

RIVER-SENSITIVE MASTER PLAN FOR PERIYAR RIVER IN KOTHAMANGALAM TALUK

Feba James¹, Sherin P.V²,

¹M. Plan Student, Dept of Arch, Govt College of Engineering Thrissur, Kerala, India

²Asst Professor, Dept of Arch, Govt College of Engineering Thrissur Kerala, India

Abstract – The paper aims to develop a river-sensitive master plan for the integrated development of the Periyar River region in Kothamangalam Taluk. To achieve this, the thesis identified the potential of the Periyar River for development while also considering challenges related to the river. By analyzing relevant case studies and literature, the paper establishes key parameters for river-sensitive urban planning. These parameters are used to define the study area influenced by the Periyar River. Finally, spatial planning strategies are formulated to achieve the integrated sustainable development of the region, considering the concepts of river-sensitive urban planning.

Key Words: River-sensitive, Spatial Planning

1. INTRODUCTION

The Periyar River, stretching roughly 244 kilometres, is the lifeline of central Kerala. This vital waterway not only shapes the region's socioeconomic and ecological well-being, but also provides essential resources like hydropower, drinking water, irrigation, and habitat for diverse plant and animal life. From supporting industries and tourism to acting as a source of natural materials and fisheries, the Periyar River is an integral part of Kerala's cultural and ecological heritage.

1.1 Aim and Objectives

This Paper aims to create a river-sensitive master plan for the development of the Periyar River region in Kothamangalam taluk. To achieve this, it will delve into the concept of river-centric urban planning through case studies. This analysis will help identify key parameters for incorporating river health and functionality into development strategies. Following this, the project will define the study area based on the Periyar River's influence.

Within this zone, a comprehensive analysis will be conducted to identify both the potential and the existing issues related to the chosen parameters. Finally, based on this information, the project will formulate spatial planning strategies that promote integrated and river-centric development for the Periyar River region in Kothamangalam taluk.

1.2 Scope and Limitations

The topic scope targets identifying the potential of the Periyar River for development in Kothamangalam taluk, while also acknowledging existing river-related challenges. This will inform the creation of a plan that integrates the river into the region's future growth. It's important to acknowledge that the ideal study area would be larger, but for practical reasons, this project will focus on the river basin within Kothamangalam taluk, defined using specific criteria. Additionally, the project will concentrate on spatial planning aspects that consider the river's health and functionality. The potential and issues within this defined area will be quantified through household surveys, and the resulting proposals will be based on this primary data collection

2. CONCEPT OF RIVER SENSITIVE URBAN PLANNING

River-sensitive urban planning is a strategic approach to city development that prioritizes the health and functionality of rivers within the urban landscape. This concept emphasizes two key aspects: The first is to clarify the ambition of the city in this regard, by setting out a broad vision of how the city views its connection with the river, within the plan period. The second is to create a robust knowledge and information baseline of the river and its interaction with the city, which will help inform river-specific strategies. After creating this supporting environment, the Master Plan instruments and tools can be used to mainstream sustainable river health management into the city's larger long-term vision

2.1 Planning Tools for River Management

This section elaborates on seven such tools and instruments that can be used to ensure river-sensitive development within a city.

- 1. Localising National Policies and Initiatives:** The national or state policies having direct implications on river management, need to be localized
- 2. Town-Specific Sectoral: Strategies:** Area and issue-specific strategies shall be developed, to suit the local needs, for customized implementation of policies

3. **Land use assignment:** After delineating land use and use zone categories, defining permissible activities and allocation of land becomes essential to ensure systematic planning and management of the river zone
4. **Development Control Regulations:** Specific building bye-laws, architectural controls, and development controls should be framed and adopted for river zone
5. **Norms and standards:** Standardised specifications and norms should be adopted within the river zone to facilitate consistent, restricted and regulated development within the river zone
6. **Recommendations and directions:** these could be provided to different agencies for specific action taken for river management
7. **Special projects:** Special projects focused on river-sensitive development should be identified as model projects.

Kuttampuzha Gram Panchayat, the largest among the four, spans 44,805 hectares with a population of 24,799 distributed across 16 wards. Notably, it has a higher male population and a literacy rate of 89.4%, with a significant Scheduled Tribe presence of 4,262 and 1,995 Scheduled Caste members. Surrounding it are various Taluks and districts. Keerampara GP, covering 3,279 hectares, hosts 12,258 residents across 13 wards, with a literacy rate of 84.30% and a smaller but notable Scheduled Caste and Tribe representation. Pindimana GP, spanning 2,179 hectares, accommodates 12,516 inhabitants distributed over 13 wards, boasting a remarkably high literacy rate of 97.5% and also a presence of Scheduled Caste and Tribe communities.

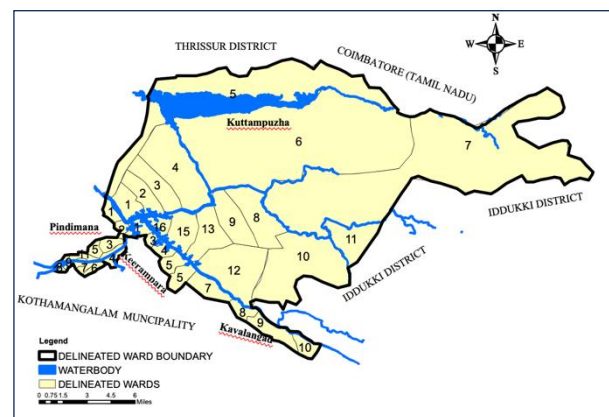


Fig -2: Map of Delineated study area

Kavalangad GP, over 6,320 hectares, houses 33,394 residents across 18 wards, with a literacy rate of 90.79%, and, like the others, includes Scheduled Tribe and Caste communities within its boundaries.

3.1 JUSTIFICATION FOR PARAMETER

The vulnerability assessment of the Periyar River basin highlights four key parameters. Firstly, the region faces significant flood hazards due to its hilly terrain and susceptibility to landslides, placing it within a high to medium flood hazard zone. Secondly, river pollution is a major concern, with 70% of industrial wastewater directly discharged into the river by 16 nearby industries, necessitating urgent action to protect the river ecosystem's health. Thirdly, land use plays a crucial role, with impervious surfaces exacerbating surface runoff and flooding downstream, while natural vegetation helps mitigate flood risks and maintain habitat connectivity. Finally, the Periyar River basin boasts a rich ecological diversity, including the renowned Thattekad Bird Sanctuary, making river ecology a vital parameter for identifying areas requiring specific protection measures to ensure the long-term sustainability of the ecosystem and its biodiversity.

3. DELINEATION OF STUDY AREA

The focus of the study lies on the Periyar River basin in Kerala, particularly in Ernakulam district, which serves as the state's commercial hub and boasts a high population density. Within Ernakulam, Kothamangalam Taluk has been selected for in-depth analysis due to its proximity to the river and its importance as a tourist destination. Four panchayats sharing boundaries with the Periyar River were chosen, totaling 37 wards. The study's parameters, derived from thorough analysis, include river flooding, land use, pollutants, and ecology. A 36 km stretch of the Periyar River, from Nerimangalam to Pindimana within Kothamangalam taluk, is the focal area, aiming to address issues such as flood risk, sustainable development, pollution sources, and ecological preservation.

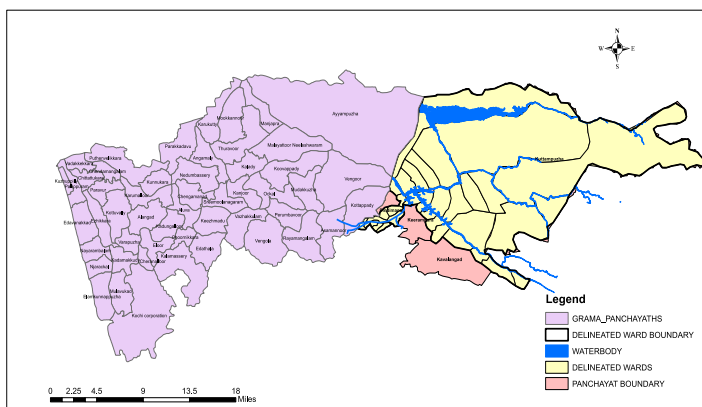


Fig -1: Map of Kothamangalam Taluk

4. POTENTIALS AND ISSUES

The study area presents a myriad of potentials and issues across different dimensions. In terms of flood and landslide risks, the region exhibits medium to high susceptibility, posing threats of property damage and loss of life, exacerbated by sediment buildup during floods and ecological disturbances caused by cyclic flooding and draining of plains. River pollution is a critical concern due to corroded pipelines and direct discharge of industrial wastewater, leading to water quality issues highlighted by the Kerala State Pollution Control Board. However, the area boasts a rich ecological habitat, including diverse vegetation and the renowned Thattekkad Bird Sanctuary, presenting opportunities for biodiversity conservation and eco-tourism activities. In planning for the region's development, domestic water supply faces challenges such as the absence of proper treatment plants and high fecal coliform bacteria content, while irrigation systems suffer from encroachment, canal lining damage, and blocked drainage, necessitating upgrades for reliable water delivery. Additionally, the potential for hydropower generation and eco-tourism is hindered by poor infrastructure and a lack of initiative from relevant departments, exemplified by the underutilization of existing facilities like boat jetties. Addressing these issues while capitalizing on the area's potential is crucial for sustainable development and environmental preservation.

4.1 MONITORING INDICATORS

The analysis of issues in the study area has led to the identification of eight monitoring indicators, collectively forming the River Sensitive Management (RSM) index, crucial for developing strategies to enhance river management. The RSM index, measured on a scale from one to five, indicates the level of river management. With an RSM index of 2.16, falling within the range of 1.6 to 2.5, the area demonstrates an elementary level of river management. Basic actions for floodplain management, riparian buffer, eco-friendly riverfront, and citizen sensitization are present. However, there are notable gaps and concerns in almost all aspects of river management, suggesting a need for further interventions to address critical issues such as floodplain management, eco-friendly riverfront development, and citizen sensitization. This elementary level underscores the necessity for comprehensive measures to elevate river management practices in the study area to ensure sustainable and effective management of river resources.

5. STRATEGIES

Issue 1: Pollution in rivers and drains: The study area faces significant challenges related to pollution in rivers and drains, necessitating a comprehensive approach to address these issues. Localizing national policies and initiatives, such as the National Water Policy of 2012, is essential, emphasizing the prevention of water pollution and

the implementation of stringent punitive actions against polluters. Town-specific sectoral strategies are crucial, including connecting industries to Common Effluent Treatment Plants (CETPs), upgrading corroded sewer pipelines, and incentivizing organic farming. Moreover, the establishment of composting pits in households and cleaning programs for aqueducts are imperative for sustainable waste management and safe drinking water. Land use assignment plays a vital role, with zoning regulations dividing activities into prohibited, permissible, and regulated categories, while development control regulations prescribe setback distances from rivers and drains. Strict effluent discharge standards for Sewage Treatment Plants (STPs) are necessary to ensure compliance with national water quality standards. Additionally, recommendations for inspections and enforcement actions on industries, along with special projects like centralized waste treatment plants, are essential steps towards mitigating pollution and promoting environmental sustainability in the study area.

Issue 2: Flood And Landslide Susceptibility: Addressing the susceptibility to floods and landslides in the study area requires a multifaceted strategy. Localizing national policies like the National Disaster Management Guidelines 2008 is crucial, advocating for floodplain zoning regulations to mitigate risks. Town-specific sectoral strategies entail developing an emergency preparedness plan tailored to the area's needs. Land use zoning categorizes zones into high, medium, and low-risk areas, prohibiting new construction in high-risk zones and mandating flood risk assessments in medium-risk areas. Recommendations include establishing a flood warning system using data from the Bhothathankettu dam and constructing embankments in high-risk zones like Kuttampuzha GP. Additionally, special projects aim to convert flood plains into natural wetlands and recreational areas, fostering resilience against flooding while enhancing environmental sustainability and community well-being.

Issue 3: Weak Tourism Development: To address the weak tourism development in the study area, a comprehensive strategy is essential. Localizing national policies such as the National Tourism Policy of 2002 is pivotal, emphasizing the enhancement of tourism circuits and preservation of historical and ecological sites. Town-specific sectoral strategies focus on promoting tourism activities like nature trails along the Periyar River, adventure sports, and guided tours. Land use assignment divides zones into categories for tourism development, heritage preservation, and ecological conservation, with clear zoning regulations implemented to ensure sustainable growth. Norms and standards are established for tourist facilities to maintain sustainability and aesthetics. Recommendations include developing tourism-related infrastructure and promoting the area through social media and tourism publications. Special projects aim to revitalize existing areas like the jungle park and Adiydoi Oxygen and Biodiversity Park, while also redeveloping the Nerimanagalam boat jetty to enhance

accessibility and recreational opportunities, ultimately fostering robust tourism development and economic growth in the study area.

6. CONCLUSION

In conclusion, the Periyar River basin in Kothamangalam Taluk faces multifaceted challenges requiring urgent attention and strategic intervention for river-sensitive urban planning. Pollution stemming from industrial, agricultural, and domestic sources, compounded by sand mining activities, has severely degraded the river's water quality and ecosystem health. This not only jeopardizes the livelihoods of communities dependent on the river but also poses risks to public health, particularly in regions downstream, including Alappuzha and Kollam districts connected through the Vembanad Lake. Effective regulation and enforcement mechanisms are imperative to mitigate pollution at its source and safeguard the ecological integrity of the river and its interconnected water bodies, such as the Vembanad Lake, designated as a Ramsar site.

Additionally, the basin's vulnerability to frequent disasters, including floods and landslides, underscores the need for robust disaster management strategies, encompassing floodplain zoning, improved drainage systems, and green infrastructure development. Leveraging the untapped potential for river tourism and hydropower generation presents opportunities for sustainable economic development while enhancing the region's resilience and ecological sustainability. Hence, a comprehensive approach integrating environmental conservation, disaster risk reduction, and socio-economic development is paramount for river-sensitive urban planning in the Kothamangalam Taluk-Periyar River basin, ensuring a harmonious coexistence between human activities and the natural environment for generations to come.

REFERENCES

- [1] D. Kornack and P. Rakic, "Cell Proliferation without Neurogenesis in Adult Primate Neocortex," *Science*, vol. 294, Dec. 2001, pp. 2127-2130, doi:10.1126/science.1065467.
- [2] M. Young, *The Technical Writer's Handbook*. Mill Valley, CA: University Science, 1989.
- [3] R. Nicole, "Title of paper with only first word capitalized," *J. Name Stand. Abbrev.*, in press.
- [4] K. Elissa, "Title of paper if known," unpublished.