



International Journal of Research in Academic World



Received: 04/December/2024

IJRAW: 2025; 4(1):21-28

Accepted: 08/January/2025

Study of Green Spaces in Channapatna

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Abstract

The urbanization on land use, the allocation and the implementation of urban green spaces, we attempt to analyze the distribution and accessibility of public parks in Channapatna (Tier 2 city in the state of Karnataka). Cities are the places where multiple challenges related to environmental, economic, social, and cultural phenomena are condensed. Improving the accessibility of urban green space is an integral part of city planning. Through an analysis of open and green spaces, the Air Quality Index (AQI), and the Normalized Difference Vegetation Index (NDVI), this study aims to evaluate the region's environmental conditions and suggest strategies for improving the healthier living environment.

Keywords: Green Spaces, urbanization, land use etc.

1. Introduction

Green open spaces, including parks, gardens, and urban forests, are essential components of city landscapes, offering ecological, recreational, and social benefits. In tier-2 cities, which represent medium-sized urban areas experiencing rapid growth, the development and evolution of green spaces play a crucial role in maintaining environmental balance amidst urbanization.

Traditionally, green spaces in smaller cities were often informal—ranging from large village commons and temple gardens to agricultural land and natural vegetation. These areas provided residents with opportunities for recreation, community gatherings, and a connection to nature. However, as tier-2 cities have transitioned from semi-rural environments to more urbanized hubs, the pressure of infrastructure development has often led to a reduction in natural green spaces.

2. Channapatna Town

Channapatna, a historic town in the Ramanagara district of Karnataka, India, is best known as the "Land of Toys" due to its globally recognized wooden toy industry. The town, located approximately 60 kilometers from Bangalore, combines cultural heritage, artisanal craftsmanship, and increasing urbanization as part of its distinct identity. Channapatna has been evolving from a small, traditional town to a tier-2 city, reflecting broader changes in India's urban landscape.

It is a fast-developing tier-2 city known for its vibrant toy-making industry and traditional crafts. Over the years, the city has experienced significant growth in urban infrastructure and

population, which has brought both challenges and opportunities in terms of urban planning and environmental sustainability.

In cities, green open spaces such as parks and natural reserves contribute to better quality of life through recreation, air purification, and ecological harmony.

A. Historical & Cultural Significance: Channapatna's history is rooted in its association with craftsmanship and trade. The town's toy-making industry, which dates back over 200 years, was nurtured under the reign of Tipu Sultan, the ruler of the Mysore Kingdom. He invited Persian artisans to teach locals the art of wooden toy-making, introducing the lacquerware technique that Channapatna toys are famous for today. Over generations, this craft has evolved into a cottage industry that provides livelihoods for many local artisans.

Traditionally, Channapatna's landscape is characterized by small agricultural plots, natural vegetation, and open communal spaces, with a close connection between the people and their environment. Open spaces often doubled as community meeting areas and local festivals.

B. Geography and Location: Channapatna is situated along the Bangalore-Mysore highway (NH 275), which has significantly contributed to its connectivity and development. Located in the southern part of Karnataka, the town enjoys proximity to both Bangalore, a major IT hub, and Mysore, a cultural and historical center.

C. Economy: The local economy of Channapatna is largely driven by its toy industry, which has gained international recognition for its eco-friendly and sustainable production methods. Artisans use ivory wood (Wrightia

tinctoria), and the toys are coated with vegetable dyes, making them safe for children. Channapatna's toys are now exported globally, and efforts to promote this traditional craft have led to its recognition as a geographical indication (GI) product. In addition to its toy-making industry, Channapatna's economy is supported by agriculture. The surrounding areas are known for cultivating crops such as ragi, sugarcane, and coconuts.

D. Demographics and Urbanization: With a population of around 70,000–80,000 people, Channapatna is categorized as a tier-2 city. Over the past few decades, it has witnessed rapid urban growth due to its strategic location near Bangalore. The expansion of road infrastructure and economic opportunities has led to population growth, commercial development, and changes in land use.

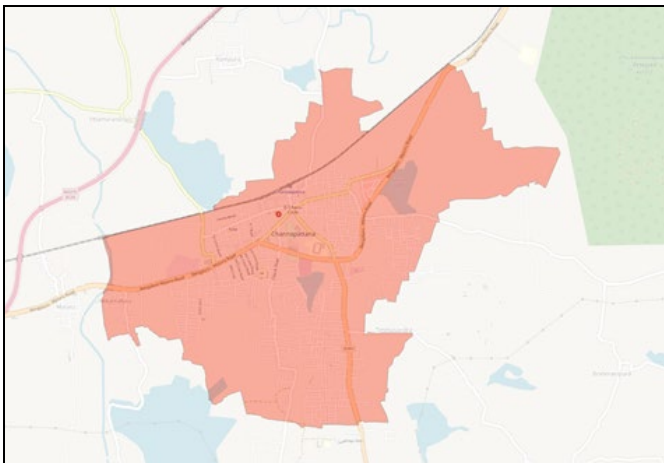


Fig 1: Boundary of Channapatna, Author Compiled

Guidelines

URDPFI Guidelines for Open Spaces:

- The URDPFI guidelines recommend that open spaces should be around 10-12% of the total developed area of the city.
- This includes parks, playgrounds, gardens, green belts, and buffer zones.
- Specific space allocation for parks, gardens, and playgrounds should be 1.2 to 1.4 hectares per 1,000 population.

Open Spaces

Open Spaces such as neighborhood Parks and Playgrounds should be within a walking distance (around 400-800 meters) for residents.

Community Parks such as larger parks, often catering to several neighborhoods, should be around 2.0-4.0 hectares.

Green Belt Development: The guidelines encourage the creation of green belts or buffer zones along the periphery of the city to prevent urban sprawl and enhance ecological balance.

The paper aims to study the strategies implemented by other tier 2 cities to combat the problems of expansion of region with respect to open spaces & sustainable ecofriendly streetscape such as Parks, playgrounds, lakes, ecofriendly streets. The paper intends to develop strategies to resist the problems of open spaces by suggesting methods and techniques with respect to the guidelines to create sustainable development & streetscapes that would help in reducing the environmental impact on cities. The urban environment's effects in the Tier 2 city of Channapatna were analyzed by

examining various factors, including adherence to guidelines and the impact of limited open spaces on ecosystems, water features, greenery, human life, and streetscape design.

A. Study Area Precinct

The study area Channapatna taluk is located in south western part of *Ramanagara* District of Karnataka. Reason for choosing the study area extent is to understand & analyze the green & open spaces in this Region.

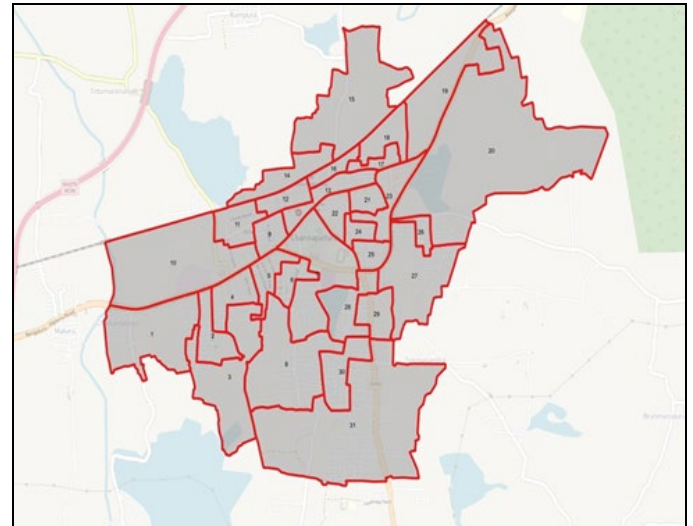


Fig 2: Ward Map of Channapatna, Author Compiled.

The total area of the developing town is 19.85 Sq. Km, there are 31 wards in Channapatna town & the total population is 71,942 according to the census of India 2011, the census 2021 was cancelled due to Covid. The census authority have announced to be conducted the census in 2024, the expected population in 2024 is to be 99,000.

B. The Role of Public Space & Accessibility

Public Spaces play a pivotal role in the cities as they provide zones of social interaction, cultural, political and recreational activities. Urban design protects and enhances the characteristics of streets, nodes, buildings, landmarks, and creates views that are unique and define the city. It also addresses how people feel, perceive and congregate to use their surroundings. Public Spaces can be of various spatial forms such as Parks, Sidewalks, Streets, Playgrounds, Plazas, Markets, Edge spaces & River fronts etc.

Urban Design can bring in change by understanding spaces and needs to Public such as the Accessibility analysis plays a vital role in evaluating the urban green spaces at ward levels.

C. Required Green Spaces in a City

Urban green spaces play a crucial role in enhancing air quality, promoting mental health, and offering recreational opportunities.

The different types of green spaces such as:

- i). Parks & Gardens
- ii). Green belts & Buffer zones
- iii). Street greenery
- iv). Green roof & vertical gardens
- v). Recreational green spaces &
- vi). Community gardens

D. Existing Land Use Study

The Urban Regional Development Plans Formulation and Implementation (URDPFI) guidelines, 2014 recommend 10 to

12 sq.mt. Of open space per person within a planned open space such as recreational, organized green & other open space. Specific space allocation for parks, gardens, and playgrounds should be 1.2 to 1.4 hectares per 1,000 population.

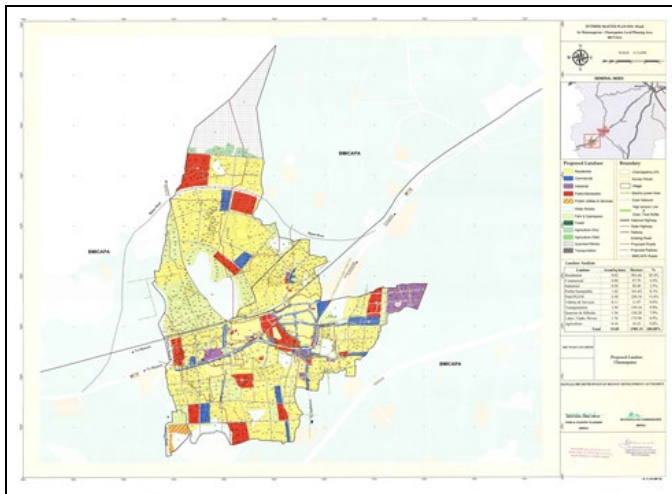


Fig 3: Interim Masterplan 2021, Source: RCUDA.

According to the interim master plan 2021, the total area of Channapatna is 19.85 Sq. Km.

Table 1: Interim Masterplan Land use Data

Sl. No.	Land use	Area in Sq.km.	Percentage
1	Residential	9.02	45.4%
2	Commercial	0.88	4.4%
3	Industrial	0.50	2.5%
4	Public/Semipublic	1.62	8.1%
5	Park/PG/OS	2.30	11.6%
6	Utilities & Services	0.11	0.6%
7	Transportation	1.94	9.8%
8	Quarries & Hillocks	1.56	7.9%
9	Lake/Tank/River	1.76	8.9%
10	Agriculture	0.16	0.8%
	Total	19.85	100.00%

E. Study & Analysis of Green & Open Space of the Precinct

The green spaces such as: Parks, play grounds, open spaces & lakes are analyzed.

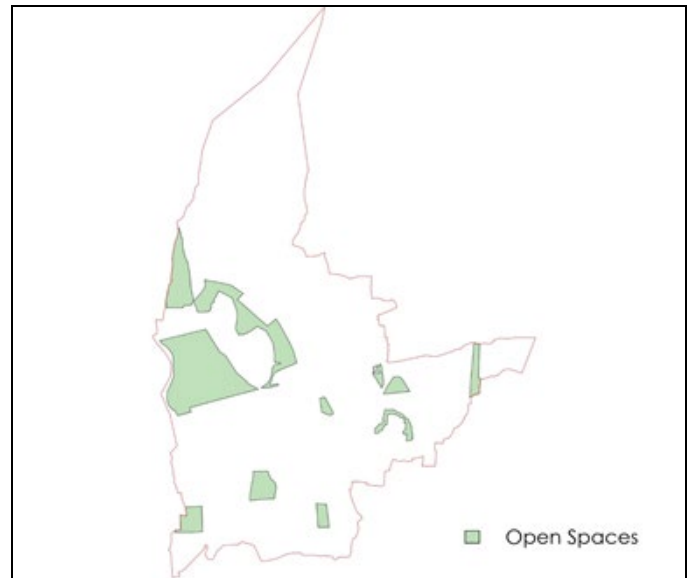


Fig 4: Analysis of Open space, Author Compiled

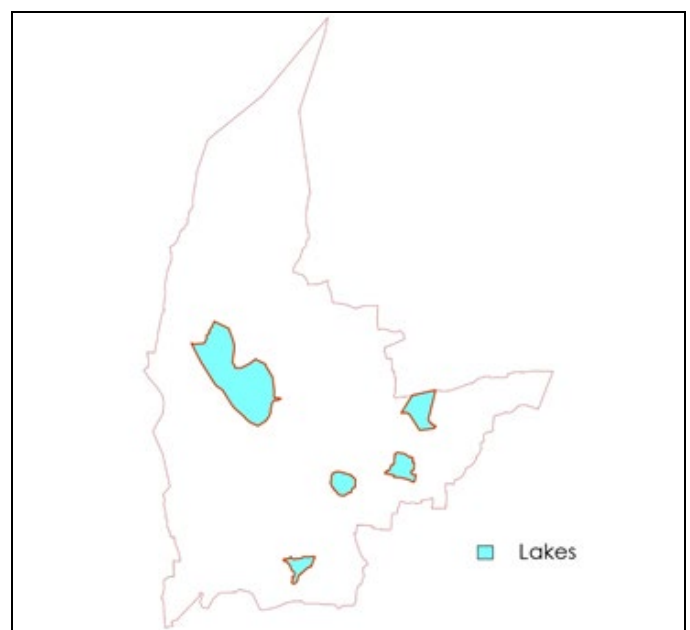


Fig 5: Analysis of Lakes, Author Compiled

In the tire 2 City Channapatna, the existing playground & open space area is 2.30 sq.km. & has five lakes that span an area of 1.76 sq. km. The open spaces here are mainly the farmlands & one school playground which is used by the school & Public. The current green space percentage is limited (11.6%) of the total area of Channapatna. The ongoing urbanization and reduction of agricultural lands indicate a decline in available green and open spaces. This reduction is affecting the local biodiversity, climate regulation, and resident’s access to recreational areas.

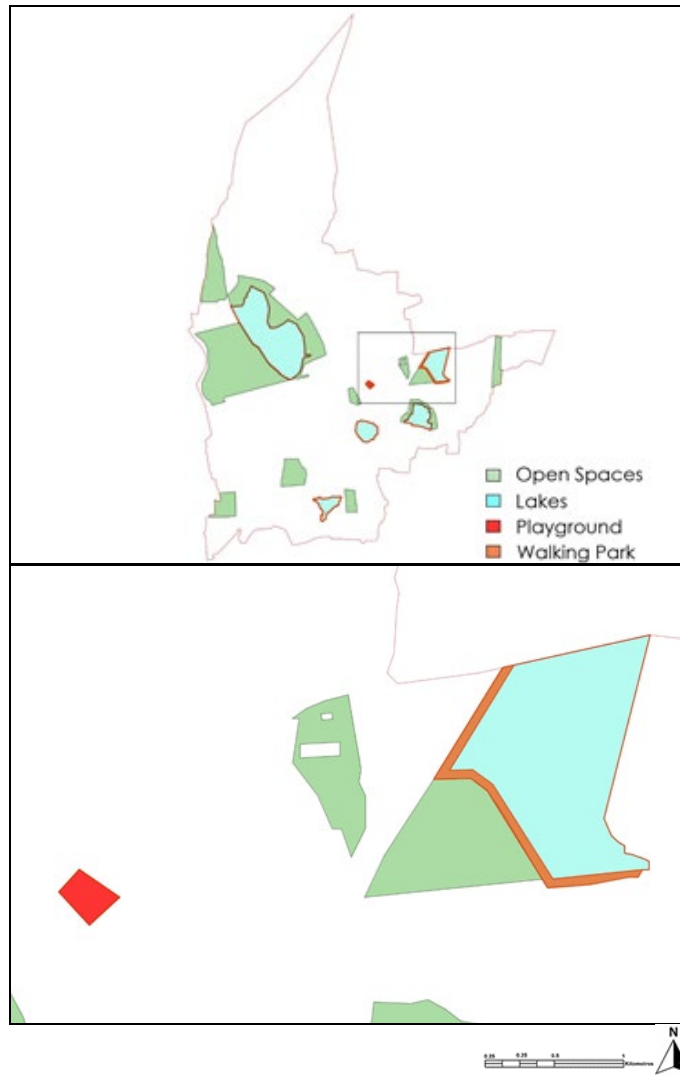


Fig 6: Analysis of space used by public, Author Compiled

i). There is only one play ground, which is a school playground of the area 0.00814 Sq. Km, which is used by the school authority to organize sports & play area for the

students & it is also used by the public to play & walking purpose in the morning.



Fig 7: Existing images of the Playground, Author Compiled

ii). There is only one park at the junction of “Mehdavia circle” which is a lake front development mainly

designed as walking track for the public.



Fig 8: View of the walking track, Author Compiled.



Fig 9: Existing condition of the Walking track, Author Compiled

The lake front developed Walking Park is the only walking park in the town of Channapatna, this lake front walking park is not well maintained & is not well looked after which has caused the wild shrubs & plants to grow across the pathways & peripheral region of the tracks, which has effected the activeness of the people to walk and jog in this developed park.

The school playground and the lake front developed walking park are the only two used areas for the walking and jogging purpose by the public which defines the lack of open spaces like parks in this region, which effects the healthy leaving of people living in this region.

F. Analysis of Air Quality Index (AQI) & Normalized Different Vegetation Index (NDVI) of Channapatna

i). **Air Quality Index (AQI) of Channapatna:** The Air Quality Index (AQI) of Channapatna is analyzed as **78**, which is categorized as 'Moderate'. This indicates that sensitive groups should reduce outdoor exercise and consider using masks or air purifiers. The primary pollutant across these reports is PM2.5 (fine particulate matter), which can penetrate deep into the lungs and pose

health risks, especially for individuals with pre-existing respiratory or cardiovascular conditions.

It's important to note that AQI values can fluctuate throughout the day due to factors like traffic, industrial activities, and weather conditions. For context, the AQI scale is generally categorized as follows:

Table 2: AQI condition analysis based on values.

AQI Values	Conditions
0-50	Good
51-100	Moderate
101-150	Unhealthy for Sensitive Groups
151-200	Unhealthy
201-300	Very Unhealthy
301-500	Hazardous

Given the reported AQI values, the air quality in Channapatna is currently within acceptable limits but may pose a risk to sensitive individuals. It's advisable to monitor the AQI regularly and take necessary precautions, such as limiting

outdoor activities during periods of higher pollution, especially for vulnerable groups. Air Pollution reduction is by developing and maintain green belts and tree-lined streets, Encourage planting trees with high particulate matter absorption, such as pine, oak, and silver birch, which trap pollutants and improve air quality of this region.

ii). Normalized Different Vegetation Index (NDVI) of Channapatna

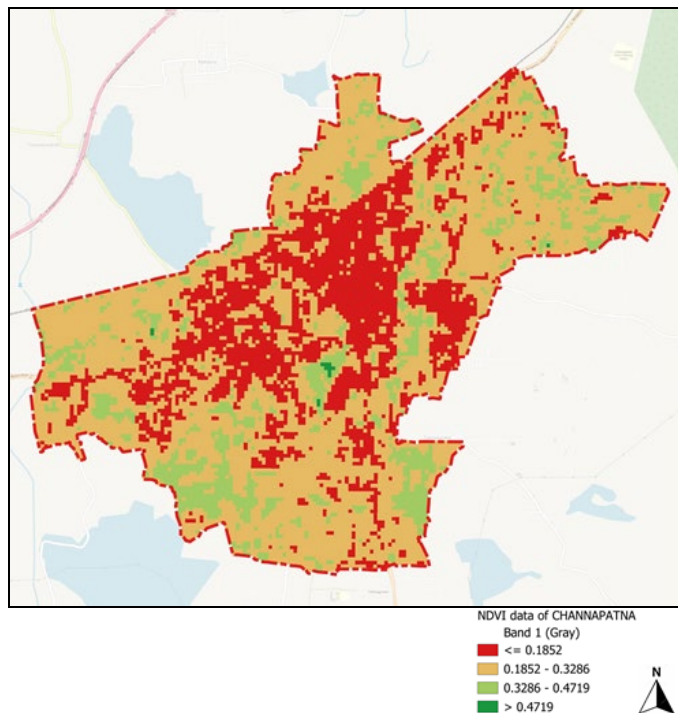


Fig 10: NDVI Analysis of Channapatna, Author Compiled

NDVI (Normalized Difference Vegetation Index) is a measure of vegetation health and density, calculated using satellite imagery. It ranges from -1 to 1, with higher values indicating healthier and denser vegetation. NDVI is calculated using the formula:

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

Where: NIR = Near-Infrared reflectance (captured by satellite sensors). & RED = Red reflectance (captured by satellite sensors).

- **-1 to 0:** Non-vegetative features like water, snow, or bare soil.

- **0 to 0.2:** Sparse or degraded vegetation, like dry areas.
- **0.2 to 0.5:** Moderate vegetation (e.g., shrubs or grasslands).
- **0.5 to 1:** Dense and healthy vegetation (e.g., forests or agricultural crops).

Table 3: NDVI condition analysis based on values, Author compiled

Channapatna NDVI Values	NDVI Conditions
-1-0 is (29%)	Non-vegetative & bare oil
0 to 0.2 is (47%)	Degraded vegetation & dry Area
0.2 to 0.5 is (18%)	Moderate vegetation (e.g. shrubs or grasslands)
0.5 to 1 is (6%)	Dense and healthy vegetation (e.g., forests or agricultural crops)

The (NDVI) analysis tell that Channapatna region has 47% of degraded vegetation like dry areas, 29% of bare soil, 18% of areas with moderate vegetation & 6% with Dense and healthy vegetation. Therefore increase in the vegetation & plantation of plants & trees helps in increasing the (NDVI) of the Channapatna region which enhances the healthy living of the people.

G. Strategies

Strategies are the actions of planning how to achieve the goal or the target, strategies can be issue based & guideline based. An approach integrating pollution control measures, enhanced greenery, and active participation from the community. Channapatna having an (AQI) value of 78, which indicates the moderate air quality, due to pollution less trees & vegetation in the region. There might be increase in the air pollution in future days, here are some of the measure to improve the (AQI) are:

- Developing dedicated cycle tracks and pedestrian-friendly zones.
- Implementation of schemes and proposals to redesign roads prioritizing NMT.
- Promotion of public bike-sharing systems.
- Promoting walking infrastructure such as footpaths, parks, jogging tracks.
- Switch to cleaner fuels & promote the adoption of electric vehicles (EVs) by installing charging stations and offering subsidies.



Fig 11: Case study of Pune Bicycle track by (PDA Architects)



Fig 12: Case study of New York, Public Park.

- Proposing community parks & playgrounds to the Public to enhance the wellbeing and health.
- Raising awareness by conducting campaigns on the health impacts of poor air quality and ways to improve it and

educating schools and colleges by initiating programs where students participate in air quality improvement efforts.

Proposal for the Cycling Tracts & Developing Vegetation in Channapatna

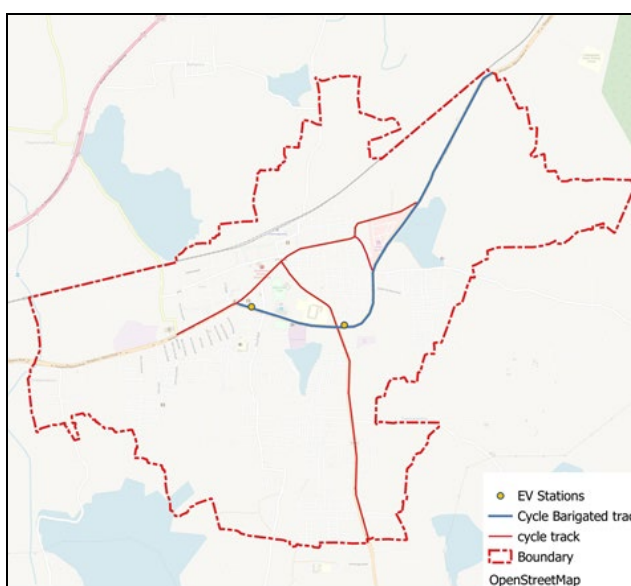


Fig 13: Proposal of Bicycle track, Author Compiled.

Proposal to develop a dedicated bicycle track, enhancing vegetation that promotes safe, efficient, and sustainable cycling as a primary mode of transport in the region of

Channapatna. The proposal focusses on potential routes and traffic patterns by understanding the routs to propose the bicycle tracks & develop the vegetation.

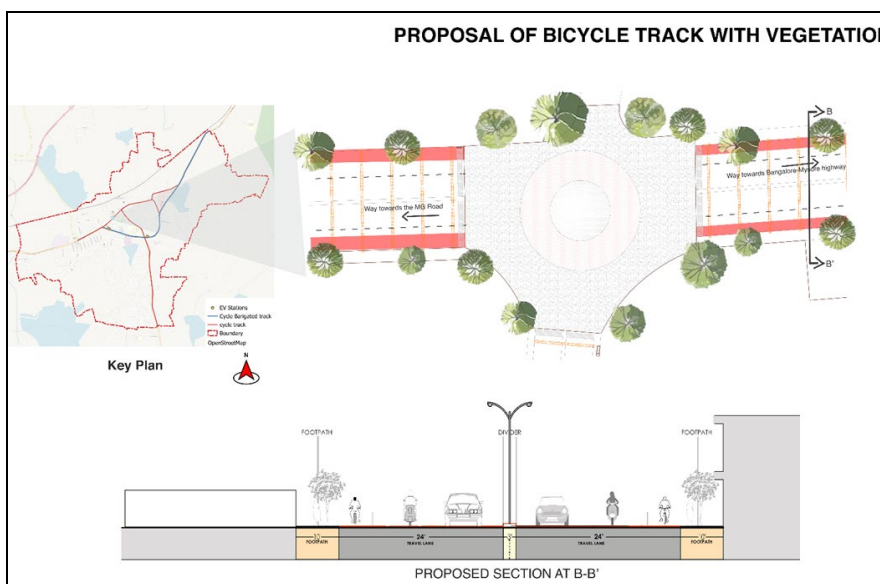


Fig 14: Plan & Section of Proposed Bicycle track, Author Compiled

The proposal of bicycle track is done by considering accessibility of the users, where the 1st phase is connecting the inner regions of the town of total length 3.85 sqkm & the 2nd phase is connecting the state highway of the town which covers a length of 3.4 sqkm. The 1st phase of proposal focuses just by indicating the bicycle lane through highlighting the cycle track with a color representation for the surface since the road width of one lane is 24 feet and the 2nd phase being a State Highway dividing the city into 2 parts, where the safety is considered for the cycle lane by providing Boulders.

This promote in sustainable transportation and reduce the reliance on motorized vehicles to decrease carbon emissions, encouraging physical activity among residents through safe and accessible cycling infrastructure. Installation of proper signage, road markings, and lighting for better visibility and navigation and develop bicycle parking stations at strategic locations.



Fig 15: Conceptual ideas of Hubli Smart City Proposal, Author Compiled.

Separating cyclists from motor vehicles, reducing accidents and enhancing safety for all road users. Requires less space than roads for cars, optimizing urban land use. Reduces personal transportation costs, including fuel and parking expenses.

Implementation of PPP Model

The People, Process & Place (PPP) Model is a helpful framework for evaluating and designing green spaces that helps in good health of the community. This model (PPP) focuses on understanding the different groups who will use the green space. Each community has unique demographics, lifestyles, and preferences that should guide the design and management of green spaces. By focusing on these three interconnected aspects which help in planning by create inclusive, functional, and sustainable green spaces.

- Encouraging to develop green infrastructure, including community gardens, parks, and green belts, to improve vegetation coverage and air quality and establish comprehensive waste management systems to facilitate segregation, recycling, and composting by preventing open burning. Promoting sustainable agriculture & vegetation by adopting zero-tillage techniques, organic inputs, and diverse cropping systems to preserve land quality.
- Ensure that green spaces are incorporated into all urban planning initiatives by encourage environmentally conscious behavior among citizens, such as carpooling, composting, and rooftop gardening and offering financial rewards like subsidies or tax cuts for actions that support

sustainability, such as solar installations and maintaining local green areas.

- Collaborate with local businesses to organize tree-planting initiatives, air quality improvement efforts, and awareness-raising campaigns and encouraging companies to support environmental causes through their Corporate Social Responsibility (CSR) programs. Working together with local government bodies to develop and enforce environmental policies that align with national objectives and connecting with NGOs, schools, and private enterprises to secure funding and implement on environmental projects.

Conclusion

Along with the growth of the town, it is important to provide and develop Open Public spaces, which becomes the potential of good urban quality, and support the cultural, heritage and ecology of the region. The diminishing Open public spaces due to the unplanned development of the region which is used by the people with upcoming built structure and is making the town lose it basic essence on quality of life. Therefore, there is a lot of scope for enhancing and establishing planned Urban Green Spaces with public space with respect to the URDPFI guidelines for the open spaces and implementing (PPP) Model by creating awareness to the public with respect to the green spaces, sustainability living, green streets, green roofs etc. and considering the accessibility of the users to these green spaces.

Acknowledgement

This paper originated as a Study Paper prepared under the auspice of the Curriculum for Master's in urban design. I consider this as an opportunity to express my sincere and absolute gratitude to my guide Dr. Yashaswini S, Assistant Professor, Faculty of Architecture, School of Planning and Architecture, University of Mysore, Manasagangotri, Mysore. Without her guidance, encouragement, and persistent support this research work would not have been successfully completed.

References

1. Hall P. Cities of tomorrow: An intellectual history of urban planning and design in the twentieth century. Oxford: Blackwell Publishing, 2002.
2. Government of India. Urban Greening Guidelines. Report, Ministry of Urban Development, 2014.
3. M. Luck and J.G. Wu, "A gradient analysis of urban landscape pattern: A case study from the Phoenix metropolitan region, Arizona, USA" in Landscape Ecology. 2002; 17(4):327-339.
4. Madanipour A. Urban Design: Space and society. England: Palgrave Macmillan, 2014.
5. Yashaswini S, Shankar B. Significance of Urban Green Space Network for Mysore City, *Journal of Positive School Psychology*, 2022.
6. Carmona M. Contemporary public space: Critique and classification, part one: Critique. *Journal of Urban Design*. 2010; 15(1):123-148.
7. M. Neunen, T. Sievanen, T. Susan and K. Terhi. "Access to green Areas and the frequency of Visits: A Case Study in Helsinki," Elsevier: Urban Forestry and Urban Greening. 2007; 6(4):235-247
8. Jo Barton and Mike Rogerson, The Importance of Green Space for Mental Health BJPsych Int. 2017; 14(4):79-81.