



EXPLORING THE DEVELOPMENT POTENTIAL FOR BEACHFRONT

A Case of Kanniyakumari Town , Tamil Nadu, India

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Abstract: Kanniyakumari, a peninsular settlement has significance as the extreme southern tip of India and the converging point of three oceans (Arabian sea, Indian Ocean, and Bay of Bengal and in the west, south, and east). The mainland of India has a coastline length of 5422.6Km and Kanniyakumari district comprises 71.5Km length of coastline on three sides. Kanniyakumari is a significant tourist destination, with the scenic beauty of the sea being the most remarkable. The presence of prehistoric culture is apparent from a discovered Neolithic Celt dated back to 1500 to 1000 B.C. The district has a linguistic blend of Travancore province and Tamil Nadu. Kanniyakumari Town has a population of 22453 and a density of 4573 people per sq. km. Millions of tourists visit the place every year, with an average number of visitors of 25000 to 50000 per day, but the existing development happened in an unplanned manner. Significant structures such as Vivekananda rock, Tiruvalluva statue, Bhagavathi Amman Temple(more than 2000 years), Old Lady of Ransom Church (1914), Kamarajar memorial, and Mahatma Gandhi Mandapam gave rise to unplanned allied service infrastructures. The native people were inherently from the fishermen's community, and the Temple and Church's presence was the settlement's base. Till 1956, the region was under Travancore province and then became part of Tamil Nadu which was the current demarcated Kanniyakumari District. The study aims to understand the site context and the problems associated with the unplanned development of the site. The development potentials are explored based on site surveys, exploratory research, and critical analysis.

IndexTerms - Waterfront, Beachfront, Tourism, Fishing, Heritage, Coastal, Sector-Wise Activities.

I INTRODUCTION

The research has considered the definition of the waterfront as “the area of unification of water and land” (Hou,2009). Various authors have outlined the Waterfront as “the urban area in direct contact with water” (Moretti, 2008), “the segment of the town next to water” (oxford dictionary), “the region of interaction between water and urban development” (Yassin et al., 2010). The Beachfront is the segment of the town facing the beach (Oxford Advanced Learner's Dictionary). Tourism is the interim shift of people from their regular location of stay and works to destinations outside (Wanhill, 1988). Tourism on the beachfront was key in developing various countries (Kumar, 2007). In addition to industrialized uses like industrial ports, the waterfront also focuses on tourism and recreational aspects. Coastal tourism is the approach of engaging tourists, the people, and the locations they visit. Specifically, coastal tourism is the tourism generated in the coastal surroundings annexed with natural and cultural resources (Miller and Hardey, 2005). India has the longest coastline in the east (Prabu, 2021). Heritage tourism sites promote tourism activities and culture(Szromek, 2022). Heritage tourism is vivid (UNESCO, 2021), and the destinations with natural, historical, and cultural values are focused (Bonn et al., 2007).

The coastline stretch of India is 5422.6 Km, with Tamil Nadu as one of the nine coastal states (Josh, 2021). Tamil Nadu consists of 13 coastal districts, and Kanniyakumari is one among them. Coastal destinations such as Chennai, Mamallapuram, and Kanniyakumari are known for their sandy beaches. Kanniyakumari is one of the major beach tourist destinations (State Of Environment Report For Tamil Nadu, 2017). Kanniyakumari is the southernmost and smallest district of Tamil Nadu, with an expanded coastal line on three sides 71.5 km. The district is small in area but has a higher density (1119/Sq.Km) next to Chennai. Kanniyakumari occupies a special place as it is the only place in the world to view both sunrise and sunset at the convergence of three oceans (Census of India, 2011). As per the 1991 notification below Environment Protection Act, the coastal land upto 500m from the High Tide Line(HTL) towards the landward side are categorized into four categories (Anna University, n.d). The Coastal Regulation Zone(CRZ) II, as per the Kanyakumari - Draft Czmp Maps 2019 in Kanniyakumari Town, is considered as the delineated study area (figure 2). The location of the study area is mentioned in figure 1, and the delineated study area is mentioned in figure 2. The study area comes under Kanniyakumari Special Grade Town panchayat. For administration, the villages or towns in India is further subdivided into many ‘wards’ (Census of India, 2011). Kanniyakumari Special Grade Town Panchayat has 18 wards in it.

Five different zones are identified (figure 2) from the delineated study area based on their characteristics, such as the leisure zone, boating zone, religious harmony zone, and harbor zone (figure 3).



Figure 1a: Country - India



Figure 1b: State



Figure 1c: District

Figure 1: Location of Kanniyakumari Beachfront

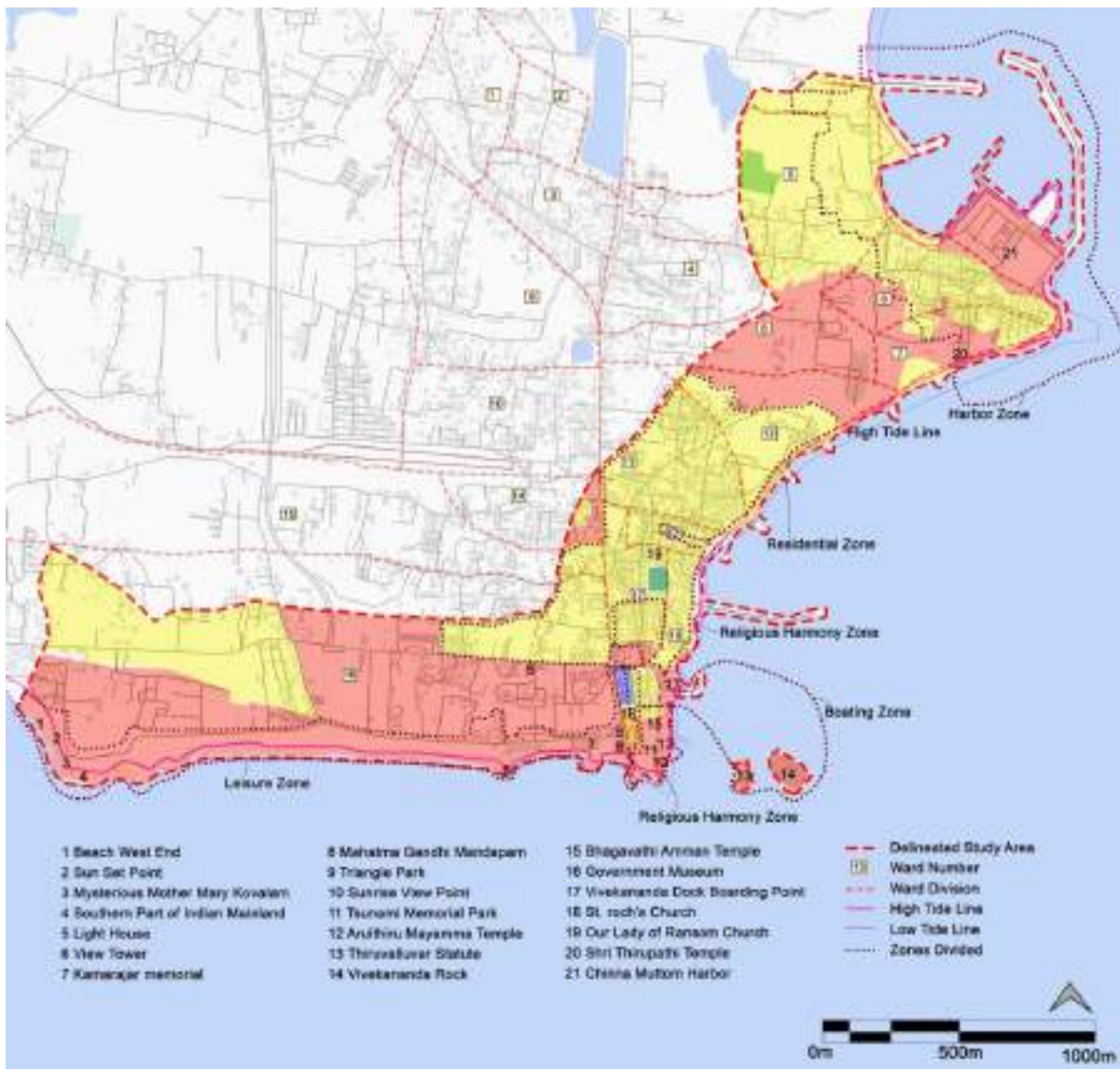


Figure 2: Delineated Study Area



Figure 3a: Leisure Zone (under ward 16)



Figure 3b: Boating Zone (under ward 17 and 18)



Figure 3c: Religious Harmony Zone
(under ward 13,17 and 18)



Figure 3d: Residential Zone
(under ward 11,12, 13, 15, 16, 17, and 19)



Figure 3e: Harbor Zone
(under ward 05,06 and 07)

Figure 3c: Five Zones Divided in the delineated Study Area (Not to Scale)

II. NEED OF THE STUDY

In the study area, a floating population more than the town's permanent population is observed. Kanniyakumari special grade town panchayat occupies only 0.003% of the area of the district. Despite various significant places and millions of tourists, there exists an infrastructure gap in the region. On average, 25000 to 50000 visit the region, but the infrastructure is not meant for the footfall in the region. The primary purpose is to understand the study area regarding different occupation sector-wise activities and identify the infrastructure and potential development gap. Studies have been conducted on various aspects such as landuse/landcover changes, land surface temperature across the Kanniyakumari district, evaluation of metals and trace elements and mapping of coastal landforms and volumetric changes, hydrological studies and marine litters along Kanyakumari beach (Perumal, Thamarai and Elango, 2010; Kaliraj, Chandrasekar and Ramachandran, 2017; Sundar et al, 2021; Sam and Balasubramanian, 2022; Perumal and Muthuramalingam, 2023). There is a need to identify the infrastructure gap. Understanding different sector-wise activities will help analyze the study area based on different occupation sectors. The sectors and the sector's activities play a major or minor role in the area of investigation. The sector-wise investigation and ranking of the study area lead to identifying the development potential in Kanniyakumari town.

Kanniyakumari district possesses multiple tourist spots, distinguished as spaces for historical, heritage, religious, medical, nature (waterfalls, bird watching, wildlife sanctuaries) tourism, and man-made attractions. Four fishing harbors are located in Kanniyakumari, namely Chinna Mttom, Muttom, Cholachel, and Thengapattinam (Kanyakumari District Handbook). It is a place where people from various regions of the country visit. It is a place of many attractions, but the development happened in an unplanned manner.

2.1 Census/ Demographic Data

Table 1: Census data for 3 decades (Kanniyakumari Special Grade Town panchayat)
Source: Census of India, 1991, 2001, 2011; Kanyakumari District Statistical Handbook, 2022

Kanniyakumari Special Grade Town Panchayat					
Year	1991	2001	2011	Inference	Remarks
Male	8682	9884	11272	A gradual increase in population	No major factor influencing population growth.
Female	8543	9855	11181		
Total	17225	19739	22453		
Growth rate	12.43	10	11.6	Increase in growth rate	
Sex ratio (No.of females/1000 males)	991	1014	1019	The female population is almost equitable to male population	People settle in the same locality for generations.
Area (sq. km)	4.91	4.91	4.91	The boundary has not changed	
Density(population per sq. km)	3508	4020	4573	Density has increased	
No. of household	3476	4236	6629	The number of households has reduced	

Table 2: Ward wise population data and number of households (Kanniyakumari Special Grade Town panchayat)
Source: Kanniyakumari District Special Grade Town Panchayat office, Census of India 2011

Ward Number	Prominent street/ road	Population	No. of Households
1	National Highway 66	1316	389
2	Swaminathapuram Road	1304	385
3	National Highway 66	1294	382
4	Anjugramam Road	1267	347
5	Chinna Muttom Main Road	1243	367
6	Chinna Muttom Main Road	1136	336
7	Church Street	996	294
8	Lurthu Matha Street	1233	364
9	South Kundal Road	1355	400
10	Kanniyakumari Station Road	1361	402
11	Church Road	1202	356
12	Periya Nyagi Street	1409	416
13	Raja Sangeetha Street	1131	334
14	Anchukootuvilai Road	1348	398
15	Pillar Hospital Road	1311	387
16	Beach Road and Kovalam Road	1283	373
17	Beach road	1136	336
18	Vivekananda Dock Road	1145	338
Total	Kanniyakumari Special Grade Town Panchayat	22453	6629

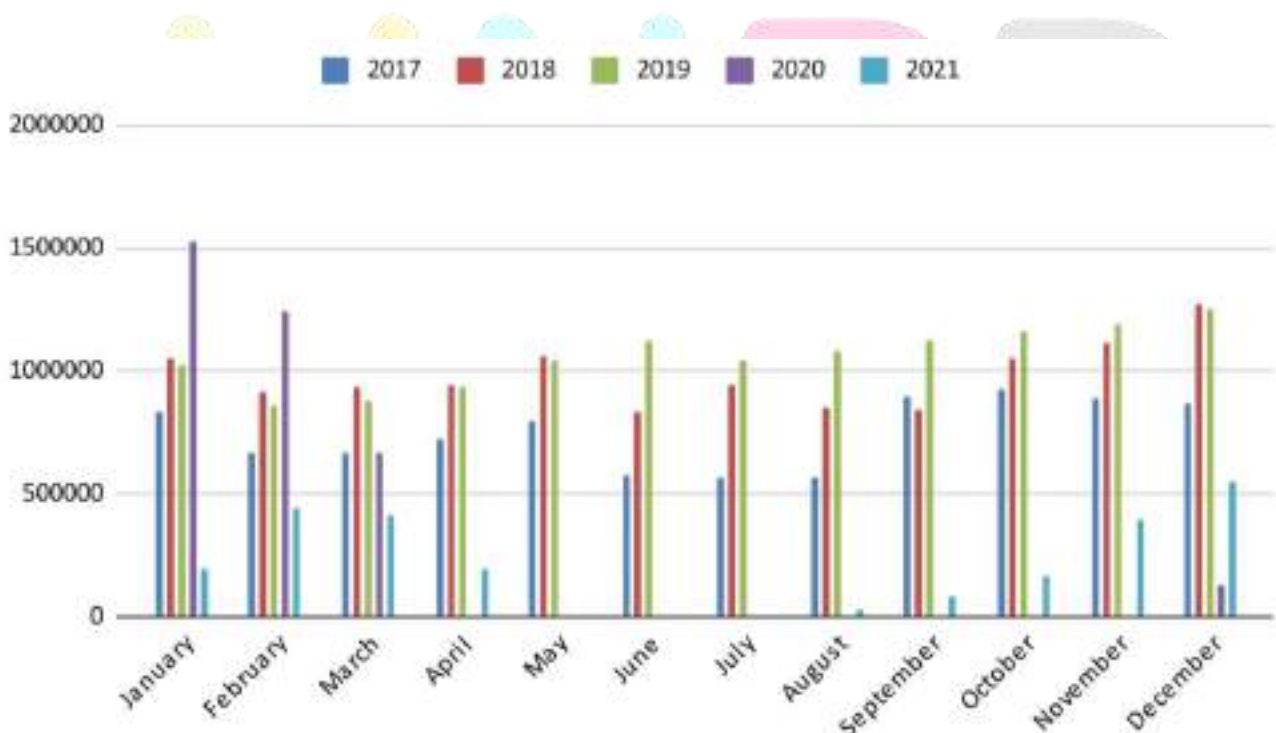


Figure 4: Tourist Population

Source: Tourist Information Centre, Kanniyakumari

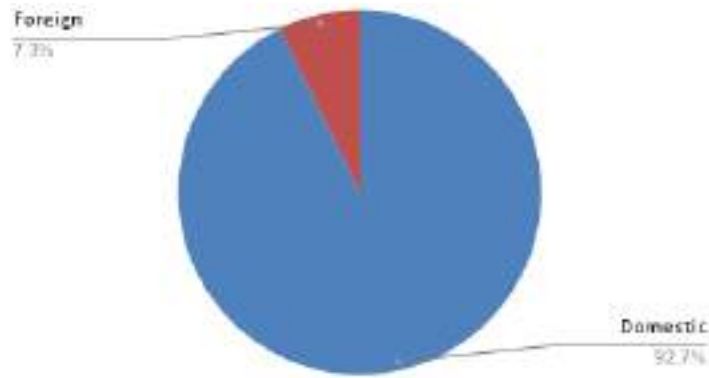




Figure 5: Distribution of Indian and Foreign Tourist Population







Source: Tourist Information Centre, Kanniyakumari



There is almost an equivalent female for the number of males. The boundary demarcated for Kanniyakumari town has not been changed for the past three decades, but the density in the locality has increased. Kanniyakumari has significant locations which attract tourists, mostly from various parts of our country. The Bhagavathi Amman Temple was the oldest structure in the locality. The structure was considered to be the base of the settlement. Though the church was constructed in 1914, Catholics resided in the region for centuries. St. Francis Xavier encountered ‘Our Lady of Delights Grotto’ at Kanniyakumari when he visited Kanniyakumari in 1542, which was believed to be developed as the Old Lady of Ransom Church (Catholic Online, n.d). Both Hindus and Christians have resided in the region, and there existed an inter-cultural significant relationship for years. The population data mentioned in Figures 4 and 5 is the population data of the number of tourists visiting Vivekananda Rock and Tiruvalluvar state, as it is the major attraction in the region. The maximum population is recorded during 2020 with a monthly population of 1532012. The minimum population shown in the graph is during the covid period when access to the region is restricted. The average monthly population for the year 2021 is 2,58,037. Considering the native population and migrant population, the number of the migrant population is more. More than 90% of the population is from India (figure 5). From the Tamil month of Katthigai to the Pongal festival, the Sabarimala Ayyappa devotee gather on Kanniyakumari beach, which is the second major tourist season of the year (Tamil Samayam,11 Dec, 2022). People visit the place mostly during the summer and winter holidays for children.

2.2 Existing Structures

Table 3: Various places in the study area

Name	Year	Significance	Images	Remarks
The numbers referred to in brackets are() mentioned in figure 2				
Significant Places				
Sunrise point (10)	-	Sunrise can be seen. Moonrise can be seen during a full moon day (census 1991). Physically beach can be experienced.		The space triggers activity in the region from 5.00 AM. Shaded seatings can be provided on the shore to provide a better experience of the place during the day..
Sunset Point (2)		Sunset can be seen, and sunset and moon rise can be rarely seen. physical beach experience		Acts as a point of concluding the place of visit of the day. Food joints or vending zones can be introduced.
Triveni Sangamam		The meeting point of three oceans. Physical access to the beach		A place to physically and visually experience the three oceans.
Significant Structures				

Bhagavathi Amman Temple (15)	More than 2000 Years	Temple dedicated to Goddess Bhaghawati Amman. The temple is specified in the proficient epics Ramayana, Mahabharata as well as Sangam Literature (Sandy and Vyjay, 2022).		The temple structure can be conserved.
Old Lady of Ransom Church (19)	1914	St.Mary's Church. The location was believed to be where St. Francis Xavier spotted 'Our Lady of Delights Grotto' (Catholic Online, n.d) in 1542. The church was constructed in the Gothic Architecture Style		The church can be better integrated with the beach.
Mahatma Gandhi Mandapam (8)	1956	It is a memorial to the Father of the Nation. An urn of Mahatma Gandhi was kept here. The building's architecture permits sun rays to fall on the Urn on Mahatma Gandhi's birthday on October 2nd		The memories of Gandhi can be narrated impressively. Extension of existing infrastructure is advisable.
Vivekananda Rock Memorial (14)	1970	Memorial of Swami Vivekananda to Commemorate his visit to Sripada Parai in 1892		The access to the island can be made better.
Kamarajar Memorial (7)	1978	Memorial for the past Chief Minister of Tamil Nadu, Perunthalaivar Kamarajar		The history of Perunthalaivar Kamarajar can be depicted impressively.
Tiruvalluvar statue (13)	1999	The memorial statue of Thiruvalluvar, an immortal poet of Tamil Nadu who has given the world Thirukkural.		Some means of connectivity can be introduced between Vivekananda Rock Memorial and Thiruvalluvar Statue.

Chinna Muttom harbor	1985	Main fishing harbor in the district		The boats in the harbor can be upgraded to harness solar energy.
Shri Tirupathi Temple	2019	The temple was designed to imitate the Tirupathi Venkateswara Temple, Andhra Pradesh. The architecture made sunlight fall on the idol's food on Vishnu's occasion.		The temple can be integrated with the beach.
Other attractions				
Government Museum, Lemurian Park, View Tower, Lighthouse, Tsunami memorial park, Arulythiru Mayamma Temple, Mysterious Mother Mary Kovalam, Triangle park, St. Roch's Church, and other open spaces and shops.			The individual attractions can interconnect by introducing uniformity in the connecting path.	
Amenities				
Bus Stand	-	This bus stand is not the major bus stand in the district	The bus stand is not maintained and has high scope for improvement	
Railway Station	1979	Located at a distance of 1 km from kanniyakumari beach	The station has a proposal to receive a world-class upgrade	
Source: Department of Tourism, Government of Tamil Nadu.				

III. METHODOLOGY

The data is collected from primary as well as secondary sources. The secondary sources are research articles, government websites, and other online sources to understand the aspects of the waterfront. Primary data is collected from the site observation, random sampling survey, tourism office, town planning authority, and panchayat offices. The study will understand the site's history, existing coastal conditions, existing activities, and economic drivers and identify the key issues. It evaluates and analyses existing waterfront neighborhoods in terms of different occupational sector-wise activities. The sector-wise analysis will be done based on the Strength, Weakness, Opportunities, and Challenges (SWOC). The key issues will be identified. The development potential of the existing study area will be identified from the need of the area and the key issues. The methodological chart is mentioned in figure 6.

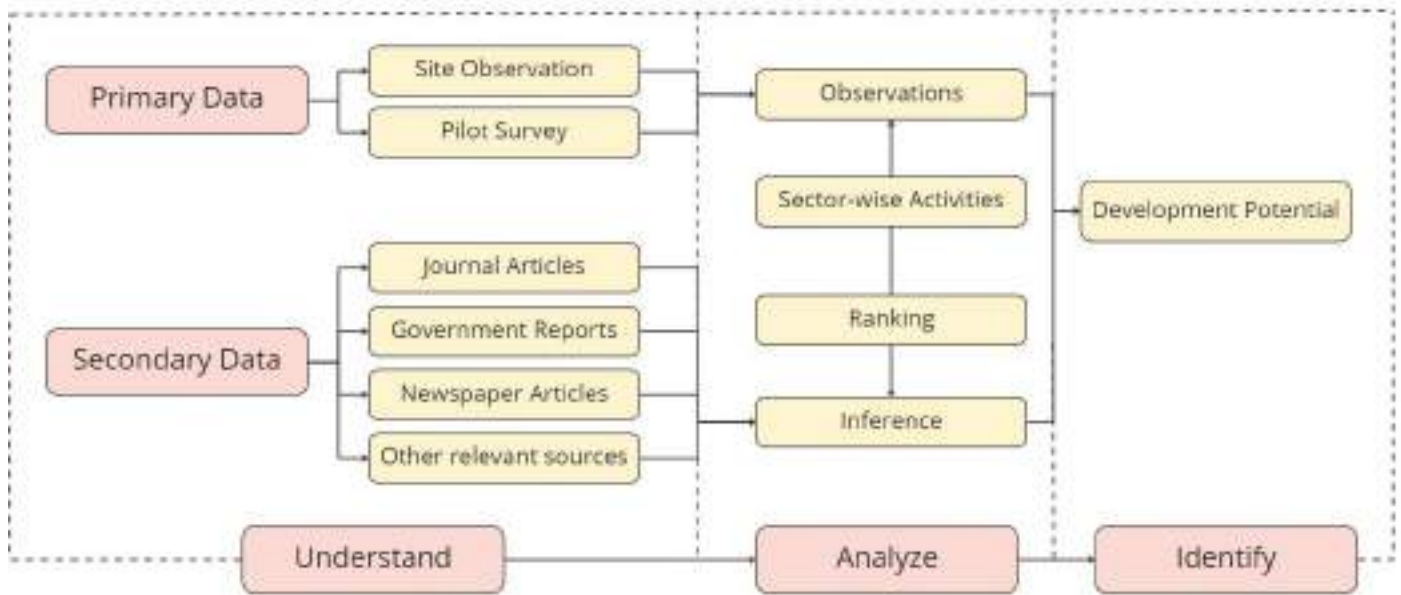


Figure 6: Methodology

IV. REVIEW OF LITERATURE





Variety of activities and uses have concerns along the waterfront (Ragheb and EL-Ashmawy, 2020). Worldwide tourism development has a considerable presence in coastal areas due to their natural attraction. Tourism development is a sustainable and non-extractive development that connects rural areas with the national economy. Tourism has a significant impact on social, cultural, environmental, political, and economic sectors. (Mille, 2022). Cities prefer a waterfront as a place with visual and physical access to water and the land. In addition, people also need a waterfront for multiple purposes, such as a place presenting aspects of quality of life such as social, cultural, and economic (Seattle Department of Planning and Design, 2012). The concept of eco-tourism is the journey to natural areas for their natural and cultural elegance and understanding of the history of the environment generating economic opportunities favorable to local people (Biju, 2004). Mass tourism is the involvement of a huge population in tourism. Mass tourism is critically a qualitative motion where the proportion of participating population or the activity’s volume is the base. Mass tourism delivers service entities where local people are the suppliers and tourists are the customers (Velmurugan, n.d). Local crafts and manufacturing are supported by tourism. Regional arts, traditional festivals, and events can be economically supported by tourism (Kumar, 2008). Globally commercial fishing reinforces coastal communities, and fishing livelihoods are intertwined with the local society, knowledge, economic culture, and society's identity (Snook, et al.). In the recent 2023-24 Indian Budget, ₹2400 crores have been apportioned to the Ministry of Tourism, which ₹1742 crore for infrastructure development and ₹242 crores for promotion and branding (TravelWorld.com). Swadesh Darshan Scheme is initiated by the Ministry of Tourism and Culture, Government of India in the central sector. The scheme focuses on an integrated growth of theme-based tourist circuits. In the 2023-24 budget, ₹1412 crores have been allotted.

4.1 Secondary Case Studies

The secondary case studies are considered based on a variety of activities on the beachfront. The different opportunities and the way in which distinct problems are unraveled are understood from the case studies. Two Indian Case studies are considered among the four case studies.

Table 4: Comparative analysis of the secondary case studies

Identified Case Studies	The Vishakapatnam Beachfront Development	Kakinada Beachfront Development	The Waterfront of Wan Chai North (Beachfront)	Barcelona waterfront (Beachfront)
Location	Visakhapatnam, Andhra Pradesh, India	Kakinada, Hope Island, Konaseema, India	Southern coast of China’s territory, Wan Chai North, Wan Chai District, Hong Kong	Barcelona, Spain
	A hazard resilient development and expansion of social, recreational, social and economic gain offered by the beach.	Aims to create a landmark destination that is a tourism anchor point and a recreational destination for the local community	Recommendations to redevelop Wan Chai North waterfront into a public place, and the recommendations are mainly in the form of a design proposal.	Infrastructure improvements can be the applications of promoting and benefiting Barcelona in the long run and to fetch a fashion vista

				
Proposed	The amenities involve a continuing cycle track, retaining wall, and homogeneous urban elements such as signage, street furniture, and harmonious construction material are introduced.	The Addition of allied infrastructure for an amusement park, aquamarine park, wax museum, hotels, retail, food outlets, and convention center furnishes urbanity to the beachfront.	Diaphragm Wall, Extension of Outfalls, Pier Protection of existing Bridges, Anchor Slab, Retaining Wall, Pumping Station, Staircases & Ramps, Ghats & Ramps, Interceptor Sewage & Junction Chamber.	The beachfront has Columbus Monument, La Rambla- the main pedestrian street, port vell, plaza, Rambla de Mar bridge, and a highway,
Inference	<p>The design is dynamic as retaining wall is doubled as seating space and promenades opening to stepped seating</p> <p>Physical and visual interface are considered.</p> <p>The design has a uniform language, and the existing biodiversity is preserved.</p> <p>The resilient design safeguards from future hazards.</p> <p>The existing places have been sustained, and new vibrant spaces are created</p>	<p>Visitors interact closely with</p> <p>Natural elements, aided by wandering pathways and boardwalks emphasized by breakpoints.</p> <p>The planning focussed on improving an unexplored natural region which leads to sustaining the ecological environment.</p> <p>Attracting magnets are created, and additional infrastructures required are provided based on the need</p> <p>A balance is created between the natural and man-made infrastructures</p>	<p>Design proposals have considered different aspects considering the connections of the attraction with the waterfront, accessibility, identity, and integration by considering the aspects of building typology and elevation, block size, view corridor, environmental quality, and management.</p> <p>Different aspects are considered, and the issues with various aspects are identified. The proposal for various aspects provides an overall solution</p> <p>Individual attractions are created, and connecting them provides a uniform design.</p>	<p>Pedestrian street with different activities enhances the vibrancy of the place by with its various activities.</p> <p>Monuments act as significant nodes and as meeting points. It gives identity to the space</p> <p>Plaza Different kinds of spaces are present.</p> <p>The development is individually done in small pockets on the beachfront.</p> <p>The bridge lacks safety due to a lack of handrails.</p> <p>Though the beach was artificial, it is well maintained, attracting many people</p>
Source	INI Design Studio	INI Design Studio	Shi, and Högskola, 2013	Iwamiya and Yeh, n.d

V DATA ON THE STUDY AREA

5.1 Beachfront of Kanniyakumari Town

The uniqueness of the place as the region of the confluence of the sea makes it the main anchor point. The physical infrastructures are developed radiating from these points toward the northern, western, and north-western directions. The three major points of attraction are the sunrise point, sunset point, and the point of confluence of the three seas.

Kanniyakumari district is dominantly agriculture-oriented and by its allied activities. The district is topographically split into Plain lands, Mountainous terrain, and an Undulating valley. Paddy, banana, coconut, and vegetables are grown in plain lands. Rubber, coconut, pepper, tea, coffee, gloves, spices, tapioca, and horticulture crops like mango, pineapple, and jackfruits are grown in the hilly tracks of western ghats. Paddy is grown broadly on 11461 (Gross) hectares. The major water canals are Pechiparai, Perunchani, Kodayar, Pattanamkal, and Neyyar

The economic structure is classified as primary (raw materials and transform into a product), secondary (produce an end product for consumption), and tertiary (service) sectors. The primary occupation along the coastal region is fishing. The selling of fishing in the region was done locally until the establishment of the Chinna Muttom Harbor. The fishermen used to return within a day in Kattumaram for fishing. Recently motor boats have been used for fishing for a day. Auctions happen twice daily, and local merchants buy and sell them in the markets in the district. Fishermen used ships for fishing and used to be in the sea for a month after establishing the harbor. Storage facilities are in the ship to store the fish for a month.

5.2 Occupation Sector-Wise Response

Table 5: Sector-wise response in the study area

Sectors of the Economy			Inference
Primary(raw material s)	Agriculture	Primarily, the occupation in the district is accustomed to agriculture in a total area of 79413 hectares. The study area does not have major agricultural land. The land classified under agricultural land has planned vegetation in it.	Though agriculture is the predominant occupation in the district the delineated study area is not predominantly agriculture oriented.
	Fishing	Fishing occupation is next to agriculture. Chinna muttom harbor is the main fishing harbor in the Kanniyakumari district. The ships parked in the harbor are with facilities for fishing for a duration of one month. The boats which are for fishing for a day are parked on the coastal edge of the beach. The Marine Fish production in the year 2021-22 in Kanniyakumari District is 8181140.00 tonne quantity and it is worth 169735.00 Lakhs.	The existing settlement has fishing as their major occupation.
Seconda ry (finished goods)	Manufacturing	Manufacturing of coirs, and fishing nets do not happen in the delineated study area but happen in other parts of Kanniyakumari District	As the delineated area is under CRZ II, it does not have a major manufacturing sector.
	Utilities- electricity, gas, and supply of water	The utilities are delivered from other areas to the study area	The area has the supply of service amenities.
Tertiary(service sector)	Tourism- Accommodatio n (hotels and lodges), local handicrafts, local vendors, travel agents, travel buses, restaurants, transportation,	No. of Private accommodation(hotels and lodges): 95 No. of other accommodation facilities: 6	Major accommodation in the region is private.
	Financial services	No.of Banks: 7	The area has banks within accessible distance.
	Service facilities	No.of public Toilets: 5 No.of pay and use the toilet: 4	Public toilets are located in the area, but the required number catering to the population is lacking.
	Hospitality and leisure	No.of Major attractions for tourists: 10 No.of parks: 7 No.of Temples: 5 No. of Churches:8 No. of Mosques: 2	People visit the region for the major tourist attractions. This triggers the development of allied amenities.
	Education	No. of Government/Government aided School: 7 No. of Private School: 7 No.of Anganwadi: 9	Schools and anganwadis are located in the region.
	Hospitals	No. of hospitals: 6	Government and private hospitals are present in the region.
	Public Sector	Number of Government Offices: 12	Various government offices are present.

Source: Compiled by the author with reference to the classification of sectors by Pettinger (2021) and data collected from Kanniyakumari District Statistical Handbook 2021, Kanniyakumari Town Panchayat office

5.3 Financial Data

Table 6: Income of Kanniyakumari Special Grade Town Panchayat (2022)

The annual income of the Panchayat	460.09 Lakhs	Remarks
Source	Annual Income	
Pay and Use Toilet	₹17.176 Lakhs	Rental income from the shops and property tax is the major income source for the panchayat. Income from pay and use toilet, food court and rent from shops under this panchayat is minimum. The data is graphically represented in figure 7.
Food Court	₹13 Lakhs	
Shops under Special Town Panchayat		
Commercial shops	₹4.503 lakhs	
Bunk Stalls	₹0.570 lakhs	
Restaurants	₹1.055 Lakhs	
Entry fees		
Tourist Bus(100)	₹67 Lakhs	
Tourist Van(75)		
Tourist car/taxi(50)		
Rent for shops	₹141.54 lakhs	
Tax		
Property tax	₹80 lakhs (half yearly)	
Income Tax	₹ 12.00 lakhs (half yearly)	
Drinking water	₹54.84 lakhs	

Source: Kanyakumari panchayat Office)

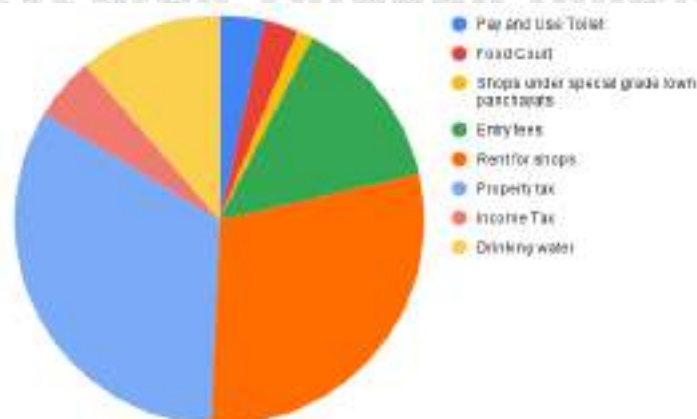


Figure 7: Income of Kanniyakumari Special Grade Town Panchayat (2022)

5.4 Data on Fishing

Table 7: Data on fishing for Kanniyakumari District (2022)

1. Area		
a	Coastal length	71.5Km
b	i. Inland Fresh Water Spread	5991HA
	ii. Estuaries and Brackish Water	05 Estauries ; 407Ha
c	Marine Fishing Villages	42

Source: (Distict Statistical Handbook, Kanniyakumari)

Table 8: Quantity and value of Fish production (2022)

S.no	Item	Quantity (in tonnes)	Value (in Lakh)
Fish Production (Marine)			
1	Marine, Fishes, Including Prawns and Cattle fish	8181140.00	169735.00
Fish Production (Inland)			
1	Inland, Fishes, Including Prawns and Cattle fish	7586.698	11380.054

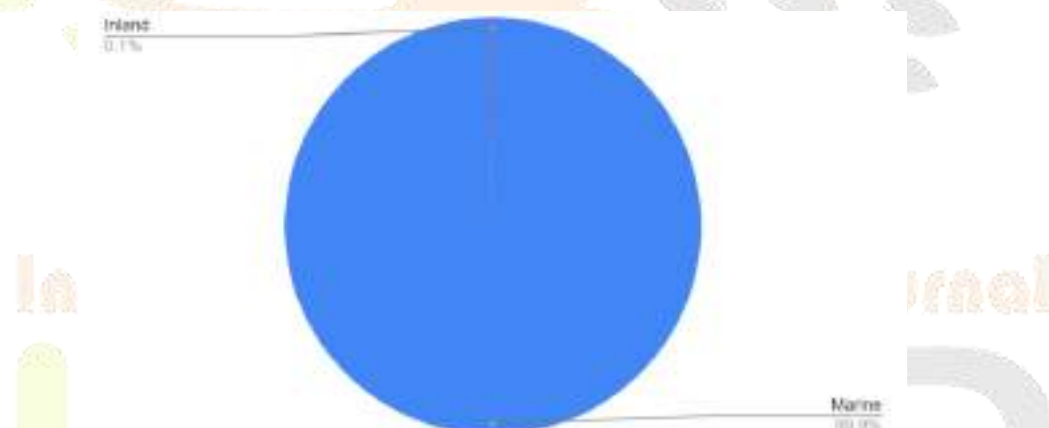


Figure 8: Quantity of fish production

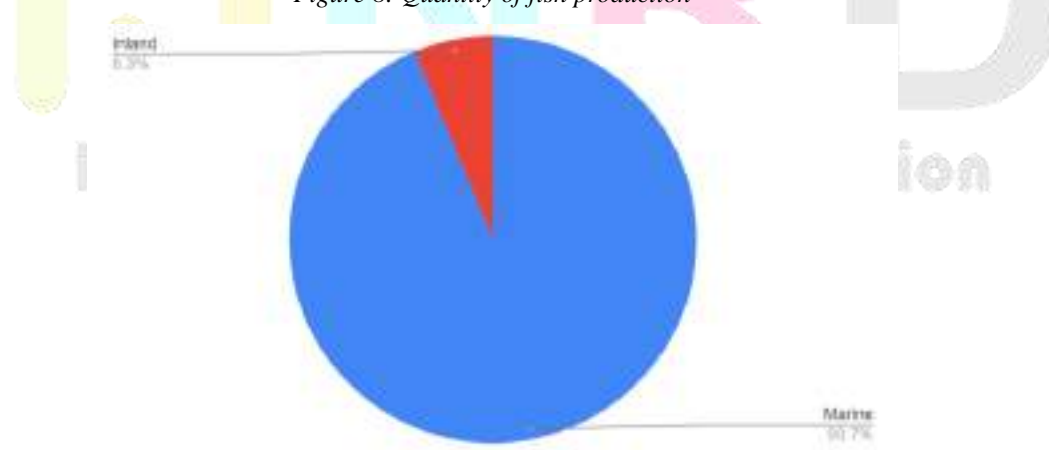


Figure 9: Value of fish production

5.5 Sector-wise financial contribution

The data provided for fishing are data for the district (figures 8 and 9). As the study area has a significant harbor of the district, the data is considered for the study. Kanniyakumari is the second richest in Tamil Nadu in per capita income (About: Kanyakumari district, n.d.). The gross domestic product in the district in 2011-12 was ₹26,11,454 lakhs at the current price and ₹16,23,988 at constant prices in the year 2004-2005. The Per Capita Income at factor cost during 2016-17 was ₹1,55,763 at the current price and

₹ 1,20,263 at a constant price in 2011-2012 (indiastatdistricts, n.d). The worker population accelerated to 36.34 in 2011, which was 27.65% in 2001. As two third of the population are categorized as non-workers, it is evident that the flow of income is from outside. From 2001 to 2011, the percentage of cultivators declined from 2.93% to 0.84%, the percentage of agricultural laborers inclined from 10.36% to 3.90%, and the percentage of household industry workers declined from 4.37% to 1.91% (District Human Development Report, 2017)

Table 9: Contribution of each sector to the Economy

At constant (2004-05)	2009-10	2011 – 12
Primary sector	7.3%	4.61%
Secondary sector	46.94%	49.64%
Tertiary sector	45.76%	45.75%

Table 9: Per Capita Income

Source: District Human Development Report (2017), State Planning Commission, Tamil Nadu.

	2004-05	2011-12
Per Capita Income	Rs. 42832	Rs. 96070

Major sectors in the district are secondary and tertiary. A steady rise in per capita income was witnessed in per capita income. Consistent economic growth is identified in the Kanniyakumari district from the employment, income, and poverty evaluation. It is observed in the consistent rise in annual growth in per capita income. It has noticed a rise in urbanization.

VI ANALYSIS AND PRIORITIZING ZONES FOR THE IDENTIFICATION OF DEVELOPMENT POTENTIAL

Fishing is the primary economic activity in the site, but the predominant sector is the tertiary sector. Tourism in the region led the tertiary sectors to flourish in the region. The amenities present in the region are shown in figure 10.



Figure 10a: Physical Infrastructure

Figure 10b: Educational and health Infrastructure

Research Through Innovation

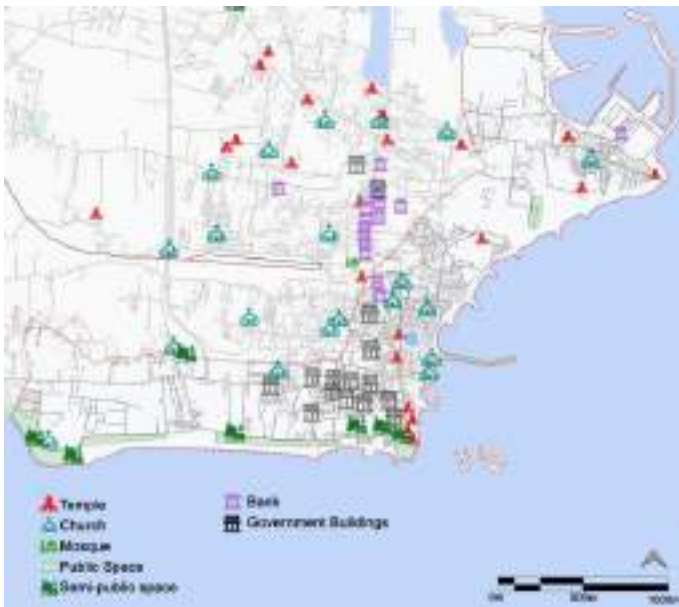


Figure 10c: Social Infrastructure

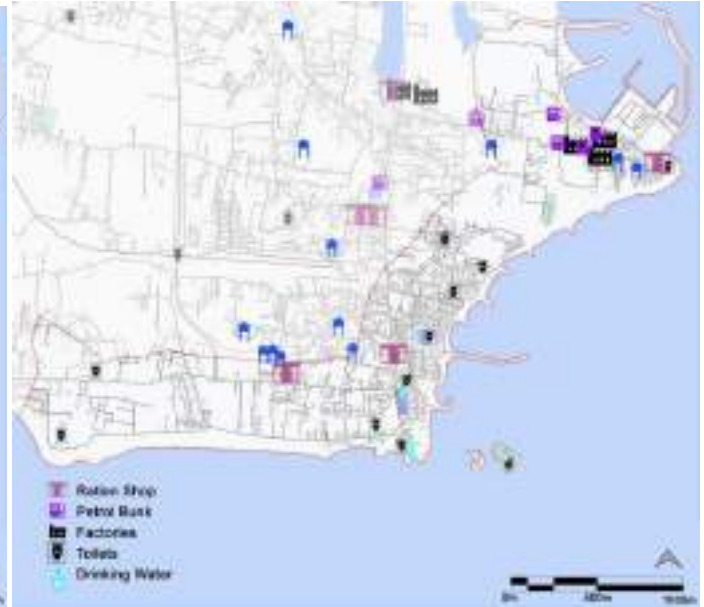


Figure 10d: Public Amenities

The predominant sectors in the delineated study area of Kanniyakumari town is mentioned in table 7

6.1 Sector-wise SWOC Analysis

Table 10: Sector wise SWOC Analysis

Primary Sector	Secondary Sector	Tertiary Sector	Inference
Strength			
a) Ice plant factories, fish processing plants, and petrol bunks are located in close proximity b) Major boats are parked next to the residential zone	a) The major occupation in the area gave rise to fishing net factories in the district	a) A part of the beachfront has a segregated parking lane. b) Multi-modal access at a walkable distance directs people to the active zone c) Two major nodes direct people to the active zone. d) Bait curves have been provided to control the speed of the wave. e) Parking is provided at different locations f) Segregated pedestrian lane is present g) Tourist attractions are mostly concentrated in the southeastern part of the coastline h) Traditional handcrafted items with beads and shells are promoted in the region i) People are not allowed till HTL for safety purposes j) Ambience for shopping is present. k) Required services are present in the zone concentrated with tourist attractions l) Most of the Educational Institutions are located in a residential zone. m) Most of the government buildings are located in public zone	The major strength of the region is the service sector.
Weakness			
a) The fuel consumption is more and the fuel is a non-renewable (diesel) resource.	a) Manufacturing of goods does not happen in this zone. Only the selling of goods happens here.	a) No drop-off point b) The walkable space allocated lacks ambience to walk c) Major roads have been occupied by vehicles d) Insufficient parking space e) Pedestrian zone is occupied by vendors f) The existing development is sporadic and happened haphazardly. g) The existing settlements were developed on the natural coastal zone h) The heritage value of historic structures is unknown to many people i) Mostly temples and churches are present to the dominance of both religions in the areas. j) A stretch between the sunrise point and sunset point lacks pause points. k) Restricting access between HTL and Low Tide Line (LTL) for safety concerns limits the space with a beachfront ambience to the public l) Restricted access in some parts and lack of attractive spaces make some places deserted during normal days. m) People standing in queue occupied more space on the road n) Pedestrian path has many barriers	The unplanned development is the major cause for the infrastructure gap.

		Most of the accommodations are private	
Opportunities			
a)Alternate mode of the boat transport with less energy consumption can be used	a)Measures can be made to convert salt water to fresh water.	a)Uniformity can be introduced on the site. b)Signages acting as an identical element can be introduced c)Zones for vending can be provided d)Solar lights can be introduced to reduce energy consumption e)Solid waste management facilities can be introduced f)Multi-level parking can be provided g)Maintain Existing zones with waterfront access h)Introduce sufficient shaded spaces for sitting relaxing i)Unplanned development of flora is present between HTL and LTL. It can be planned to be visually appealing. j)Enhance walkability and create vistas k)A cycling lane can be provided to provide an opportunity for cycling l)Physically connect the disconnected part of the waterfront m)Underutilized open spaces can be enhanced n)Open spaces in small pockets can be provided for residents o)Linkage can be provided connecting existing religious structures	The existing amenities can be upgraded to serve for the population.
Challenges			
a)One of the places for fish auctioning is located amidst the tourism zone. b)Service vehicles have to travel through the tourism corridor to the auction point Changing to other means of fuel requires more capital cost	a) Factories can't be set in regions under CRZ	a)Service vehicles and two-wheelers use the same path as pedestrians b)A stretch of Beachfront that lacks pause points and lack drinking water facility. c)Vendors occupy a part of the road d)Existing road is crowded by people e)Lack of space for parking and providing separate service corridor. f)Public transport facilities are not in proximity to all the locations g)The major stretch lack pause points and a part of this zone is between the HTL and LTL h)Providing alternate means for ticketing is a challenge i)A part of the stretch of beachfront has been neglected for development j)Insufficient space for people standing for getting a ticket for boating k)Few underutilized structures are present l)Reviving the natural coastal ambiance in the entire beachfront with beach sand is difficult. m)Sufficient parks are not present for permanent residents n)The religious structures present are for native residents but migrants are from various religions	The lack of space is the major challenge faced in the area.

6.2 Ranking

The five different zones are ranked as per the data collected from varied sources and the site observation. The parameters considered for ranking are the key attributes and intangible qualities of place-making. The qualities are phased from deprived to excellent and marked from 1 to 5, as shown in table 8.

Table 11:Color code and grade for ranking






	Deprived	Low	Fair	Good	Excellent
Color					
Grade	1	2	3	4	5

Table 12:Zone wise grading -Access and Linkages

Access and Linkages

	Leisure Zone	Boating Zone	Religious harmony Zone	Residential Zone	Harbor Zone	Inference
Continuity						The leisure zone has continuous elements to access. The other zones have interruptions to disconnect the continuity from the neighboring zones
Proximity						The length of the leisure zone is more than 2.0 km. The boating zone, the temple in the religious zone, and a part of the leisure zone are located at a walkable distance.
Connected						All the zones have some means of connectivity but are not distributed in series.
Readable						Ambiguity is present in most of the areas.
Walkable						Most of the zones are not walkable
Convenient						The zones where more tourists access is not convenient.
Accessible						The access by vehicles and pedestrians in the same zones creates havoc in the region
Grade	19	12	15	22	24	

As per table 9, the boating zone requires more upgradation in terms of access and linkages. People stand in long queues in the street to access the ticket counter for boating. The spaces in the leisure zone can have a common character and can be made walkable. As the vehicles and pedestrians share the same space, it is not walkable.

Table 13: Zone-wise grading -Sociability

Sociability						
	Leisure Zone	Boating Zone	Religious harmony Zone	Residential Zone	Harbor Zone	Inference
Diverse						The leisure have a range of activities.
Stewardship						Both private and public spaces are present leisure zone. The other zones have management to manage a major part of each zone.
Cooperative						As the leisure zone consists of both public and private amenities, an integrated approach is required to bring uniformity
Neighborly						All the spaces are not attractive and all attractive spaces are not overwhelming
Pride						Historic structures have pride but are unknown to many people

Friendly						People wait in long queues on roads to get tickets.
Interactive						Major spaces are less interactive
Welcoming						Attractive structures are present but it is not intended to be welcoming
Grade	22	18	27	22	27	

As per table 10, the zone which needs more upgradation is the boating zone. The tourism department of Kanniyakumari district, Poompuhar shipping corporation, authorities for temple and church, respectively, and fisheries department are managing authority for each zone. Each zone has its own characteristics and a part of each zone is interactive in its way. In the long stretch of leisure, the eastern part has been filled with attractions and amenities, and the region is between the western end and eastern end of the beach. In the boating zone, people are exhausted from waiting for the beach and could experience a friendly environment. People find a friendly environment in religious places. In the residential zone, the people are native residents and they interact in their locality. Harbor is functioning regularly with its regular activities such as going for fishing, packing, transmitting, auctioning and so on.

Table 14: Zone-wise grading - Comfort and Image

Comfort and Image						
	Leisure Zone	Boating Zone	Religious harmony Zone	Residential Zone	Harbor Zone	Inference
Historic						The boating started in 1970 and the harbor is constructed 1984. The leisure zone has recently constructed structures. The other zones are historically significant.
Attractive						structures are minimal in the region
Charming						The major attracting magnets are charming and only some are charming in the other infrastructures developed
Sittable						The zones do not have sufficient seating spaces
Walkable						Major tourism zones are not walkable
Green						The infrastructures have not considered to be environmentally friendly
Clean						The spaces are maintained but the space becomes unclean by the inappropriate use of the tourists.
Safe						Most of the spaces are safe as a beachfront
Grade	23	20	22	20	21	

The major comfort zone is experienced in the leisure zone and is due to the amenities present. The experience can be enhanced by making it walkable and introducing shaded seating spaces. Pause points can be introduced as people have a long beach stretch of more than 2.0 km to experience. People are waiting in a long line to experience the Vivekananda Rock Memorial and Tiruvalluvar Statue but a major time is wasted waiting for the boating which spoils the experience for more time. The religious places present have historic importance and the feeling of worshipping makes the people’s experience better. Residential zones are developed in an unplanned way. The places have means for access but are not walkable. Accommodations for tourists are also located here. The

Harbor zone has a routine and is not meant to be attractive.

Table 15: Zone-wise grading - Uses and Activities

Uses and Activities						
	Leisure Zone	Boating Zone	Religious harmony Zone	Residential Zone	Harbor Zone	Inference
Fun						Harbor is functionally active so the aspect of fun is not required.
Active						All the functionally active spaces are considered for the zonal classification except residential zones.
Vital						The vital spaces are considered
Special						Each zone has a special characteristic
Real						The five zones have an independent existence
Useful						The zones are extremely useful
Indigenous						The infrastructure developed is as a result of the need for the context
Celebratory						Harbor is functionally praised
Sustainable						The aspect of sustainability is not considered in the existing development
Grade	36	37	40	30	34	

The historic significance of the religious structures enhances the activities in the area. The major uses and activities are in the boating zone and in the leisure zone. This is the palace filled with tourists due to the magnets in the region and allied amenities. The residential zones comprise settlements of the native residents, schools, government institutions for the public, and accommodations for tourists. The place lacks common open spaces such as a residential park for local people. The harbor zone has a special nature as it is the main harbor in the region.

Table 16: Zone-wise grading

	Leisure Zone	Boating Zone	Religious harmony Zone	Residential Zone	Harbor Zone	Max grade	Inference
Access and Linkages	19	12	15	22	24	35	Boating zone needs more attention
Sociability	22	18	27	22	27	40	Sociability is minimal in Boating zone
Comfort and Image	23	20	22	20	21	40	The comfort and image is fair in all the zones

Uses and Activities	36	37	40	30	34	45	The residential zone have fewer activities
Total Grade	100	87	104	94	106	160	Boating zone has maximum potential for development
Percentage	62.5	54.3	65	58.75	66.25	100	

VII. DEVELOPMENT POTENTIAL

The study was conducted through site visits, site surveys, observation, and interaction with various stakeholders. It is then divided into five zones based on its characteristics, and zone-wise analysis is done.

7.1 Leisure Zone

The leisure zone should be convenient for people to walk. Segregated spaces must be provided for vehicles and pedestrians to make the space walkable. Uniformity has to be introduced in the area. Symbolical signages can be placed to make better interconnection and interaction. Vending zones have been made separate with walkable shopping experiences. Currently, the ground surface is not permeable. Penetrable components such as bioswales can be introduced in the region. Solid waste management has to be done in the region. Pause points with shaded seating spaces have to be introduced in both zones. The existing parking spaces can be transformed into multi-level parking. The potential sites for multi-level parking are marked as 2 and 5 in figure The potential site identified for the development of the leisure zone is shown in figure 11.

7.2 Boating Zone

The boating zone is the region with a frequent flow of people throughout the day. The path leading toward boating should be welcoming. Alternate means for ticketing should be made to reduce the waiting time. Design measures should be taken to experience the space towards the boating point. The region which is the main area for the ticketing counter for boating is shown in figure 11.

7.3 Residential Zone

Affordable accommodation has to introduce on the site, as the major accommodation facilities are provided by private sectors. The religious zone has footfall due to its significance. As the region surrounding the religious structures is developed, the way leading towards it is not warm enough. Different religious structures in the region must be interconnected to have an integrated religious corridor. Interactive open spaces have to be introduced for all age groups. Currently, only the children have playground space for recreation.

7.4 Harbor zone

Alternate means of fueling have to be made in the harbor. The cost of petrol is a major expense for fishing. The amenities in the harbor can be upgraded based on the latest technology.



Figure 11: Potential Sites for development

Based on the analysis, the demarcated areas are the potential sites identified for development (figure 11)

VIII. CONCLUSION

The settlement of Kanniyakumari, also known as 'Komari' and 'Nanjil Nadu' in the peninsular region, has potential places for tourism. Naturally, Kanniyakumari has a scenic beauty of the environment and the beachfront. The Bhagavati Amman Temple, Old lady of ransom Church have historical significance associated with the region's settlement. The two islands of the Vivekananda rock memorial and Thiruvalluvar statue are historically connected to the region and attract tourists. Attractive destinations may attract more people, but inappropriate planning will make the scenario worse. Chinna Muttom harbor has brought significant regional transformation and needs more attention and planning. The current scenario in the region is not planned holistically. The study has identified the primary zone for tourism in the district as the study area. The occupation sector-wise and zone-wise analysis facilitated the identification of the zone-wise development potential and intervention. The intervention must be made at the right time to avoid worsening the situation. The potential means of development vary as per the need in each zone. Though interventions have been made zone-wise, the planning should be an integrated approach for the effective functioning of the region. In a place where tourism is a significant means of income, the right kind of intervention at the right time maintains and further accelerates the income from tourism. The potential intervention required has been identified in the current study. The design process will be carried out in a subsequent study.

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