampur
Navarasapur (Part)
Vijayapura
Devara Hipparagi
Puradol
Kannaguddihal
Dhavalar
Dasyal
Utnal
Mullal
Satihal
Saladhalli
Babaleshwar
Deginal
Kadakol
Rampur(P.T)
Masabinal
Nagaral Don
Wanakihal
Yakkundi
Nandihal (P.H.)
Budihal
Ambalnur
Katral
Bolachikkalaki
Basavana Bagewadi
Kyatanal
Madagunaki
Kubakaddi
Basavanagara
Shellagi
Bolawad Guttihal
Babalad
Bhanyal Lingadalli
Masuti
Padekmur
Talikoti
Hangaragi
Kolhar
Nagaradinni
Lingadalli
Baluti
R.C
Akalwadi
Gudadinni
Ingalgeri
Hadaginal
Abbihal
Jeeralabhavi
Nidagundi
Muddebihal
Jalapur
Araladinni
Jainapur
Kandaganur
Devoor
Alur
Kunchaganur
Garasangi
Lotageri
Amaragol
Baladinal
Takkalaki
Legend
Square Pattern Village Location
Taluka Head Quatres
Taluka Border
10 0 10 20 30 40 km
Scale

Fig 2

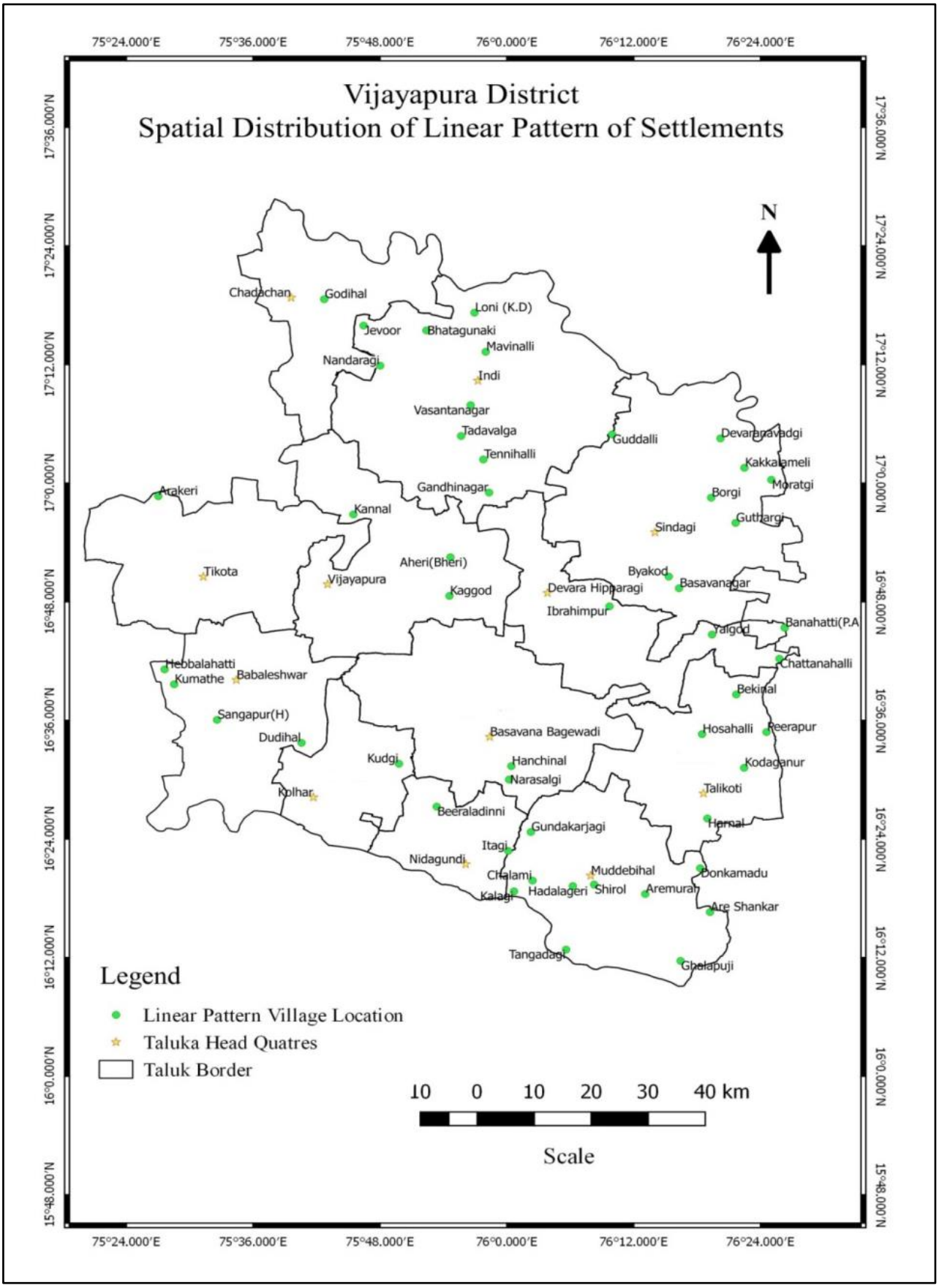

Vijayapura District
Spatial Distribution of Linear Pattern of Settlements
N
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
Chadachan
Godihal
Loni (K.D)
Jevoor
Bhatagunaki
Mavinalli
Nandaragi
Indi
Vasantanagar
Tadavalga
Tennihalli
Guddalli
Devaranavadgi
Kakkalameli
Moratgi
Borgi
Gutthargi
Sindagi
Arakeri
Gandhinagar
Kannal
Tikota
Aheri(Bheri)
Vijayapura
Kaggod
Byakod
Basavanagar
Devara Hipparagi
Ibrahimpur
Banahatti(P.A
Talgod
Chattanahalli
Bekinal
Hebbalahatti
Kumathe
Babaleshwar
Sangapur(H)
Dudihal
Basavana Bagewadi
Hosahalli
Peerapur
Kudgi
Hanchinal
Narasalgi
Kodaganur
Talikoti
Kolhar
Beeraladinni
Gundakarjagi
Harnal
Itagi
Nidagundi
Donkamadu
Chalami
Muddebihal
Kalagi
Hadalageri
Shirol
Aremurah
Are Shankar
Tangadagi
Gholapuji
Legend
Linear Pattern Village Location
Taluka Head Quatres
Taluk Border
10 0 10 20 30 40 km
Scale

Fig 3

2. Square Pattern

The square and rectangular patterns are complementary to each other. Due to attractive but restrictive physical forces in a village site, a square settlement may evolve into a rectangular one, and vice versa. The crossing of cart tracks or roads leads to the formation of this pattern. Villages located at the intersection of two cart tracks give rise to four distinct blocks, all square in shape. The study area consists of 685 settlements, of which 111 represent square patterns, accounting for 16.20 percent of the total settlement patterns in the district (Table 1). There is considerable variation in the square pattern of settlements among the taluks in the study area. Eleven villages (out of 51) in Babaleshwar taluk, seven villages (out of 51) in Basaan Bagewadi, nine settlements (out of 41) in Chadachan taluk, 18 villages (out of 91) in Indi taluk, 15 settlements (out of 103) in Muddebihal taluk, ten villages (out of 97) in Sindagi taluk, seven villages (out of 42) in Nidagundi taluk, ten villages (out of 52) in Talikoti taluk, and four villages in Vijayapura taluk exhibit square patterns of settlements. Among the above-cited villages, some are perfectly square in shape, some are similar, and some approach the said pattern (Fig.3&4). Examples of square patter. **An example of a square pattern of settlements is shown below.**

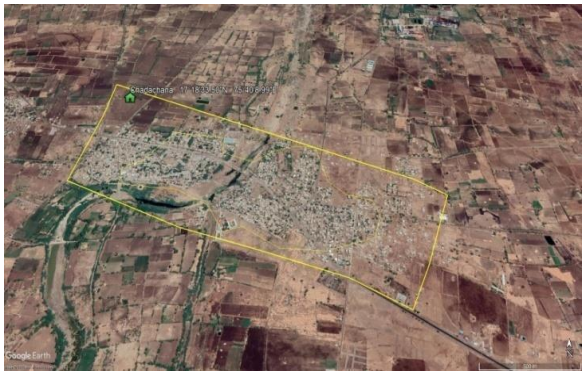
Hangaragi (Babaleshwar taluk)

Nandihal (PU-)Basavana Bagewadi Taluk

3. Rectangular Pattern

The rectangular pattern is the most common shape of nucleated settlements, found not only in this district but also in India, China, Japan, and Italy. This pattern originated from ancient land divisions, such as the bigha system in India, which is similar to Japan's jori system, China's han-den, and Italy's jugerium. The rectangular pattern is also referenced in the *Mansara*. The bigha system, based on square units, contributed to the development of this settlement form. Dwellings are typically aligned north-south and east-west to maximize sunlight and airflow. This shape allows for efficient accommodation in parallel rows. In summary, when settlements are clustered, they often follow a rectangular layout, while irregular or roughly rectangular shapes occur in areas without natural growth

In the study area, this type of settlement is developed in the plain area and on both sides of the road-intersected area, as well as the surrounding area of the tank, well, and religious centers like Math and Temple, etc. out of 685 settlements in the area under study, 133 settlements represent rectangular shapes which accounts for 19.42 per cent of the total settlements in the district. It has been noticed that the spatial distribution of rectangular shapes of settlements shows greater variation owing to different causes. Babaleshwar and Basavana Bagewadi taluks consist 13 villages each, Chadachan and Devara Hipparagi taluks registered 6 and 11 villages with a rectangular shape. Fifteen villages of Indi taluk indicate a rectangular shape. There are 5 villages in Kolhar and 20 villages in Muddebihal taluk, Nidagundi 6 villages and Sindagi taluk 18 villages, 11 settlements in Talikoti taluks witnessing a rectangular shape (Table.1 and Fig. 5 & 6). **An example of a rectangular pattern of settlements is shown below.**

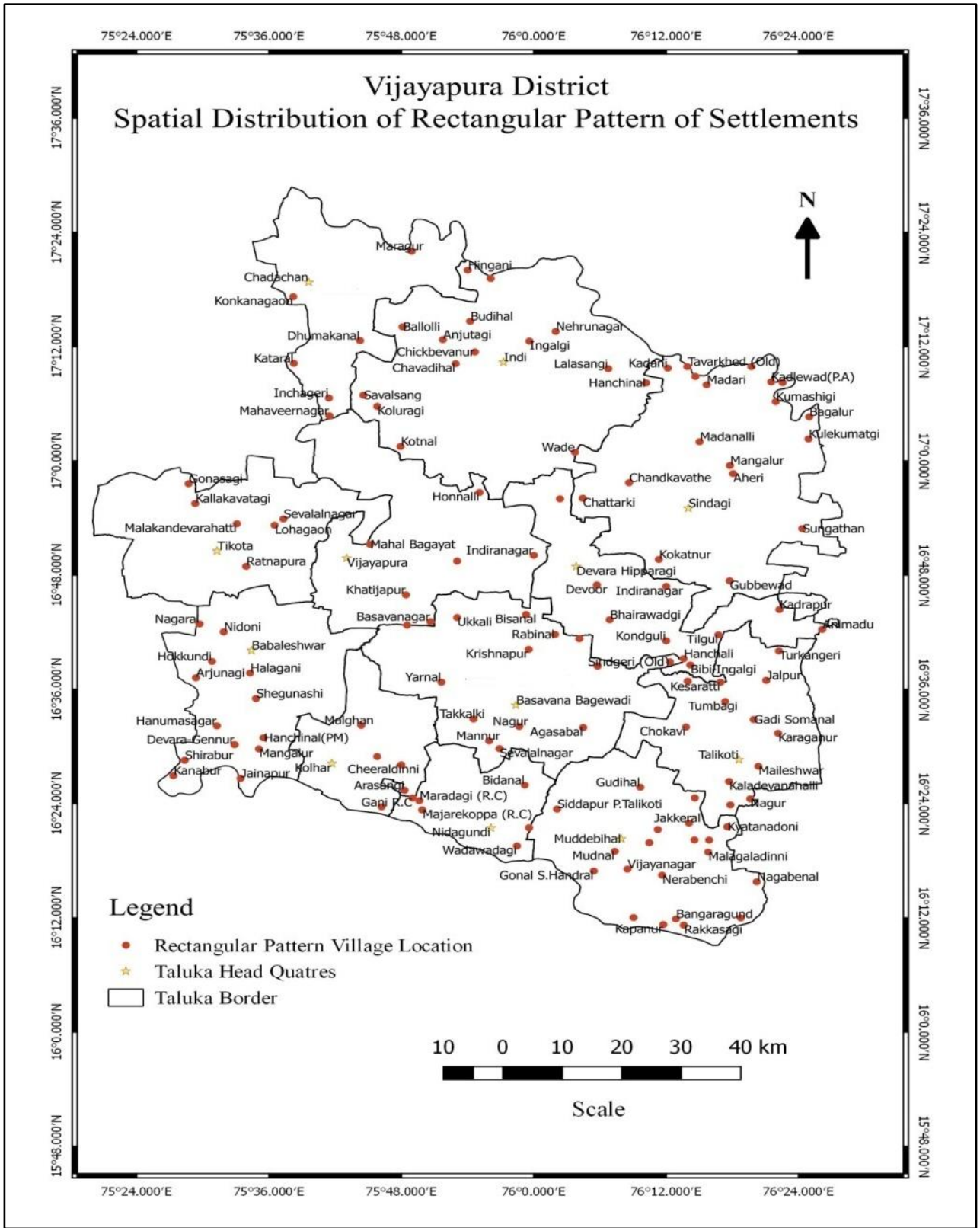


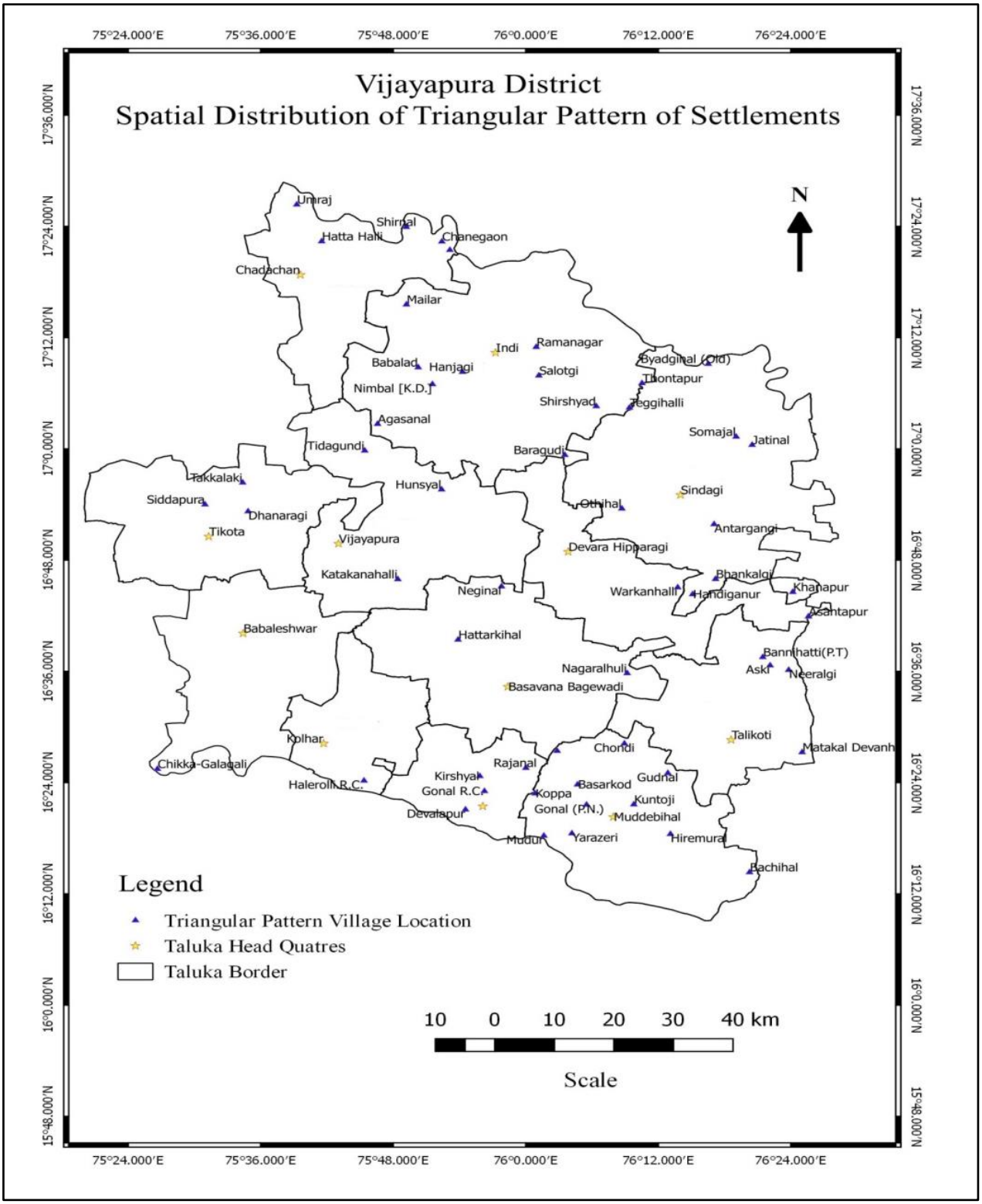
Horti (Chadachan Taluk)

Bagalur (Sindagi Taluk)

4. Triangular Pattern

The triangular shape of settlements reflects the characteristics of the site they occupy. Typical examples include settlements located at the confluence of two rivers or where two roads intersect. In such cases, the settlement cannot expand beyond the rivers and can only grow along the riverbanks upstream, resulting in a triangular shape. This pattern usually occurs when growth is restricted on three sides by physical or cultural factors, such as cart tracks, roads, or rivers. In the study area, this pattern can also emerge at the junctions of two or three roads, near railway lines, or along meandering rivers like the Krishna, Doni, and Malaprabha.


Vijayapura District
Spatial Distribution of Rectangular Pattern of Settlements
N
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
Maragur
Hingani
Chadachan
Konkanagaon
Budihal
Ballolli
Anjutagi
Nehrunagar
Dhumakanal
Ingalgi
Chickbevanur
Katara
Indi
Chavadihal
Lalasangi
Kadani
Tavarkhed (Old)
Madari
Sadlewad(P.A)
Hanchinal
Kumashigi
Inchageri
Savalsang
Bagalur
Mahaveernagar
Koluragi
Kulekumatgi
Madanalli
Kotnal
Wade
Mangalur
Chandkavathe
Aheri
Gonasagi
Honnalli
Kallakavatagi
Chattarki
Sindagi
Sevalalnagar
Malakandevarahatti
Lohagaon
Sungathan
Tikota
Mahal Bagayat
Indiranagar
Kokatnur
Ratnapura
Vijayapura
Devara Hipparagi
Khatijapur
Devoor
Indiranagar
Gubbewad
Kadrapur
Nagara
Basavanagar
Ukkali Bisanal
Bhairawadgi
Nidoni
Rabinal
Kondguli
Tilgul
Babaleshwar
Krishnapur
Hanchali
Turkangeri
Hokkundi
Sindgeri (Old)
Bibi Ingalgi
Halagani
Jalpur
Arjunagi
Yarnal
Kesaratti
Shegunashi
Basavana Bagewadi
Tumbagi
Takkalki
Hanumasagar
Malghan
Nagur
Gadi Somanal
Agasabal
Chokavi
Devara-Gennur
Hanchinal(PM)
Mannur
Karaganur
Shirabur
Mangalur
Sevalalnagar
Talikoti
Kanabur
Jainapur
Kolhar
Cheeraldinni
Maileshwar
Bidanal
Gudihal
Kaladevanahalli
Arasanal
Maradagi (R.C)
Siddapur P.Talikoti
Nagur
Gani R.C
Majarekoppa (R.C)
Jakkeral
Nidagundi
Kyatanadoni
Muddebihal
Wadawadagi
Mudnal
Malagaladinni
Vijayanagar
Gonal S.Handral
Nerabenchi
Nagabenal
Bangaragund
Kapanur
Rakkasagi
Legend
Rectangular Pattern Village Location
Taluka Head Quatres
Taluka Border
10 0 10 20 30 40 km
Scale


Vijayapura District
Spatial Distribution of Triangular Pattern of Settlements
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
N
Umraj
Shirnal
Hatta Halli
Chanegaon
Chadachan
Mailar
Indi
Ramanagar
Byadgihal (Old)
Babalad
Hanjagi
Salotgi
Tiontapur
Nimbal [K.D.]
Shirshyad
Teggihalli
Agasanal
Somajal
Jatinal
Tidagundi
Baragudi
Takkalaki
Hunsyal
Sindagi
Siddapura
Othihal
Dhanaragi
Antargangi
Tikota
Vijayapura
Devara Hipparagi
Katakanahalli
Bhankalgi
Neginal
Warkanhalli
Handiganur
Khanapur
Asantapur
Babaleshwar
Hattarkihal
Bannihatti(P.T)
Nagaralhuli
Aski
Neeralgi
Basavana Bagewadi
Kolhar
Talikoti
Chordi
Matakal Devanh
Chikka-Galagali
Rajanal
Kirshyal
Basarkod
Gudnal
Haleroli R.C.
Gonal R.C.
Koppa
Kuntoji
Devalapur
Gonal (P.N.)
Muddebihal
Mudur
Yarazeri
Hiremural
Bachihal
Legend
Triangular Pattern Village Location
Taluka Head Quatres
Taluka Border
10 0 10 20 30 40 km
Scale

56 settlements in the study area display a triangular shape, making up 8.18 per cent of all settlements. There is considerable variation in this pattern across the taluks. For instance, Babaleshwar taluk has 1 village, Basavan Bagewadi and Chadachan taluks have 3 and 5 villages, respectively, while Devara Hipparagi has 2 settlements. Indi taluk has 10 villages, and Muddebihal taluk has 11 villages with a triangular shape. Nidagundi taluk has 4 settlements, and Sindagi taluk has 9 villages exhibiting this pattern. Four settlements from Talikoti taluk also show a triangular shape (Table. 1). In these villages, some settlements are perfectly triangular, while others are similar or approaching this shape (Fig. 7&8).

An example of a triangular pattern of settlements is shown below.

Dhanargi (Tikota Taluk)

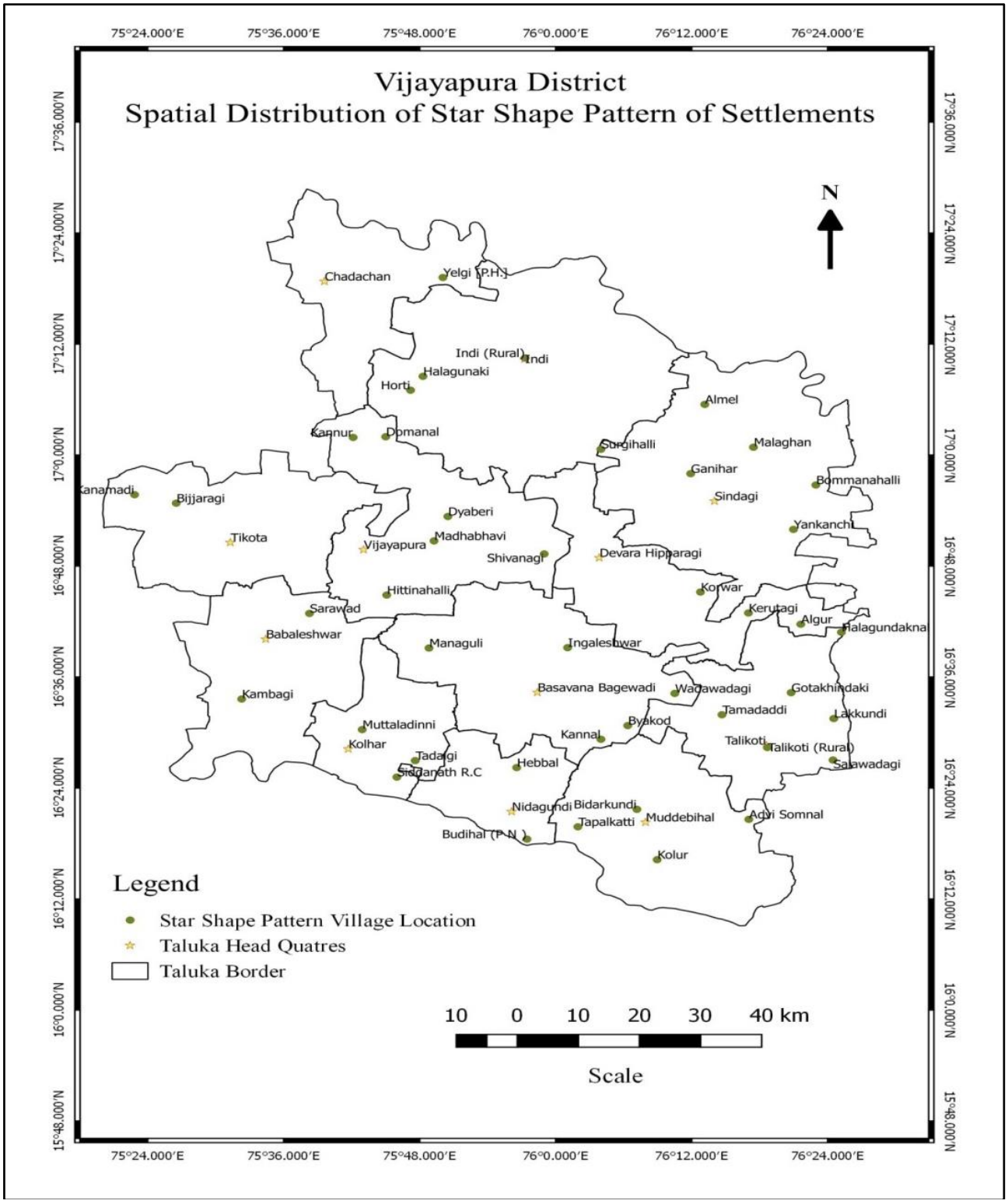
Tidagundi (Vijayapura Taluk)

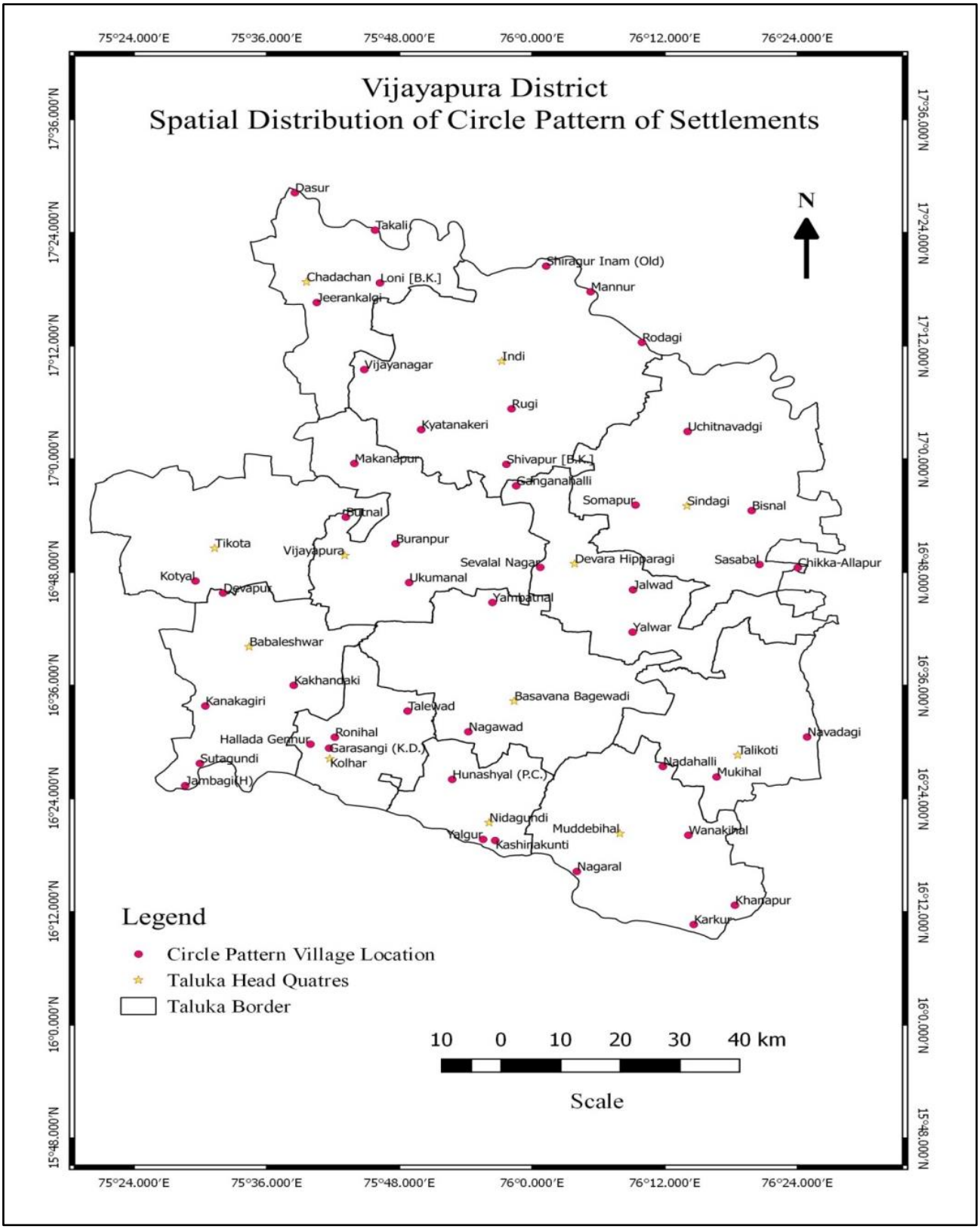
5.CircularPattern.

This pattern may vary, typically arising from the need to concentrate houses in one location for defense or around a well or the mansion of a local zamindar. It reflects a historical legacy, particularly from the eighteenth and nineteenth centuries, when village security was uncertain. According to Ahmad, the circular shape often resulted from clustering for defense around the zamindar's mansion, which offered protection against raids. Sometimes, a semi-circular pattern forms along a meander or around natural features like marshes, lakes, religious buildings, ponds, wells, or marketplaces. These cultural features at the center create a hollow circular pattern. In the study area, this pattern is seen in settlements developed around water sources such as tanks and wells, which provide drinking and domestic water. Some villages are also cantered around religious sites. Out of 685 settlements in the study area, 46 have a circular shape, making up 6.72 per cent of the total. An example of a triangular pattern of settlements is shown below(Fig. 9 &10).

Kakhandaki (Babaleshwar Taluk)

Yelgur (Nidagundi taluk


Vijayapura District
Spatial Distribution of Star Shape Pattern of Settlements
N
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
Chadachan
Yelgi [P.H.]
Indi (Rural)
Indi
Halagunaki
Horti
Almel
Kannur
Domanal
Sirgihalli
Malaghan
Ganihar
Bommanahalli
Sindagi
Bijjaragi
Dyaberi
Yankanchi
Tikota
Vijayapura
Madhabhavi
Shivanagi
Devara Hipparagi
Hittinahalli
Korwar
Sarawad
Kerutagi
Algur
Halagundakna
Babaleshwar
Managuli
Ingaleshwar
Kambagi
Basavana Bagewadi
Wadawadagi
Gotakhindaki
Tamadaddi
Lakkundi
Muttaladinni
Byakod
Kolhar
Kannal
Talikoti
Talikoti (Rural)
Tadagi
Hebbal
Salawadagi
Siddanath R.C
Nidagundi
Bidarkundi
Muddebihal
Tapalkatti
Advi Somnal
Budihal (P.N.)
Kolur
Legend
Star Shape Pattern Village Location
Taluka Head Quatres
Taluka Border
10 0 10 20 30 40 km
Scale


Vijayapura District
Spatial Distribution of Circle Pattern of Settlements
75°24.000'E
75°36.000'E
75°48.000'E
76°0.000'E
76°12.000'E
76°24.000'E
17°36.000'N
17°24.000'N
17°12.000'N
17°0.000'N
16°48.000'N
16°36.000'N
16°24.000'N
16°12.000'N
16°0.000'N
15°48.000'N
N
Dasur
Takali
Shiragur Inam (Old)
Chadachan
Loni [B.K.]
Mannur
Jeerankalgi
Rodagi
Indi
Vijayanagar
Rugi
Kyatanakeri
Uchitnavadgi
Makanapur
Shivapur [B.K.]
Ganganahalli
Somapur
Sindagi
Bisnal
Putnal
Tikota
Buranpur
Vijayapura
Sevalal Nagar
Devara Hipparagi
Sasabal
Chikka-Allapur
Kotyal
Ukumanal
Devapur
Jalwad
Yambatnal
Yalwar
Babaleshwar
Kakhandaki
Kanakagiri
Basavana Bagewadi
Talewad
Nagawad
Navadagi
Hallada Gemnur
Ronihal
Garasangi (K.D.)
Talikoti
Sutagundi
Kolhar
Nadahalli
Mukihal
Jambagi(H)
Hunashyal (P.C.)
Nidagundi
Muddebihal
Wanakihal
Yalgur
Kashinakunti
Nagaral
Khanapur
Karkur
Legend
Circle Pattern Village Location
Taluka Head Quatres
Taluka Border
10 0 10 20 30 40 km
Scale

6. Star Pattern

When the circular settlement extends in several directions along footpaths and roads, the village assumes star shapes. Star-shaped settlements develop where several roads converge, with houses built along these roads. These star-shaped settlements often occur at sites where multiple metalled or unhealed roads converge. In star-shaped settlements, houses spread out along the sides of roads in all directions. This pattern is common in both villages and towns and is mostly caused by new development expanding along major roads. Such settlements also occur with the construction of new dwellings on the fringe of circular and square-shaped rural dwellings and on the fringe of square-shaped settlements. The study area consists of 685 settlements; of which 43 represent star-shaped patterns, accounting for 6.28 percent of the study area. The spatial distribution of star-shaped pattern of settlements among the taluks shows a broad variation. An example of a triangular pattern of settlements is shown below (Fig. 11 & 12).

Bijjaragi (Tikota Taluk) **Shivanagi (Vijayapura Taluk)**

The present study area exhibits various patterns of settlements across its 12 taluks and 685 habitats, each having different shapes. The researchers have considered a limited set of shapes, as discussed above. The analyst grouped these patterns into 10 categories: Linear Pattern, Square Pattern, Rectangular Pattern, Triangular Pattern, Semi-Circular Pattern, Star Pattern, L-Shaped Pattern, Y-Shaped Pattern, and Other Shaped Patterns such as C, H, I, S, T, X, and Z patterns.

In the study area, there are 685 settlements with different types of settlement patterns. Among them, 50 settlements have a linear pattern, 125 settlements have a square pattern, 154 settlements are rectangular, 43 settlements have a triangular pattern, 44 villages are in a semi-circle pattern, 49 settlements have a circular pattern, 38 settlements have a star-shaped pattern, 46 settlements have an L-shaped pattern, 31 settlements have a Y-shaped pattern, and 105 settlements have other types like C, H, I, S, T, X, Z patterns, etc., in the study area (Table. 1 & Fig. 13).

Additionally, Babaleshwar is one of the taluks in the Vijayapura district, comprising 51 settlements, all situated in different patterns across 9.62 sq km of the geographical area of the taluk. Basavana Bagewadi is another taluk in the study area with 51 rural settlements, each built in different shapes within 8.95 sq km of the geographical area of the taluk. Chadachana taluk in the Vijayapura district has 41 settlements, all indicating different shapes and constructed in 6.55 sq km of the geographical area of the taluk. Devara Hipparagi is also one of the taluks in the Vijayapura district, comprising 46 rural settlements, each representing different shapes and situated in 8.52 sq km of the geographical area of the taluk. Indi taluk in the Vijayapura district has 91 settlements, all included in various patterns and constructed in 15.49 sq km of the geographical area of the taluk. Kolhar is another taluk in the study area, consisting of 28 rural settlements situated in 6.48 sq km of the geographical area of the taluk. Muddebihal is one of

the taluks in the Vijayapura district, comprising 103 settlements, all representing various shapes and settled in 14.30 sq km of the geographical area of the taluk. Nidagundi is a taluk in the Vijayapura district, comprising 42 rural settlements situated in 7.56 sq km of the geographical area of the taluk. Sindagi is one of the taluks in the Vijayapura district, with 97 settlements, all grouped into various shapes and constructed in 16.59 sq km of the geographical area of the taluk. Talikoti is one of the taluks in the study area, consisting of 58 rural settlements, each with different patterns and built in 10.72 sq km of the geographical area of the taluk. Tikota is one of the taluks in the Vijayapura district, comprising 31 settlements, all indicating different patterns and constructed in 9.08 sq km of the geographical area of the taluk. Vijayapura is one of the taluks as well as the district headquarters of the study area, consisting of 46 rural settlements, each representing various shapes and built in 42.45 sq km of the geographical area of the taluk (Table. 1 Fig.13& 14).

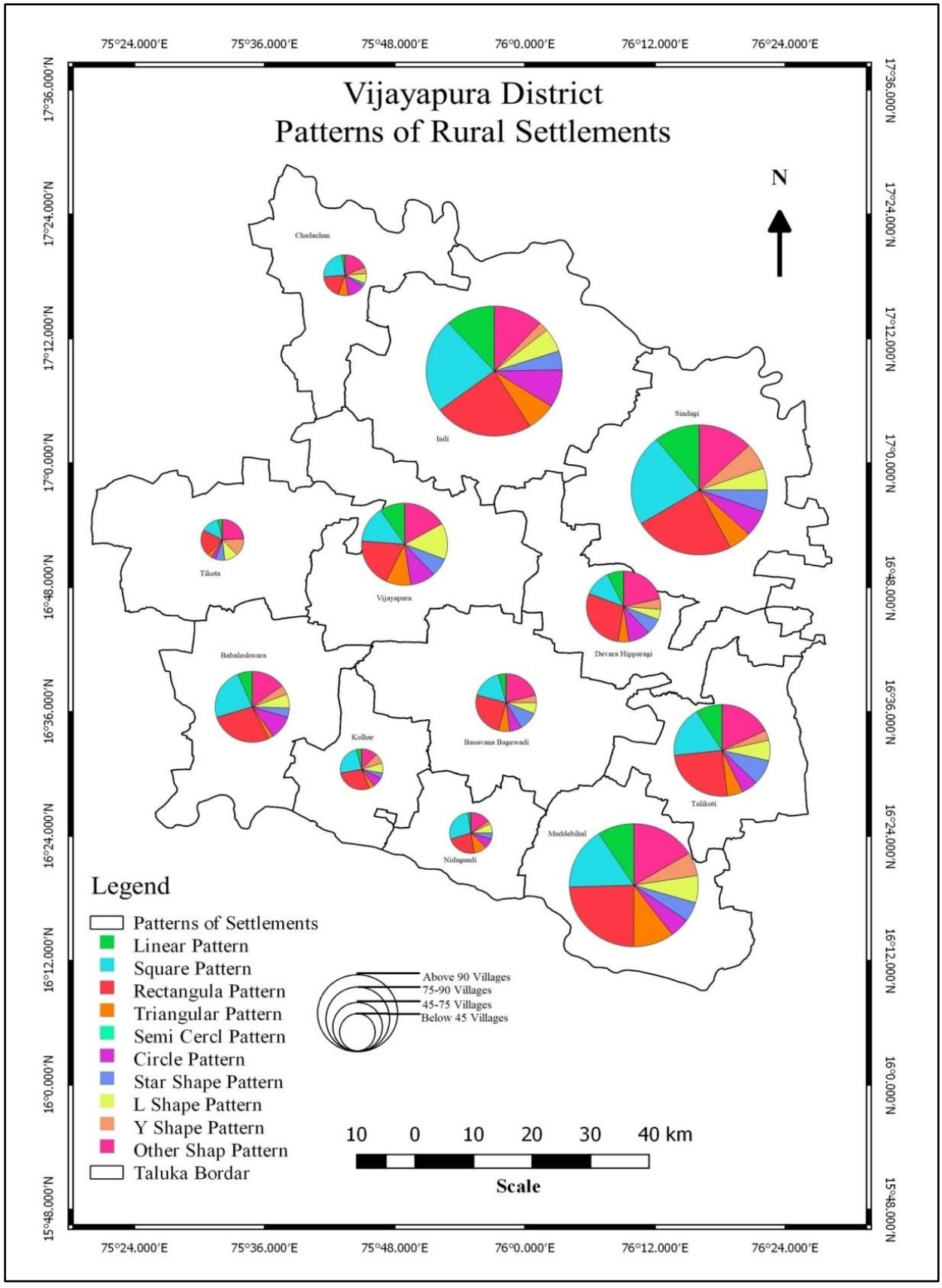
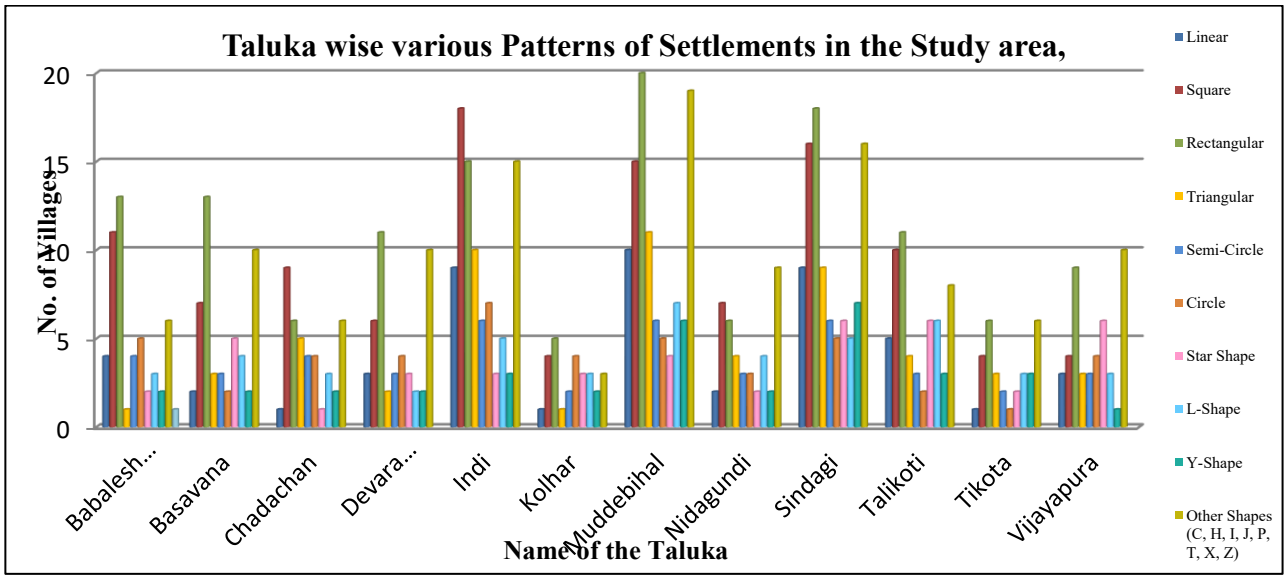

Vijayapura District
Patterns of Rural Settlements
N
75°24.000′E
75°36.000′E
75°48.000′E
76°0.000′E
76°12.000′E
76°24.000′E
17°36.000′N
17°24.000′N
17°12.000′N
17°0.000′N
16°48.000′N
16°36.000′N
16°24.000′N
16°12.000′N
16°0.000′N
15°48.000′N
Chadachan
Indi
Sindagi
Tikota
Vijayapura
Devara Hipparagi
Babaleshwara
Kolhar
Basavana Bagewadi
Talikoti
Muddebihal
Nidagundi
Legend
Patterns of Settlements
Linear Pattern
Square Pattern
Rectangula Pattern
Triangular Pattern
Semi Cercl Pattern
Circle Pattern
Star Shape Pattern
L Shape Pattern
Y Shape Pattern
Other Shap Pattern
Taluka Bordar
Above 90 Villages
75-90 Villages
45-75 Villages
Below 45 Villages
10 0 10 20 30 40 km
Scale

Table: 1- Various Patterns of Rural Settlements in Vijayapura District

Name of the Taluks	Patterns											
	Linear	Square	Rectangular	Triangular	Semi-Circle	Circle	Star Shape	L-Shape	Y-Shape	Other Shapes (C, H, I, J, P, T, X, Z)	Total	Settlement constructed area Sq.Km
Babaleshwara	4	11	13	1	4	5	2	3	2	6	51	9.62
Basavana Bagewadi	2	7	13	3	3	2	5	4	2	10	51	8.95
Chadachan	1	9	6	5	4	4	1	3	2	6	41	6.55
Devara Hipparagi	3	6	11	2	3	4	3	2	2	10	46	8.52
Indi	9	18	15	10	6	7	3	5	3	15	91	15.49
Kolhar	1	4	5	1	2	4	3	3	2	3	28	6.48
Muddebihal	10	15	20	11	6	5	4	7	6	19	103	14.3
Nidagundi	2	7	6	4	3	3	2	4	2	9	42	7.56
Sindagi	9	16	18	9	6	5	6	5	7	16	97	16.59
Talikoti	5	10	11	4	3	2	6	6	3	8	58	10.72
Tikota	1	4	6	3	2	1	2	3	3	6	31	9.08
Vijayapura	3	4	9	3	3	4	6	3	1	10	46	42.45
Total	50 (7.30)	111 (16.20)	133 (19.42)	56 (8.18)	45 (6.57)	46 (6.72)	43 (6.28)	48 (7.01)	35 (5.11)	118 (17.23)	685 (100)	156.31



Conclusion

It can be concluded that the geometric shapes of the settlements have been identified using GIS techniques, and all types of settlement shapes have been observed. Among the ten types of geometric shapes, the rectangular shape is unique and has been identified in 133 settlements in the study area, accounting for about 20 percent of the total settlements, indicating a planned structure often seen in urbanized or organized village setups. Among the twelve taluks, Muddebihal (20) and Sindagi (18) taluks have the highest number of settlements with a rectangular shape. The second most common pattern is square, suggesting compact and organized villages, with a high frequency in Indi (18) and Sindagi (16) taluks. Other shapes rank third, with 118 villages in the study area exhibiting them. These include irregular or mixed forms (C, H, I, J, P, T, X, Z) and are prominent in Muddebihal (19) and Indi (15). Linear shape settlements (50 villages) are common along transportation routes or water bodies, with the highest frequency in Muddebihal (10) and Sindagi (9) taluks. Fifty-six villages have a triangular shape, 45 villages show a semi-circle, and 46 villages are circular in shape. These shapes occur in areas where topography or tradition influences village layouts. Indi (10) has the highest number of triangular settlements. Forty-three, 48, and 35 villages exhibit star-shaped, L-shaped, and Y-shaped layouts, respectively. Complex layouts are scattered, with Sindagi and Talikoti showing slightly higher occurrences.

The settlement patterns in Vijayapura district exhibit a blend of traditional and modern influences. Rectangular and square shapes dominate, reflecting planned and efficient layouts. The high diversity in taluks like Muddebihal and Sindagi indicates adaptation to diverse geographical and socio-economic factors. In contrast, smaller taluks like Kolhar and Tikota display simpler settlement structures, emphasizing regional variations within the district. The significant presence of irregular and complex shapes highlights the role of cultural practices and geographical constraints in shaping village settlements.

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