



RHGT, Vol. XVIII, Issues 35-36, pp. 55-78

URBAN PLANNING AND CONSERVATION OF THE PAST-A STUDY ON SRIRANGAPATNA, MANDYA DISTRICT OF KARNATAKA, INDIA

Priyadarshini SEN

Mrinalini Datta Mahavidyapith, Kolkata, India

Email: priyadarshinigeo@gmail.com

***Abstract:** The terms 'space' and 'place' have complex and varied meanings that can lead to debates and confusion in urban studies. When attempting to refine human space, it can become difficult to balance the responsibility of acknowledging the past with the present. Planners in the Srirangapatna block of Karnataka region, located in the Deccan Plateau, struggle to maintain historical footprints while exploring ekistics-related possibilities. The Srirangapatna region, which was once a fort area during the pre-British era and is home to the famous Summer Palace of Tipu Sultan, now relies on tourism as a source of income. However, the heritage sites in the area are not well-maintained, and there is haphazard urbanization, which is affecting the tourism industry. This study analyzes the demographic components of Srirangapatna, taking into account the changing land uses and the recent threats posed by the shifting of the adjoining Cauvery River, which has resulted in frequent waterlogging situations. These issues need to be addressed immediately before attempting to restore the past with planned urbanization.*

***Key words:** Urban Planning, Urbanization, Land Use, Fringe Area, Human Habitation, Srirangapatna*

1. INTRODUCTION

Land is considered to be a valuable and cherished natural resource utilized majorly for the cultivation of various food and cash crops, patterns of settlements of human population, establishment of dams, reservoirs and irrigation facilities, development of industries and maintenance of forests, and of course Wildlife (Balasubramanian A., 2015). But its use has to be thoughtful for conserving the same by restoring the valuable past while paving ways for neo-urbanization. Such urbanization should be both inclusive and sustainable, though it may would portray quite a few challenges for urban planning in countries like India. There is a need to address such



challenges including a sharp rise of non-agricultural sectors, relocation of population and resources from rural areas to urban parts with a steady rise of urbanisation (Ahluwalia I.J.,2015). In the early history of mankind, land was considered the major source of revenue; even in modern times although there are varied sources of revenue earning, yet land remains a significant source of earning tax in one or the other form (Kaushal G., 1997). It is often argued that the cultural heritage largely contributes towards the right promotion of economic, social, and territorial cohesion, as it enhances typical locals' identity and its works. As the concept of urban matures, its techniques and processes evolved through practices and experiments, which widely contributed to conserve the 'good' past while constructing the new (GOI, 2012). All actors who distinctly participate in the processes of conservation strategies and settlement upgradation use a multidisciplinary approach for typical heritage sites (Colavitti A.M., 2018), quite applicable in Srirangapatna region too. As far as area is concerned, India is considered to be the world's seventh largest country along with a population of about 1.3 billion people in 2015 (FAO, 2017; UN-Pop, 2017). India typically exhibits immense diversity in its patterns of climate, relief, plants, animals, land use, and of course socioeconomic conditions (FAO, 2017b). However over the past few years it has experienced remarkable land use and land-cover changes including deforestation, cropland changes, due to rigorous urban expansion and fringe area inclusions (Tian et al., 2014). The study here encompasses in-situ development attempts in Srirangapatna with the right mention and description of its heritage related features for a good reality check. Geomorphologically Srirangapatna is a fluvial island that may be defined as a well elevated landform often surrounded by stream-channel branches or waterways, that exists quite sufficiently to establish permanent vegetation and then human habitation (Osterkamp, W.R., 1998). They are also similar to floodplains generally resulting from long-term cumulative action of the flow, erosion and depositional processes of a river (Singh, B., Goswami R. K., 2011). In these cases, channel migration becomes utmost important as far as land formation and modification are concerned (Wolman & Leopold, 1957). River Cauvery in the southern peninsula form few notable fluvial islands, Srirangam, Srirangapatna and Shivasamudram islands are important (and here Srirangapatna is under consideration).

The island of Srirangapatna exhibits rich cultural values and monuments represent creativity and art. What remains a challenge is conservation of these spectacular masterpieces with great assimilating elements of architectural and artistic heritage of Indian, Islamic and British styles that evolved through 16th Century and continued beyond. It is important to define a well understood boundary specific to delimit the archaeologically unique site characterised by fragments of spaces with mixed land use and frequent yet disruptive development process as in case for Srirangapatna. However, conflicting interests often persist in the areas of urban development, and real estate plans that should consider freedom in ancient architecture and royal urban designs (Esposito A, 2018). It is always important to develop a conceptual framework for analysing human adjustment to a given piece of landforms specifically on regional to micro or site scales. It should be followed by the built-in framework of major landform to human settlements configuration especially in areas where past has a major to play (Wescoat, J. L., 2018). It is important to make a set of comprehensive planning arguments in favour of various system approaches towards urban planning, as focussed by Leung H.L., (2003). He systematically argued for logical sequencing starting from planning at the incipient stage, towards fitting of the same in

land use while working upon the varied goals, information, while co-analysing the results before meaningful implementation in regions where present has to co-exist with past (Sankha S., Vittan I., Mohan A., 2010). The choices that Indians and its planners to manage the process of its urbanization would have profound consequences for its people and its possible satisfactory future for a long-term sustenance (Sankha S., 2010). Infact urban areas located in Asian countries and the Pacific coasts are growing fast so it is quite a possibility that within the next twenty years a major part of Asian population will live in cities. They(cities) are considered engines of growth where more than 80 percent of any region's GDP (Report, UN,2011). In such cases, it is even more needed to protect historical sites amidst urbanization.

2. STUDY AREA

One of the major districts of the state of Karnataka (see Figure 1), Mandya has a total area of is 4962 square kilometres. According to Census of India, 2011 the district with a total population of 18, 05,769 ranks at 13th in the State. It has a density of 364 persons per square kilometres with a decadal growth rate of 2.4 percent, it ranks 28th in the State in terms of decadal growth rate. Srirangapatna with 33 Village Accountant Circles, 4 Hoblies, 21 Gram Panchayats is considered to be one of the most distinguished Taluks of Mandya District of Karnataka due to its rich heritage values (Esposito A., 2018). The fig. 1 shows the location of Srirangapatna block as positioned in one of the southern most districts of Karnataka, named Mandya. India truly witnessed quite a socio-cultural assimilation as its history evolved over time.

Srirangapatna encompasses 90 habited villages and 6 un-inhabited villages with a total geographical area of 368 square kilometres. With over one lakh eighty thousand population, the male population accounts for a lesser count (89940) than female ones (90251). Overall, it gets the seventh rank in terms of population of all the blocks or taluks of Mandya. Out of total geographical area 357.58 square kilometres, 7.25 square kilometres belong to forested areas, 39.04 square kilometres to non-agricultural land use, barren and uncultivated area account for 17.36 square kilometres area. With other uncultivated land, cultivable wastes account for 5 square kilometres, permanent pastures account for 28.80 square kilometres, trees and groves accounts for 3.04 square kilometres of the total 36.84 square kilometres. The block has a canal measuring over 30 Kilometres with a Gross Irrigated Area of over 3 square kilometres, with a Net Irrigated Area of 2.25 square kilometres. Sericulture is considered to be one of the most important occupations here; almost 73 villages are totally engaged in this activity of Mulberry production. Annually the value of silk produced here is over INR 2633 lakhs. Of the total population of 180191, the urban population accounts for 34,135 (18.94%). Out of all the male population in the taluk 60.5 % are literates and of all the females 68.7 % are literates in the rural areas although same account for 76.2% of total urban males and 82.7 % urban females. The Government of Karnataka (GoK) has already set up the Karnataka Tourism Vision Group in order to take initiatives in regards to upgrade the tourism sector and providing a path towards the development of Karnataka as a preferred tourist destination. Under this, certain sites were specifically chosen, like:

- a. Kittur Fort, Belgaum
- b. Haliyal Fort Nisarga Dhama, Uttar Kannada
- c. Maulangi Falls, Uttar Kannada
- d. Old Mangalore Town, Dakshin Kannada

e. Srirangapatna Town, Mandya

This paper includes the study of Srirangapatna region as a significant block or taluk of Mandya district of Karnataka state of India including special mention of the Srirangapatna town in particular for understanding urban status of the same.

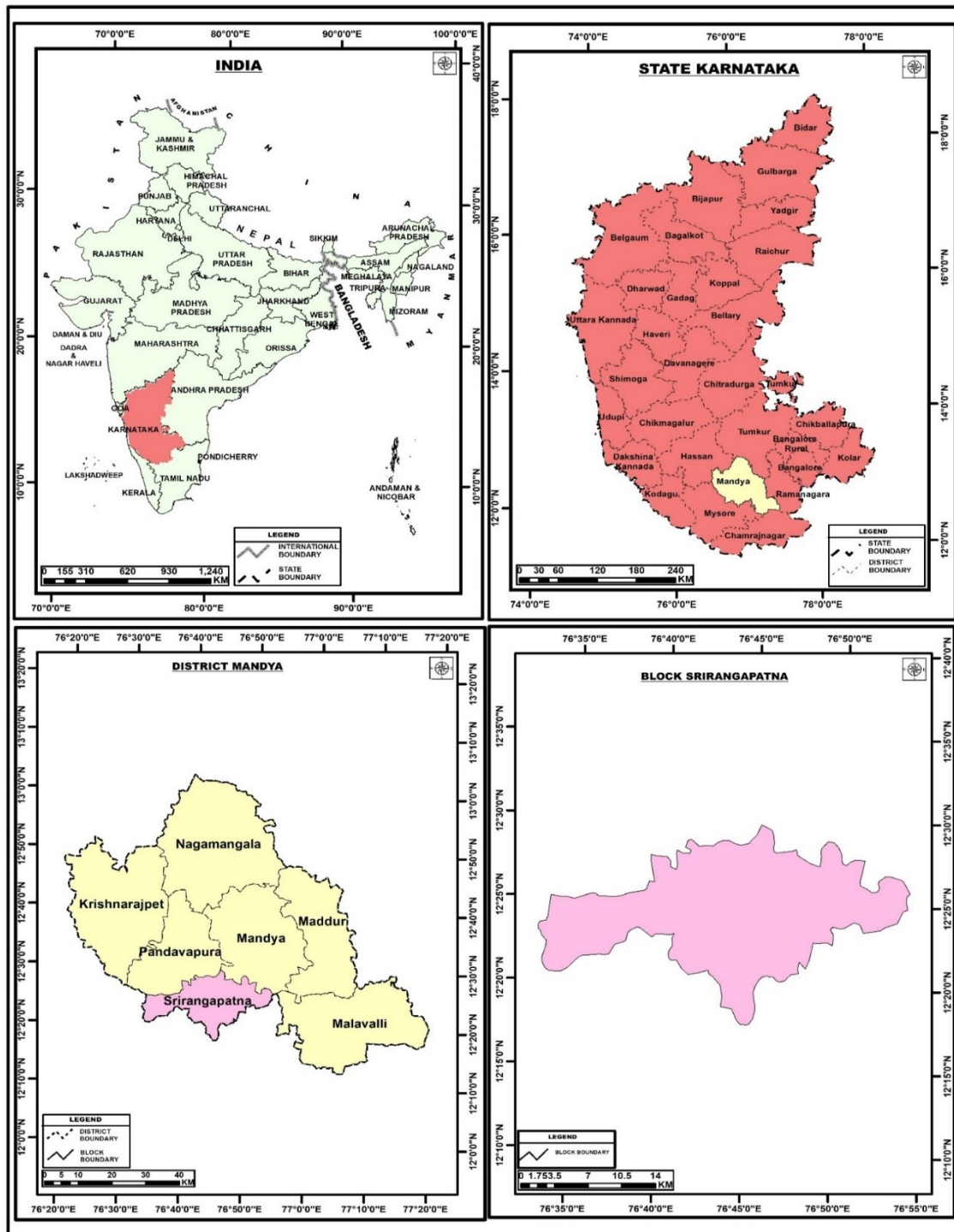


Figure 1. Location of Srirangapatna Region, Mandya District, Karnataka State, India
 Source: National Atlas and Thematic Mapping Organization, India

3. METHODOLOGY

When researchers document their studies, there are few aspects which need urgent considerations. Firstly, for Srirangapatna which has been a rich heritage site for archaeological tourism has been enquired quite a deal with past literature from two perspectives. At the beginning the region has been studied with historical insights and a narration of the past through chronology and self-visit last year, 2022. Later such study was followed by in-depth literature reviews that highlighted the main dilemma of gaps in urban planning measures visible in one of the oldest river islands of India (Ali B. S, 1956).

The second part of the study is the analysis part. It includes the plotting of average precipitation data at the block level which gives an idea of the river island's situation climatically and year wise expenditure on various urban related activities are compiled and plotted graphically too. Further, secondary data obtained from various governmental reports threw light upon important crops cultivated in the region. Land use components are studied in two ways; the first way is to understand the broader categories of land use under non-agricultural and agricultural uses along with the pastures and grazing fields. On the other hand, later part of the study contains geographical variation of land use composition over 20 years gap. These have been done by downloading satellite imagery of Srirangapatna region for the year 2000 and 2020 obtained from Landsat 8 and Landsat L7_ETM respectively from the USGS earth explorer. The required part of the region has been extracted and treated under QGIS software for band composition. The map of 2020 ad 11 bands while 2000 had 9 band compositions. Based on these two maps, various layers of land use components were formed creating the ultimate land use maps for both the decades with the classification clearly formed. These two maps produced a clear picture of land use change which are tabulated in percent values over temporal scale.

The third part of the study included the analysis of demographic data at Srirangapatna town which included preparing of thematic maps (ward wise) based on households, gender distribution status (for adults and 0-6 years age categories) and working status of the given population. Additionally, a Z-score analysis is computed where the literacy of male and female population is 'measured' as deviated from mean and standard deviation values applying the formula:

$$Z \text{ Score} = (X_i - \text{Mean of } X_i) / \text{Standard Deviation of } X_i$$

where X_i =Percent values of Male/Female literates {if Z score is positive then the literacy (male or female) appears more than average which is satisfactory but if it is negative (male or female) the distribution is less than the average value meaning a not so satisfactory literacy situation. Thus, such wards are backward in basic measures of development.

This study included thorough analysis of all kinds of components in every aspect of physical, geographical, land use, demographic and planning perspectives that helped understanding Srirangapatna intensively and extensively as well.

4. PHYSICAL-GEOGRAPHICAL BACKGROUND

Srirangapatna situated in one of the southern districts of Mandya and is predominantly agrarian, positioned between 76⁰19' and 77⁰ 20'E longitude and 12⁰ 13' and 13⁰ 04'N latitudes with an altitude of below 1000 metres (Mean Sea Level) predominantly exhibiting a table land characteristic. The region experiences semi-arid type of climate, characterised by three seasons namely, summer, rainy and winter. Summer is hot and dry while, winter is cool and pleasant. The district comes under Southern Dry zone with an annual average rainfall of 863 mms which happens to be bimodal. The maximum rainfall occurs during the months of May, September and October. So, Kharif season receives less than 40 percent rainfall and only slightly over 35 per cent of rainfall is received during Rabi season. Infact the stored water from the Krishna Raja Sagara dam feed major parts of Maddur, Mandya, Malavalli and Srirangapatna taluks. As far as average annual distribution of rainfall (Table 1) in concerned for a period of 10 years (2005-2015) Srirangapatna exhibits second position after Maddur (Suwardhi, D., Trisyanti, S.W., Virtriana, R., 2022). Questions may arise why such climatic data are incorporated below. This is solely due to the reason of understanding Srirangapatna in precipitation aspects where situations like more than average precipitation, water logging along with sifting river paths may be quite concerning in conserving the heritage sites.

Table 1. Average Annual Rainfall in mms at Block Level (2005-2015), Mandya District

Taluk	Srirangapatna	K.R. Pet	Maddur	Malavalli	Mandya	Nagaman-gala	Panda-vapura
Average Annual Rainfall in mms at Taluk Level (2005-2015)	18.41	16.55	20.21	17.72	15.02	14.74	15.75
Rank	2	4	1	3	6	7	5

Source: Climate Data; District level: Karnataka, 2017

https://cgwb.gov.in/District_Profile/karnataka/Mandya_brouchere.pdf

5. HISTORICAL BACKGROUND

The river island named Srirangapatna is known historically for the fort of Srirangapatna that happens to be the most important tourist spot for the entire Deccan region. Majorly all kinds of monuments and relics that belonged to the reign of Tipu Sultan are located inside the fort except Dariya Daulat Bagh and Gumbaz which were built in the late 18th Century. The fort was built in the year 1537 and has a peculiar triangular shape aligned beautifully along the north western side of the island. Infact the rugged undulating river bed formed a natural deep and wide ditch around the fort. Coming to the island, it is roughly measured to be approximately five kilometres wide

and stretches around one and half kilometres lengthwise with an area of over seven square kilometres (Wescoat, J. L., 2018). It is often believed that lord *Buddha* visited and resided here for few days in this particular island. Near the town of Srirangapatna the river Cauvery fabricates into two parts, namely North and South Cauvery creating in between a central landmass termed as a river -island (Singh B., Goswami K.R., 2011). The island has been named after the holy god of Srirangapatna who is worshipped in the temple situated there. While moving upstream, once again the river Cauvery deviates towards west before the creation of the river island and gets the name of Paschimavahini. Under continuous occupation since 12th Century, Srirangapatna displays a wide array of architectural influences that manifest themselves in unique features and components visible across the myriad of buildings across the property (see Table 2).

The Figure 2 shows the historical event of the British progressing to take over the territories owned by Tipu Sultan, the then ruler of Mysore. Indeed, the map has been considered a clear source of the British army taking over the Indian kingdom through right and left aggression of them through slow and steady capture of the adjoining areas. Infact, there were traces of the discrete locations of French colonies and the camps of Mysorian local rulers too that the British could not cross. However, the leftward movement of the British became 'fruitful' for taking over Tipu's fort. Besides, Table 2 represents the chronological evolution of the rulers at different time period. The Hoyasala empire ruled for quite a few decades taken over by Vijayanagar. It was taken over by the chieftain of Gangaraja, Ramaraja and later Wodeyars. Finally, Hyder Ali and later his son Tipu Sultan reigned Srirangapatna and were considered two of the greatest rulers of Indian history during the late 18th Century. Such chronological tour becomes important to get a clear picture of what paved the way to Srirangapatna being a rich site of heritage belonging to the Medieval time period.

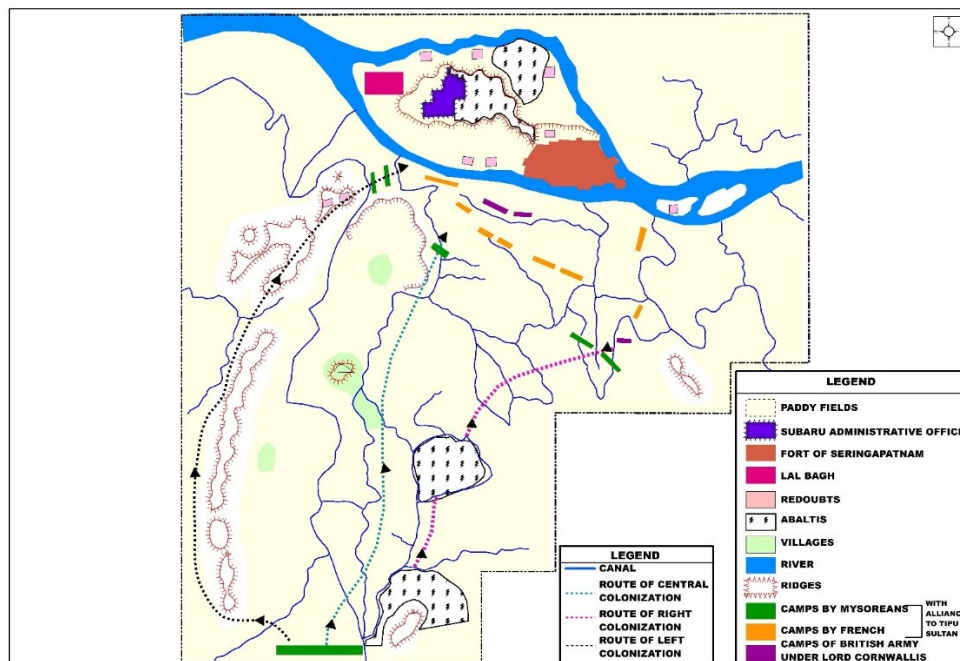


Figure 2. British Aggression towards Tipu Sultan's Territory-A Sketch
 Source: *Srirangapatna: The Historical Past (Mandya District at a Glance)*

Table 2. Historical Evolution of Srirangapatna

Chronology and more	
Beginning of Christian Era- 10th Century AD	<ul style="list-style-type: none"> • Mysuru plateau was under the reign of Gangas • Maddur, known as Murudur in epigraphs was the capital of the territory designated as Chikkagangavadi.
Post 10 th Century AD	<ul style="list-style-type: none"> • The reign of Hoyasala King Vishnuvardhana began, he renamed the place after his son's name as 'Narasimha Chaturvedi Mangalam' and made it into an Agrahara.
1400 AD	<ul style="list-style-type: none"> • After the fall of Hoyasala power, this region came under the influence of Vijayanagar empire.
1495 AD	<ul style="list-style-type: none"> • In 1495 A.D., Narasanayaka, the founder of the third dynasty of the Vijayanagara, captured Shrirangapattana. • Subsequently, Srirangapatna became the seat of a Viceroy of the Vijayanagara empire and continued to flourish under the royal patronage.
1511 AD	<ul style="list-style-type: none"> • The Chief of Gangaraja set up a principality at the island of Shivasamudram and conquered Srirangapatna • Later, when Gangaraja II became the Chief of Shivasamudram, he was attacked by his son-in-law and enemies were allowed to enter the fort • Gangaraja first killed all his women and children and then died
1532 AD	<ul style="list-style-type: none"> • The Vijayanagara king Achtuyaraya visited Srirangapatna on his way back from Srirangam • Even after the decline of Vijayanagara empire, Srirangapatna continued to be a seat of power • According to the epigraphic evidence, Ramaraja (one of the four sons of King Thirumalaraya) who is styled as Mahamandaleshwara, was the Viceroy of the Shrirangapattana region
1610 AD	<ul style="list-style-type: none"> • His son Thirumala II became the Viceroy of Srirangapatna • Raja Wodeyar of Wodeyar dynasty possessed Srirangapatna making it his capital
1673-1704 AD	<ul style="list-style-type: none"> • Shrirangapattana became a flourishing city during Chikkadevaraja Wodeyar's regime and during this period • Malavalli too assumed importance as a city of learning, teaming with men learned in Vedas, Vedanta, Shruti and Dharma shastras • Among the rulers of the small kingdoms that emerged from out of the wreckage of the Vijayanagara empire, Chikkadevaraja Wodeyar stood out as the foremost • The political centre of gravity, in so far as the former Mysore kingdom is concerned, soon shifted to Srirangapatna • The Nawabs of Sira, Arcot, Kurnool and Kuddapah etc., both in their individual capacities made repeated efforts to capture Srirangapatna but were not successful. • The Maratha invaded the fort but failed to succeed.
1761 AD	<ul style="list-style-type: none"> • Hyder Ali became the ruler of the kingdom where he had to defend against the triple alliance of the Nizam of Hyderabad, the Marathas and also the British who had already established a strong foothold in the country and were in the forefront of the power struggle.

1782 AD	<ul style="list-style-type: none"> • Tipu Sultan succeeded Hyder Ali and carried on with the warfare, especially with the British, for seventeen long years
1799 AD	<ul style="list-style-type: none"> • The fight for supremacy was ended with the capture of Srirangapatna by the British • The valiant Tipu Sultan was slain in the battle field • Thereafter, the kingdom was restored by the British to the Wodeyars who ruled this part of the country under the suzerainty of the British till August 1947 when the country attained independence • The official capital of the kingdom was shifted from Srirangapatna to Mysore. With this change, the importance of Srirangapatna began to decline
1809-1811 AD	<ul style="list-style-type: none"> • The European regiments moved from Srirangapatna to Bangalore and by 1830 AD, Srirangapatna ceased to be a military station • The Gun Carriage Manufactory situated at Srirangapatna was shifted to Madras • In this way, a place which rose to prominence and served as a seat of power for more than three centuries, lost its lustre and went into oblivion
1947	<ul style="list-style-type: none"> • India secured its independence and these regions came under special government considerations.

Source: District of Mandya at a Glance (2016)

The major monuments that have preserved by the State and Central governments are listed below, reveal rich heritage of Srirangapatna taluk that has been listed in the Table 3. The Photo 1 shows Tipu Sultan's summer palace or Dariya Daulat Bag (meaning a garden or Bag near the Dariya or river, here Cauvery) where he spent his summer. He used to hold meetings at ministerial levels in the place (see Photo 2). Also, the summer palace had a pigeon house which sheltered pigeons to send information from one place to another (see Photo 3). These historical monuments are indeed worth seeing from a tourist's point of view.

Table 3. Protected Monuments of Srirangapatna

Protected Monuments		
	Archaeological Survey of India	State Government
1	Obelisk	Krishnamurti's Bungalow
2	Colonel Bailey's Dungeon	Mummadi Krishnaraja Wodeyar birth place
3	Sri Ranganathaswamy Temple	Fort
4	Lal Mahal (Tipu's Palace)	Dungeon
5	Sri Kanteerava Statue	8 Storehouses of Gunpowder
6	Spot where Tipu's body was found	Hanging Bridge
7	Thomas Inman's Dungeon	Moat around Fort
8	Jumma Masjid (Masjid-E-Ala)	2 Ranagambha
9	Daria Daulat Bagh	Ruined Palace of Mirsadhik
10	Gumbaz	Tuppada-Kola

Source: Onsite visit to Dariya Daulat Bagh by the author



Photo 1. *Dariya Daulat Bag*
(Tipu's Summer Palace)



Photo 2. Tipu Sultan's Darbar

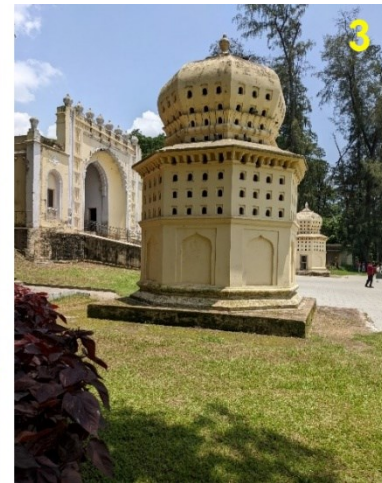


Photo 3. *Kabutar Khana*
The Pigeon House

6. PLANNING EFFORTS

It is important to note that over the years 2008-09 till 2019-20, maximum investments has been towards the segment of other works category that encompasses the salaries of Paurakarmikas (or workers), Resistant Drainage Unit construction, Raw Water Pump House and Filter Installations, construction of filter houses, tractor sheds, maintenance of bridges, Renovation of Administrative Office and heritage sites, plantation of saplings, construction of latrines, town and regional planning functions, electrification, repair works for houses meant for economically weaker sections of the population (see Table 4 and Figure 3). Indeed, besides localised investment of funds in the above-mentioned categories and roads, hardly any investments were meant for underground drainage, storm water drainage and water supply as far as river Cauvery and its drainage (or seasonal spillages are concerned). Buildings, open space, plots, streets, community halls, drains sewerage and water supply were studied in order to identify homogenous morphological spaces and measure the planning parameters. In order to develop the region as a tourist destination issues like maintaining storm water drainage, regulating the water of Cauvery for agricultural and domestic purpose during monsoon remain utmost important. No such planning has been so far formulated for reserving spilled over Cauvery water during monsoon, proper maintenance of Krishna Raja Sagara Dam and equipping Srirangapatna for regional development at block level should be the top most priority. As a result, the growth and development remain only centred around the tourist spots that hardly trickledown towards the remaining parts of the taluk. Below is the Table 4 that elaborates the expenditures under several categories that hardly addressed the conservation efforts of Srirangapatna region in a holistic way.

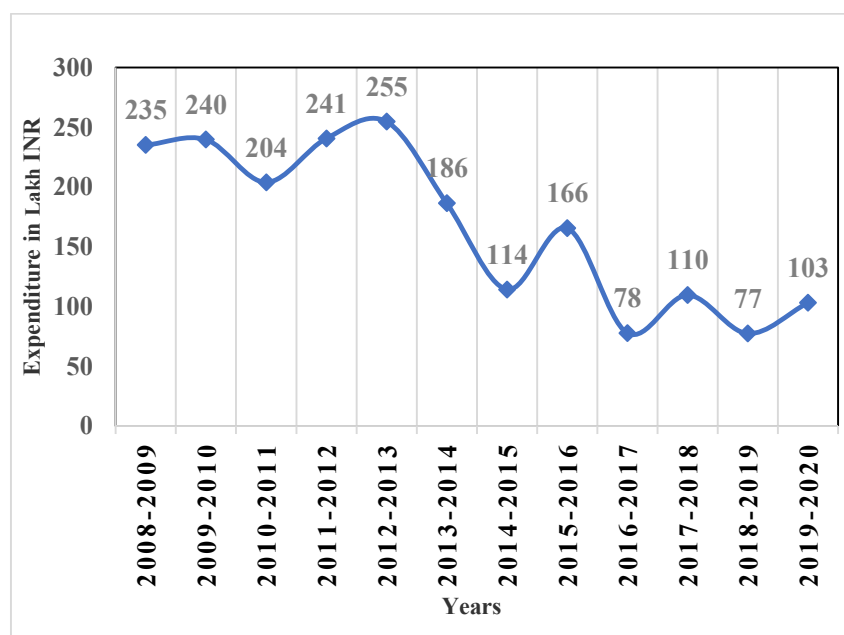


Figure 3. Expenditure (in INR Lakhs) on Infrastructural Development of Srirangapatna Region (2008-2020)

Source: Report: Mandya District at A Glance, (2009-2020)

Table 4. Year wise Expenditures (in Lakhs) for the development of Srirangapatna (2009-2020)

Years	Projects	Expenditure (In Lakhs)	Types of Works
2009-2010	Other Works	121.96	Resistant Drainage Unit construction, Raw Water Pump House and Filter Installations
2010-2011		99.15	Construction of filter houses, tractor sheds and maintenance of bridges
2011-2012		106.71	Drainage Works, Ward 4, 2,5 and Interlocking pavements
2012-2013		111.52	Renovation of Administrative Office, Plantation of Saplings, and Construction of latrines etc.
2013-2014		72.53	Continuation of maintenance of works
2014-2015		73.35	Tree plantations etc.
2015-2016		82.6	Works carried forward
2016-2017		77.82	Continuation of Works as scheduled for 2015-16
2017-2018		84.07	Payment of Paurakarmikas, and Town Planning functions
2018-2019		62.98	Repair of Anganawadi at ward No.10, Pacca House construction, and salaries for Paurakarmikas
2019-2020		8.28	Amount reserved for construction of houses, electrification, repair works for houses meant for Scheduled Cast beneficiaries

Source: Report: Mandya District at A Glance and Year wise Work Summary Reports (2009-2020)

7. LAND USE AND ITS CHANGE

On his accession of power, Tipu Sultan brought about certain changes in land tenure and systems in 'the southern Carnatic region' or the deccan plateau regions. He identified areas based on arability and crop combination methods (Ali, B. S., 1956). Tipu Sultan in such land revenue system introduced the system of collecting the rent in cash and his officials were strictly prohibited from collecting excess tax forcefully and such taxes upon grains were fixed each year depending upon the yield. As per Census of 2011, the district of Mandya that includes the Srirangapatna presently under discussion includes ninety inhabited villages, two un-inhabited villages and two urban units namely Ganjam and Srirangapatna which are towns, latter being headquarter of one of the seven blocks of Mandya as on recorded in the year 2016. With a geographical area of 368 square kilometres Srirangapatna taluk shows distinct changes in human habitation increase. Given a satisfactory rainfall distribution (see Table 1) and warm temperature the region has paddy as the major cereal grown here followed by ragi or millet crops as far as area coverage is concerned. Among the pulses, horse grams and cow peas are mostly grown here. Sesamum and Niger seeds are grown also and sugarcane is considered most important cash crop grown here. A small parcel of land is also used for the cultivation of cocoon and mulberry for sericulture (see Table 5).

As far as the Fig.4a below is concerned, it gives a clear idea of the land use of Srirangapatna region; of the land available for use other than agriculture is mostly under settlements and communication and remaining area designated barren. Some parts of land are categorised cultivable waste land areas, and those under trees and groves, however almost 80 percent of the category other uncultivated lands are permanent pastures. Of the fallow lands, some are currently kept fallow and rest are kept fallow time to time. Infact major areas are covered under net sown area of the cultivated areas indeed (Roy, P. S., 2015). Also, Fig. 4b reveals that arable land available in Srirangapatna are mostly irrigated by canal, a small part is irrigated by tanks and wells.

As far as Land use and land cover mappings are concerned there are visible changes noticed between two maps of Srirangapatna of 2020 and 2000. With a decadal gap of twenty years, remarkable expansion of residential areas has been noted followed by newer addition of closely knitted transport networks (see Table 5). The urbanization factors are efficiently dominant with a huge decline of agricultural and open land (Fig.6). Water bodies have marginally increased owing to the satisfactory measures undertaken by the government. The geomorphologists here recommend conversion of at least a quarter of the already irrigated area into elongated trenches through which water may be passed and stored for future usages in order to moisten the roots of the plants via perforated pipes.

Table 5. Crops cultivated in Srirangapatna Taluk

Areas under Different Crops produced (2016)	
Cereals	Area (Sq. Kms)
Paddy	76.97
Jowar	0.32
Maize	0.44
Ragi	20.14
Pulses	Area (Sq. Kms)
Tur	0.89
Horse Grams	20.7
Black Grams	0.57
Green Grams	0.57
Avare	0.57
Cow pea	4.54
Bengal Gram	0.7
Oil Seeds	Area (Sq. Kms)
Ground Nut	0.25
Castor	0.35
Sesamum	2.94
Niger Seeds	0.51
Commercial Crops	Area (Sq. Kms)
Sugarcane	35.85
Sericulture	Area (Sq. Kms)
Mulberry	9.9133
Cocoon	8.6811

Source: Report: Mandya District at A Glance, 2015-2016

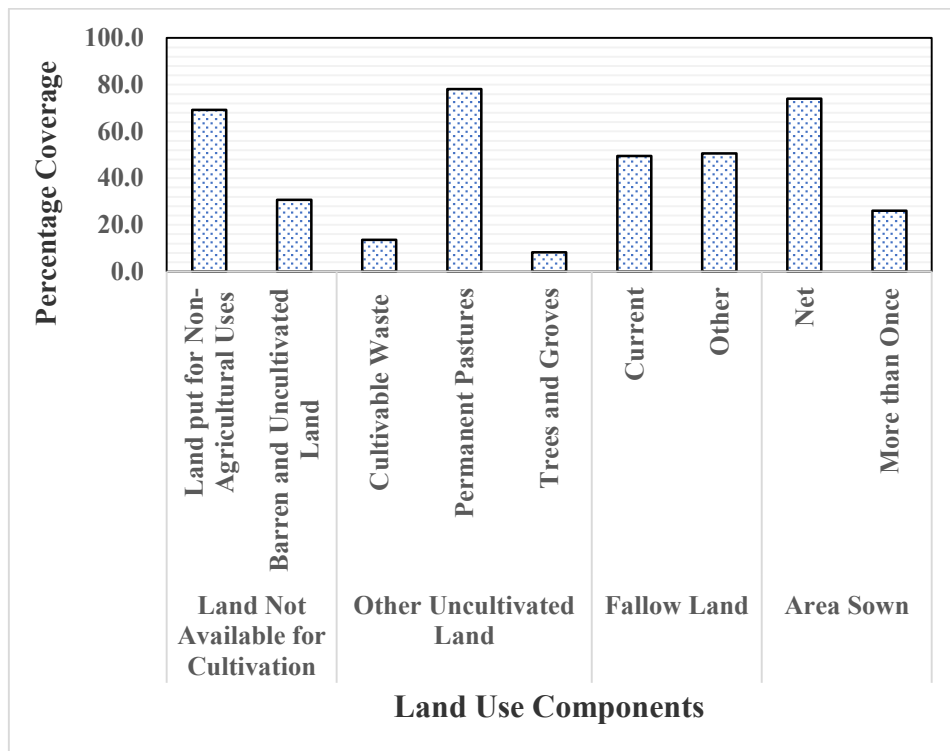


Figure 4a. Land Use Components-Srirangapatna Taluk for Agricultural Purpose (2016)

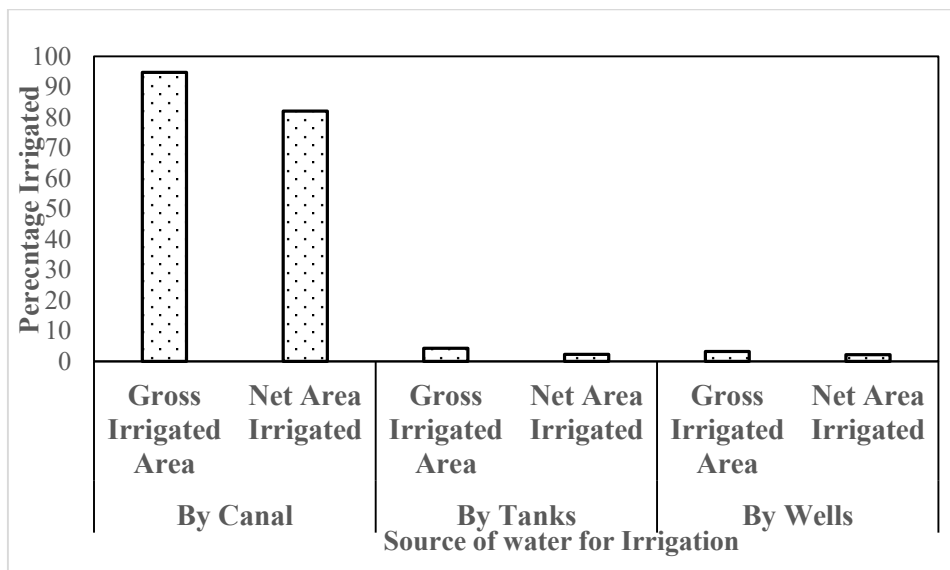


Figure 4b. Distribution of Gross Irrigated Area and Net Area Irrigated in Srirangapatna based on Source of Water for Irrigation (2016)

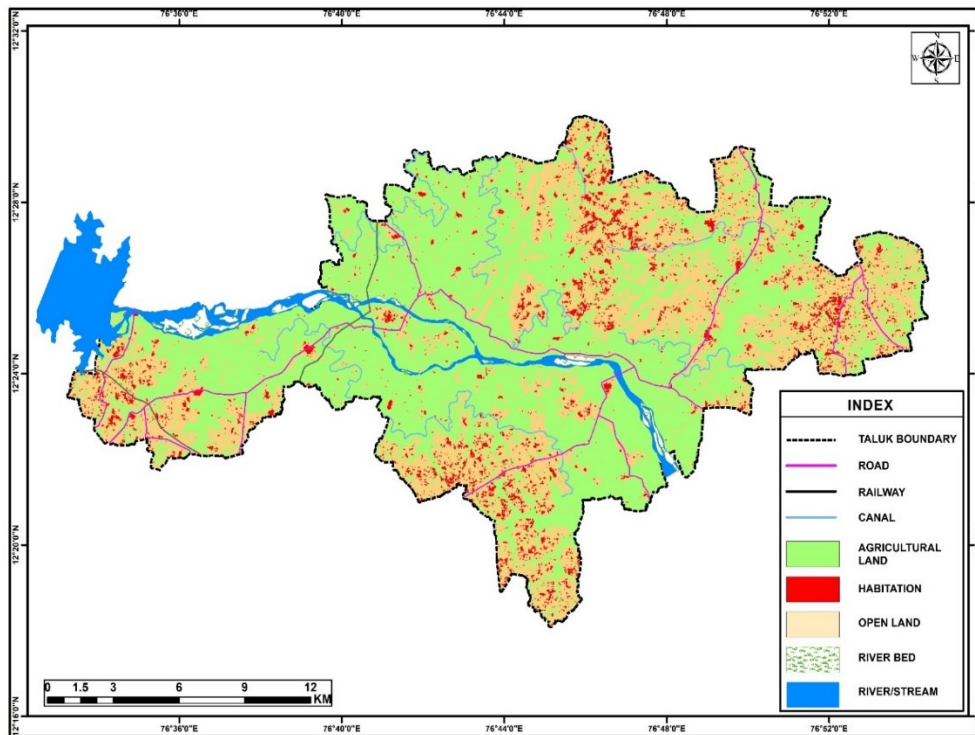


Figure 5a. Land Use Land Cover Map of Srirangapatna Region (2000)

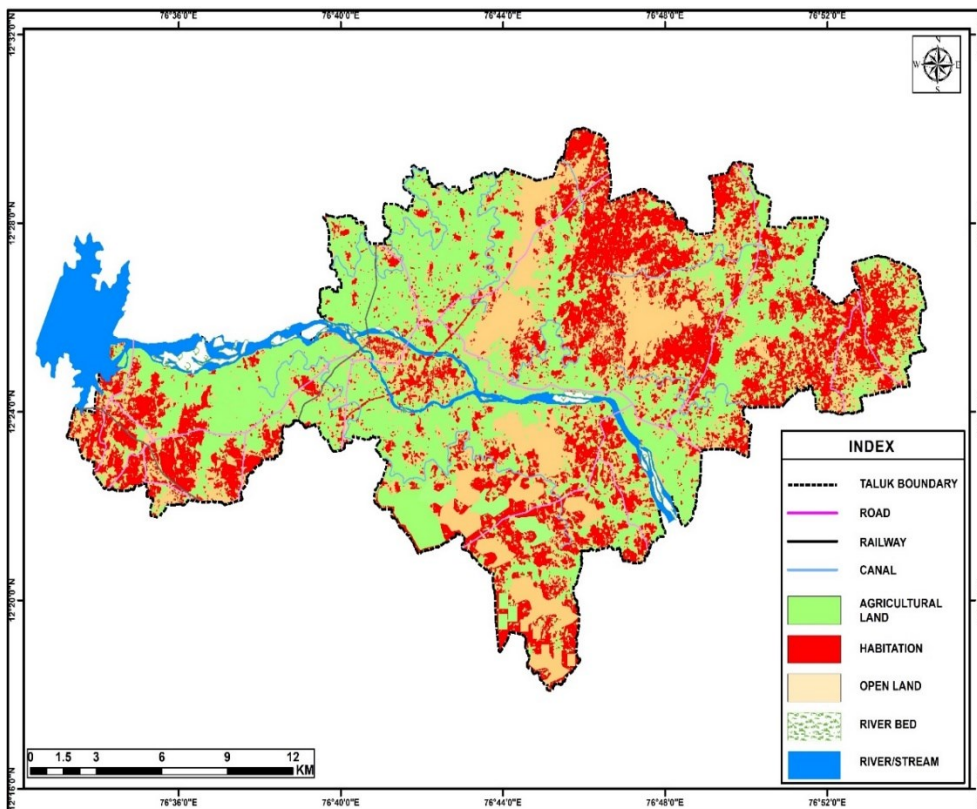


Figure 5b. Land Use Land Cover Map of Srirangapatna Region (2020)

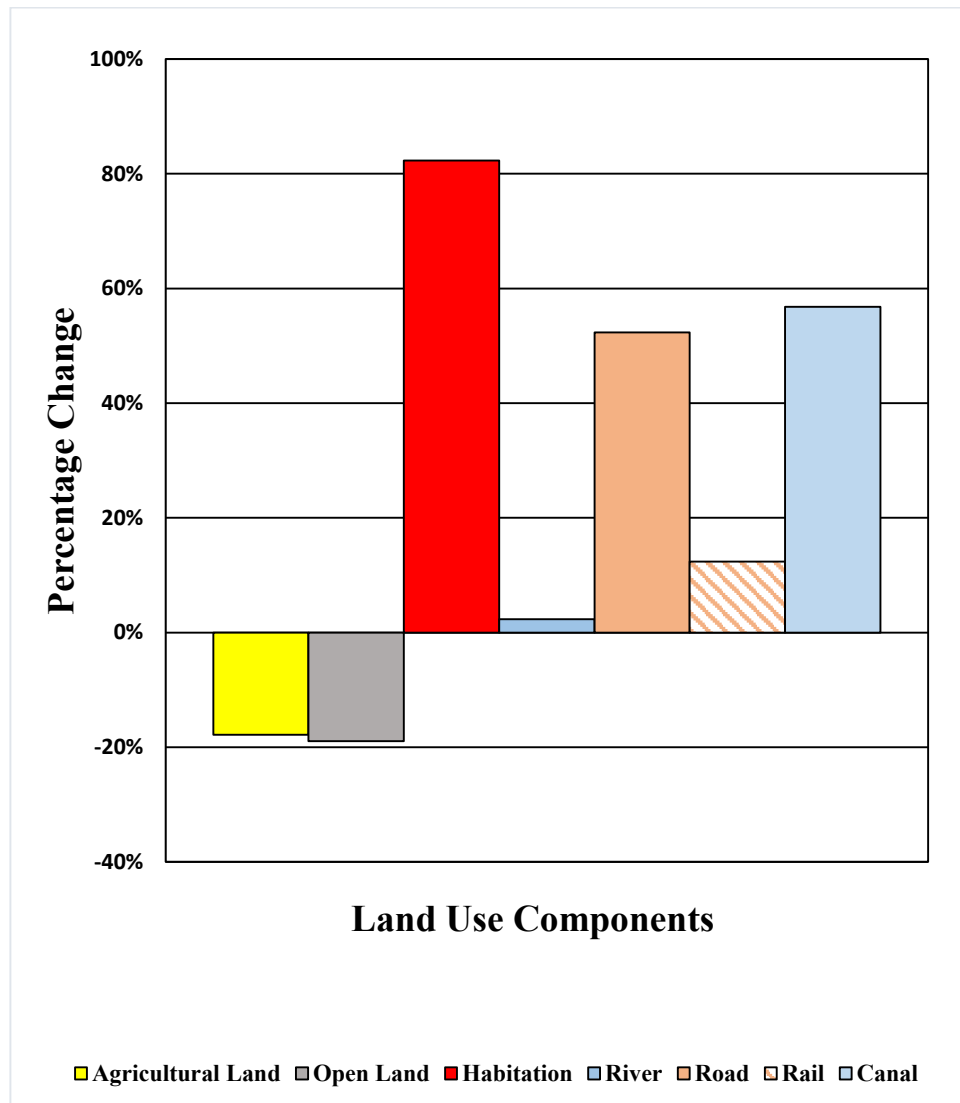


Figure 6. Percentage Change of Land Use Components in Srirangapatna Region (2000-2020)

Table 6. Changes in Land Use Components (2000-2020)

Land Use Components	Area Coverage (Sq. Kms) in 2000	Area Coverage (Sq. Kms) in 2020	% Change
Agricultural Land	179.89	147.85	-18%
Open Land	97.55	79.05	-19%
Habitation	54.22	98.84	82%
River	9.85	10.08	2%
Road	8.68	13.22	52%
Rail	3.56	4	12%
Canal	1.25	1.96	57%

8. DEMOGRAPHY OF SRIRANGAPATNA TOWN

The demographic situation of Srirangapatna in particular needs to be analysed as the paper deals with the region's urbanization processes too. In fact, the region of Srirangapatna has discrete form of urbanization impact specifically concentrated in the vicinity of heritage sites owing to better opportunities of employment and other modes of tourism related activities. The region already suffers from haphazard growth where there is a need for holistic planning rather sectoral ones. The Figure 7a below shows the location of Srirangapatna town while 23 wards are shown in the Figure 7b. The latter Fig 8a. shows that there has been quite a dense arrangement of wards in the Srirangapatna near the places of tourists' interests. All together it exhibits maximum concentration of households in the wards numbered 9 followed by 20 and least in the ward numbered 13 (Figure 8a).

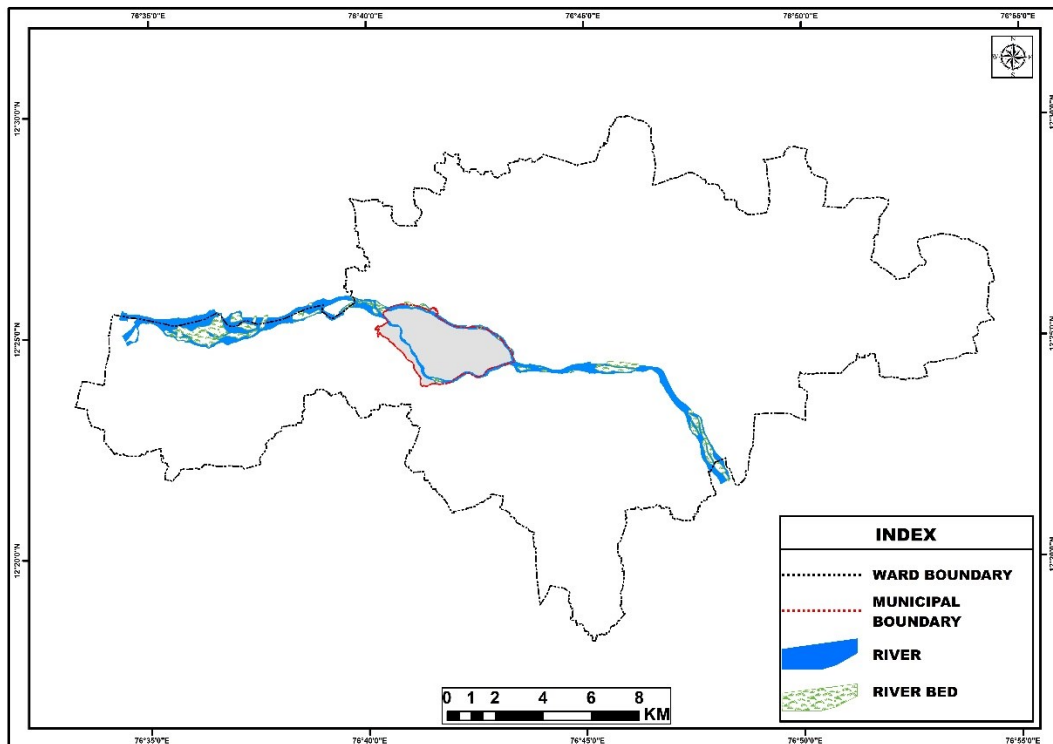


Figure 7a. Locating Srirangapatna Town in Srirangapatna Block

The maximum concentration of population is recorded in the ward numbered 15. With nearly one thousand five hundred population in this ward the female population outweighs the male population. However least population is recorded in the ward numbered 13 where female population still outnumbers their male counterparts. Also, as far as population of children in 0-6 years age groups maximum concentration has been noted in the ward numbered 18. Similarly, the ward number 13 that exhibits lowest population concentration for adults also exhibits the same trend for the children in the above-mentioned age group (see Figure 8b and 8c).

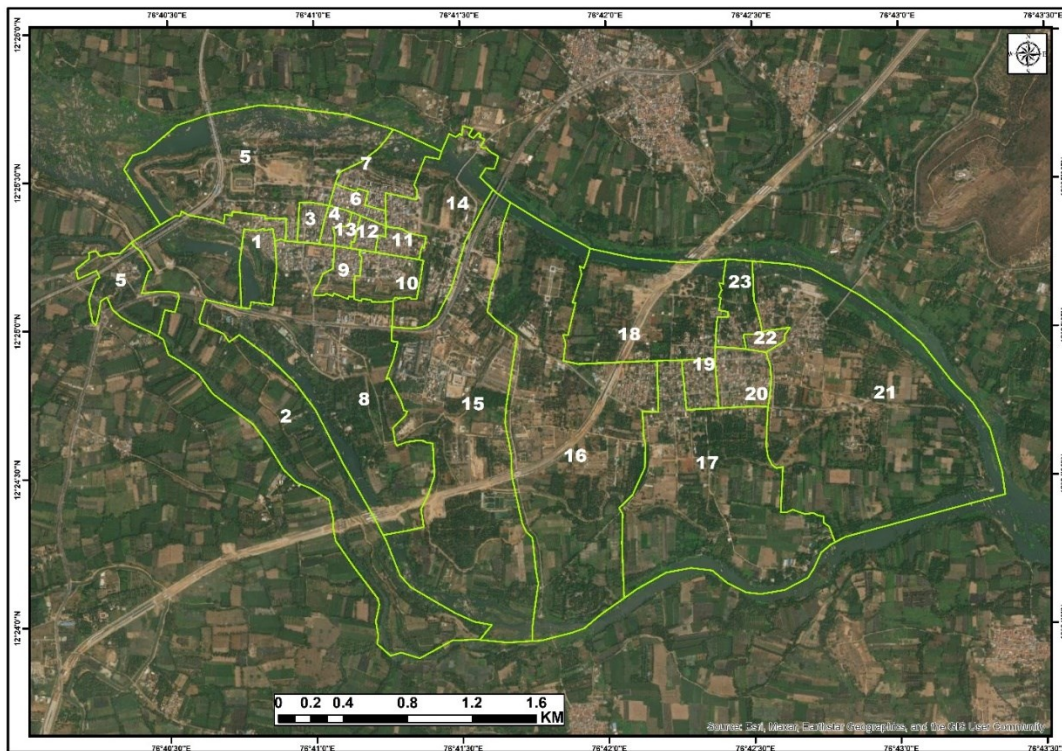


Figure 7b. Srirangapatna Town with 23 Wards

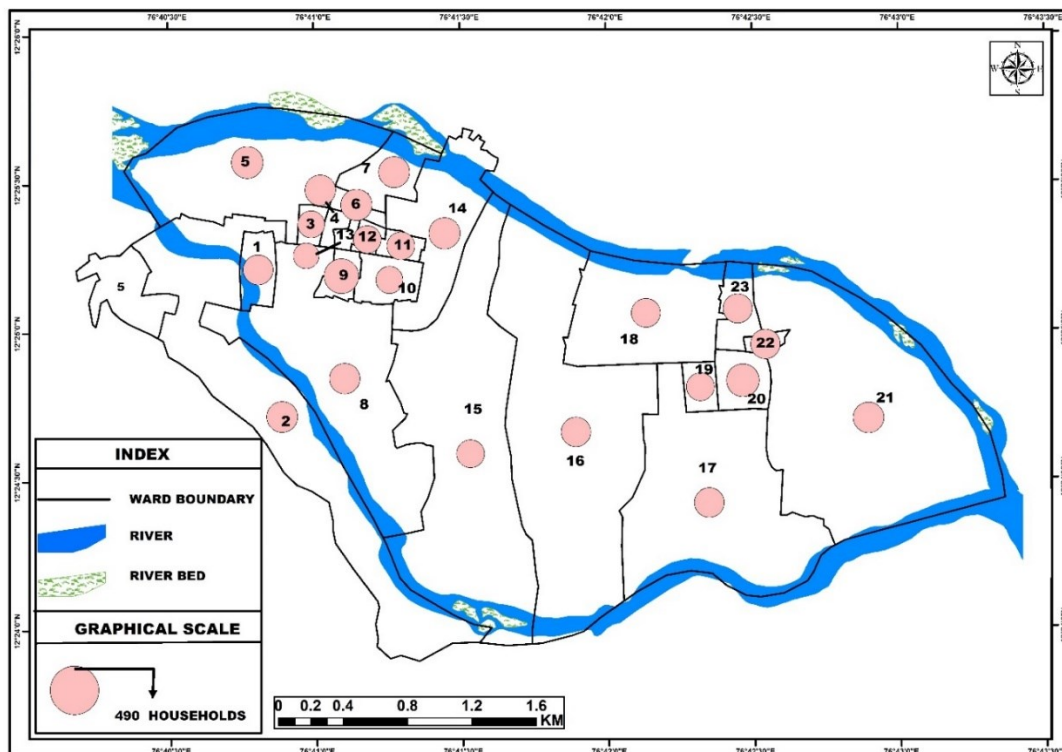


Figure 8a. Ward wise Distribution of Households in Srirangapatna Town (2016)

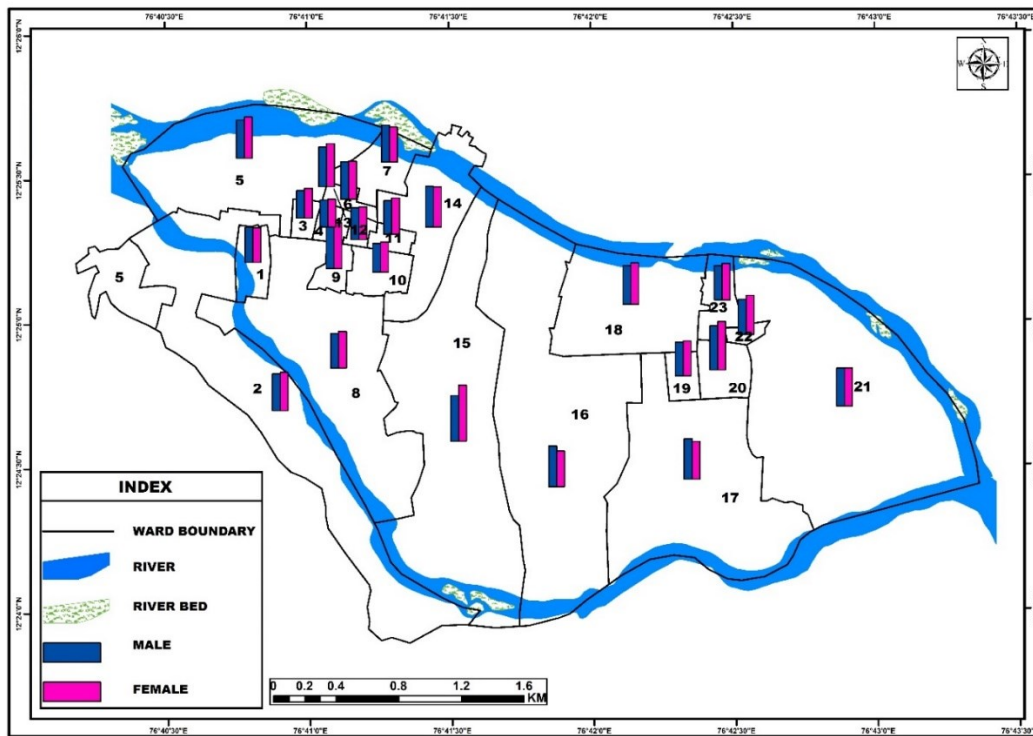


Figure 8b. Ward wise Distribution of Male and Female Population in Srirangapatna Town (2016)

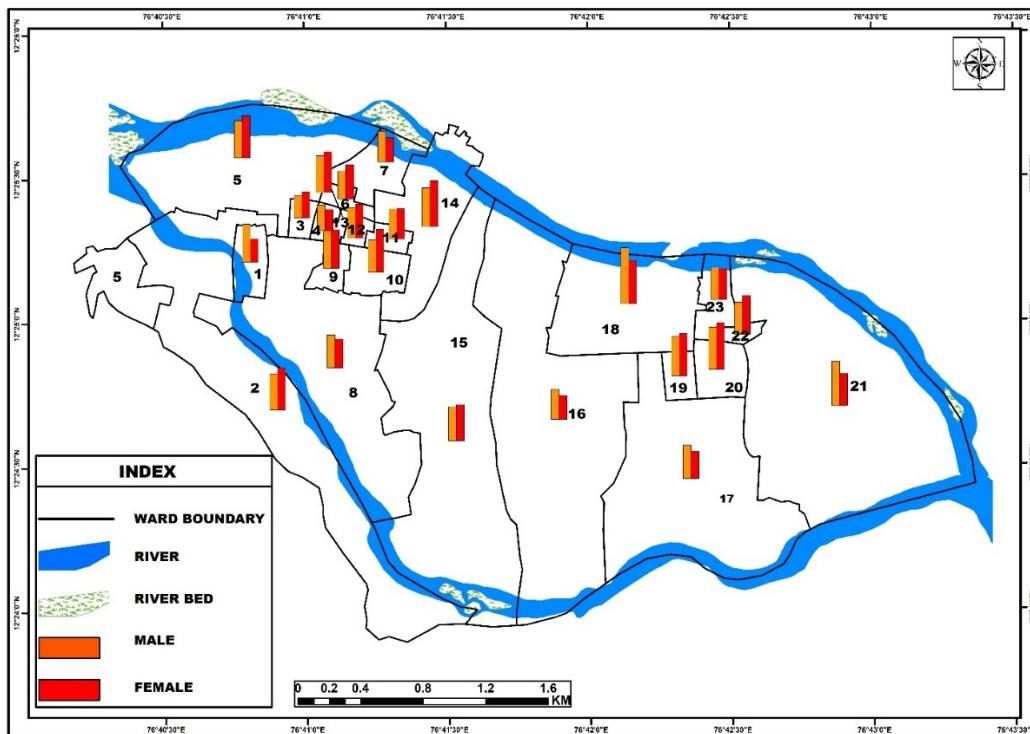


Figure 8c. Ward wise Distribution of Male and Female Population in Srirangapatna Town in (0-6 Age Groups) (2016)

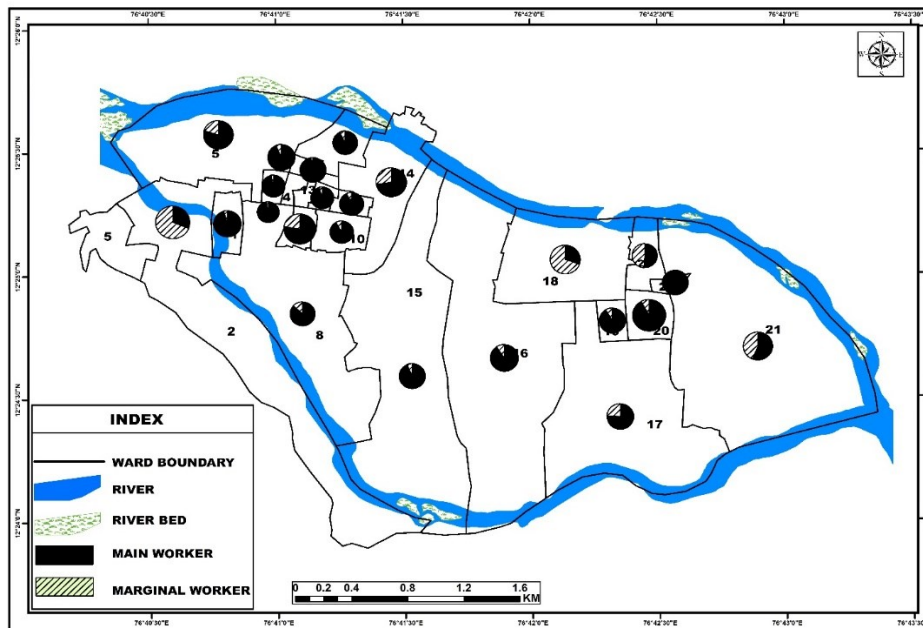


Figure 8d. Ward wise Distribution of Main and Marginal Workers in Srirangapatna Town (2016)

As far as occupations are concerned, mostly the Srirangapatna town exhibits workers from “other” category which encompasses activities like service, trade, commerce and transport categories polarised to the tourism activities of the region. Some are agricultural labourers, followed by very few cultivators on own land and workers in household industries. Moreover, all the wards of Srirangapatna show majorly the workers as ‘main’ category, followed by few in marginal categories (Figure 8d).

The Table 7 below shows the distribution of male and female literates based on their Z-scores. The wards numbered 4,6,7,8,9,14,15,17,20 and 22 show both high than average distribution of literates both male and female, whereas wards numbered 1,2,3,5,10,12,13,19,21,23 show below average score for literates. This exhibits quite a disparity as far as literacy is concerned. Also wards starting from 1,2,3,4 and 5 and 8,9,10 show that the number of tribal populations reserved by the government as socially and economically backward, and they outweigh that of reserved categories of population who are economically poor. However, the remaining wards show considerable number of populations in reserved category. Overall, the remaining majority of population belong to the un-reserved category.

Table 7. Z-Score Analysis of distribution of Male and Family Literates (Srirangapatna TMC), 2016

Wards	Male and Female Literates	Number of Wards
1,2,3,5,10,12,13,19,21,23	L, L	10
16	H, L	1
11,18	L, H	2
4,6,7,8,9,14,15,17,20,22	H, H	10

L=Low and H=High

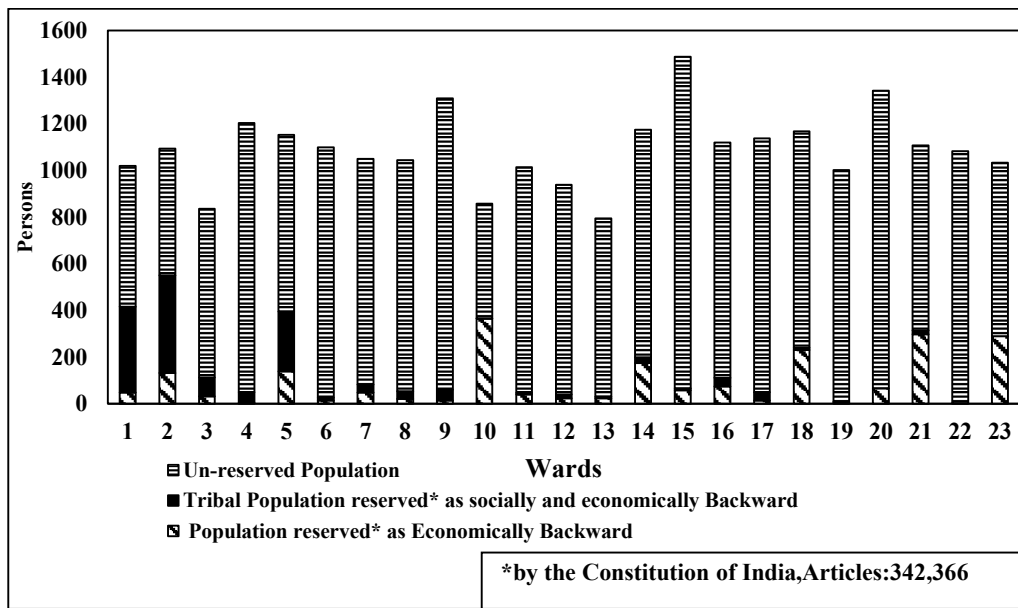


Figure 9. Distribution of Population based on their Social Status in Srirangapatna Block (2016)

As said earlier, the Srirangapatna often suffers excess precipitation and sifting river flow of Cauvery which pose quite a threat to the nearby heritage sites and the town itself and most importantly few sanctuaries of birds and other rare animals that remain concerning (Figure 10).



Figure10. Shifting of river Cauvery in Srirangapatna Block (2000-2020)

Table 8. Shift of Cauvery River (2000-2020)

At the Vicinities of	Shift of River Cauvery (in Metres)
<i>Ranganatha</i> Bird Sanctuary	160
<i>Mahadevapura</i> Hydroelectric Power Plant	37
<i>Maralgala</i>	124
<i>Chandagalu</i> Blue-Tailed Bee-Eater Reserved Area	29

9. CONCLUSION

As far as Srirangapatna is concerned, it is a social, cultural and heritage centre that exhibit creativity and innovation. But it faces quite an issue as far as its development at block and urban levels are concerned. Poverty, inequality and disparity persist in the region where growth is polarised around the heritage sites with major concentration of markets, tourism, transport and hotel industries. A fundamental fact about the land tenure systems very much existent in India is that none of them was spontaneous owing mainly due to historical development, rather it was considered to be 'imposed' by the British rulers and what is more concerning is that the region is still dependent on such sites while new growth centres or agro-based potentialities are yet to come. Karl Marx once remarked that what they created in Bengal was something similar (he mentioned "caricature") to what they had in Britain. Similarly, the regions like Srirangapatna witnessed quite a change of power between the Hindu rulers to Muslim emperors till the British annexed the major part. A change of power game always had a role to play on Indian economy and land use. What exists in Srirangapatna now is a mixed bag of cultural remains, few heritage sites, haphazard urbanization, reckless use of land for non -agricultural purposes, shifting of river flow, discrete planning and all-round threat of modern conjectures. In spite of such these issues which are still to be addressed, the study here listed few advantages or *hopes* for the urban planners and some negative characteristics which may considered *hurdles* yet to be crossed for comprehensive region-based approach in Srirangapatna.

Advantages

1. There are scopes of agro-based industries given ample production of mulberries, cocoons, and few dry crops
2. The precipitation amount and soil types support agriculture, thus the local people to earn their bread
3. There are growth potentialities in and around the archaeological sites like Tipu's Summer Palace and Gumbaz for tourism and

Disadvantages

1. But it is alarming to note that agricultural land areas are steadily declining with rapid urbanization
2. The areas under forest cover and even regions under cultivable fallow are steadily declining to affect weather components that would hamper agriculture
3. The growth has been prominent in and around the Srirangapatna towns and the heritage sites but remaining areas have few growth-pockets with little or no

- entertainment purposes
4. Since the region of Srirangapatna is potential in tourism, urbanization process may be planned proper with private, public enterprises along with people interventions.
 4. This region suffers alarmingly with water logging, shifting river course and ill maintenance of few heritage sites
 5. The town Srirangapatna has disparity in gender literacies and do suffer from underdevelopment intra regionally which should be addressed with top most priority
 6. There are few adjoining places near the heritage sites where remains of forts and monuments of historical sites are found which are presently sites of many residential areas. They are rather areas of disputes which retain rural entities (as Urban Villages)

A lop-sided growth with many issues still to be taken care of and few growths still to be nurtured is what Srirangapatna is now has to offer and hence thoughtful planning may address both.

REFERENCES

- Ahluwalia, I. J.**, (2019), Urban governance in India, *Journal of Urban Affairs*, 41:1, 83-102, DOI: 10.1080/07352166.2016.1271614.
- Ali, B. S.**, (1956), Land Tenure in Mysore under Tipu Sultan, *Proceedings of the Indian History Congress*, 19, 368–371. <http://www.jstor.org/stable/44140867>.
- Balasubramanian, A.**, (2017), *Soil Erosion-Causes and Effects: A Report*, University of Mysore, Mysore.
- Colavitti, A.M.**, (2018), *Urban Heritage Management: Planning with History*, Springer International Publishing AG.
- FAO**, (2017), *The future of food and agriculture – Trends and challenges*, UN, Rome.
- Esposito, A.**, (2018), *Urban Development in the Margins of a World Heritage Site: In the Shadows of Angkor (Asian Cities)*, Amsterdam University Press.
- Kaushal, G.**, (1997). *Economic History of India (1757-1966)*, Kalyani Publishers, Ludhiana pp. 234-236.
- Leung, H.L.**, (2003). *Land Use Planning Made Plain*, University of Toronto Press.
- Osterkamp, W.R.**, (1998). *Processes of fluvial island formation, with examples from Plum Creek, Colorado and Snake River, Idaho*. *Wetlands* 18, 530–545 <https://doi.org/10.1007/BF03161670>

-
- GOI**, (2012). *Report of the Technical Group of Urban Housing Shortage for the 12th Plan*, Ministry of Housing & Urban Poverty Alleviation.
- GOK**, (2016). *District at a Glance: Mandya*, District Statistical Office, Mandya, Karnataka.
- Roy, P. S.**, (2015). et al. *Development of decadal (1985–1995–2005) land use and land cover database for India*. *Remote Sensing* 7.3: 2401-2430.
- Sankha, S., Vittan, I., Mohan, A.**, (2010). *India's Urban Awakening: Building Inclusive Cities: Sustaining Economic Growth*, MC Kinsey Global Institute.
- Singh, B., Goswami, K.R.**, (2011). Influence of Landforms and Geomorphic Process on Topographic Evolution of a River Island, *International Journal of Engineering Science and Technology (IJEST)* Vol. 3 No. 7.
- Suwardhi, D., Trisyanti, S.W., Virtriana, R.**, (2022). *Heritage Smart City Mapping, Planning and Land Administration* (Hestya). *ISPRS Int. J. Geo-Inf.*, 11, 107. <https://doi.org/10.3390/ijgi11020107>.
- Tian, et al.**, (2014). *Agricultural Development and Land Use Change in India: A Scenario Analysis of Trade-Offs Between UN Sustainable Development Goals (SDGs)*, *Earth's Future*, <https://doi.org/10.1029/2019EF001287>.
- UN**, (2017). *World Population Prospects: Key Findings and Advance Tables*, United Nations, New York.
- UN**, (2011). *World Urbanization Prospects The 2011 Revision*, United Nations, New York.
- Wescoat, J. L.**, (2018). Human use of landforms on the Deccan Volcanic Plateau: Formation of a geocultural region, *Geomorphology* 331 pp.175-190.
- Wolman, M.G. and Leopold, L.B.**, (1957). *River floodplains: Some observations on their formation*. U.S. Geological Survey, Professional Paper 282-C, pp. 87-109.
-