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Impact of Tourism Through The Real Estate (Construction) Sector On The Coastal Environment Of Goa - A case study of Panjim

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***Abstract*:-Goa is the 25th state in the union of India and lies on the western coast. The state is bounded by Arabian sea on the west side which is economically very important for Goa and on the north and north east its bounded by Maharashtra and on east and south its bounded by Karnataka. Goa is also counted as most progressive state by the socio economic indicators and was ranked No.1 by the Eleventh Finance Commission India in terms of Infrastructure facilities this puts Goa under tremendous pressure to keep the state progressing the tourism sector is major contributor to the state GDP and being a tourist destination of choice both by foreign and domestic it has seen a continues hike in the number of tourist visiting state year by year.**

The infrastructure facility catering to tourism like real-estate sector which has potential in the sub sectors like residential sector, commercial sector, retail sector, hospitality sector and industrial sector are land intensive. The study area which is the capital of called Panaji or Panjim is one of the most visited places due to its central location to the entire major tourist destination in the north Goa district. It is also a most favored location among tourist visiting north Goa for their accommodation during their visit to Goa.

Panjim mostly the reclaimed land which was reclaimed centuries ago, the places like Fountainhas, Campal and Mala are the location which has high heritage importance and are located around the major the natural resources like khazan lands, mangroves and sand dunes along the beach stretch which 4.5 Km long starting from the Caranzalem and up to Campal.

Panjim as a city is expanding due to the in migration from the country and state in search of better employment opportunities and due to being one of the most comfortable cities to live in after the retirement. Due to this a lot of new construction of apartments and villas and private residence had come up in and around the Panjim city in Tiswadi taluka of North Goa District. So due to the above mentioned all the reason there is a lot of demand for the land and most of it being full filled by reclaiming land putting the major natural resources at threat like Khazan lands, Salt pans, Mangroves and sand dunes along the beach.

Key words:-Real estate, Residential, Commercial, Retail Hospitality, Industrial, Natural resources, Khazan land, Mangroves, Creeks, Sand dunes, Land use, Delineation.

1. INTRODUCTION

1.1. Contextual background

Goa is the smallest state by area and is the fourth smallest by the population in India. It is also known for its natural environment and the world heritage architectural sites. Goa is rich in flora and fauna due to its proximity to the Western Ghats and Arabian Sea, which makes it an excellent tourist destination.

Capital of Goa is Panaji & the largest city of Goa is Vasco Da Gama, few other Important Cities are Margao, Ponda, Mapusa, etc. Goa is divided into 2 Divisions, North Goa Headquarters with its headquarters in Panaji and South Goa with its Headquarters in Margao. Goa has an Area of 4000(sq km) with the Population (2011 census) 1.34 million and the Literacy rate (%) is 82.3, Sex ratio (per 1000 males) is 960. The total length of coastline is 130 km, the length of National Highway in state is 224 km the Domestic cum international airport in the state is also located in the city of Vasco Da Gama, Goa is also

Picture 1 : Regional Setting

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famous for its ports with Mormugao being a Major Port & Panaji is a minor port. Key Industries in the state are Fisheries, Pharmaceuticals, Tourism and Hospitality, Mining and Mineral based, Information Technology.

The coastal plain consisting of estuaries, khazan lands and mangroves constitutes about 22% of the geographical area and falls in the talukas of Bardez, Tiswadi, Marmugoa and Salcette.

Goa has nine major rivers, all of which, except the Sal in South Goa, originate on the Western Ghats and subsequently meander over falls and rapids (during young/initial stage), from where they tend to become sluggish (during mature stage) and then ultimately form the mouths of estuaries and drain into the sea (old stage). Most of these rivers are subject to tidal variations and salinity up to a distance of 20-40 kms upstream from their respective estuarine mouth regions. Most of these rivers are excellent navigational channels used extensively for transporting ore through barges from ore loading jetties to Mormugoa harbour for onwards for export.

The study is mainly to find out what is effect of all potential factors related to tourism industry in respect to the real estate and construction industry to natural resources of Goa, the study area taken up is Panjim due the reason that it's the state capital and also very rich in natural resources apart from being main transit and Areas having natural resources under threat. Areas with maximum tourist inflow in the city. Areas where recent development is taking place.

1.2. Aim

To Access the Impact of Developing Real Estate (Construction Industry) Sector Related to Tourism in the state On the Coastal Environment of Goa, by Studying of Selected zones of Panjim city and its Evaluation of Vulnerability for the Major Natural Resources under Threat.

1.3. Objectives

- Improve understanding about the effects of tourism.
- Identify where improvement is needed and where change is occurring.
- Enable destination and businesses to remain competitive without harming the Ecosystem.
-

Figure 1 : Objective of the study

1.4. Need for the study

- The quality of the environment, both natural and man-made, is essential to tourism.
- Tourism development can put pressure on natural resources when it increases consumption in areas where resources are already scarce.
- Impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas.
- The negative impacts of tourism development can gradually destroy the environmental resources on which it depends.
- Negative impacts from tourism occur when the level of visitor use is greater than the environment's ability to cope with this use within the acceptable limits of change (Carrying Capacity).
- It can put enormous pressure on an area and lead to impacts such as: soil erosion, increased pollution, discharges into the sea, natural habitat loss, increased pressure on endangered species and heightened vulnerability to Mangroves, Khazan Land & Sand dunes.

It often puts a strain on water resources, and it can force local populations to compete for the use of critical resources.

1.5. Major resources under threat

The resources which are under threat in and around the Panjim city are as follows:

- Khazan lands
- Mangroves
- Creeks
- Sandunes in and around the beach.

Picture 2 : Khazan land at St. Cruz, Panjim

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Picture 3 : Salt Pans

Picture 4 : Rua De Ourem Creek, Fountainhas

Picture 5 : Rua De Ourem Creek, Fountainhas

Picture 6 : Sand Dunes at Miramar

These are one of the most vulnerable resources and can have catastrophic effect if damaged beyond a certain limit in the case of the natural disaster like for example Tsunami, Cyclone and Sea level rise (SLR)

1.6. Methodology

The study is considered as an inter sectoral exercise and takes into account the existing situation including assessing the current status of services. The study also takes into consideration the works and plans of sector contributing towards the growth and development of the city and related threat to natural resources and the study includes the following tasks:

- Situation analysis
- Formulation of goals and strategies
- Conclusion
- Recommendation

Situational analysis shall be primarily done on the basis of secondary reports/ documents available by the various concerned offices (government departments, consultancy), internet based research. The analysis will include the GIS and satellite imagery to understand the spatial context and to map the resource and understand the temporal changes which has happed to the natural resources.

Formulation of goals and strategies will be done to achieve the set aim through the objectives based on the sectors to be studied.

The steps which shall be followed in the study as a part of methodology are shown below:

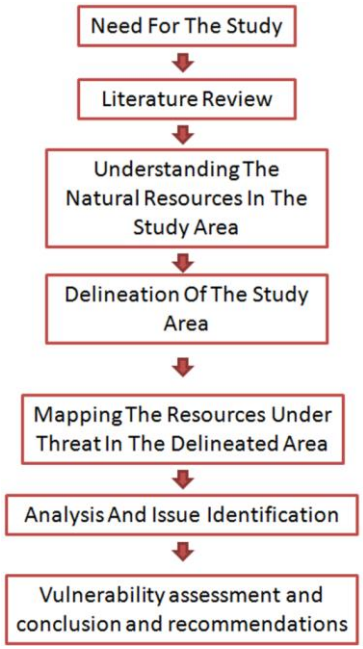

Figure 2 : Detailed Methodology

2. LITERATURE REVIEW

2.1. Climate Resilient Infrastructure services - Goa, TERI

The study focus around the vulnerability due to the climatic hazards and manly on the sea level rise. It also focuses on the intensity of the vulnerability to climate hazards due to the frequency of the hazard

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and the intensity of the hazard related events to the local carrying capacity and the factor to which the city can mitigate the same and adapt to the same.
the vulnerability of the coastal region to the sea level rise (SLR) due to the global warming and the result melting of the ice caps in the polar region the sea level will rise in the future. The two main vulnerability to the coastal region are Sea level rise and storms and the third one is tsunami.
The study focused on the following thematic components:

- Develop and demonstrate an urban infrastructure and linkages, along with other considerations to support climate resilient planning effort.
- Develop and demonstrate a rapid climate vulnerability assessment approach for infrastructure services.
- Wastewater Treatment Plants,
  - Name, location, and age of the treatment plant,
  - The coverage area of the plant,
  - The design capacity and operational capacity
  - The type of treatment process followed,
  - The form also seeks to record the frequency and cost of each maintenance activity undertaken by the authority.
- Urban infrastructure like :

a. Sewerage Zones,
  - List of areas covered under each zone,
  - Number of connections and length of network,
  - Sewage processing capacity in each zone.

b. Storm Water Zones.
c. Sanitation Network.

- Capacity and age of the network,
- Details of diameter categories and length of that particular pipe in the network along with the corresponding material of the pipeline,
- Efficiency values can be recorded for the desired parameters along with the source of this data,
- The form also seeks to record the frequency and cost of each maintenance activity undertaken by the authority.

2.2. Scope of the Study

The scope of this study included developing and demonstrating a methodology for assessing the vulnerability of infrastructure services of coastal cities to sea-level rise and how this assessment can support climate resilience planning efforts. This was done by taking up case studies of two coastal cities- Panaji on the west coast and Visakhapatnam on the east coast of India. This document presents the outcomes of the case study of Panaji.

2.3. Objectives

The vulnerability assessment of Panaji was carried out with an objective to:

- Understand the impact of sea-level rise and vulnerability of the city to climate change induced events like extreme precipitation.
- Identify hotspots and critical infrastructural services infrastructure and services.
- Identify actions to address climate criticality and plan for climate resilience and
- Inform planning decisions at the level of the local government (city government) to achieve the same.

2.4. Outcomes

This assessment resulted in the identification of vulnerable hotspots and critical infrastructure on spatial scale and a Database Management System (DBMS) to support the city government to address the impacts of sea-level rise in its planning strategies. The study also gives broad sector-wise recommendations to the city as a starting point to initiate climate resilience planning and retrofitting of infrastructure assets and services. However, further detailed studies and expert consultation will be required to appropriately implement these actions.

2.5. Case Study On The Effects of Tourism on culture and Environment, 'A Case study of Jaisalmer, Khajuraho & Goa'

India is environmentally and culturally so diverse that it is not feasible to focus on a single destination or tourist experience to understand the effects of tourism on culture. It was therefore, decided that this study should look at least three different tourist sites, which together could put across the nature and dimensions of the issues being examined. The three case studies selected were: Jalsalmer, an isolated, medieval town in the desert in the western State of Rajasthan; Khajuraho, a World Heritage Site in the Central Indian State of Madhya Pradesh; and Goa, fast becoming an international 'sun, sand and sea' mass tourism destination on India's west coast. Unlike other more popular destinations like Agra or Jaipur, which along with Delhi form the 'Golden Triangle' of Indian tourism, it was felt that in each of the sites selected for study, the effects of tourism on culture could be more easily distinguished from other equally powerful agents of change which are simultaneously transforming those societies. For the record it must be stated that this study was conducted by an individual researcher actively involved in the field of architectural/urban conservation on behalf of the Indian National Trust for Art and Cultural Heritage,

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New Delhi (INTACH). It was conducted between January and May 1993, and used participant observation and in-depth interviews as main methods of research, backed by extensive references to numerous multidisciplinary studies and reports, some prepared by INTACH, and others by Government and Non-Government Organizations.

The study focused on the following components:

- Socio economic development of areas there benefits to community thereby uplifting the quality of life. it can further foster development even in areas where otherwise economic activity would be difficult to sustain.
- Increasing employment opportunities, tourism industry generated employment directly for many.
- Developing domestic tourism especially for the budget category.
- Preservation of heritage and environment.
- Development of international tourism and optimization of foreign exchange earnings.
- Diversification of tourism product.
- Increase in India's share in world tourism.

It then focuses on the Forces of change and then the Items of Culture Affected through the case studies of the above mentioned tourist destinations. Then the study talks about the factors which affect the environment like Natural Factors, Social Factors, Historical Factors, Recreational and shopping facilities & Infrastructure, food and shelter.

2.6. Deterioration to Environment

Uneconomical Landuse, exploitation of natural resources like water bodies, forest, and then solid and liquid waste related problems.

2.7. Scope of the Study

The scope of this study included finding the relationship between the tourism and its effect on the community and the considerable socio economic benefits to the community and the increasing opportunity of the employment and the developing domestic tourism especially for the budget category finding out the effect on the heritage and environment. Finding out the benefits if the foreign exchange earnings are possible and how diverse is the tourism as a package as a product.

2.8. Objective

- To access the socio economic development of the areas of tourist importance.
- To access the employment opportunities of the tourism industry (Direct and Indirect).
- Effects of tourism on the heritage and culture.

2.9. Outcome

The study has found that in India, the importance of tourism is seen primarily from the economic angle, earning much needed foreign exchange and providing employment. This is evident in the objectives stated in the National Action Plan for Tourism prepared by the Government of India in May 1992, and in the recommendations of the Planning Commission's Report of the National Committee on Tourism of May 1988 which are two important documents on the Government's tourism policy.

The Government is aware of problems related to the development of tourism sites and imposes certain restrictions amongst which, to safeguard the environment, the Government requires that tourism projects obtain clearance from the Ministry of Environment and Forests. Such clearances are however, not necessary for safeguarding the cultural and social well-being of society. This is not surprising, because the very reason there of Government action is to transform the traditional society into a modern one. The present study on the effects of tourism on culture and environment nevertheless has identified cautionary evidence to indicate that a less benign view be taken of tourism generated social and cultural change.

3. UNDERSTANDING THE NATURAL RESOURCES IN THE STUDY AREA

3.1. Khazan land and Mangroves

The important natural anti-erosive barrier is provided by the mangrove vegetation near the external or internal bunds. Mangroves act as wave breakers and reduce the net erosive energy of the tides. The biota of estuaries, mangrove swamps and forests, intertidal zones, mud flats, embankments, and the productive khazan farms constitute very vulnerable elements of the system. These lands serve as emergency storm water receptacles. If this land is destroyed or filled up, flooding (in surrounding area) is bound to occur.

3.2. Creeks

Urbanization and construction in the vicinity of the creek is exposing it to increasing pollution. The St. Inéz and Rua De Ourem Creek in Panaji opens up into the Mandovi River which further joins the sea at Miramar. The Rua De Ourem creek is 3.7 km in length, with surface area of 65,750 sq m with an average width of 12.6 m. This beautiful creek in the past has now turned into a nallah since it has been receiving untreated sewage and garbage over the years.

3.3. Sand dunes

A stretch of about 4.5 km of sandy shore exists from Miramar, Carnazalem to Panaji town. Due to rapid urbanization and tourism, most of the dunes are

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destroyed and posse's extreme danger in Tsunami likes situations.

4. ANALYSIS

4.1. Delineation of study area

- Areas having natural resources under threat.
- Areas with maximum tourist inflow in the city.
- Areas where recent development is taking place.

4.2. Developing activities

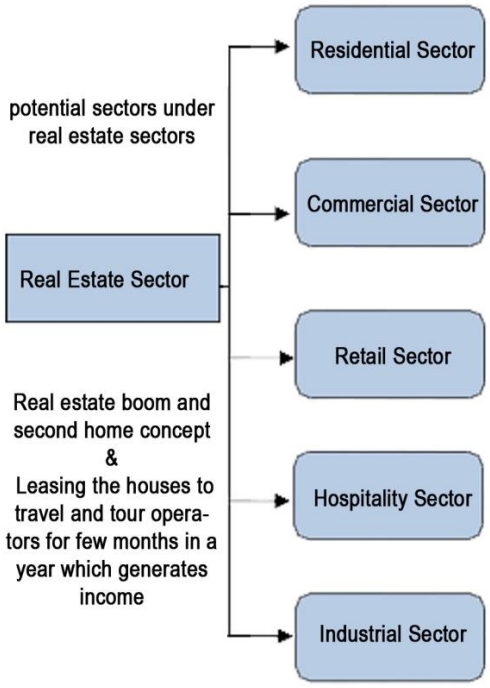


Figure 3: Potential Sectors of Real Estate

4.3. Demographic Study

Particular	Goa	North Goa	Panaji CCP	OG +CT	Panaji Urban Agglomeration
Administrative Unit	State	District	Urban Local Body	Outgrowth areas and census town	CCP +OG+CT
Area in km2	3702	1736	8.12	78.5	86.00
Population (Census 2011)	1458545	8,18,008	40,019	74,742	1,14,759
Population Density	394	471	4928	952	1334

Table 1 : Population of Panjim City

Year	Population	Decadal Growth Rate	Area	Density
	Nos.	%	Km2	Persons/Km2
1971	34953	N.A.	7.56	4,623
1981	43165	23.49	7.56	5,786
1991	43349	0.43	22.63	1,916
2001	59066	36.26	22.63	2,610
2011	70991 (CCP+OG)	20.19	22.63	3,137
2011	40017(CCP)	N.A.	8.12	4,928

Table 2 : Population growth trend

S. No	Land use	Area in sq. km.	%
1	Residential	2.80	50.91
2	Commercial	0.85	15.45
3	Industrial	-	
4	Institutional/ Government	0.75	13.64
5	Transport/ Communications	0.30	5.45
6	Parks/ Playground	0.80	14.55
	Developed Area	**5.50 (66%)**	**100%**
7	Natural Resources	2.09	
8	Conservation/ Preservation	0.34	
9	Defence land	0.07	
10	Watershed	0.30	
	Undevelopable area	**2.80 (34%)**	
	Total	**8. 30^{13} (100%)**	

Table 3 : Land Use Pattern of the city

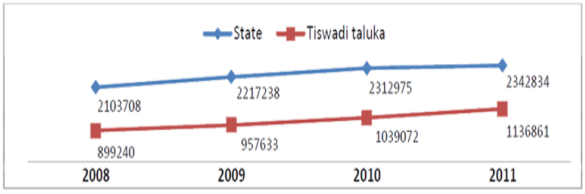
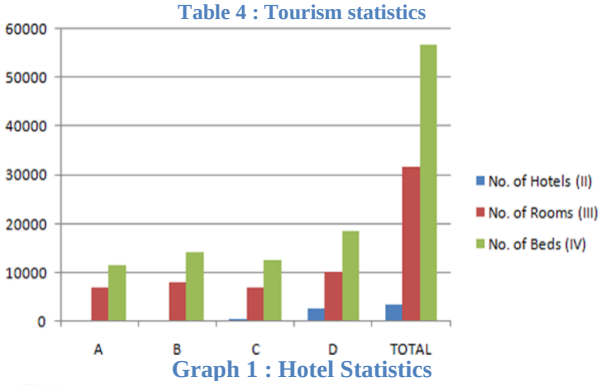
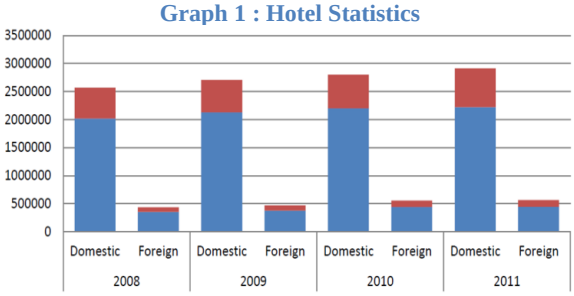


Table 4 : Tourism statistics



Graph 1 : Hotel Statistics



Graph 2 : Domestic and Foreign tourist visiting Goa

Year	Taluka Tiswadi (City Panaji)		State Goa	
	National	International	National	National
2001	3,63,063	38,108	11,20,242	2,60,071
2004-2005	6,39,177	NA	19,65,343	3,36,803

Table 5 : Migration to Goa

Year	2001	2011
Population/Projected (in lakhs)	59066	70991
Household size	4.3	4
Total houses (In lakhs)	1.28	0.18
Residential and mix use %	81.90%	83.90%
Residential Housing stock (In lakhs)	1.05	0.15
Residential Housing (In lakhs) - Gap	-	-
Dilapidated Houses (%)	4.77%	1.13%
Residential Housing -Dilapidated (nos.)		168
Residential Housing -Total (nos) - Gap		168

Table 6 : Gap Analysis

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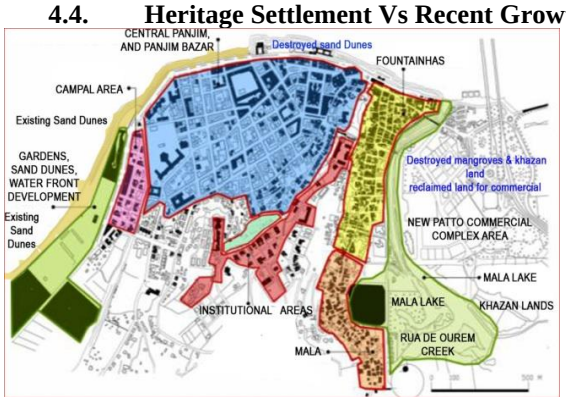
4.4. Heritage Settlement Vs Recent Growth



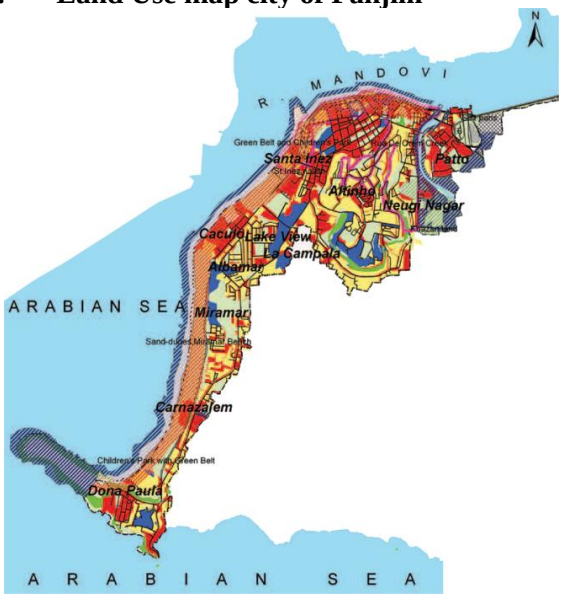
Map 1 :Study area Zoning

City of Panjim have been divided into few Zones to compare the growth post liberation of Goa in 1961. These areas are highly Commercialized due to the growing tourism industry in the state, Panjim being the capital of Goa is a preferred location by the tourist and also because the tourism related infrastructure and heritage settlements. Panjim being state capital has seen a lot of migration from State and Country for the employment and other sectors.

4.5. Ecologically sensitive areas

Ecologically sensitive areas like khazan lands, salt pans, creeks, and estuaries in the northern part of the city are more likely to be affected. Apart from this, tidal influenced water bodies like the St. Inez creek, Rua de ourém, and River Mandovi will also be affected due to SLR (Sea Level Rise). Sand dunes and beaches in Miramar, Dona Paula, and Caranzalem, and also Dr Salim Ali Bird Sanctuary are likely to be affected partially.

4.6. Land Use map city of Panjim



Map 1 : landuse map of Panjim

4.7. Loss of mangroves

Loss of Mangroves – In the outskirts of Panaji, mangroves are being reclaimed. Also there are many cases where coastal stretches have been subjected to forces of erosion due to cutting down of mangroves for land reclamation. However no formal mapping of change in the mangrove cover has been carried out.

Picture 7 : Map of Rua De Ourem Creek and areas around.

4.8. Land Reclamation

At the Querem Creek, the river is deep and beach formation does not impact the flow to a large extent. The area has a good mangrove cover. St. Inez Canal carries a lot of waste and is polluting Mandovi River. Reclaimed areas are prone to water logging due to flooding in Zuari and Mandovi River. Most areas along the coast line of Panaji were earlier under marshes and have been reclaimed over time.

Picture 7 : Sand Dunes at Campal

4.9. Reclamation of Areas of Mala Lake & Patto

Reclamation of area of Mala Lake - Mala Lake located towards the eastern edge of the city had a

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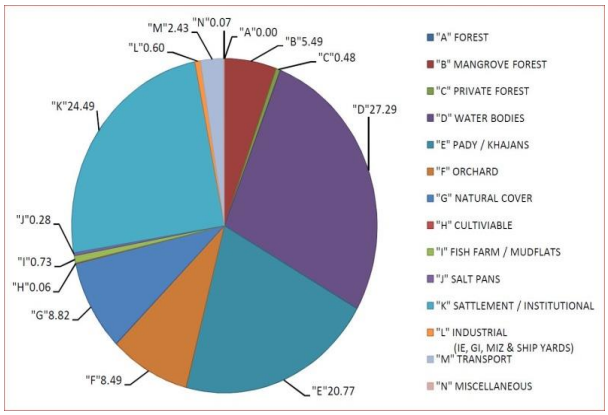
spread of nearly 75,000 sq. m but due to reclamation of marshes and development in surrounding areas, this has gone down drastically. Runoff from Altinho hill was earlier absorbed to a large extent by the Mala Lake but owing to incessant reclamation of marshes, the lake is now easily flooded and the excess runoff from Altinho hills also causes water logging in low lying areas of the city. Further, the high tide line, springs in core area and backwater areas causes flooding of Mala Lake as catchment area has been encroached.

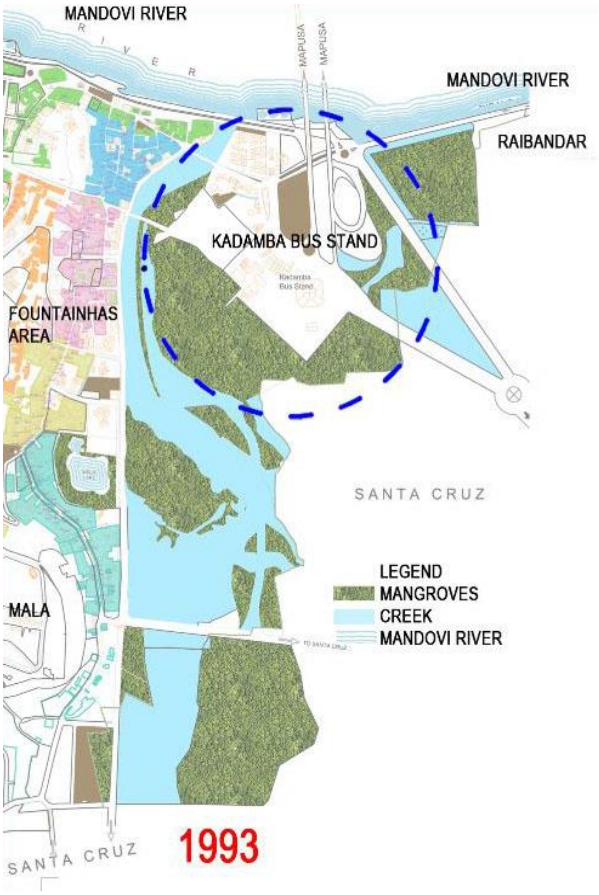


Pie Chart 1 : Land Cover Distribution

	FINAL RPG-2021 AREA IN HECTARES	FINAL RPG-2021 % OF TALUKA
ECO - 1		
FOREST (Protected/reserved/ national park/wild life)	0.00	0.00
MANGROVE FOREST	1146.98	5.49
PRIVATE FOREST	99.65	0.48
WATER BODIES/ nalla/ponds	5697.53	27.29
PADDY FIELD/KHAZAN LANDS	4335.74	20.77
SUB TOTAL	**11279.89**	**54.04**
ECO - 2		
ORCHARD	1771.67	8.49
NATURAL COVER	1841.07	8.82
CULTIVIABLE	11.78	0.06
SALT PANS	152.02	0.73
FISH FARM / MUD FLATS	57.96	0.28
SUB TOTAL	**3834.50**	**18.37**
SETTLEMENT	4269.36	20.45
INSTITUTIONAL	842.87	4.04
INDUSTRY	121.08	0.58
MIZ	5.05	0.02
TRANSPORTATION	506.76	2.43
MISCELLANEOUS	14.41	0.07
GRAND TOTAL	***20874***	***100.00***

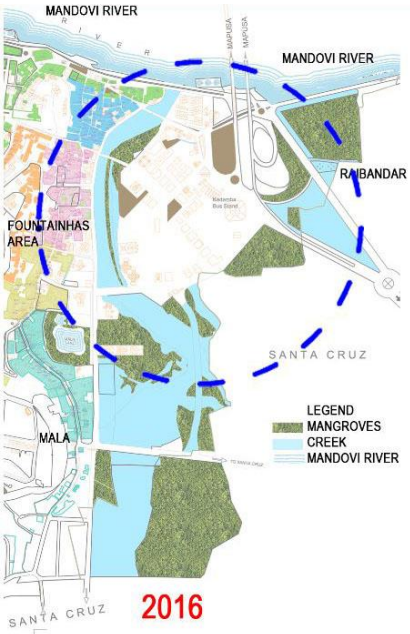
Table 7 : Landuse land cover of Taluka

4.9.1. Land reclamation Till 1993



Map 2 : Fountainhas, Patto & Mala Area

4.9.2. Land reclamation Till 2016



Map 3 : Fountainhas, Patto & Mala Area

4.9.3. Land reclamation and destruction to sand dunes

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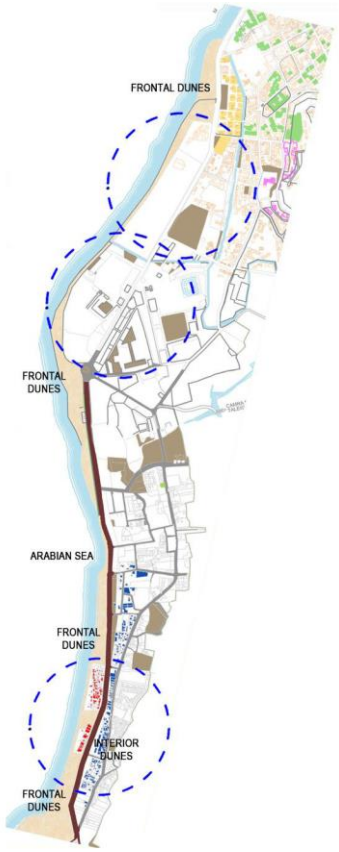

Map 4 : Miramar and Surrounding Areas

5. CONCLUSIONS AND RECOMMENDATIONS

Area	Sensitive Sector	Resources at Threat	Vulnerability
Near Mala Lake	Solid waste management	Mangroves	Tsunami, Cyclone.
Fountainhas	Tourism & Heritage Water Supply Sewerage & Drainage Solid waste management Transport	Mangroves Rua De Ourem Creek Khazan land 1.St. Cruze 2. Mala	Tsunami, Cyclone, Flood prone, Heritage settlements.
Patto Plaza	Tourism & Heritage Solid waste management Transport	Mangroves Rua De Ourem Creek Khazan land 1.St. Cruze 2. Mala 3. Riabandar	Tsunami, Cyclone, Flood prone, Heritage settlements, high population density .
Miramar & Caranzalem	Ecologically sensitive areas, Transport, Water Supply , Sewerage & Drainage Solid waste management	Sand dunes	Tsunami, Cyclone, Flood prone

Sector	Structural measures	Non-structural measures	Suggested data fields
Ecologically Sensitive Areas (khazan lands; mangroves; creeks)	1. Rehabilitation and preservation measures around sand dunes and mangroves. For instance, plantation of vegetation along the dunes can help restore and stabilize the dunes. 2. immediate need of indentifying and curbing the point and non point sources of the pollution along its course, de-silting and cleaning of the creeks.	1. Spatial maps of the nautral assets like Khazan lands, salts pans, mangroves, creeks etc should be maintained. The entire shore line ecosystem should be demarcated in Gis framework. 2. The natural assets of the city should be demarcated and preserved and no construction / man made interventions should be allowed in the ecologically sensitive areas.	1. Sea level rise will change the coastal morphology and soil characteristics. Cities must therefore, maintain beach erosion information.

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