SUSTAINABLE TOURISM DEVELOPMENT IN RAMANATHAPURAM COASTAL REGION

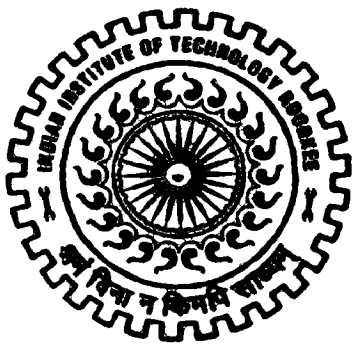
A DISSERTATION

Submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF URBAN AND RURAL PLANNING

By

NACHIKETHA .B. PHATHANJALI



DEPARTMENT OF ARCHITECTURE AND PLANNING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE - 247 667 (INDIA)

JUNE, 2006

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in this thesis entitled **"SUSTAINABLE TOURISM DEVELOPMENT IN RAMANATHAPURAM COASTAL REGION"** in partial fulfillment of the requirement of the award of the Degree of Master of Urban and Rural Planning submitted in the Department of Architecture and Planning, Indian Institute of Technology Roorkee is an authentic record of my own work carried out during the period from July 2005 to June 2006 under the supervision of **R. SHANKAR,** Professor and Head, Department of Architecture and Planning, Indian Institute of Technology Roorkee.

The matter embodied in thesis has not been submitted by me for the award of any other degree.

Dated: 15 June 2006

(NACHIKETHA .B. PHATHANJALI)

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

(R. SHANKAR)
Professor and Head,
Department of Architecture & Planning,
Indian Institute of Technology, Roorkee,
Roorkee – 247 667
Uttaranchal, India

Dated: 15 June 2006

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Abstract

Tourism is one of the fastest growing areas of international trade, particularly for smaller coastal countries and island countries with limited development options. The growth of tourism has induced many benefits to the coastal areas but its unplanned expansion has also resulted in serious environmental costs. Sustainable tourism implies an approach to development aimed at balancing social and economic objectives with environmentally sound management. Tourism development implies tradeoffs and, in fact, planning for sustainable tourism requires identifying possible constraints or limits for tourism development

The Ramanathapuram district of Tamil Nadu has a diverse coastal environment with an extremely rich biodiversity and productivity. The number of visitors to this district is quite high and their interest is increasingly oriented towards non religious tourism destinations. Since mechanized fishing methods were introduced around fifty years ago and since populations of people dependent on fishing for their livelihoods have increased, the marine resources of the Ramanathapuram coast have come under increasing pressure. Many resources are now declining in abundance and diversity and some species risk extinction.

Considering the various problems and potentials in the district, there is an urgent need to seek alternative and supporting livelihood options for the fishing communities along the coast of the Ramanathapuram. Sustainable tourism development is amongst the only options available, coupled with community-based sustainable projects. Thus the main aim of the study is *"to prepare a blue print for the development of Ramanathapuram coastal region through sustainable tourism development"* which benefits the coastal communities and stimulates regional development.

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Chapter 1

Introduction

1.1 Background of the Study

Tourism is often the shortest route to broad economic growth and prosperity if appropriate resources are available. It is one of the fastest growing areas of international trade, particularly for smaller coastal countries and island countries with limited development options. The growth of tourism has induced many benefits to the coastal areas but its unplanned expansion has also resulted in serious environmental costs. There are several examples of negative impacts of uncontrolled tourism on the ecological resources of coastal areas. For example unplanned and ill managed coastal tourism has led to the degradation of near shore marine habitats as a result of the sewage pollution originating from the tourism associated establishments. Boating, a coastal tourist activity has also affected the marine habitats which support a treasure of biological diversity. Anchor dropped by boats smash coral on landing and by dragging or unwrenching it, causing extensive destruction to coral branches. In some instances, mangroves, reefs and Seagrasses have been removed and dredged for the construction of marinas and boat basins. Tourist demand for seafood such as lobster has been responsible for overfishing in many places, which has led to a decline in the average size of the catch. Other effects include the discharge of large quantities of sediment from the construction of coastal tourism development projects and related activities, and the commercial collection of corals and other marine specimens.[7] These facts clearly indicate that the balance between tourism and environment is very delicate. It needs to be maintained through appropriate planning and sustainable management of tourism resources.

Tourism promotes international understanding. It could generate innumerable benefits, both in social and economic spheres. Today tourism is widely acclaimed as an important global industry offering immense employment opportunities, both direct and indirect. It has emerged as an instrument for employment generation, poverty alleviation and sustainable human development.

Domestic tourism plays a vital role in achieving the national objectives of promoting social and cultural cohesion and national integration. Its contribution to

generation of employment is very high. With the increase in income levels and emergence of a powerful middle class, the potential for domestic tourism has grown substantially during the last few years. Issues around tourism and its potential for impacting positive effect upon the poor have been receiving increasing amount of attention world wide.

1.1.1 Tourism in Ramanathapuram

The Ramanathapuram district of Tamil Nadu, as a tourist destination has the heritage; culture and scenic beauty to make it all irrestible (see Fig. 1.1). Travelling through the coastal stretch of Ramanathapuram and Rameswaram is almost like walking through the pages of the Ramayana. The district has a diverse coastal environment with an extremely rich biodiversity and productivity. To supplement these natural resources, there are ancient shrines, mystic bathing spots and majestic temples, which attract thousands of pilgrims. Rameswaram in Ramanathapuram district is a fascinating place, which is virtually flooded with tourists all round the year. The number of visitors to this district is quite high and their interest is increasingly oriented towards non religious tourism destinations also.

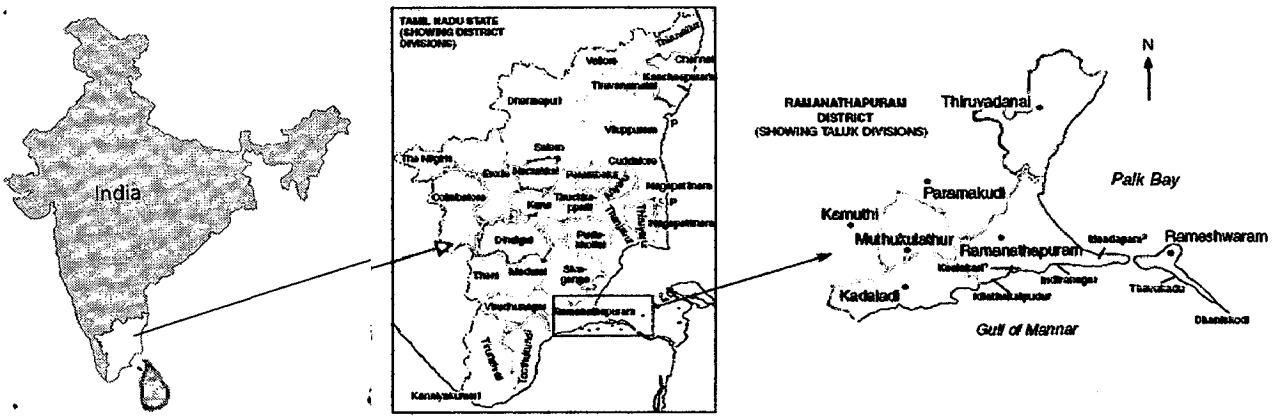


Fig 1.1: Location of Ramanathapuram District

1.1.2 The Gulf of Mannar and threats to its unique biodiversity

The Gulf of Mannar (GOM) lies along the south east coast of Ramanathapuram District between the south coast of Pamban Island (site of the holy town of Rameswaram) and Thuthukudi (Tuticorin) (see Fig. 1.2). It is the site of a Marine Biosphere Reserve, which contains 21 coral islands and harbours an array of increasingly threatened biodiversity that has been the subject of

ecological study over many years. Since mechanized boats using trawling fishing methods were introduced around 50 years ago and since populations of people dependent on fishing for their livelihoods have increased, the marine resources of the GOM biosphere reserve have come under increasing pressure. Fish, corals, sea cucumber, chanks (sacred conch shells), sea cows, marine turtles and many other resources are now declining in abundance and diversity and some species risk extinction.[5]

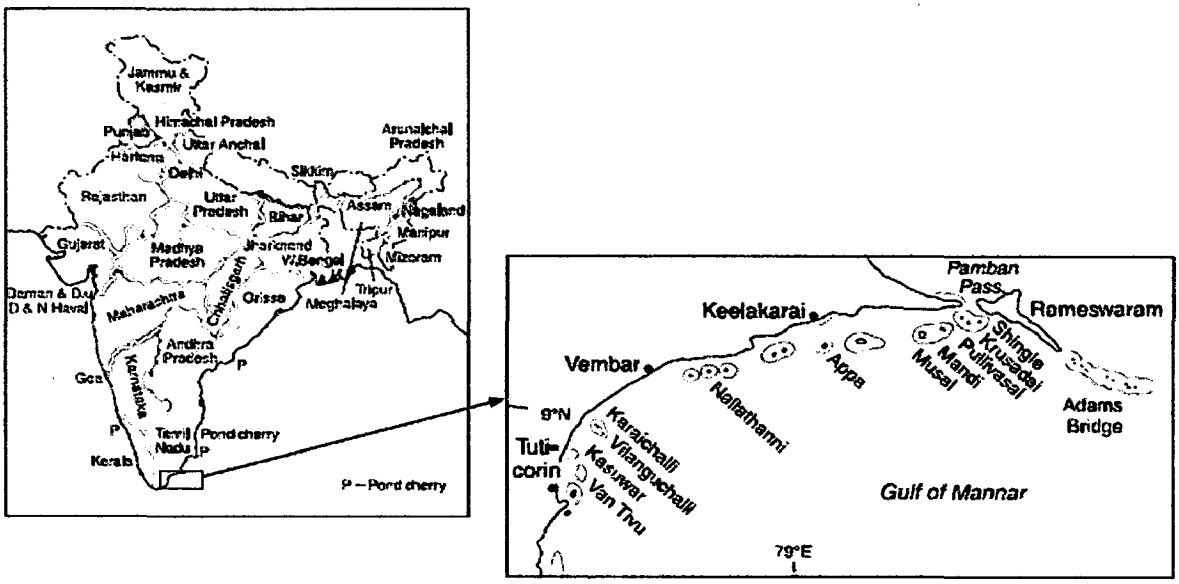


Fig. 1.2: Location of Gulf of Mannar

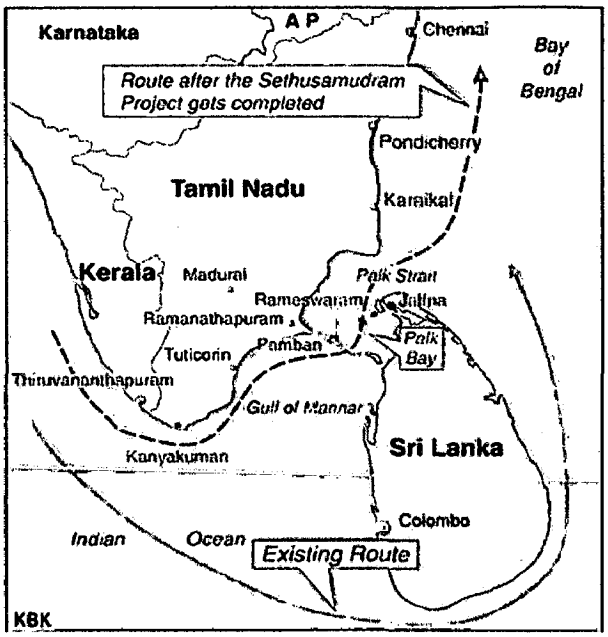
1.1.3 Work currently being undertaken in Ramanathapuram District

East Coast Road:

Upgrading and widening the existing stretches of roads along the coast in Ramanathapuram district to State highway standards has already started and will be linked with the existing East Coast Road from Cuddalore. The proposed East Coast corridor in Ramanathapuram district has great potential for tourism. Apart from this the other benefits of these developments include the proposal of Industrial developments, anticipated along the corridor, such as electronic park, integrated infrastructure development, etc. These projects will have a positive financial impact on the proposed East coast Corridor in Ramanathapuram District and specifically to the coastal region of the district. The road will thus serve the extensive needs of both passenger and goods traffic especially in the stretch between Ramanathapuram and Thuthukudi Port. [23]

Sethu Samudram Ship Channel Project:

The Sethu Samudram Ship Channel project will provide large scale employment opportunities and avenues of additional income to the coastal region through establishment of small ancillary industries in Ramanathapuram district. The project will also trigger development of coastal trade between the ports of south and north of Rameswaram consequently reducing the load and congestion on railways and roadways. (See Map 1.1)



Map 1.1: Map showing the proposed route for Sethu Samudram project

On completion of the channel, the fishing in the canal would be restricted and properly regulated under expert guidance. At the same time, the fishermen being seafarers might find increased opportunities in sea/mercantile marine-based jobs. The construction of the channel would also strengthen the security of the country and Ramanathapuram district in particular, and enhance its economic development through maritime trade and income to service industries connected to shipping. The implementation of the project would encourage many industries to come up in the districts of Ramanathapuram and Tuticorin. [23]

Considering all the problems and potentials in this district, there is an urgent need to seek alternative and supporting livelihood options for the fishing communities along the coast of the Ramanathapuram district. Sustainable tourism development is amongst the only option available coupled with other community based sustainable development projects.

Sustainability is more appropriate in the context of coastal tourism, which is an activity at the interface of people, land, and water. Though broader concerns of sustainability will be considered in this study, the focus will be on environmentally sustainable development, which benefits the local community and the long-term developmental gains which can be achieved without disturbing the coastal ecosystem.

1.2 Aim of the study

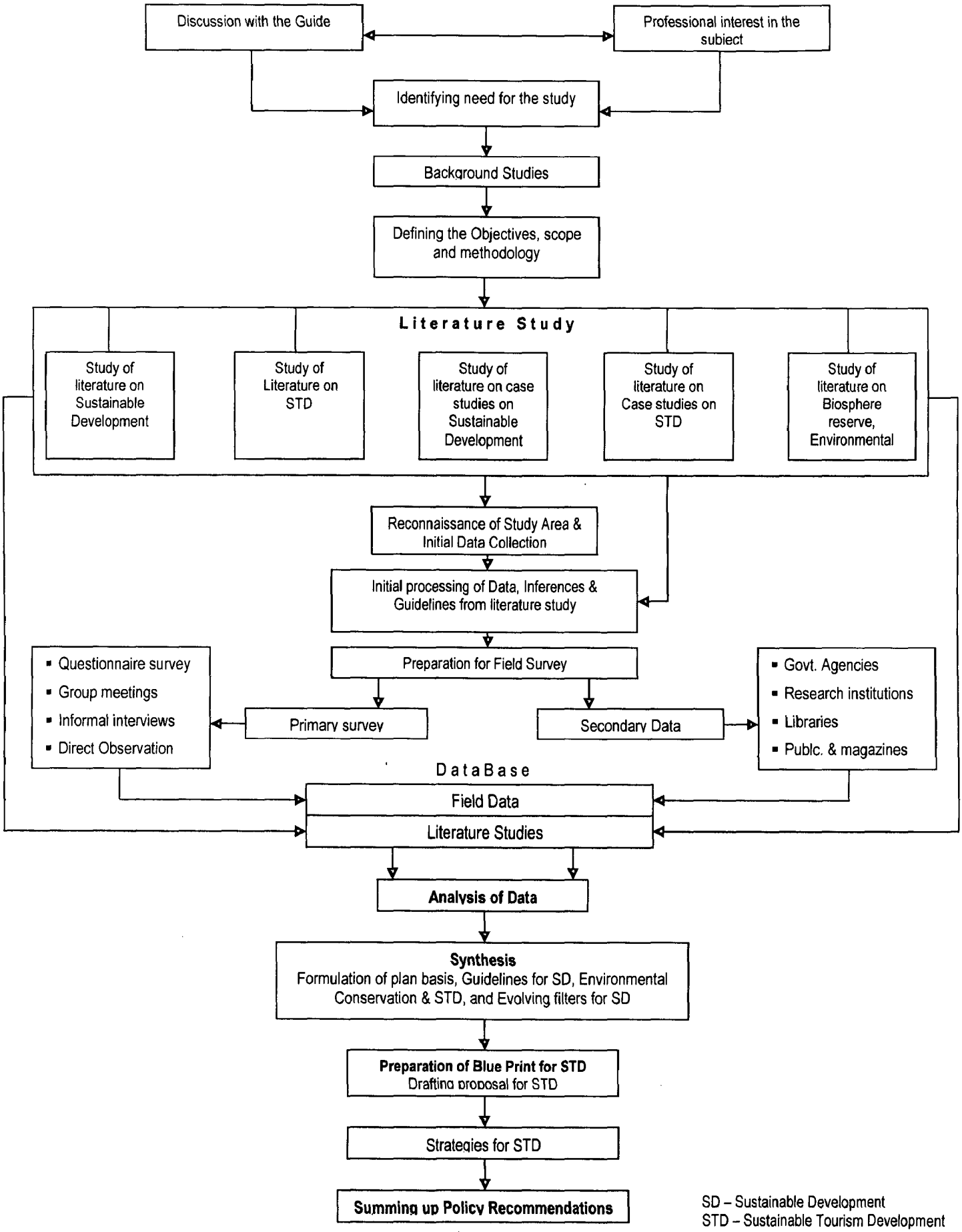
To prepare a blue print for the development of Ramanathapuram coastal region through sustainable tourism development.

1.3 Objectives of the study

1. To identify and delineate Ramanathapuram coastal region out of Ramanathapuram district, in terms of its attributes and resources.
2. To study the level of development of Ramanathapuram district in general and the coastal region in particular and analyze the development cause effect relationship.
3. To assess the tourism resources and their development potentials within environmental parameters.
4. To prepare a plan proposal for the Sustainable Development of tourism that could benefit communities and stimulate regional development.

1.4 Methodology for Studies

1. Extensive literature study to understand Sustainable Development, Sustainable Tourism Development, Case studies on Sustainable development, Case Studies on Sustainable Tourism Development, Biosphere Reserve and other environmental constrains.
2. Collection of secondary data from government agencies, from publications and institutions on census statistics, developmental work already undertaken, statistics on tourism, natural and manmade resources of the district.
3. Field surveys to gain first hand knowledge on the condition and potentials of the Coastal region, development problems, resource availability and scope of development through intensive discussions with officials, experts, informed representatives of the local population and field observation.
4. Analysis of the data through statistical methods and presentation of the analyzed data and report through various computer softwares.
5. Formulation of Plan Basis and preparation of proposals fro sustainable Development of Ramanathapuram Coastal Region.



SD – Sustainable Development
STD – Sustainable Tourism Development

1.5 Methodology Chart

1.6 Limitation/Scope of the Study

Any study of this nature aiming at preparing a comprehensive plan for the Sustainable Tourism Development in Coastal region would be limited mainly by the limitation on the availability of data. The limitation of this study is mainly on account of the non availability of the data on multifarious aspects of the environment in coastal region of Ramanathapuram. The remoteness and the backwardness status of the study area also contributed to the inaccessibility of information on various key developmental aspects, besides paucity of money, manpower and time.

Not withstanding the above limitations, a sincere attempt has been made to deal with a complex, sensitive and highly pertinent topic like this and to come out with a very satisfactory output.

1.7 Schedule of work

Month	Activities
June – July 2005 (First Survey)	• Reconnaissance of study area. • Meeting up of concerned officials in District head quarters and State head quarters. • Secondary data collection from District head quarters and State head quarters. • Gathering Tourism information from the field and concerned department.
Aug ,Sep & Oct 2005	• Literature search on Sustainable Development, Sustainable Tourism Development, Case studies on Sustainable development, Case Studies on Sustainable Tourism Development, Biosphere Reserve and other environmental constrains
Nov 2005	• Presentation for the first review of work (end of 3rd semester)
Nov – Dec 2005 (Second Survey)	• Secondary data collection from District head quarters and State head quarters. • Visit to all the well known tourist places in the District. • Visit to Central Marine and Fisheries Research Institute (CMFRI) Library. Discussions with Scientist in-charge Dr. Kaliapermal, and other scientist in CMFRI. • Interviews with Vendors / shopkeepers selling to tourists. • Visit to Sea World Aquarium in Thankachimadam, exporter of Ornamental fishes to various Indian cities, Gulf countries, etc. • Survey of coastal features in the region
Jan 2006	• Initial processing of data, Inferences & Guidelines from literature study • Digitization and preparation of district maps.
Feb 2006 (Third Survey)	• Secondary data collection from District head quarters and State head quarters. • Visit to some potential tourist spots in the district after discussing with the Tourism department, locals, auto drivers, tourist, etc. • Group discussions with fisherfolks in seven coastal villages, to access the needs of coastal communities. • Interviews with tourist guides, auto drivers and tour operators in Rameswaram.

	• Questionnaire survey in tourist spots • Visit to Mullimunai, the only village where Sea Water Desalination plant is running successfully. • Boat trip and snorkelling on coral nearby Sankumal village with fishermen's • Visit to Agar Processing Plant and Ice factory in Pamban and interacting with the members of the village. • Interviews with Hoteliers in Rameswaram
Feb – Mar 2006	• Analysis of the data through various statistical methods
March 2006	• Interim presentation
Apr – May 2006	• Preparation of district maps. • Preparation of Plan proposal for Sustainable tourism development in Ramanathapuram Coastal region • Summing up Policy Recommendations
June 2006	• Finalization of report and submission

Chapter 2

Literature Study

2.1 Sustainable Development

2.1.1 What does sustainable development mean?

The World Commission on Environment and Development used the term 'sustainable development' in its 1987 final report, 'Our Common Future', and defined it as

> *development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

The National Strategy for Ecologically Sustainable Development uses the term 'ecologically sustainable development', or ESD, which it defines as

> *development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.*

These and the many other definitions of sustainable development recognize that we need to link development and protection of the environment in order to protect and manage ecosystems and natural resources which are essential for fulfilling basic human needs and improving living standards for all.

2.1.2 Key principles of sustainability

A number of principles form the foundation of sustainability which is based on research, literature and experience of what is most practical. They are

1. *Integration* - the effective integration of environmental, social and economic considerations in decision making.
2. *Community involvement* - recognition that sustainability cannot be achieved, nor significant progress made toward it, without the support and involvement of the whole community.
3. *Precautionary behaviour* - where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
4. *Equity within and between generations* - fairness and equal access to opportunities both in our lifetimes, as well as for future generations.

5. *Continual improvement* - the declining environmental situation means there is an imperative to take immediate action to become more sustainable and to make continual improvement.
6. *Ecological integrity* - to protect biological diversity and maintain essential ecological processes and life-support systems. **[29]**

2.1.3 Tourism and sustainable development

Tourism is in a special position in the contribution it can make to sustainable development and the challenges it presents. Firstly, this is because of the dynamism and growth of the sector, and the major contribution that it makes to the economies of many countries and local destinations. Secondly, it is because tourism is an activity which involves a special relationship between consumers (visitors), the industry, the environment and local communities.

This special relationship arises because, unlike most other sectors, the consumer of tourism (the tourist) travels to the producer and the product. This leads to three important and unique aspects of the relationship between tourism and sustainable development viz. Interaction awareness and dependency.

2.2 Sustainable tourism

While tourism is welcomed almost universally for the benefits and opportunities it creates, there is a growing recognition of the need to see tourism in its environmental context, to acknowledge that tourism and the environment are interdependent, and to work to reinforce the positive relationship between tourism and the environment.

Clearly, sustainable tourism implies an approach to development aimed at balancing social and economic objectives with environmentally sound management. It is not synonymous with unlimited growth of tourism development. Although we use the phrase "sustainable tourism development", this terminology can be considered misleading because it emphasizes continued and increasing growth rather than the long-term viability or sustainability of tourism, environments, and cultures. Tourism development implies tradeoffs and, in fact, planning for sustainable tourism requires identifying possible constraints or limits for tourism development. **[28]**

2.2.1 The World Tourism Organization's definition of sustainable tourism

Sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism segments. Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability.

Achieving sustainable tourism is a continuous process and it requires constant monitoring of impacts, introducing the necessary preventive and/or corrective measures whenever necessary.

Sustainable tourism should also maintain a high level of tourist satisfaction and ensure a meaningful experience to the tourists, raising their awareness about sustainability issues and promoting sustainable tourism practices amongst them.

2.2.2 International recognition

The importance of tourism to sustainable development and of the need for tourism to integrate sustainability principles has been increasingly recognized in international fora, and echoed in policy statements, like

- The UN Commission on Sustainable Development, 7th session, 1999
- The WTO Global Code of Ethics for Tourism, 1999
- Convention on Biological Diversity, Guidelines on Biodiversity and
- Tourism Development, 2003
- Quebec Declaration on Ecotourism, 2002
- World Summit on Sustainable Development, Johannesburg, 2002

2.2.3 The imperatives of sustainable tourism

Over the last twenty years, the global community has been primed for some fundamental changes, including a search for "sustainable development" that is based on new modes of resource allocation and accounting, new attitudes toward the preservation of environmental integrity, and new ways of making decisions in all sectors. Among the imperatives that promote and enhance the vision of sustainable futures, including that of a sustainable future for tourism, are the following:

- prudent use of the earth's resources within the limits of the planet's carrying capacity;
- devolution of top-down decision-making responsibilities and capabilities to a broader range of the destination's stakeholders;
- the abatement of poverty and gender inequalities, and respect for fundamental human rights;
- enhancement of the quality of life through improved health care, shelter, nutrition, and access to education and income-generating skills;
- preservation of biodiversity and life support systems for all natural habitats; and
- preservation of indigenous knowledge and ways of living, and respect for the spiritual and cultural traditions of different people. **[8]**

2.2.4 Principles for sustainable tourism

The lists of principles provided below are important for sustainable and responsible tourism.

1. Residents of a community must be involved in tourism development by having community tourism vision, identifying the resources to be maintained and enhanced, and developing goals and strategies for tourism development and management. Equally important, community residents must participate in the implementation of strategies as well as the operation of the tourism infrastructure, services, and facilities.
2. A tourism initiative should be developed with the help of broad-based stakeholder input.
3. Tourism development must provide quality employment. Part of the process of achieving quality employment is to ensure that, as much as possible, the tourism infrastructure (hotels, restaurants, shops, etc.) is developed and managed by local people. Experience has demonstrated that the provision of education and training for local residents and access to financing for local businesses and entrepreneurs are central to this type of policy.
4. Broad-based distribution of the benefits of tourism must occur at the tourism destination. Community participation will help to ensure that a more equitable distribution of benefits will occur among residents, visitors, and other service providers.

5. Sustainable tourism development has to provide for intergenerational equity. To be fair to future generations of tourists and the travel industry, society should strive to leave a resource base no less than the one we have inherited. Sustainable tourism development must, therefore, avoid resource allocation actions that are irreversible.
6. A long-term planning horizon needs to be adopted by businesses and destination tourism organizations to ensure destination sustainability and the establishment of local linkages over time.
7. Harmony is required between the needs of a visitor, the place, and the community. This is facilitated by broad stakeholder support with a proper balance between economic, social, cultural, and human objectives, and recognition of the importance of cooperation among government, the host communities, and the tourism industry, and the non-profit organizations involved in community development and environmental protection.
8. Tourism strategies and plans must be linked with a broader set of initiatives and economic development plans.
9. A need exists for more coordination at both policy and action levels. Service provisions such as transportation, parking, and water and sewer capacities must also be considered in conjunction with tourism plans and developments.
10. Cooperation among attractions, businesses, and tourism operators is essential given that one business or operation can be directly affected by the performance or quality of another.
11. There is a definite need for impact assessment of tourism development proposals. The capacity of sites must be considered, including physical, natural, social, and cultural limits.
12. Guidelines have to be established for tourism operations, including requirements for impact assessment. There is also a need to develop indicators and threshold limits for measuring the impacts and success of local tourism ventures.
13. Tourism planning must focus on opportunities for employment, income and improved local well-being while ensuring that development decisions reflect the full value of the natural and cultural environments. The management and use of public goods such as water, air, and common lands should include accountability on behalf of the users.

14. Sustainable tourism development requires the establishment of education and training programmes to improve public understanding and enhance business, vocational and professional skills.
15. Sustainable tourism development involves promoting appropriate uses and activities that draw from and reinforce landscape character, sense of place, community identity and site opportunity.
16. The scale and type of tourism facilities must reflect the limits of acceptable use that resources can tolerate. Small-scale, low impact facilities and services should be encouraged.
17. The tourism process must also ensure that heritage and natural resources are maintained and enhanced using internationally acceptable criteria and standards. **[8]**

2.2.5 Agenda for sustainable tourism

The twelve aims for an agenda for sustainable tourism are:

1. Economic Viability: To ensure the viability and competitiveness of tourism destinations and enterprises, so that they are able to continue to prosper and deliver benefits in the long term.
2. Local Prosperity: To maximize the contribution of tourism to the economic prosperity of the host destination, including the proportion of visitor spending that is retained locally.
3. Employment Quality: To strengthen the number and quality of local jobs created and supported by tourism, including the level of pay, conditions of service and availability to all without discrimination by gender, race, disability or in other ways.
4. Social Equity: To seek a widespread and fair distribution of economic and social benefits from tourism throughout the recipient community, including improving opportunities, income and services available to the poor.
5. Visitor Fulfillment: To provide a safe, satisfying and fulfilling experience for visitors, available to all without discrimination by gender, race, disability or in other ways.
6. Local Control: To engage and empower local communities in planning and decision making about the management and future development of tourism in their area, in consultation with other stakeholders.

7. Community Wellbeing: To maintain and strengthen the quality of life in local communities, including social structures and access to resources, amenities and life support systems, avoiding any form of social degradation or exploitation.
8. Cultural Richness: To respect and enhance the historic heritage, authentic culture, traditions and distinctiveness of host communities.
9. Physical Integrity: To maintain and enhance the quality of landscapes, both urban and rural, and avoid the physical and visual degradation of the environment.
10. Biological Diversity: To support the conservation of natural areas, habitats and wildlife, and minimize damage to them.
11. Resource Efficiency: To minimize the use of scarce and non-renewable resources in the development and operation of tourism facilities and services.
12. Environmental Purity: To minimize the pollution of air, water and land and the generation of waste by tourism enterprises and visitors. **[20]**

Many of the aims relate to a combination of environmental, economic and social issues and impacts, as illustrated by Figure 2.1.

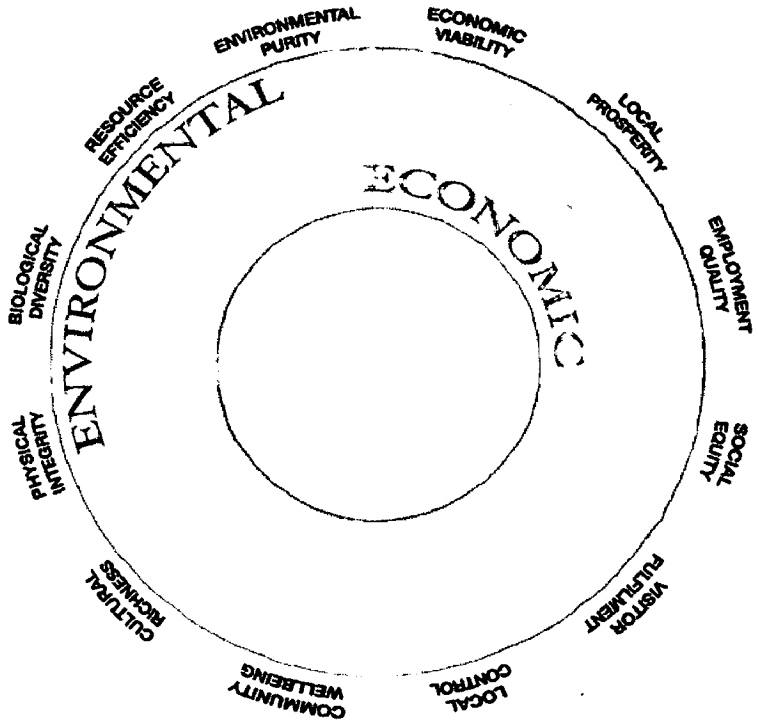


Figure 2.1: Relationship between the 12 aims and the pillars of Sustainability.
(Source: Making Tourism More Sustainable: *A Guide for Policy Makers*, UNEP& WTO, 2005)

2.3 Development of Coastal Tourism

During the past two decades, tourism in general and coastal tourism in particular experienced impressive growth in the Asian region. (Tourism sector often exceeded the regions growth in gross domestic product). This growth has generally led to the creation of additional employment, increased flows of scarce foreign exchange and improvement of infrastructure in and around coastal areas. This chapter examines the size, growth trends and contribution of tourism to the economy to give an overview of this important sector in relation to its resource base. It also delineates the categories of tourism and emphasizes the dominant role of the coastal tourism in the region. A detailed breakdown of activities related to coastal tourism follows with a schematic presentation of spatial relationship between the activities and resource zones of the coastal environment in which they are taking place. Emphasis has been placed on the care needed in undertaking activities in these zones rich in fragile resources such as mangroves, Seagrass and coral reefs.

2.3.1 Coastal Tourism Activities and Facilities

A wide range of tourist activities can be found in the coastal region. Roughly speaking, these activities can be classified into two types.

1. *Nature based activities*: Fishing, sun-bathing, swimming, sight-seeing, snorkeling, scuba-diving, etc.
2. *Man made activities*: Shopping, entertainment, etc.

Generally, the more popular and developed the coastal destinations are, the less important and dependent on the nature-based activities they are. Currently, the potential development of the coastal tourism industry relies heavily on the availability and adequate provision of recreational and support facilities. Figure 2.2 summarizes major components of tourist facilities.

Coastal tourism development includes both consumptive and non-consumptive tourist activities. Consumptive activities involve the consumption of local products and seafood in significant quantities, and may result in overfishing and eventually lead to depletion of species.

Non-consumptive activities vary from underwater photography to surface water contact activities and their impacts vary accordingly. Reef walking and

boating are such type of activities which have caused extensive damage to the coral reefs that serve a host of **[7]**

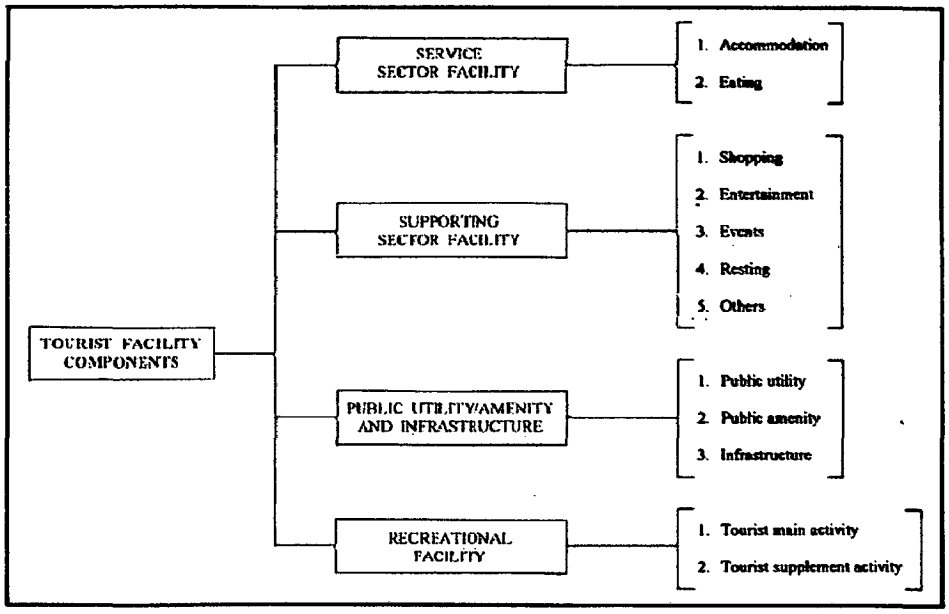


Figure 2.2: Typical Tourist Facility Components

Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism

species and varieties of marine resources. The majority of tourist activities, whether consumptive or non-consumptive, can have significant environmental effects (mostly negative) on the physical, ecological and social/cultural resources.

2.3.2 Components of coastal environment

The coastal zone is a place of rapid transition from terrestrial to marine influences. Tides and surf entering freshwater streams and shallow waters make this environment one of constantly fluctuating conditions, and many organisms living here survive at the extremes of their range of tolerance. Additional stress in this situation from tourism development activities can have particularly severe effects. The geographical feature of coastal zone can be delineated into six major coastal resource units described below

(i) ***Delta and estuaries*** are highly productive because of the nutrients brought in by freshwater and its mixing with marine waters. The dynamics of the changing shape and size of these ecosystems can be affected by inappropriate silting and uncontrolled construction and operation of tourism development projects at or adjacent to deltas and estuaries.

(ii) ***Mangrove forests*** are highly productive because of their ability to live on shallow marine flats, trap sunlight, and produce energy in the form of leaf

Table 2.1: Coastal Tourism Activities and Facilities commonly observed in the ESCAP region

Zone	Activities		Facilities /Services				
	Nature Based	Man Made	Accommodation	Eating Places	Supporting Facilities	Public Utilities/Amenities	Associated Infrastructure
Hinterland	– Sight Seeing – Trekking – Nature Studying – Camping – Bird Watching – Bicycling – Others	– Shopping – Dining – Discotheque – Entertainment – Bars – Sporting – Others	– Bungalow – Hotel – Guest house – Resort – Condominiums – Hostels – Community complex – Others	– Local shops – Hawker – Restaurant – International cuisine – Bar – Coffee shop – Others	– Shopping complex – Souvenir shops – Entertainment places – Diving shops – Tour / travel agent – Rental shops	– Water supply – Sanitation – Solid waste disposal – Electricity – Telecommunication – Road – Public transport – Others	– Drainage – Road – Airport – Railroad – Others
Beach Front / Dune	– Reading – Sun bathing – Nature studying – Picnic – Swimming – Parasailing – Yachting – Scootering – Windsurfing – Camping – Other angling	– Sporting	– Low rise bungalow	– Kiosk – Local shop – Hawker – Refreshment booth	– Bicycle – Motor cycle – Play ground – Horse riding	– Shower stand – Parking lot – Rescue tower – Marina	– Pier – Harbour
Marine	– Snorkeling – Scuba diving – Fishing – Cruising – Sight seeing – Others						

Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism

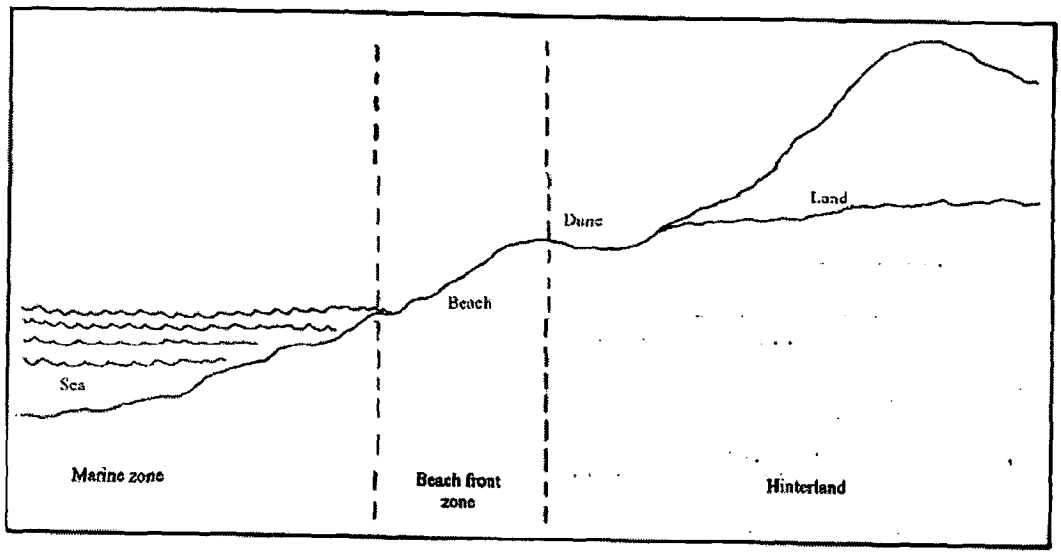
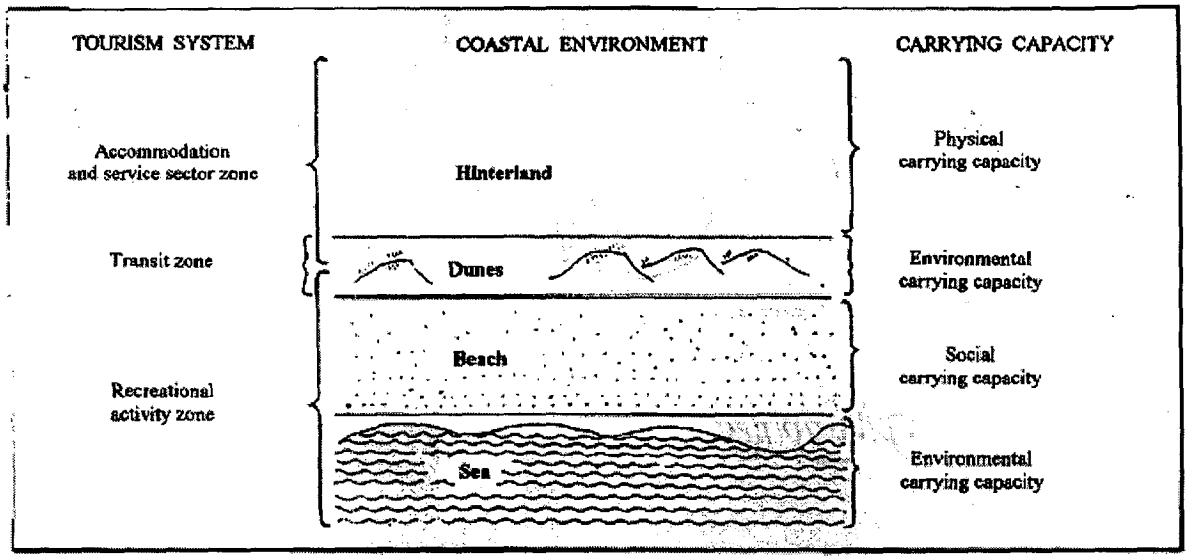


Figure 2.3: Schematic drawing showing coastal zones related to tourism development
(Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism)

2.3.4 Carrying capacity and tourism planning

An effective formulation and implementation of realistic strategy to avoid tourism pressure on environment in a locality are often based on the estimation of carrying capacity. Applied to tourism site Optimum carrying capacity is "the maximum number of tourists that can be catered for while making full use of the recreational facilities and without damaging the environment". Another definition of carrying capacity is the level of visitor's use an area can accommodate with high levels of satisfaction for visitors and few impacts on resources. The concept implies that there are limits to visitor use.

A detailed methodology for estimating carrying capacity with an Indonesian example is given in *Annex I*. The major factors in estimating carrying capacity are (a) environmental, (b) social, and (c) managerial. The formula to estimate the tourist carrying capacity of a given area, consists of dividing the area to be used by tourists by the average individual standard" (usually in m2/person) required. It would require consideration of differing types of carrying capacity - environmental, physical and social (perceptual) for each type applies and has been applied to different and often quite specific parts of the tourism system and the coastal environment. Their relationships in a typical coastal resort have been depicted schematically in figure 2.4. **[7]**



Source: D.G., Pearse, and others (1986), "Carrying capacities for coastal tourism", *UNEP Industry and Environment*, vol. 9, No. 1 (January-March 1986). (21).

Figure 2.4: Schematic representation of the spatial relationships between elements of the tourism system, the coastal environment and carrying capacity

2.3.5 Planning standards and development controls

Planning standards constitute the basic ingredients of a carrying capacity study. Planning standards may vary depending on factors such as location and quality of coastal resort, development policies of the government and existing legal framework.

Their main purpose is to provide statistical measures of assessing visitor numbers relative to the threshold levels or carrying capacity, land and building areas, infrastructural requirements, and the needs of support population and services. These parameters are the backbone of resort planning, and in formulating development proposals and physical plans for resorts.

The standards are established through building codes and other regulations. They provide for control on types of building, their location, height and density, and site characteristics. There are two categories of planning standards for resorts. The common standards which are summarized in table 2.2, and are applied to all resorts in developing accommodation, infrastructure and tourist facilities. The special standards are applicable only to specific resorts (Refer Table 2.3). These are based primarily on European and American experiences and need to be modified to suit the region's need and environment.

Table 2.2: Selected common planning standards for beach resorts

1	**Accommodation**		
	a.	Hotels	
		Economy	10 m^2 / bed
		Average	19 m^2 / bed
		Luxury	30 m^2 / bed
	b.	Seaside holiday villages	15 m^2 / bed
	c.	Apartments in beach resorts	
		Studio	36 m^2 / bed
		1 – bedroom unit	53 m^2 / bed
		2 – bedroom unit	110 m^2/ bed
2	**Infrastructure**		
	a.	Water (daily consumption per person)	
		Mediterranean resorts	200 – 3001 lit/ day
		Tropical beach resorts	500 – 10001 lit / day
	b.	Sewage disposal(no main system)	0.3 ha / 1000 persons
	c.	Access road and parking	
		Parking lots	1 per 2 – 4 bedrooms
		Overall density	5 – 15 per cent of site
3	**Tourist facilities**		
	a.	Swimming pool(resort hotel)	3 m^2 of water/ user
	b.	Open space(seaside resort)	20 – 40 m^2 / bed
	c.	shops	0.67 m^2 / bed

Source: WTO, 1981. Proceedings of the workshop on resort planning

Table 2.3: Selected special planning standards for beach resorts

1	**Beach capacity (for resort excluding facilities)**			
			M^2 / person	Person / m of coast
	a.	Low standard	10	2.0 – 5.0
	b.	Medium standard	15	1.5 – 3.5
	c.	Comfort	20	0.7 – 1.5
2	**Beach facilities**		Sanitary facilities in ratios of 5 water closets, 2 lavatory basins and 4 showers for every 500 persons	
3	**Resort Density**			
	a.	In Spain , Greece, Bali, Honolulu	60 – 100 beds / ha	
	b.	Club Mediterranean village	20 beds / ha	
4	**Marina facilities**			
	a.	Size	150 – 200 boats minimum to about 500 boats maximum	
	b.	Harbour	75 – 100 boats / ha	
	c.	Land area	100 boats/ ha for parking , boat storage, maintenance and administration	

Source: WTO, 1981. Proceedings of the workshop on resort planning

Concerning crowding or density of people, a number of carrying capacity guidelines exist to ensure a reasonable quality of experience:

- Beach: 10-15 square metres per person;
- Angling from a boat: 2 boats per hectare;
- Small boats: 2.6 per hectare;
- Sailing boats: 1-2 per hectare;
- Water-skiing: 1 boat for every 2-4 hectares;
- Low density picnicking: 40-100 people per hectare;
- Forest nature trails: 10 persons per km. (well used). **[7]**

2.3.6 Guidelines on siting of buildings, structures and associated facilities

Coastal tourism development involves development of buildings, structures and associated facilities, jetties, piers, etc. on the coast line and adjacent hinterland. Such physical developments need to be regulated, controlled and carried out with great care; otherwise, serious impacts on coastal environment will be incurred. Some guidelines on these are as follows.

1. Land development

Coastlines have great natural beauty but they are also dynamic and fragile areas. Any physical development, be it building, infrastructure or supporting facility, should therefore be carefully sited to avoid adverse impacts. For instance, buildings, parking lots, storage areas should be located inland, with aesthetics in mind, so that coastal and tidal waters should not be interrupted or otherwise altered. Illustrative guidelines have been provided in figure 2.5 (a) (b).

2. Coastal protection structures

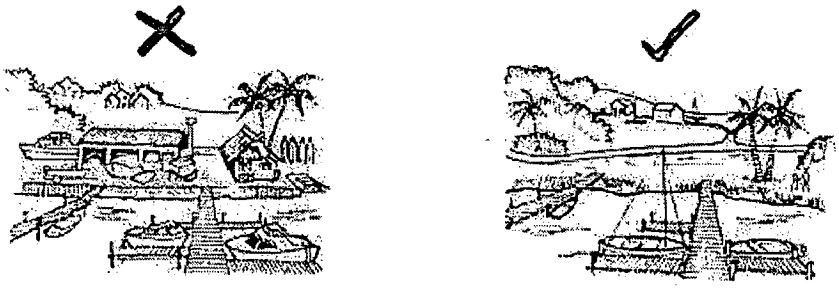
Protection structures are constructed commonly to safeguard coastal infrastructure in the event of a storm surge or to remedy sea erosion. Sea walls, for example are used to protect the shore from erosion and prevent inland flooding of beach, cliff and estuarine coastlines. Sea walls can also be self destructive as the scouring action of wave can undermine the structure and lead to its collapse (See figure 2.6). **[7]**

Siting the wall as far inland as possible will minimize its contact with water and therefore its modification of marine processes. Low angle rough surfaced permeable structures are known to cause less interference with natural processes.

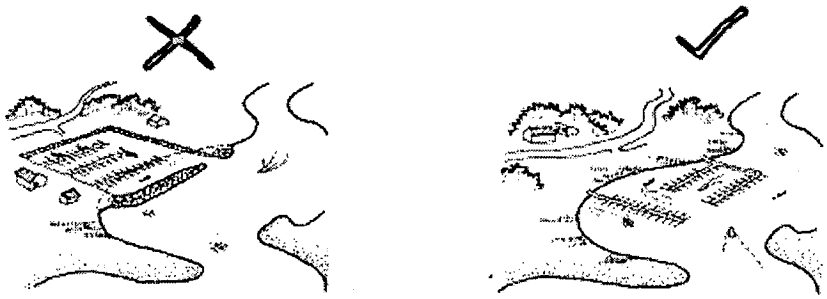
Figure 2.5(a): Illustrative guidelines as building and structure siting

(Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism)

Buildings and other types of development that do not require a COASTAL LOCATION should be inland of the coastline. Locating such development inland will keep coastal areas free for more appropriate water-related uses.



SUPPORTING FACILITIES for marinas, including buildings and storage areas, should be located inland. Locating these facilities on the shoreline occupies valuable open space, pollutes surrounding waters with storm runoff, and greatly increases the probability of serious storm damage.



MARINAS should be located in areas with steep banks and good water circulation, that provide wave and storm protection. In many cases, the natural shoreline can be largely preserved by placing boat slips farther out into the water and connecting them to the shore with wharves. This will reduce expensive dredging and bulkheading, and will preserve the shoreline for recreation and wildlife.

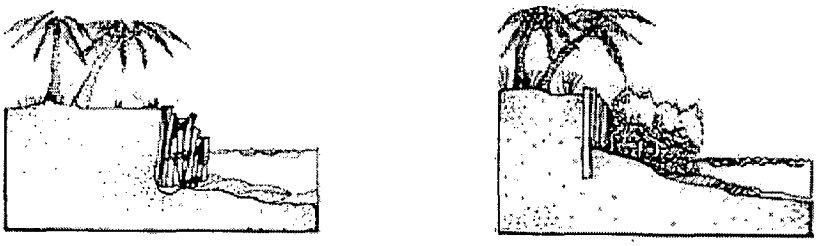
- **Proper Development of Lakefront/Coastline**

The natural quality and attractiveness of a lakefront or coastline can be destroyed by improper development. Heavy development of the immediate waterfront causes loss to most vegetation and increases danger of pollution from septic systems. Houses should be set back and clustered, with common docks and access points instead of unsightly piers.

Figure 2.5(b): Illustrative guidelines as building and structure siting

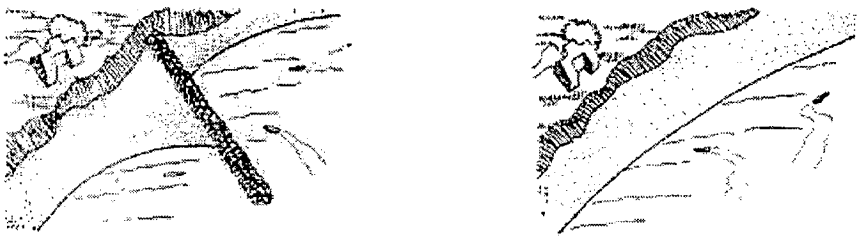
Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism

• **Avoid Bulkheading**



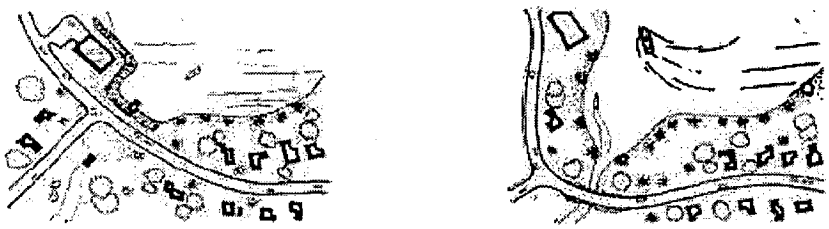
With careful planning, BULKHEADING can usually be avoided by locating development a way from eroding shorelines. If not, it may be possible to retain or establish a buffer strip of vegetation between the bulkhead and the water. This will help prevent undermining of the bulkhead and will protect wildlife habitat and increase productivity.

• **Eroding Beaches**



JETTIES, GROINS AND OTHER STRUCTURES perpendicular to the shoreline often cut off the transport of sand by wave action. Sand may build up on one side of the barrier while the beach on the other side is starved of sand and erodes away. Avoiding such structures allows natural processes to resupply eroding beaches with sand.

• **Reclamation of Coastal and Tidal Waters**



As a rule, coastal and tidal waters should not be filled or otherwise altered. Filled tidal areas are often subject to flooding and may result in erosion problems. In addition, filling alters the flow of water and sediments and destroys wildlife habitat and productive shallow areas.

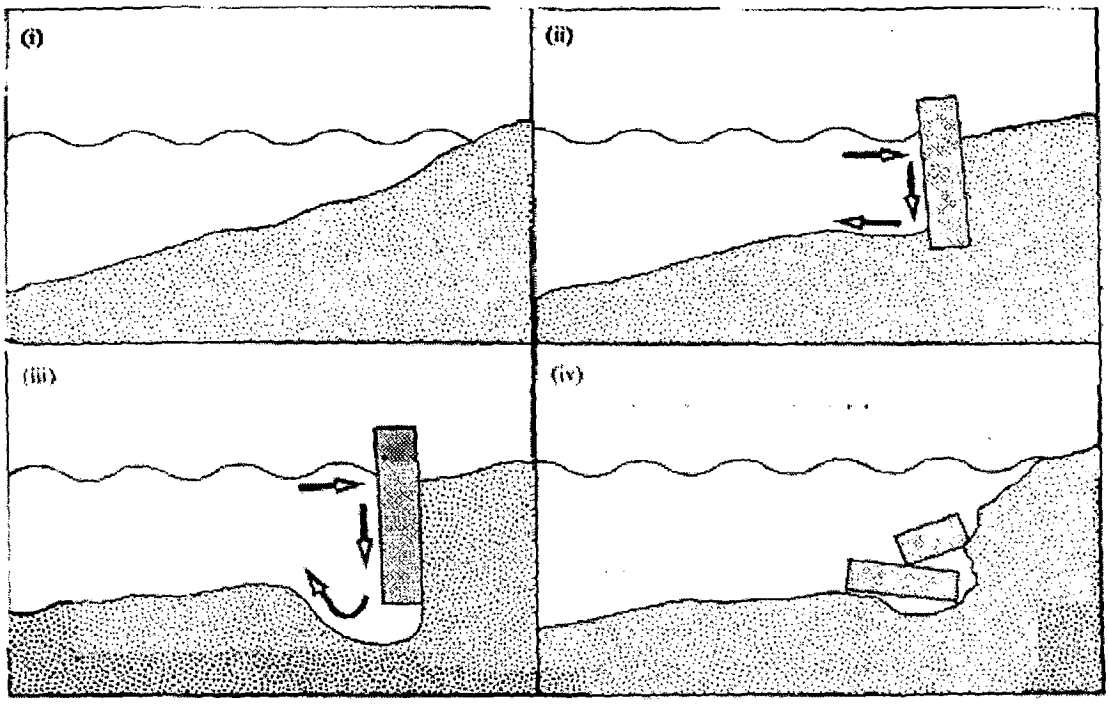


Figure 2.6: Process of undermining of sea wall by wave sources

Source: ESCAP, UN 1995. Guidelines on Environmentally sound development of coastal tourism

2.4 Coastal Zone Management

2.4.1 Indian Initiatives

Coastal environment plays a vital role in nation's economy by virtue of the resources, productive habitats and rich biodiversity. India has a coastline of about 7,500 Kms of which the mainland accounts for 5,400 Kms, Lakshadweep coasts extend to 132 Kms and Andaman & Nicobar Islands have a coastline of about 1,900 Kms. Nearly 250 million people live within a distance of 50 Kms from the coast. The coastal zone is also endowed with a very wide range of coastal ecosystems like mangroves, coral reefs, sea grasses, salt marshes, sand dunes, estuaries, lagoons, etc., which are characterized by distinct biotic and abiotic processes. The coastal areas are assuming greater importance in recent years, owing to increasing human population, urbanization and accelerated developmental activities. These anthropogenic activities have put tremendous pressure on the fragile coastal environment. The coastal areas are also the place where natural disasters are also experienced. The entire east coast of India, the

Gujarat coast along the West coast and the islands of Lakshadweep and Andaman and Nicobar face frequent cyclonic conditions which some times cause large scale destruction of life and property.

The tsunami, which occurred on 26th December, 2004 was one of the most serious and unexpected natural catastrophes to occur along the Indian coast. The major destruction caused by this tsunami was to the life and property located along the coast of Andaman and Nicobar, Tamil Nadu, Pondicherry and Kerala.

For the purpose of protecting and conserving the coastal environment the Ministry of Environment & Forests issued the Coastal Regulation Zone Notification dated 19.2.1991 under Environment (Protection) Act, 1986. This notification regulates all developmental activities in the Coastal Regulation Zone area. There has been significant degradation of coastal resources in recent years due to poorly planned developmental activities and overexploitation of natural resources. **[15]**

2.4.2 Indian Laws and Regulations

Apart from the Coastal Regulation Zone Notification, 1991 there are many legislations /Acts and rules related to coastal activities. The following are the important ones:

Indian Fisheries Act, 1897; Indian Ports Act, 1902; Merchant Shipping Act, 1974, Wildlife (Protection) Act 1972; Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981; Indian Coast Guards Act, 1974; and Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and Environment (Protection) Act 1986; The Petroleum Act, 1934; National Environment Tribunal Act, 1995; Hazardous Wastes (Management and Handling) Rules, 1989. In addition to this, India has signed and ratified several international conventions relating to oceans and related activities. Some of these are related to marine environment and applicable to coastal area also. The important ones are the following: MARPOL 1973/1978; London Dumping Convention, 1972; Convention on Civil Liability for Oil Pollution Damages (CLC 1969) and its Protocol, 1976; Fund, 1971 and its Protocol, 1979; CITES, Convention on Biodiversity, 1992 includes coastal bio-diversity also. **[23]**

2.4.3 Institutional Infrastructure

The Ministry of Environment and Forests and the Department of Ocean Development are the two nodal Departments that deal primarily on the coastal and ocean areas. In addition to this, there are several Ministries, Departments, State Government Bodies looking after several issues relevant to coastal management in this country and are listed below:

Table 2.4: Institutional Infrastructure for Coastal Zone Management in India

Department / Agencies	Responsibilities
Ministry of Agriculture	Fisheries Management, Coastal Aquaculture
Ministry of Defence(Coast Guard)	Oil Pollution, Poaching, etc.
Pollution Control Board	Coastal Pollution
Ministry of Commerce	Marine Products Development , Special Economic Zone
Ministry of Surface transport	Ports and harbours
Ministry of Tourism	Tourism Development
Ministry of Urban Development	Town and Country Planning
Ministry of Industries	Coastal industries
Ministry of Mines	Coastal and Offshore Mining
Ministry of Home	Disaster management
Ministry of Petroleum and natural Gas	Exploration and Exploitation of Oil and natural gas
Ministry of Chemicals and Fertilizers	Storage and handling of chemicals and fertilizer in the port areas.
State/Union Territory Environment Department	Coast and Marine management under Water Act, Air Act.

However, Coastal Regulation Zone Notification 1991 implemented by the ministry of environment and Forest (MoEF), is the single regulation that takes care of most of the activities in the coast. The Various activities that can be taken up in the Coastal Regulation Zone area and the locations where they can be set up based on the category of the Coastal Regulation Zone is given in Annexure II.[15]

2.4.4 CZM best practices by International agencies

The coastal zone management approach suggested by various multilateral and bilateral agencies such as:

(i) United Nations Conference on Environment and Development (AGENDA 21)

Chapter 17 deals with Protection of the Oceans, all kinds of Seas, including Enclosed and Semi-enclosed Seas, and Coastal Areas and the protection,

rational use and Development of their living resources. This chapter recommends Integrated Management and Sustainable Development including EEZ, with emphasis on marine environment protection, sustainable use & conservation of living resources and climate change. It also recommends integrated policy and decision making process for all sectors, identification of existing and

(ii) United Nation Environment Programme (UNEP) Guidelines

The guidelines state "integrated management of coastal areas is required to lay the foundation for sustainable development." ICZM guidelines are given in three main stages: initiation, planning (preparation of ICZM master plan), and plan implementation.

(iii) Organisation of Economic Cooperation and Development (OECD) Guidelines

These guidelines are the result of investigations using country information papers prepared by respondents in several countries and a survey carried out. The main stress is on ecologically sustainable development of the coastal zone. Recommendations are given for structure and processes for Integrated Coastal Management (ICM), including creation of the institutional body, generation of information, assessment of current policies, preparation of alternative plans, selection of a final plan, and monitoring and evaluation. OECD recommends multidisciplinary approach, problem solving, not problem transfer, priority on prevention rather than cure and precautionary approach.

(iv) International Union for Conservation of Nature (IUCN) Guidelines

Guidelines are provided for the development of a coastal area plan that can be applied at a national level, through a review of coastal problems and the need for Integrated Cross- Sectoral Management (ICSM). The process by which ICSM can be achieved by seven steps which include problem definition, assessment and analysis, issues and options, formulation, adoption, implementation and monitoring and evaluation. Guidelines state that the starting point of ICSM is sustainable development.

(v) World Bank

Guidelines are designed to "ensure that development and management plans for coastal zones are integrated with environmental (including social) goals and are made with the participation of those affected." Included are sections on institutional roles and responsibilities and on triggering of the need for ICZM. A

three-stage process of plan formulation, programme implementation, and monitoring, enforcement, and evaluation is recommended.

(vi) World Coast Conference Report

Guidelines stress the urgent need for coastal states to strengthen their capabilities for ICZM; and the need to develop strategies and programmes by the year 2000. ICZM is described as the most appropriate process for anticipating and responding to long-term concerns and needs while addressing the present day challenges. It is to be achieved through a planning process involving data collection and analysis, monitoring and evaluation, and an implementation process. The Principles follow the principles set out in the Rio Declaration – in particular, sustainable development and its long-term focus and the precautionary principles. **[22]**

2.4.5 Scientific Principles in Coastal Zone Management

Conflicts in coastal management are primarily because coast requires space for functioning whereas coastal space is required for various uses. In addition to this there are competitions for resources among various stakeholders. Current approaches in Coastal Zone Management are based on environment protection and conservation of resources rather than sustainable development and this is not adequate.

Coastal Zone Management based on Environmental Protection approach is defensive or remedial in practice (National Parks and Sanctuaries), relies primarily upon regulations and zoning to set limits on environmental damage and works well where Governments have the resources and will to impose regulations and it also aims towards long term preservation of ecosystem.

Specific Management Methodologies to implement Coastal Zone Management are

1. ***Zoning***

A popular management action employed as part of Integrated Planning and management is zonation. A zonation scheme aggregates activities that are appropriate to one another and segregates those that are contrary. Likewise, it ensures that areas that are able to sustain multipurpose development are identified and those for protection are covered by legislation. Therefore, areas of

coastal erosion and flood control, vulnerable areas to natural hazards, water catchments, habitat protection, and marine resources management, including fisheries, can be identified and mapped. Suitable areas for aquaculture, recreation, tourism, industrial use and sand mining can also be identified.

2. ***Vulnerability Mapping***

Most of the developed countries such as USA, UK, New Zealand have prepared the vulnerability maps of the coastal areas. The New Zealand vulnerability ma p is based on rate of erosion and flooding of coastal areas. The western coast of USA, has been mapped based on the vulnerability to natural disasters. For the purpose of demarcating vulnerability map along the western coast of USA, seven parameters have been taken into consideration, which include evaluation, geology, geomorphology, sea level trends, horizontal shoreline displacement, tidal ranges and wave heights.

All developmental activities are located based on the vulnerability map. In case of U.K., the vulnerability maps are prepared on the basis of erosion and flooding.

3. ***Setback zones***

According to shoreline setbacks or exclusion zones, certain uses are restricted within a specified distance. The benefits of setback zones are:

a. Avoidance of risks arising due to cyclone, flooding, erosion and other geomorphologic/geological events such as tsunamis.
b. Sufficient spaces for the functioning of the coast.
c. Protection of sensitive ecosystems.
d. Public access and preservation of the natural beauty of the shoreline.

Different set back zones for different activities on their impacts:

e.g.	Housing	20 m-200 mts
	Tourism	50 m-200 mts
	Non-polluting Industries	300 m-500 mts
	Polluting Industries	more than 1000 m

Different Setback Zones in different areas based on their importance:

e.g.	Critical Habitats	1000 m
	Infrastructure developed areas	200 m
	Under developed areas	500 m

Also there will be different setback zones in different areas based on their risk

Different government shave adopted, different setback zone based on developed activities, geomorphology, ecosystems etc.

Table 2.5 : Setback zones adopted by different countries

COUNTRIES	SETBACK ZONE
Denmark	1000 – 3000 m
France	100 m
Greece	500 m
India	500 m
Indonesia	50/400 m
Spain	100 – 200 m

4. *Special Area Management Plans*

Advantages of Area Specific Management Plans:

- Considers the physical settings of the coast, its resource and its developmental potentials.
- Considers the area specific issues and problems.
- Enables the participation of local uses and communities.
- CZM approach is much easier because of limited areas.
- Easy to implement and easy to correct.
- Designed for sustain able development.

The Coastal Zone Management has two Approaches:

(i) Top Down – In this approach, there is no participation of people. Decisions are made by Governments. The decisions of the public are not given due weightage.

(ii) Bottom Up – In this approach there is participation of public in planning and development. There is also provision for collaborative management through multi-stakeholder process/voluntary participation of all the parties concerned.

5. *Integrated Coastal Zone Management (ICZM)*

ICZM is a continuous and dynamic process that unites government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal systems and resources. ICZM is a unitary programme and it has to manage development and conserve natural resources and, while doing so, it has to integrate the concerns of all relevant sectors of society and of

the economy. Also, it is important that coastal economic development be generated for the people of a country, not just for those who are already rich and powerful.

The goal of the ICZM is to improve the quality of life of human communities who depend upon coastal resources while maintaining the biological diversity and productivity of coastal ecosystems. **[15]**

2.4.6 Coastal and Marine Resources – Threat & Safeguards

a) Non-Living Resources in coastal and marine areas

The non-living resources include the sand, rocks, heritage and archeological sites etc. The coastal and marine areas have a wealth of minerals resources. Some of these minerals have high economic potential such as oil and gas, monozite, rutile etc. Apart from these minerals the sand, rocks, cliffs etc. not only play a major role in maintaining the functional integrity of the coastal but also provides a substrata for the several organism. Sandy beaches are required for turtle nesting sites. There are several valuable man made and natural sites that have archeological and heritage importance. These may be of prehistoric and/or historic significance

b) Salt and Chemicals

The high temperatures and windy conditions prevailing along the coastline are congenial for several salt pan activities. The methods adopted for this activity are a simple technique where a tidal water is embanked and taken into the pans located in the along the inter tidal areas of the coastal stretch. Salt is formed in these pans by natural evaporation of the seawater .The adverse impact of the saltpan activities includes salinity ingress into groundwater, destruction of mangroves and mudflats. There is also occupational health hazards associated with this activity, since the workers in the salt pans are in constant contact with the high concentration of brine solution. This activity needs to be regulated.

c) Fresh Water

The freshwater for the coastal areas of the country mainly comes from surface water (pumped from inland sources) and ground water. Rainwater harvesting and desalination are beginning to be practiced in areas facing scarcity. Since the demand for the surface water sources are ever-increasing in the

hinterland, the sustainable source for freshwater requirement of the coastal areas is groundwater.

Two major problems are likely to be cropped up consequent to extensive ground water development in coastal areas are saltwater intrusion and land subsidence. A regulated development regime is crucial particularly, in the coastal areas due to the high vulnerability for salinity intrusions causing and permanent damage of the aquifers. Similarly, groundwater recharge schemes need to be taken in the coastal areas on a priority.

The roof water and other rainwater harvesting techniques practiced in Lakshadweep and in a few villages of Kerala, Tamil Nadu, etc., need to spread to the entire coastal belt for the sustainability of the groundwater, which should be used only in emergencies. For larger requirements, if surface water sources are inadequate, instead of depending on the traditional systems desalination schemes needs to be adopted as it is declared for Chennai. It is worth mentioning at this point that desalination has been successfully practiced by the industrial units and some localities (e.g. Naripaiyur, Ramnad in Tamil Nadu). **[15]**

2.5 A National Coastal Zone Management Action Plan

2.5.1 Objective

The objective of the coastal zone management is to protect with people's participation the livelihood security of the coastal fisher and other communities and, the ecosystems which sustain productivity of the coastal; areas while promoting sustainable development that contribute to nation's economy and prosperity.

2.5.2 Definition

Coastal zone is defined as an area from the territorial waters limit (12 nautical miles) including its sea bed upto the landward boundary of the local self government abutting the sea coast.

Coastal zone also includes inland water bodies influenced by tidal action including its bed and the adjacent land area upto the landward boundary of the local self –government abutting such water bodies. In case of ecologically sensitive areas, the entire notified area/biological boundary of the area will be included.

2.5.3 Classification

For the purpose of management, the coastal zone is divided into four:

(i) Coastal Management Zone -I (CMZ-I) – consists of areas designated as ecologically sensitive (ESA), which are listed in Annexure-II.

(ii) Coastal Management Zone -II (CMZ-II) – consists of areas identified as areas of particular concern (APC) such as economically important areas, high population areas and culturally/strategically important areas. The administrative boundaries of these areas would be boundaries of CZM-II. The list of such areas is given at Annexure-III.

(iii) Coastal Management Zone-III (CMZ-III) – consists of all other open areas including the coastal seas but excluding those areas classified as CMZ-I, CMZII and CMZ –IV.

(iv) Coastal Management Zone-IV (CMZ- IV) - consists of Islands of The Andaman and Nicobar and Lakshwadweep.

2.5.4 Management Methodology

As part of the management of the coastal zone, the following preservation, conservation and development criteria are to be followed in the zones identified above:

(i) Coastal Management Zone -I – MoEF shall identify and declare the ecologically sensitive areas falling under this zone. An indicative list of these areas is enclosed in Annexure -II. Integrated Management Plans for these sensitive areas shall be prepared by the Ministry of Environment & Forests through scientific institutions which will be implemented by the concerned States/Union Territory and monitored by the Coastal Zone Management Authority of State/Union Territory. Necessary funding will be earmarked and provided by MoEF.

(ii) Coastal Management Zone -II –Integrated Management Plans (IMP) prepared by the local bodies /concerned agencies following the guidelines which will include vulnerability status (demarcated as per the guidelines in Annexure-I). Necessary funding for the preparation of Integrated Management Plans (IMPs) will be provided by the Ministry of Environment. The guidelines for the preparation of IMPs are given in Annexure IV.

(iii) Coastal Management Zone -III - The activities to be permitted or prohibited on the seaward side of the vulnerability line and the agencies responsible are enlisted in the Annexure-V.

(iv) Coastal Management Zone -IV - The management of the Andaman and Nicobar and Lakshwadeep islands will be based on the Integrated Coastal Zone Management plan prepared by the MOEF.

2.5.5 CMZ-I: INDICATIVE LIST OF ECOLOGICALLY SENSITIVE AREAS (ESA)

(i) Mangroves

(ii) Coral reefs

(iii) Sand Dunes

(iv) Inland tide/ water bodies such as estuaries, lakes, lagoons, creeks & straits

(v) Mudflats

(vi) Marine parks and sanctuaries

(vii) Coastal forests & wildlife

(viii) Coastal fresh water lakes

(ix) Salt Marshes

(x) Turtle nesting grounds

(xi) Horse shoe crabs habitats

(xii) Seagrass beds

(xiii) Sea weed beds

(xiv) Nesting grounds of migratory birds.

Guidelines for preparation of ICZMP of CMZ-I

- The above ecologically sensitive areas will be mapped and notified by the Ministry of Environment & Forests.
- The NISCM under Ministry of Environment & Forests will prepare the ICZMP to protect the notified areas. **[15]**

2.5.6 CMZ- II: AREAS OF PARTICULAR CONCERN (CMZ II)

(i) Coastal Municipalities/Corporations

(ii) Coastal Panchayats with population density more than 400/sqkm.

(iii) Ports & harbours

(iv) Declared Tourism Areas

(v) Mining sites

(vi) Approved Industrial Estates

(vii) SEZ

(viii) Heritage areas.

(ix) Archaeological sites

(x) Defence areas/installations

(xi) Atomic/thermal/other power plants

The guidelines for the preparation of the integrated management plans for these notified areas are given in Annexure III. **[15]**

3.1 Study of Coastal Tourism Impact - South Andaman Island, India [18]

3.1.1 Introduction

The Andaman are the northern part of a chain of islands, including the Nicobars, which stretch from the northern tip of Sumatra curving in a northerly direction towards Cape Negrais in Myanmar between the Andaman Sea and the Bay of Bengal. Its total area is about 6,408 square Kms. The study is only for a part of South Andaman. It covers a total area of about 40263.94 ha. This island is endowed with a combination of ecosystems including mangroves, sea-grass, seaweeds and coral reefs.

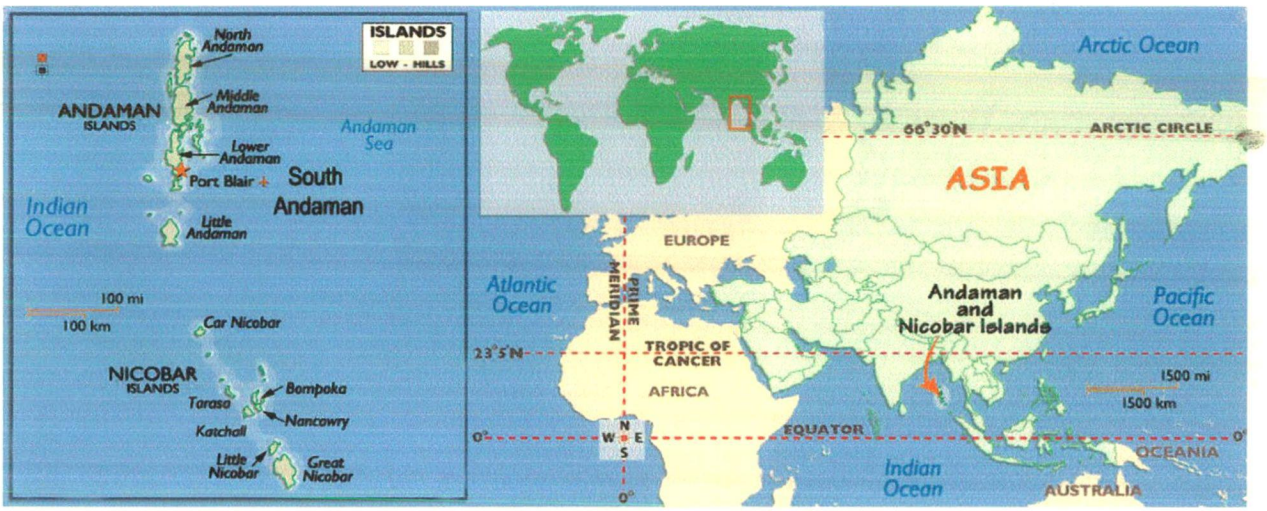


Figure 3.1: Location map of South Andaman, India
(source: www.worldatlas.com)

3.1.2 Analysis of Tourism attraction of South Andaman

The number of visitors to this island is quite high and their interest is increasingly oriented toward natural destinations. Number of tourist visiting in this island is increasing year by year (Refer Table 2.1)

3.1.3 The principal attractions in the islands

- *Beaches:* There are a limited number of sandy beaches in the Andaman especially by comparison with the Nicobar. The quality of beaches depends on their appearance and suitability for the purpose for which most tourists wish to use them, namely, sunbathing, swimming and other marine-related activities.

These beaches are most attractive because of their colorful lights, finess of grain, absence of rocks, degree of clarity, range of colors, level of wave action, less depth and gradient. Some examples are Collinpur, Cinque Island; shoal Bay, Ross/Smith Island, Corbyn's cove, Madhyban and Munda Pahad.

Table 3.1: Tourist arrival in South Andaman

Year	Domestic Tourist	Foreign Tourist	Total
1989-90	39967	2392	42359
1990-91	27997	5754	33751
1991-92	36631	1829	38460
1992-93	30197	2131	32328
1993-94	44396	2179	46575
1994-95	55975	2821	58796
1995-96	67958	5796	73754
1996-97	73358	4724	78082
1997-98	74732	4915	79647
1998-99	84112	9931	94043

- *Reefs and Corals:* The reefs of the Andaman Islands in general are of the fringing type with a series of patch reefs along the shore, particularly in embayment. These reefs and corals are attracting tourists because of suitability for diving by novices or experiences persons, suitability for snorkeling, ease of access, variety and quality of coral and marine life, strength of currents - mild or strong, maximum depth, visibility and aesthetic appeal. Some examples of tourism important places are Marine National Park, Snake Island and Ross Island.
- *Natural environment:*

  National Parks (Mahatma Gandhi Marine National Park): This park, formerly known as the Wandoor Marine National Park, with an extent of 282 square kilometers of the sea off the southwest coast of South Andaman extend from Wandoor in the north to the Twin Islands in the south and encompassing most of the western littoral of Rutland Island. It includes the island group known as the Labyrinth Islands the most important of which are Tarmugli, Redskin and Jolly Buoy. The islands are extremely popular for day excursions especially

Jolly Buoy and Redskin, which are suitable for swimming from some delightful small beaches, for safe snorkeling and for small trips in glass bottom boats.

- *Sanctuaries:* There are 91 formally declared wildlife sanctuaries in the Andaman. Species composition of bird, mammal, reptiles and plants appear to be very pretty.
- *Build Heritage*: Because it has only been significantly settled in recent times the Andaman, unlike the mainland, have no endemic architectural heritage except the few buildings left behind from colonial times.
- *Cultural Attractions:* The people of the Andaman have been drawn from many different parts of India and manifest in their festivals, rituals and celebrate the particular traditions of their antecedent states.

Results:

Coastal resources are under threat, suffering from decline and degradation due to a combination of direct and indirect impacts by tourism. The various impacts due to coastal Tourism development is summarized as follows

3.1.4 Types of threats

The current threats to the environment in the Andaman Islands are degradation of forest, quarrying of sand and gravel, discharging of pollutants at sea, erosion of beaches, sedimentation and subsequent degradation of corals and poaching activities. Tourism has both direct and indirect impacts, which is explained in table 3.2 and table 3.3.

Table 3.2: Tourism activities causing direct impacts in South Andaman's

Activities with Direct Impacts	Actual and/or Potential Impacts
Snorkeling	Physical damage (breakage, lesions)Kicking up sediment
SCUBA diving	Physical damage (breakage, lesions)
Motor boating and yachting	Physical damage from anchoring Physical damage from boat groundings
Fishing	Contribute to over-exploitation of reef fish stocks Compete with local fishers
Collecting(shells, lobsters, conch, coral)	Threatening local survival of rare species Contributing to over-exploitation and competing with local fishers

Table 3.3: Tourism activities causing indirect impacts in Andaman's

Activities with indirect Impacts		Actual and /or Potential Impacts
Resort development and construction		Increased sedimentation
Resort operation	Sewage disposal Fertilizer run off Irrigation	Nutrient enrichment
	Solid waste disposal	Leaching of toxic substances from inappropriate waste disposal Litter (especially plastics)
Seafood consumption		Over-exploitation of high-priced resource species (snapper, grouper, spiny lobster, conch)
Demand for marine curiosities		Exploitation of rare/ endangered/ vulnerable species such as shells, black coral, turtles
Construction of artificial beaches and beach replenishment		Increased sedimentation (from sand removal or from beach instability)
Airport construction or extension		Increased sedimentation from dredging and infilling
Marina construction		Increased sedimentation from dredging
Marina operation		Pollution from inappropriate disposal of oils and paint residues Pollution from fueling
Motor boating and yachting		Nutrient enrichment from sewage disposal Pollution from fueling
Cruise ships		Nutrient enrichment from illegal sewage disposal Litter from illegal or accidental solid waste disposal

3.1.5 *Land use Change*

Multi temporal satellite data used for the study, enabled to observe the land use and land cover changes (Table 3.4) in the study area from 1988 to 2003.

Table 3.4: Area of Coastal Landuse

Coastal Landuse	Area in ha. (1988)	Area in ha. (2003)
Coral reef	5054.64	3843.90
Sandy Beach	126.99	152.68
Manmade Forest	989.16	817.35
Built-up land	10645.91	13619.76
Reserve Forest	25128.01	22198.41
Mangrove Forest	3201.28	2876.28
Degraded Plantation	125.98	397.09
Degraded Mangrove	45.97	239.30

- *Reefs and Corals:* Corals are fragile formations and can be easily and irreparably damaged by the bad mooring of boats, the dragging of anchors across coral heads, inexperienced divers and snorkellers treading on them and others deliberately breaking off and collecting corals. Coral reef is decreased from 5054.64 ha. to 3843.90 ha. These changes are identified mainly in and around the tourism places particularly around Marine National park, Carbynscove and nearer to Chatham Island. In Chidiatapu and in Marine national park, dead corals are more, which are mainly due to surface runoff followed by sedimentation and inexperienced divers and snorkellers treading on them.

  The increasing population densities and rapid industrialization have also resulted in increasing discharge of sewage and effluents into the ecosystem. Oil contamination that occurs in the area, originates largely from fishing vessels.
- *Sandy Beaches*: Sandy beaches increased from 126.99 ha. to 152.68 ha., mainly in the important tourism places, particularly at Chirlyatapu, Carbyn's Cove, Ross Island and Wandoor Marine National Park. The changes are mainly due to the development of tourism activities such as resort development and deforestation.
- *Manmade forest:* Manmade forest has decreased from 9899.16ha. to 817.35ha. Most of the manmade forests have converted into settlement, plantation and agricultural land, which is due to increasing population. This has been taken place particularly around coastal track
- *Degraded plantation:* Degraded plantation has increased from 125.98 ha. to 397.09 ha. Most of the plantation area has been converted into Settlement.
- *Build – up land:* Tourist used to stay in modest concentrations to a narrow, currently undeveloped, coastal strip in a few widely dispersed locations. The buildings for accommodation and facilities will require the removal of some trees and a general thinning of the natural forest in the immediate surroundings involving a direct impact on the environment. The significance of this impact can only be measured by considering the area of land directly affected. Build up land increased from 10645.91ha. to 13619.76ha..

- *Reserve Forest:* Reserve forest has decreased from 25128.01ha. to 22198.41 ha. Many of the forestland has converted into settlement. Logging for commercial purposes is carried out by both the Department of Environment and Forest and by private companies, which are granted licenses to exploit certain timber areas. Some 1.15 lakh cubic meters of timber are logged annually. This will necessarily affect the composition of the food chain in the ecology. This logging activity creates soil erosion and increased run-off and excessive sedimentation of local watercourses causing the degradation of river and coastal flora like mangroves and the possible death of offshore corals.
- *Mangroves:* Mangroves are decreased from 3201.28ha. to 2876.28 ha. In many places mangrove have converted into settlement. Mangroves also degraded by the improper construction of road (bridge) over the creek in Wandoor and near carbynscove beach. At old Wandoor and Carbynscove, the mangroves are almost denuded completely. Besides using the land for settlement, mangroves are extensively used for fuel wood, charcoal and construction work.
- *Sea grass:* At Chidiyatapu (Forest Guest House) sea grass is moderately affected by over exploitation, boat anchoring, and forest felling and coastal tourism. The sea grass at Chidiyatapu (Fishermen jetty) is affected by low over exploitation and low boat anchoring.

Recognizing sustainable limits and adhering to some simple environmental guidelines and standards could have avoided the worst of the damage. If tourism development is to be controlled, plans have to be formulated, guidelines and standards derived, parks and reserves have to be created, and rules have to be written, implemented, and enforced by governments. It should be based on knowledge of social and environmental carrying capacity and proved methods of visitor management.

3.1.6 Inferences

Raising awareness and changing behaviors among both tourists and local tourism industry workers can often reduce impacts from tourism. The worst of the damage could have been avoided by recognizing suitable limits and adhering to some simple environmental guidelines and standards that will successfully develop tourism in sustainable manner. This will be a model for sustainable

coastal tourism and concentrate tourists in better managed large hotels and resorts outside sensitive coastal areas so their impact on resources can be more easily controlled and mitigated

3.2 Red Sea Sustainable Tourism Initiative, Egypt [9]

A comprehensive approach to coastal planning and management involving zoning of areas and the introduction or strengthening of a range of instruments to encourage developers and operators to embrace sustainability

3.2.1 Introduction

Tourism is the largest source of foreign exchange earnings for Egypt, contributing almost 12 per cent of GDP including indirect effects, though many sources estimate its share at around 15 per cent. It is one of the most dynamic sectors of the economy, generating large numbers of jobs, with at least 8 per cent of all jobs connected to tourism. Despite erratic tourism trends in the Middle East, due to the region's turbulent affairs, incoming tourists increased in number by over 20 per cent in two years, exceeding an all time record of 6 million visitors in 2004.

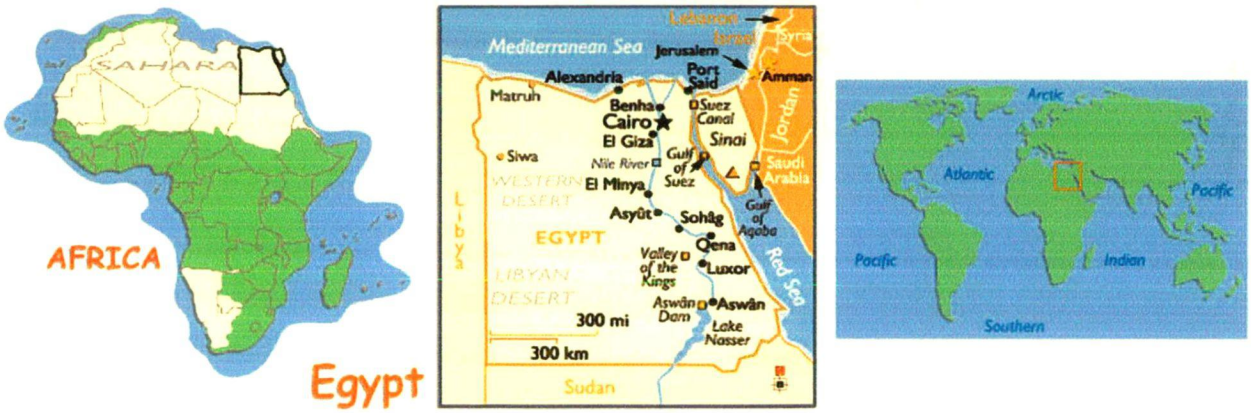


Figure 3.2: Location map of Red Sea, Egypt
(Source: www.worldatlas.com)

Antiquities provided the primary source of visitor attraction to Egypt until the early 1980s.Since then, there has been remarkable growth in tourism on the Red Sea coast, based on the appeal of the abundant marine life in the coral reef systems. The number of hotel rooms has grown from a few hundred in 1980 to almost 45 000 in 2005, attracting 2 million visitors. The Tourism Development Authority (TDA), established under the Ministry of Tourism, in 1991, has initial

plans for a four-fold increase in the number of hotel rooms, to 164 000 on the coastal land over which it has jurisdiction.

The TDA allocates large portions of land to private sector investors, who operate under contract with the TDA and who are responsible for the establishment of infrastructure, construction and operation of hotels, and the provision of community utilities for staff.

In the early years, the programme of tourism development was driven by growth targets in terms of visitor numbers and accommodation capacity. However, the TDA has now rethought its approach to embrace concerns for the environment of the destination, its overall quality and long term future. This has been assisted by the Red Sea Sustainable Tourism Initiative (RSSTI), which is based on a bi-lateral agreement between the USA and Egypt. USAID has supported the programme through technical assistance and the provision of cash transfers based on successful adoption of policy measures.

3.2.2 Land Use Management Plan and Zoning Regulations

An important component of the initiative was the preparation of a detailed plan for one of the coastal sectors. The TDA commissioned the South Marsa Alam Sector Strategic Development Plan in June 2001. The strategy considered three development alternatives: high growth (conventional/existing type) tourism development; sustainable tourism development; and low growth/ecotourism development. The study's proposed sustainable tourism alternative suggested around 15 000 rooms for the area, or the equivalent of thirty-eight 400-room hotels along a 30-kilometre coastline of which around 50 per cent consists of fringe reefs and protected areas.

The planning process for the Land Use Management Plan that followed was based on the fact that different resources have different abilities to accommodate various tourism activities. Identifying the key resources of the planning area, and those that are most sensitive, was seen as an initial step in ensuring provision of appropriate types and levels of tourist uses. The following steps for assessing the resource sensitivity and identifying the land use zoning scheme were followed:

1. Collection of data on the existing conditions for each resource as a separate Geographic Information System (GIS) layer.

2. Subdivision of the planning area into homogenous natural sub-zone/habitats by combining all natural resource layers.
3. Classification of the sub-zones/habitats based on ranges of weighted values. Sensitivity to tourism use was graded (based on the professional judgement of experts) as: low, medium, high, or very high.
4. Development of a land use zoning scheme for the different grades of natural sub-zones according to their environmental sensitivity.
5. Development of conservation, management and development regulations for the land use management zones.

A Sensitivity Map rates the most sensitive resources in terms of their resilience to the impacts of use. This illustrates an important issue: in general, the resources that the visitors want to see are often those that cannot withstand the impacts of use. The challenge for the zoning scheme was to accommodate use near or in the resources while minimizing or eliminating impacts.

Each of the proposed management zones corresponded to the different grades of sensitivity within the natural sub-zones of the Southern Red Sea Region. The following zoning scheme was proposed for the planning area: Core Zone (Absolute Reserve Areas); Buffer Zone (Restricted Wilderness Areas); Transition Zone (Ecotourism Zone); Low Intensity Development Zone (Coastal Eco-Resort Zone); and Moderate Intensity Development Zone. The Land Use Management plan listed general regulations for the management of zones identified in the zoning scheme to safeguard the area from urban expansion and ensure the best investment of environmental and cultural resources and the preservation of ecological balance.

The result led to radical changes to the regulations applied previously by the TDA, leading to serious modifications and cancellation of development plans in some zones. The new regulations govern both development and conservation activities and were approved by a tripartite committee of the TDA, the Egyptian Environmental Affairs Agency (EEAA) and the Red Sea Governorate. For the first time in Egypt, planning regulations are based on sustainability criteria that combine long-term ecological viability, long-term economic viability, ethical use of resources, equity with local communities, and compliance with EEAA guidelines and Environmental Law 4/1994.

3.2.3 Environmental impact assessment (EIA)

The EIA system in Egypt uses a listing approach to screen projects according to the possible severity of environmental impact, dividing them into those with a mandatory requirement for EIA, those where further screening is needed, and those not requiring EIA.

Responsibility for EIAs for tourism projects is divided between the TDA and EEAA, with evaluation by both. The RSSTI identified many weaknesses in the process, including:

- A lack of guidelines for tourism projects (emphasis had previously been on more polluting industries).
- Insufficient coordination between the developer, TDA and EEAA, leading to hold ups in approval and many projects going ahead without it.
- Conflicting information between TDA and EEAA on EIA compliance.
- No systematic review to ensure that mitigation measures and compliance required by the EIA are followed.

The RSSTI introduced improvements, including: a Memorandum of Understanding between the TDA and EEAA; better guidance on initial screening; and establishing an EIA tracking system to verify compliance. At the outset only 20 per cent of tourism projects were approved by EEAA prior to commencing construction. Complete compliance with EIA regulations is expected by 2006–7 as a result of implementation of these changes.

3.2.4 Environmental monitoring and management

The RSSTI has enhanced the TDA's environmental monitoring capabilities, including establishment of an Environmental Monitoring Unit within it. Protocols, procedures and checklists have been established to facilitate monitoring. An operations manual provides guidelines for monitoring of natural resources (such as coral reefs) and tourism facilities (such as marinas). The baseline data collection and recording process, using GIS, has been designed to enable assessment of the cumulative impacts of TDA facilities over time.

The TDA will encourage developers and operators to implement best practices in environmental management, while monitoring progress in order to adjust TDA promotional policies. This process has been assisted by studies, within the RSSTI, of best practices in the field and by the production of best

practice manuals for key issues such as solid waste management, landscape architecture, planting, water and sanitation, energy efficiency, and environmental management for resorts.

These manuals highlight for developers and consultants the many issues to be considered at each phase of development (planning, design and construction) and operation. A Red Sea Planting Encyclopedia interactive CD has been produced to allow professionals to select the types of plants to be used according to functional and environmental criteria. Environmental Management Systems (EMS) have been designed for integrated resorts. The EMS programme includes stakeholder training courses and certification for hotel environmental officers. A number of hotels and resorts have proceeded to recognition through the Green Globe certification programme.

Economic instruments

Although regulations have been drawn up, the TDA's policy in dealing with developers is to encourage rather than discourage, provide incentives rather than penalize, and guide rather than command. To this end, a set of economic instruments has been developed, including:

- Use of environmental criteria in the competitive land award process.
- Customs duty exemption and preferential financing for clean technologies.
- Promotion of environmental certification and awards of excellence.
- TDA criteria, standards and incentives for solid waste management.

3.2.5 Ecotourism development

There is considerable interest in ecotourism in Egypt, as a means of diversifying the tourism offer, attracting a growing market and satisfying conservation objectives. Part of the southern coast, the Wadi El Gemal-Hamata area, was declared as a protected area in 2003. It contains important ancient mining sites, dwindling Bedouin populations and a host of rare and endangered plant and animal species. As part of the RSSTI, careful research and mapping was undertaken of the cultural and natural resources, and a study was produced of the ecotourism potential of the area. Challenges include creating appropriately designed facilities and delivering a safe recreational experience in harsh environmental conditions.

3.2.6 Inference

The three factors important for the success of the RSSTI are:

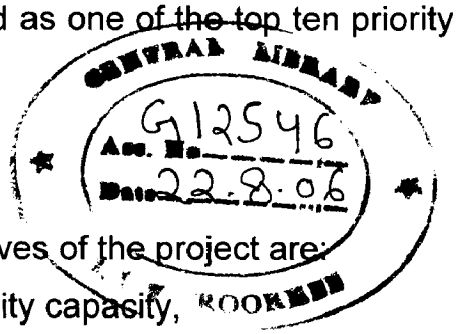
- The value of experience from elsewhere. The technical assistance and support programme provided an impetus to consider alternative strategies and adopt a new, more sustainable approach. This was helped by a series of study tours to observe good practice in other countries and international conferences held in Egypt.
- The need for harmonization between plans for tourism development and protected areas. The bringing together of the TDA and EEAA on planning and other measures was vitally important.
- The value of objective information. The concept of sustainable tourism only became a reality after extensive data collection, analysis and concrete recommendations were made. This provided extensive insight into a largely unknown area and was important in order to reach agreement on zoning regulations.

3.3 Miso Walai Homestay Programme in Sabah, Malaysia [27]

Model of ecological sustainable community tourism development

3.3.1 Introduction

The project Miso Walai Home stay Programme involves four villages in Lower Kinabatangan, Sabah, a state in the eastern part of Malaysia and started in 1998 with funding from the World Wildlife Fund (WWF) of Malaysia and Norway and Discovery Channel Television. The area is within Malaysia's largest river floodplain, which is the habitat of many rare and endangered wildlife species. The area was listed as one of the top ten priority sites in the Ecotourism Plan for Malaysia.



3.3.2 Objectives

The four main objectives of the project are:

1. Building community capacity,
2. Improving the local economy,
3. Conserving the environment and creating greater environmental awareness and
4. Cooperation and partnership at both the community and project level.

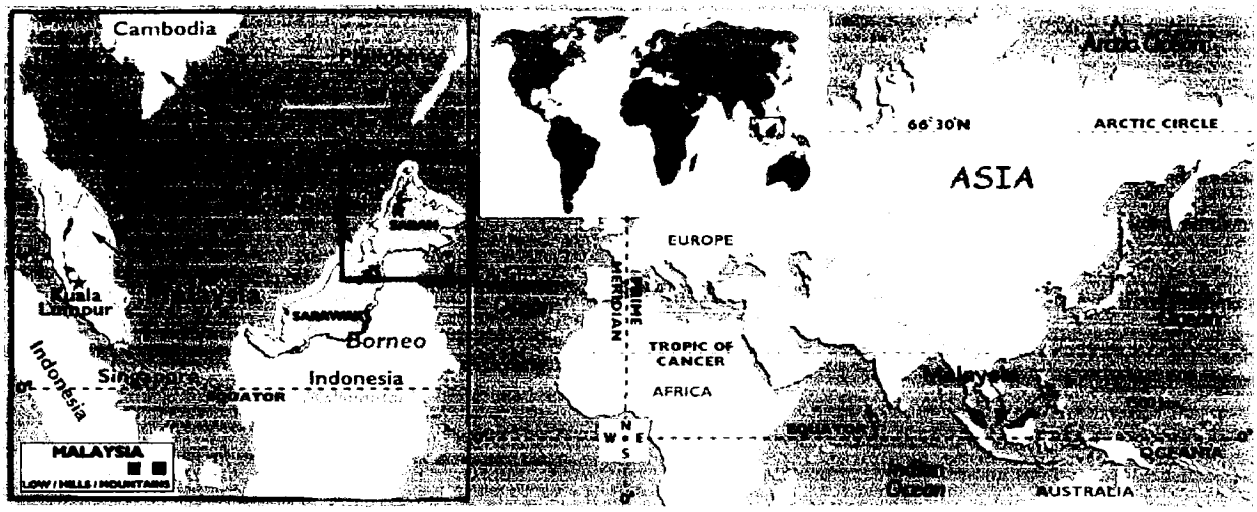


Figure 3.2: Location map of Sabah, Malaysia
(source: www.worldatlas.com)

3.3.3 Methodology

The project's methodology is based on bottom-up planning with the communities to ensure information transfer to enable local people to fully participate in the planning process and building community capacity to have the necessary skills for sustainable, effective implementation.

Awareness about the environment and intensive training for income-generating activities related to ecotourism comprised capacity building of the communities. This included creating skills for handicraft production, training for guides and providing the business fundamentals needed to operate home stay services, boat service and other ecotourism-related activities. The local economy was improved by providing alternative income-generating activities related to ecotourism. In addition, community tourism associations were set up to operate the home stay, boat service and handicraft product development.

Environmental conservation and awareness are part of an ongoing campaign, which involves use of best practice ecotourism codes for all activities, including plans to create an Eco Resort using only natural, renewable resources. The campaign extends to village landscaping and cleaning up litter, rehabilitation of the forest area near the villages and monitoring illegal logging activities.

Cooperation and partnership involve a variety of stakeholders, including members of MESCOT (Model of Ecological Sustainable Community Tourism), WWF, the State Department of Tourism (Sabah), the Ministry of Culture, Arts and Tourism (federal government), Sabah Forestry Department, the Community Development Agency, the district office and local and foreign tour operators. The

Sabah Forestry Department has highlighted the objectives of the project in relation to forestry issues and made a long-term commitment to support community-based ecotourism. Reports about the progress of the project have been disseminated and various travel trade enterprises have been interested to pilot similar trial ecotourism programmes. Other local stakeholders have asked for MESCOT to cooperate in efforts at recovering plantations and reforestation. Various interested groups have visited the villages on familiarization tours to give recognition and support to the project.

Total revenue earned from the home stay services, the boat service, handicraft sales and related activities during the first six months of operation have been significant for the communities, given the low economic base before the project. The benefits to the communities have encouraged local people that the project will be able to grow in the future. It is important to keep in mind, however, that community-based tourism must necessarily be a small-scale project designed to benefit local communities while being sustainable and sensitive to the environment.

3.3.4 Inferences

Problems have been encountered at the community level before there was any awareness that sustainable ecotourism development could generate benefits. Greater awareness about the importance of forest conservation and maintaining a commitment to conservation had to be created in a social context that was suspicious of such ideas. Transparency in all project decisions and activities, maximum efforts to encourage the widest participation and the principle of fair sharing of benefits have helped to overcome local suspicions. It has been reported that the community still needs to develop more skills and experience in order to take over the general community operations of the project. Social, economic and environmental benefits have been created, but they need to be increased in order to employ a full time coordinator and to operate as a successful, sustainable community ecotourism enterprise.

Plans for the future include development of the Eco Resort, ongoing work to strengthen community capacity and continued growth at a steady, sustainable pace. The process leading to full takeover by the community may involve creation of an umbrella group to act as a cooperative for the community tourism associations. The cooperative could hire a full time coordinator to help oversee

development, promotion and marketing of all tourism products offered by the community tourism associations. In this way, a quality ecotourism experience that retains cultural values of the communities and shows a commitment to environmental conservation will help assure the future success of the Miso Walai Home stay programme in Sabah state.

Chapter 4

Ramanathapuram Coastal Region

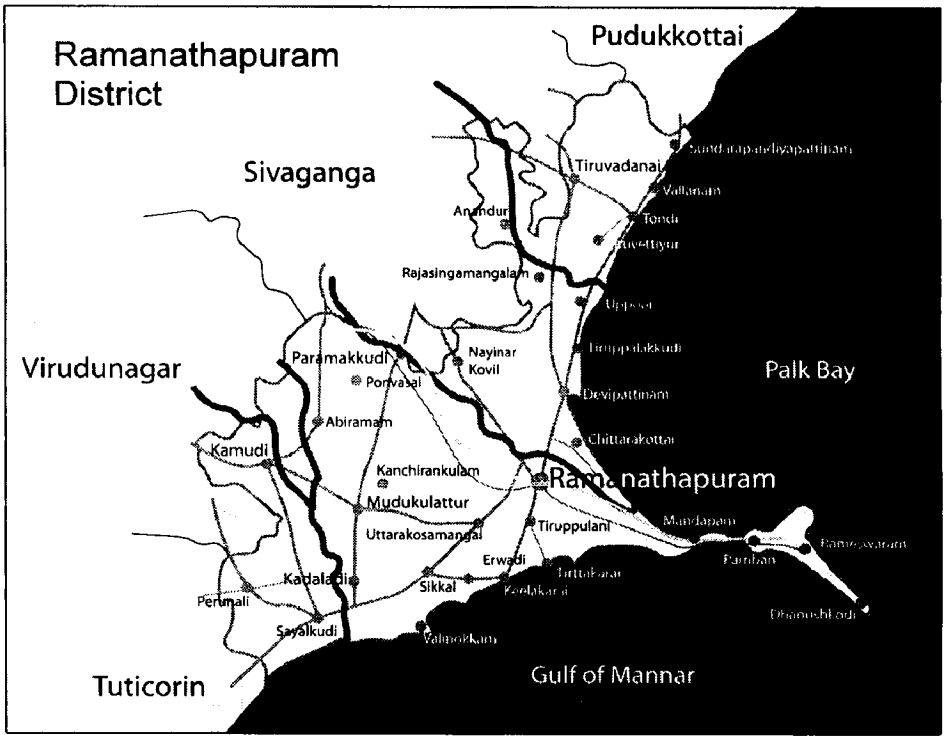
4.1 Ramanathapuram District - Background

In 1910 AD, Ramanathapuram was formed by clubbing portions from Madurai and Tirunelveli district by the British. The district was named as Ramanathapuram after the name of the important Zamindari town, Ramanathapuram. During the British period, this district was called 'Ramnad' and this name continued to for some time even after independence. Later, the district was renamed as Ramanathapuram to be in conformity with the state language. In the year 1985 the district of Ramanathapuram was trifurcated forming three separate districts i.e. Ramanathapuram, Sivagangai and Kamarajar districts. The present Ramanathapuram District thus retains the old name Ramanathapuram.

The Ramanathapuram district occupies a prominent place in the cultural heritage and history of India. The famous pilgrim centre of Rameswaram depicted in the Ramayana scriptures is situated on Pamban Island at the eastern end of the district. The coastline and mainland of Ramanathapuram district are also associated with places and events mentioned in the Ramayana (e.g. Tiruppullani, Devipattinam, Darbasayanam). Thousands of pilgrims are attracted to Ramanathapuram district and Rameswaram every day from all over India. **[25]**

4.1.1 Location of Ramanathapuram District

Ramanathapuram District is one of the drought prone coastal districts of Tamil Nadu state situated between the following co-ordinates - Latitude: 09 06' 00" – 09 54' 00", Longitude: 78 13' 00" – 79 26' 00" and spanning over an area of 4217.73 sq.km. It is bounded on the north by Sivagangai district, on the northeast by Pudukottai district, on the east by the Palk Strait, on the south by the Gulf of Mannar, on the west by Thoothukudi district, and on the northwest by Virudhunagar district (see map 4.1 & map1.1 for location). The total population of the district is 11, 83,321. The district headquarters is located at Ramanathapuram. A vast majority people are engaged in agricultural activities. Hinduism is the religion of about 85% of people the district. Islam the next largest religion has



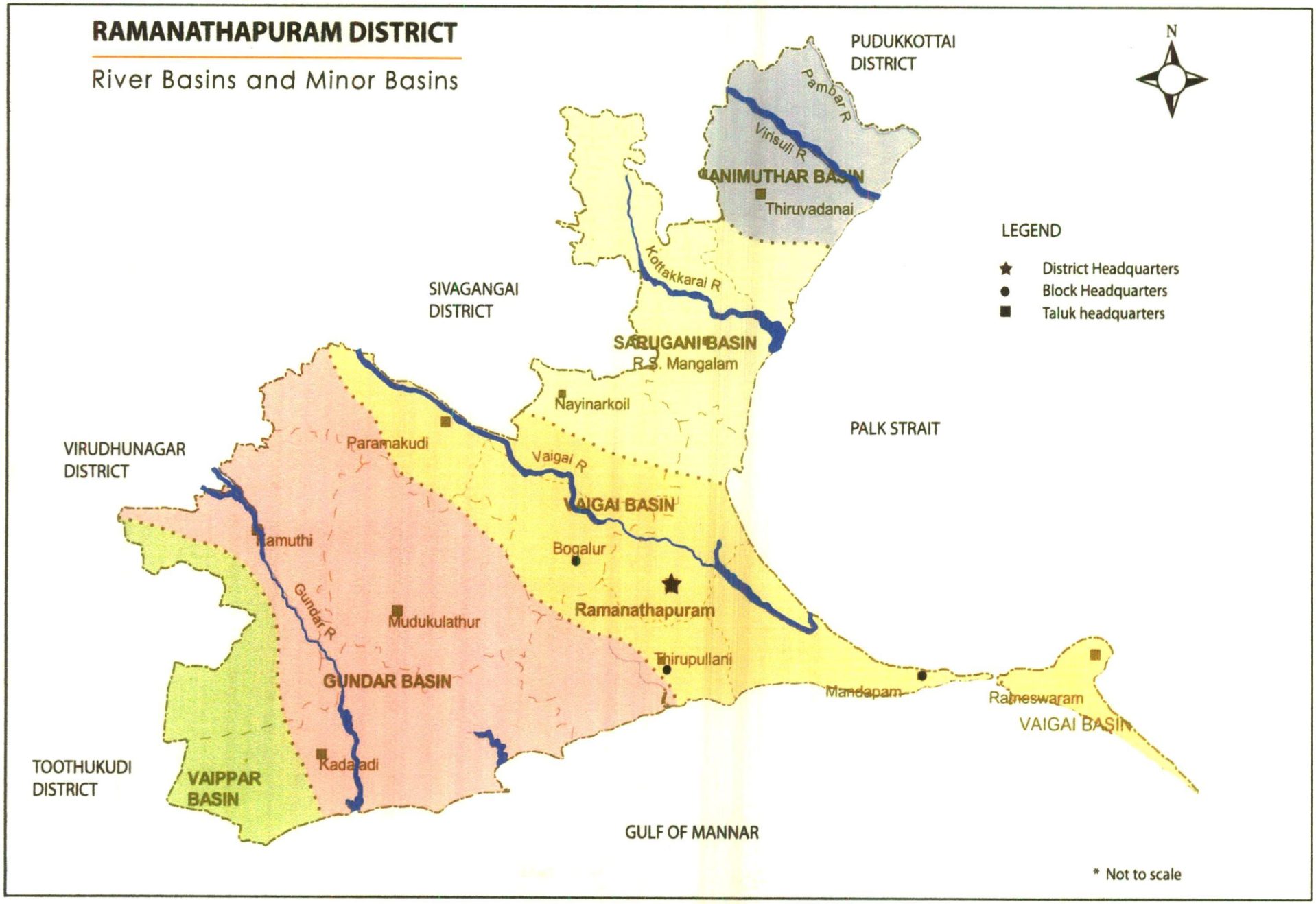
Map 4.1: Map of Ramanathapuram District
Source: Prepared by the Author

10% followers and Christianity being followed by 5% of the population. About 90% of the population speaks Tamil.

Low infrastructural facilities, marginality of agricultural land holdings, saline nature of ground water, frequent chronic drought and flood, economical backwardness, migration, high rate of illiteracy, communal riots are the notable characteristics of this district. **[4]**

4.1.2 Accessibility to Ramanathapuram

The nearest airport is at Madurai which is 112 km from Ramanathapuram. Daily flights from Chennai and Mumbai are operated by Indian Airlines and Jet Airways. The district is served by the metre gauge section of the Southern Railway. The main line from Chennai Egmore to Rameswaram runs through the district linking Karaikudi and Manamadurai of the adjoining district. Rameswaram is a railway terminus. The district is connected by the National Highway. NH 49, Madurai-Dhanushkodi road, connects Manamadurai, Paramakudi, and Ramanathapuram. The NH 210 connects Devipattinam and Chennai. The East Coast Road, currently under construction, will reduce the distance to Chennai by 100 km. Bus connectivity/services at frequent intervals are available from



Map 4.2: River basins and Minor basins in Ramanathapuram District

Source: Redrawn by the Author

Madurai, Trichy and Karaikudi. Tourist buses are operated between Chennai and Rameswaram.

There is no major shipping transport in his district. A small port at Rameswaram was having a ferry service to Talaimannar, situated in the north of Sri Lanka. This service is not operated now. Keelakarai port lost its importance in sea transport with the development of railway line to Tuticorin and the opening of the Pamban-Madurai line.

4.1.3 Physiography of Ramanathapuram District

Physiographically the entire district stretches out as at extensive plain forming a part of the vast coastal plain of Tamil Nadu (see map 4.2). It forms a part of Vaigai and Gundar river basins and is drained by the rivers Vaigai, Gundar, Kottakarai and their distributaries. There are seasonal rivers named as Sarugani river, Manimuthar river, Vaigai River and Vaippar river etc. Based on the drainage pattern, the river basins are classified and the details are given in table 4.1. **[6]**

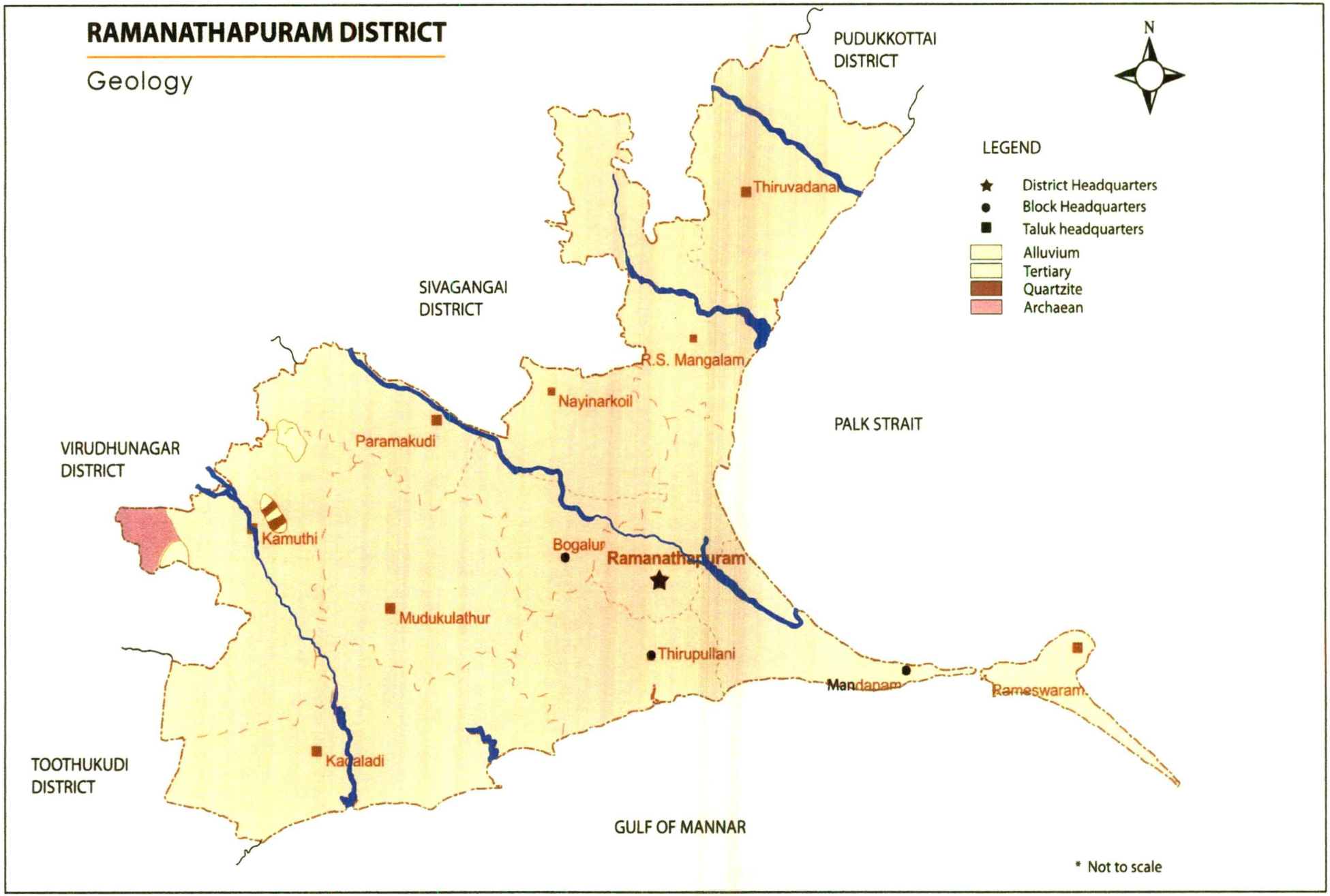
Table 4.1: River Basins and Minor Basins

Name of River basin	Area in ha.	Name of Minor basin	Area in ha.
Manimuthar	38970	Virusuliaru	38970
Kottakaraiyar	74292	Saruganiaru	74292
Vaigai	96088	Vaigai River	96088
Gundar	162203	Gundar Gridhamal	135671 26532
Vaippar	28356	Arjuna	28356
Rameswaram Island	9048	Rameswaram Island	9048
Total	**408957**		**408957**

Source: State Ground and Surface Water Resources Data Centre, Chennai

4.1.4 Geology and Geomorphology

Geologically the entire district is comprised of sedimentary formations of alluvium, tertiary except 1 % of hard rock formations of Quartzite and Gneissic formations (see map 4.3 & 4.4) .Quaternary deposits occur at the top and they range in thickness from 30 m to 160 m from west to east. They consist of sand, silt, clay, calcareous sandstone and fossiliferous sandstone etc (refer table 4.2).



Map 4.3: Geology of Ramanathapuram District

Source: Redrawn by the Author

Table 4.2: Geologic succession of the district

Quaternary	Alluvium, Coastal alluvium, River alluvium followed by alternate layers of sand, sandstone & clay etc
Tertiary	Laterite, Sandstone, mottled clay etc.
Cretaceous	Limestone
Unconformity	
Precambrian (Archaean)	Gneissic rock

Source: State Ground and Surface Water Resources Data Centre, Chennai

4.1.5 Natural resources

a) Mineral Resources

The eastern portion of the district consists of rocks formed in beds of shallow lakes and coastal backwaters where the salt and mud brought by the rivers are deposited. The sedimentary rocks extend into the whole of Tiruvadanai, Ramanathapuram and Mudukulathur taluks. These sediments, mostly of clay and sandstone, have been deposited for several million years from what is known in types of clays geological parlance as Gondwana age, to the present day. They contain limestone's. Limestone of different grades, clays, euchres, gypsum, graphite and Limonite sands are the minerals of economic value found in the district.

Minerals – Clay: China clay with an average thickness of 0.91 mm. occurs over an area of 2.59 Sq. Km. in Sivagangai area. The total estimated reserve area of the order of 4.06 million tonnes upto a depth of 3.05 mm.

Garnet and ilemenite sands – The beach sands along the coast of Ramanathapuram district carry small quantities of garnet and ilemenite ranging in length from a few meters to 8 Km. and in thickness from 0.6 to 2.5 cm. The total reserves of ilmenite and garnet are 4165 and 1219 tonnes respectively.

Graphite – Graphite bearing zones have been met between 3m and 32m at several horizons in the boreholes. The percentage of graphite in the rock varies from 18 to 23. The graphite bearing zone has been proved along the strike direction for a distance of 2000m. The total preliminary estimated reserves are of the order of 1, 80,000 tonnes of graphite bearing rock.

Gypsum – The total reserves of this area are estimated to be of 33,500 tonnes of which about 10,000 tonnes have already been mined.

Limeshell – Sub-Recent shell limestone occurs at about 0.8 Km. north of Ramanathapuram. The total reserves are of the order of 81,300 tonnes. **[2]**

b) Water Resource

- **Rivers, Canals & Waterways**

The existence of over 5000 number of tanks in the district makes it known as the lake district of the state. Vaigai river starting in Gandamanaickanur hills of Madurai district traverse through Paramakudi and Ramanathapuram taluks in a south-easterly direction feeding a large number of tanks. It joins the sea near Athangarai. There are no perennial rivers in Ramanathapuram district. The only river of importance is Vaigai. The Gundar in the eastern slopes of the Varushanadu and Andipatty ranges above Watrap flows through Aruppukkottai and empties into the Gulf of Mannar. The river assumes the name of Reghunatha Cauvery from Kamuthi.

- **Ground Water Availability**

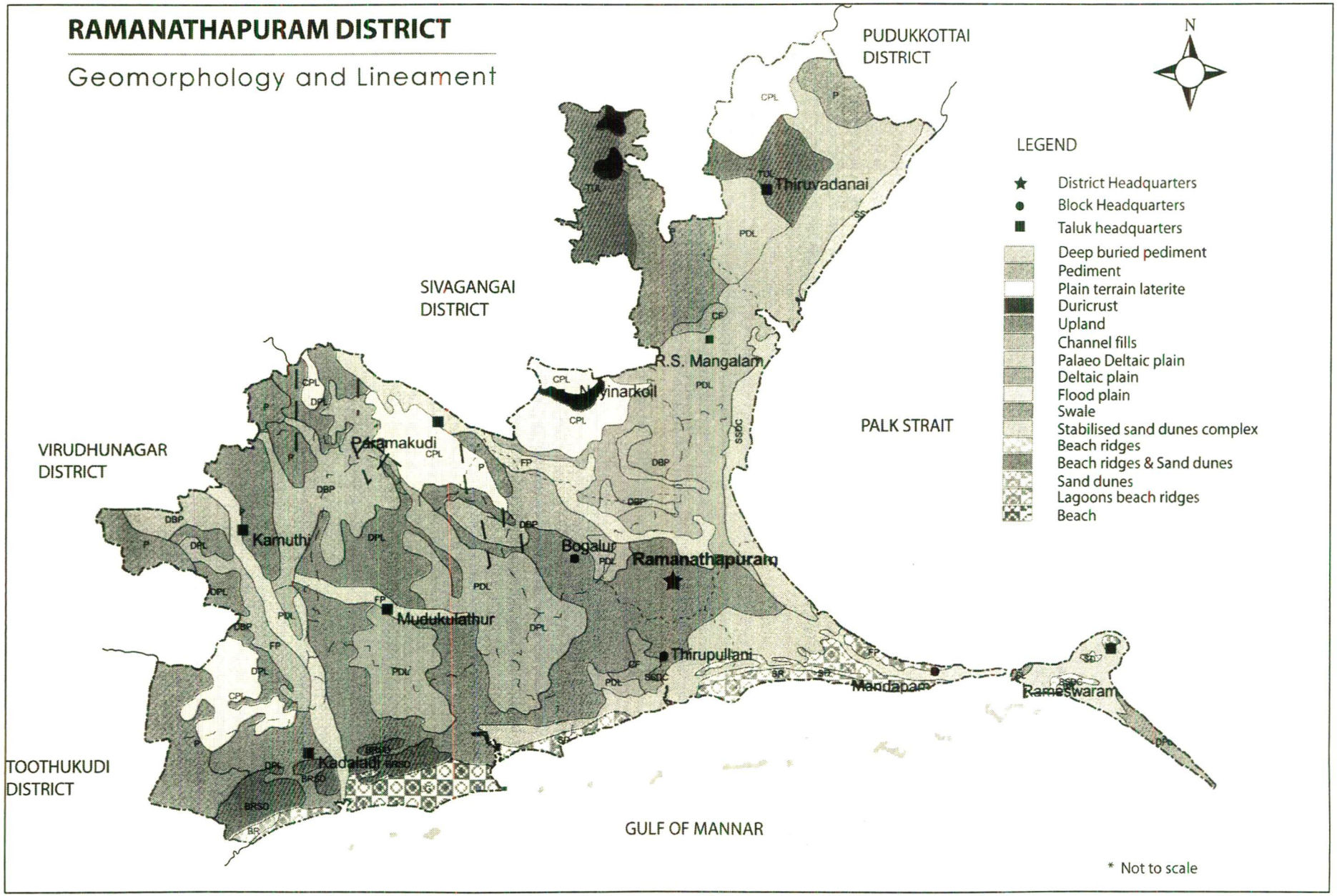
In most places Ground water is available at a depth beyond 6 to 7m is saline. The fresh water available within 6 to 7 m depths dries up quickly within 2 to 3 months after monsoon. There is acute drinking water shortage felt in most part of the year. Hydrogeologically the district can be classified as Omtofoir zones as detailed below:

The main river that flows through the District is Vaigai and a small Gundar the tributaries are Gridhamal and Sarugani. There are 8 reservoirs, 511PWD Tanks and 1695 other Small Tanks. When they are full, they can irrigate a total of 65508 hectares of land.

As per recent report of satellite remote sensing programme, there are few buried canals in Ramnad district with lot of under ground water potential with natural recharge facilities. There are a large no. of ooranies, to supply drinking water for the villages. There are 10698 wells and 437 tube wells in this district.

- **Irrigation by Surface and Ground Water:**

Since time immemorial, the largest users of all available water resources are the agriculturist through minor irrigation sources. Rapid progress has been made, particularly after independence, in the irrigation sector, by construction of major and medium reservoirs as well as by development of large number of wells



Map 4.4: Geomorphology and Lineament of Ramanathapuram District

Source: Redrawn by the Author

Irrigation of surface water:

In this district, 1694 tanks serve as the main sources for irrigation. The total ayacut area under surface water irrigation is 60032 hectares. Of the 1694 tanks, Tiruvadanai taluk accounts for 514 tanks, followed by Paramakudi taluk (328), Kamuthi taluk (256), Mudukulathur taluk (194), Kadaladi taluk (241), and Ramanathapuram taluk (161). Surface water irrigation sources play a predominant role when compared to groundwater sources in these taluks. The details of minor irrigation sources (surface water) in this district are furnished in Table 4.3.

Table 4.3: Irrigation Sources (1998 – 1999)

Sl. No.	Name of the Block	Gross area irrigated by Number of irrigation sources				Total	Percentage of tank in each block to the district total
		Canals	Reservoirs	Tank			
				With ayacut of 40 hec. & above	With ayacut of less than 40 hec.		
01	Ramanathapuram	-	-	33	47	80	5
02	Tiruppullani	-	-	23	56	79	4
03	Mandapam	-	-	1	1	2	-
04	Tiruvadanai	-	-	77	220	297	8
05	R.S.Mangalam	-	-	64	153	217	13
06	Paramakudi	-	-	49	92	141	8
07	Bogalur	-	-	33	54	87	5
08	Nainarkovil	-	-	45	55	100	6
09	Kamuthi	-	-	38	216	256	15
10	Mudukulathur	-	-	40	154	194	12
11	Kadaladi	-	-	74	167	241	14
	Total	-	-	477	1217	1694	100

Source: Department of statistics, Chennai

Irrigation by groundwater:

The net area irrigated by tanks and wells are furnished in Table 4.4

The net area irrigated by surface water source as well as by groundwater source is reported as 60032 and 12747 hectares respectively.

Since the quality of ground water is poor due to formations of marine origin in coastal areas and due to calcareous formations in the other areas, the extent of area irrigated by using groundwater is considerably less. **[6]**

Table 4.4: Block wise gross area irrigated, in hectares (1998 – 1999)

Sl. No.	Name of the Block	Gross area irrigated by					Gross area Irrigated
		Canals	Tanks	Tube well	Ordinary wells	Other sources	
01	Ramanathapuram	-	3555	-	2072	-	5627
02	Tiruppullani	-	2413	-	3108	-	5521
03	Mandapam	-	1000	-	4288	-	5288
04	Tiruvadanai	-	9757	164	8	-	9929
05	R.S.Mangalam	-	9563	8	12	-	9583
06	Paramakudi	-	5779	176	319	-	6274
07	Bogalur	-	3054	35	146	-	3235
08	Nainarkovil	-	3916	42	667	-	4625
09	Kamuthi	-	5319	-	651	-	5970
10	Mudukulathur	-	6879	63	438	-	7380
11	Kadaladi	-	8797	24	526	-	9347
	Total	_	60032	512	12235	_	72779

Source: Department of statistics, Chennai

4.1.6 Stages of Ground water development

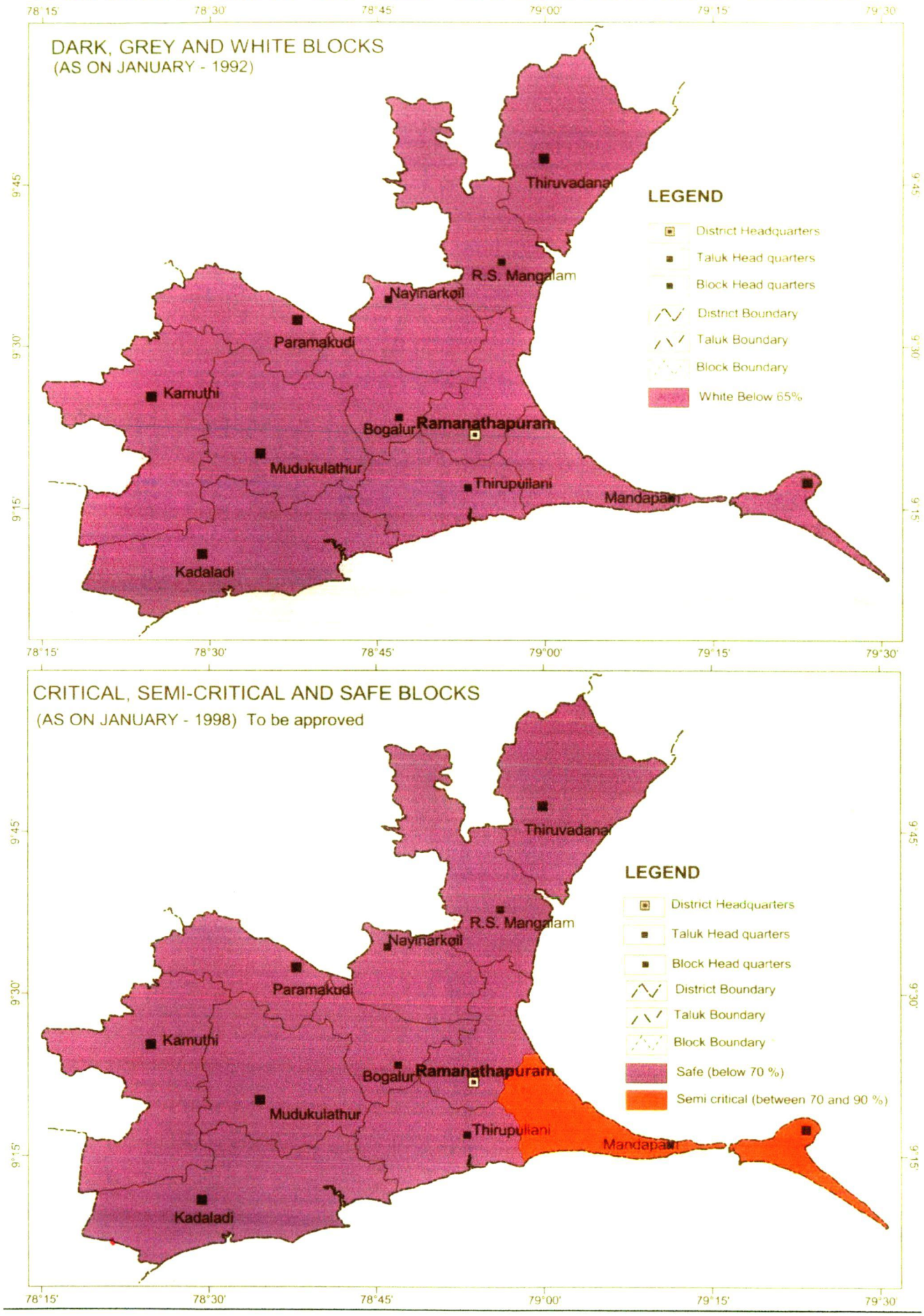
The stage of groundwater development can be defined as the ratio of net draft to net recharge available for irrigation. As per Groundwater Estimation Committee Norms of 1992, the categorizations of block are white, grey and dark. As per 1997 new methodology, the above categorization is modified as safe, semi – critical, critical and over exploited.(refer table 4.5 & 4.6) **[6]**

Table 4.5: Categorization as per 1992 methodology

Category	Stage of Groundwater Development
White	Extraction is 65% of recharge
Grey	Extraction is between 65% & 85% of recharge
Dark	Extraction is between 85% & 100% of recharge
Over Exploited	Extraction is above 100%

Table 4.6 Categorization as per GWREC Norms – 1997

Category	Stage of Groundwater Development
Safe	Extraction is less than 70% of recharge
Semi-critical	Extraction is between 70% & 90% of recharge
Critical	Extraction is between 90% & 100% of recharge
Over Exploited	Extraction is above 100%



Map 4.5: Categorisation of Blocks – Stages of Groundwater Development
Source: PWD, Tamil Nadu

In Ramanathapuram district, the level of groundwater development (as on January 1998) is less tan 70% in 10 blocks and categorized as safe area blocks. The level of groundwater development varies between 70% and 90% in the remaining one block namely Mandapam is categorized as semi-critical block. The stage of groundwater development as on January 1998 is shown in Map 4.5

4.1.7 Climate and Rainfall

The climate of this district in the inland plains is generally hot and dry with a low degree of humidity except within a distance of about 20 Kms from the coast, where the temperature is tolerable and cool on account of the sea breeze. Normally sub tropical climate prevails over the district without any sharp variation. The temperature rises slowly to maximum in summer months up to May and after which it drops slowly. The mean maximum temperature ranges from 22°c to 34°c and the mean minimum temperature ranges from 12°c to 20°c.

The district receives the bulk of its rain from the Northeast monsoon, which is often late, irregular and scanty. The monthly average rainfall in the district was 75.73 mm. The months of October, November and December receive a rainfall that is more than the annual average rainfall. The 70 years (1901-1970) average annual rainfall of this district is 827.00 mm. from four distinct seasons' viz., Southwest monsoon, Northeast monsoon, winter season and hot weather period. The season wise Normal Rainfall values are given in the following Table 4.7. **[6]**

Table 4.7: Season wise Normal Rainfall

Seasons	Period	Rainfall in mm	Percentage
Winter	January & February	67.4	8.15
Hot weather period	March to May	122.7	14.84
Southwest monsoon	June to September	135.3	16.36
Northeast monsoon	October to December	501.6	60.65
	Total	**827.0**	**100.00**

Source: State Ground and Surface Water Resources Data Centre, Chennai

4.1.8 Soil Types and Cropping Pattern

Soil characteristics of a terrain are important aspects since they meet the basic needs of all agricultural production. Varieties of soil that occur are derived from a wide range of geological materials. Knowledge about the type of soil, its

extent and occurrence are of primary importance for agricultural planning to maximize production (see map 4.6).

The talukwise percentage distribution of each soil type is given in table 4.8

Table 4.8: Percentage distribution of major soil types

Sl. No.	Taluk	Sand	Clay	Sand loam	Alluvium	Coastal Alluvium	Red soil	Total
1	Ramanathapuram	-	37	23	-	40	-	100
2	Rameswaram	80	20	-	-	-	-	100
3	Paramakudi	-	55	30	15	-	-	100
4	Tiruvadanai	-	60	-	15	25	-	100
5	Kamuthi	-	67	13	9	-	11	100
6	Mudukulathur	-	27	35	12	15	11	100
7	Kadaladi	40	60	-	-	-	-	100

Source: Soil Testing laboratory, Paramakudi

Clay soil occupies major area of Ramanathapuram district followed by sandy loam; Coastal alluvial soil exists in the coast of Ramanathapuram, Mudukulathur and Tiruvadanai taluks. Red soil exists to a limited extent in Kamuthi and Mudukulathur taluks. Sandy soil occupies the entire Ramanathapuram District. **[6]**

Table 4.9: Cropping pattern adopted in major soil types

Sl. No.	Name of Taluk	Percentage of major soil group	Cropping pattern
1	Paramakudi	Red sandy soil (5%) River alluvium (88%) Coastal alluvium (7%)	Pulses, Rainfed crops Sugarcane, Paddy, Coconut, Paddy
2	Ramanathapuram	Coastal alluvium (100%)	Coconut, Paddy
3	Rameswaram	Coastal alluvium (100%)	Coconut, Paddy
4	Mudukulathur	River alluvium (65%) Coastal alluvium (35%)	Sugarcane, Paddy Coconut , Paddy
5	Kamuthi	Red sandy soil (40%) River alluvium (60%)	Paddy, Pulses, Rainfed crops Sugarcane, Paddy
6	Tiruvadanai	Red sandy soil (3%) River alluvium (52%) Coastal alluvium (45%)	Paddy, Rainfed crops Sugarcane, Paddy Coconut, Paddy
7	Kadaladi	Clay (60%) Sand (40%)	Paddy, Cotton Coconut, Palmyra

Source: Agricultural department, Ramanathapuram

Table 4.10: Landuse Pattern in Ramanathapuram District (in hectares)

Period	Total Geographical area	Forest Land		Barren Lands		Land put to non-Agri. purpose		Cultivable waste		Permanent Pasture and other grassing land		Misc. Tree crops and crops not included in the net area sown		Current fallow		Other fallows		Net area sown		Area sown more than once	Total crapped area	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%		Area	%
1993-94	423344	4488	1.06	4961	1.17	85834	20.29	5755	1.36	851	0.20	9475	2.24	56380	13.32	37987	8.97	217563	51.39	Nil	69744	16.5
1994-95	423344	4488	1.06	4961	1.17	85884	20.28	5755	1.36	851	0.20	9475	2.24	56380	13.32	37661	8.90	217889	51.47	Nil	69625	16.4
1995-96	423344	4488	1.06	4961	1.17	85087	20.10	5674	1.34	539	0.13	18923	4.47	18977	4.48	100532	23.75	184163	43.50	Nil	59596	14.0
1996-97	423344	4488	1.06	4961	1.17	85130	20.11	5674	1.31	547	0.13	25582	6.04	23984	5.67	84984	20.07	187994	44.41	Nil	67749	16.0
1997-98	423344	4488	1.06	4961	1.17	85224	20.27	5674	1.24	547	0.12	28285	6.52	15600	3.60	77034	18.21	201531	47.81	Nil	75441	17.8
1998-99*	408957	4488	1.09	4591	1.12	83230	20.36	5318	1.31	451	0.12	33997	8.32	24848	6.05	63043	15.42	188991	46.21	Nil	72779	17.8

Source: Department of Statistics, Ramanathapuram. (* During 1998 the villages in this district are reduced and merged with Sivagangai District.)

Table 4.11: Comparative Demographic Characteristics of Ramanathapuram District, Tamil Nadu and India

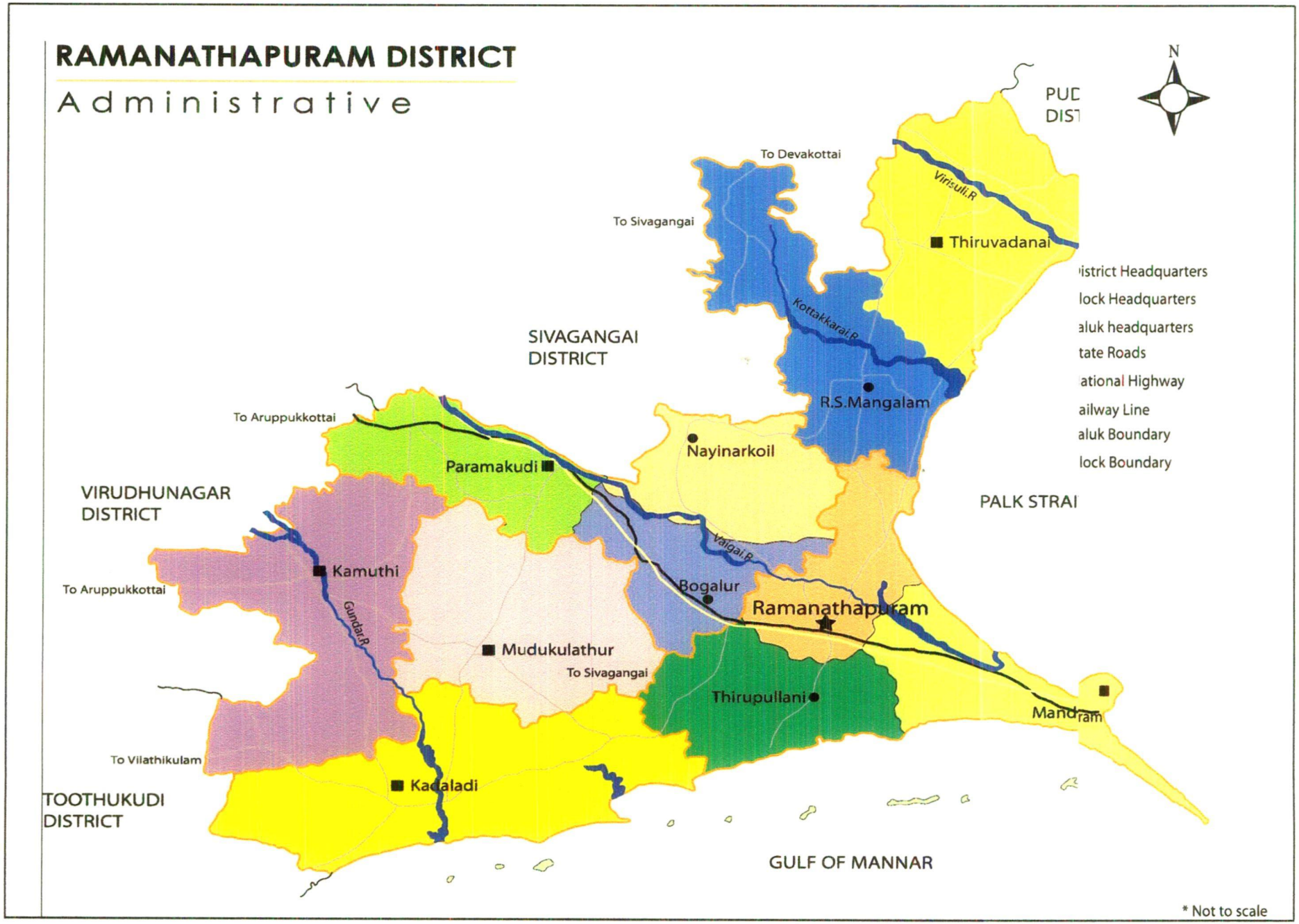
Characteristics	%	India	%	Tami Nadu	%	Ramanathapuram
Population	100	1 027 015 247	100	62 110 839	100	1 183 321
Male	51.73	531 277 078	50.34	31 268 654	49.18	582 068
Female	48.27	495 738 169	49.66	30 842 185	50.82	601 253
Decadal growth rate (1991 – 2001)	-	21.34	-	11.19	-	5.73
Population age 0 – 6 years	15.37	157 863 145	10.97	6 817 669	11.98	141 809
Population Distribution						
Urban	27.78	285 354 954	43.85	27 241 553	25.33	299 813
Rural	72.22	741 660 293	56.15	34 869 286	74.67	883 508
Population density (per sq.km.)	-	324	-	478	-	287
Sex Ratio (females per 1000 males)	-	933	-	986	-	1033
Literacy Rate	-	65.38	-	73.47	-	73.05
Male		75.96		82.33		82.96
Female		54.28		64.55		63.55

Source: Census 2001

4.1.11 Administrative set up of the district

Ramanathapuram district comprises of 7 taluks, 11 developmental blocks, 400 villages, 2362 hamlets villages, 2 municipalities, 7 urban town panchayats, 2 rural panchayats and eleven panchayats unions. Paramakudi and Ramanathapuram are the two Municipalities in the district. Abiramam, Kamuthi, Keelakarai, Mandapam, Mudukulathur, R.S.Mangalam, Rameswaram, Sayalkudi and Thondi are the nine towns in the District.

Among the eleven panchayat unions, Kamuthi, Kadaladi and Mudukulathur unions are highly susceptible to the water scarcity. Ramanathapuram is a major town and district headquarters. The details of Taluks and blocks in Ramanathapuram District are furnished in Table 4.12 (vide map 4.7). **[2]**



Map 4.7: Administrative setup in Ramanathapuram District

Source: Prepared by the Author

Table 4.12: Administrative setup of Ramanathapuram District

Sl. No.	Taluk	Area in hectares	No. of villages	Name of the Block	No. of villages
1	Paramakudi	73794	34	Paramakudi	34
2	Rameswaram	9048	59	Bogalur	23
				Nainarkovil	36
3	Ramanathapuram	77499	69	Ramanathapuram	25
				Mandapam	19
				Tiruppullani	25
4	Tiruvadanai	81461	98	Tiruvadanai	57
				R.S.Mangalam	41
5	Mudukulathur	48085	38	Mudukulathur	38
6	Kadaladi	61223	53	Kadaladi	53
7	Kamuthi	57847	49	Kamuthi	49
	Total	408957	400		400

Source: Department of Statistics, Ramanathapuram

4.1.12 Economic Base

a) Agriculture

Ramanathapuram is an agricultural district with about 830 mm of average annual rainfall, a net sown area of about 35 percent, and forests accounting for only four percent of the geographical area. Tanks account for more than 70 percent of the total area irrigated by all sources in the district while there is no land under canal irrigation. Rice is the major crop under tank irrigation in this district with an average yield of about 2500 kg/ha as compared to about 3500 kg/ha in Tamil Nadu.

Even though the district has a very high density of tanks, the dependability of tanks is very poor. Ramanathapuram district is deficient in rainfall. There are no major rivers providing perennial water supply for cultivation. Till the advent of independence, most of the areas were Zamindari areas and as such there was not enough enthusiasm for the ryots to develop agriculture. With the implementation of the schemes under the successive five-year plans and with the introduction of ryotwari settlement on the abolition of Zamindari system, fillip has been given to agriculture in the district. Though a dry district, agriculture is extensively undertaken by irrigating the land from tanks and wells. The rainfall during the Southwest monsoon is rather poor. The rain from Northeast monsoon

season is the major one but is not steady and is dependent on the vagaries of the monsoon. Whatever rainfall occurs, it is utilized to the best advantage through a large number of tanks and wells in the district. Paddy is the most important food crop of the district. About 46 per cent of the total area sown are under this food crop. Paddy crop is grown on wet lands irrigated by rivers, canals, tanks and wells. Cumbu, Cholam, Ragi, Varagu, Samai and Kudiravali are the millets produced in the district. Ragi is grown in a wide range of varying soil fertility during the periods, May-June and November-January. In East Ramanathapuram district, cotton has been introduced as an irrigated crop in summer. Large areas have been brought under improved varieties of cotton. The Ramanathapuram district is one of the chief cotton producing areas in the State, besides Coimbatore and Tirunelveli. Groundnut and Gingelly are the two prominent oil seeds grown in the district. **[16]**

b) Fisheries

The Ramanathapuram district occupies the southeast coast of India. The island system and coral reefs spreads over this region offer shelter for a variety of marine flora and fauna. Both mechanized trawlers and non mechanized vessels carry out the fishing throughout the year. When the Gulf of Mannar covering the southern portion becomes rough during April to September, the fishing operations shift to Palk Bay and when the Palk bay becomes rough during October to March, the units migrate to Gulf of Mannar.

Pearl Fishery

Ramanathapuram coast is well known for pearl fishing. The Regional center of the Central Marine Fisheries Research Institute Mandapam which was established in 1947 has developed proven technology for the culture of Pearls, edible oyster calm mussel and seaweed. Commercial Pearl Farming has come up near Kurusadai Island and the Tamil Nadu Fisheries Development Corporation Limited maintains it.

Chank Fishery

Ramanathapuram District has distinct chank fishery. Jadhi Chanks are in abundant in the Palk Bay strait and Gulf of Mannar. More than 2000 fishermen are engaged in active chank diving and sacred chank collected by divers are

marketed to West Bengal for making ornaments. This contributes significantly to the development of fisheries.

Prawn Farming

About 160 Prawn farms are operating in the district which follows intensive type of prawn culture. Prawns harvested from these farms are exported to Japan, USA and European countries, which earns sizable foreign exchange for the country. **[6]**

4.1.13 Environment / Ecology of Ramanathapuram District

Gulf Of Mannar Biosphere Reserve: Designated a Biosphere Reserve, The Gulf of Mannar and its 3600 Species of flora and fauna is one of the biologically richest coastal regions in all of mainland of India. Some of the islands are veritable 'biologist's paradise' It holds within maximum genetic diversity. It is equally rich in sea -algae, Seagrasses. Coral reef pearl banks, sacred chank bed, fin & shell fish resources, mangroves, and endemic & endangered species. It is an important habitat for the highly endangered sea mammal, the Dugong dugon commonly called as sea cow.

Wild Life is significantly scarce in this district. Ramanathapuram district is a paradise for the bird-watcher, especially during the winter months when all tanks are full attracting many avian visitors. The numbers of tanks in this district are so many that very approximately it is referred to as the "Lake District" of the State. Many beautiful birds like the paradise fly-catcher, the golden oriole, the small green barbet, the red-vented bulbul the king fisher the black cormorant, the partridge, the snipe, the rose-ringed parakeet and the blossom-headed parakeet are some of the more important birds seen in the lower forests along the plains. The following birds are living in the forest of Srivilliputhur, which was part of Ramanathapuram district until 1985. The Ashy crowned finch dark, Purple sun bird, Purple rumpled sunbird, Indian pitta, Yellow fronted pied, Golden backed woodpecker, Grimson-breasted Barbet, Common hawk-cuckoo, Pied creasted cuckoo and the Koel. **[10]**

4.1.14 Tourism in Ramanathapuram district

Ramanathapuram district has many places of tourist interest in and around Ramanathapuram and on the island of Rameswaram, offering great spiritual

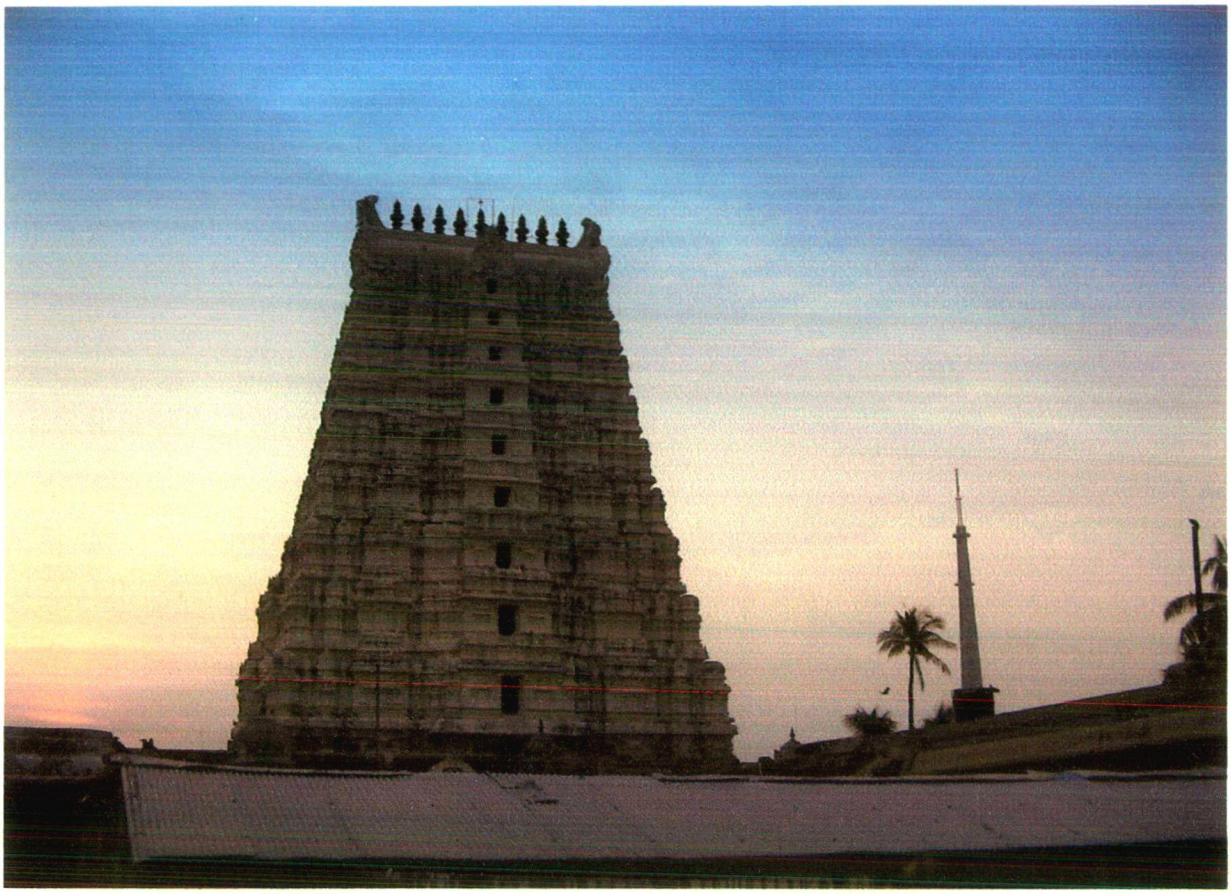
solace for the believers and breathtaking visual experience for the lovers of nature and culture. This region, having been known from early times and mentioned in Ramayana and later in Tamil Puranas, naturally has a good number of places of worship associated with Hindu gods. Above all, the district gets the most important place in the Hindu pilgrimage route of the country. The pilgrimage to Kasi (Varanasi) traditionally commences or ends at Rameswaram in Ramanathapuram district. Therefore the Rameswaram temple, which is one of the four dhams and twelve jyothilinga temples in the country, is most revere by Hindu pilgrims, next in importance to Kasi. Information about the Rameswaram temple and other temples of this district are given below. (Refer Map 4.8 & 4.9)

Rameswaram is a small town on the eastern side of an island, which is the shape of a conch shell, 55 km by 12 km. It is known as the Varanasi of the South. Rameswaram is located at the southeastern end of the Indian Peninsula on the Gulf of Mannar. The Island of Rameswaram is characterized with the following features to include:

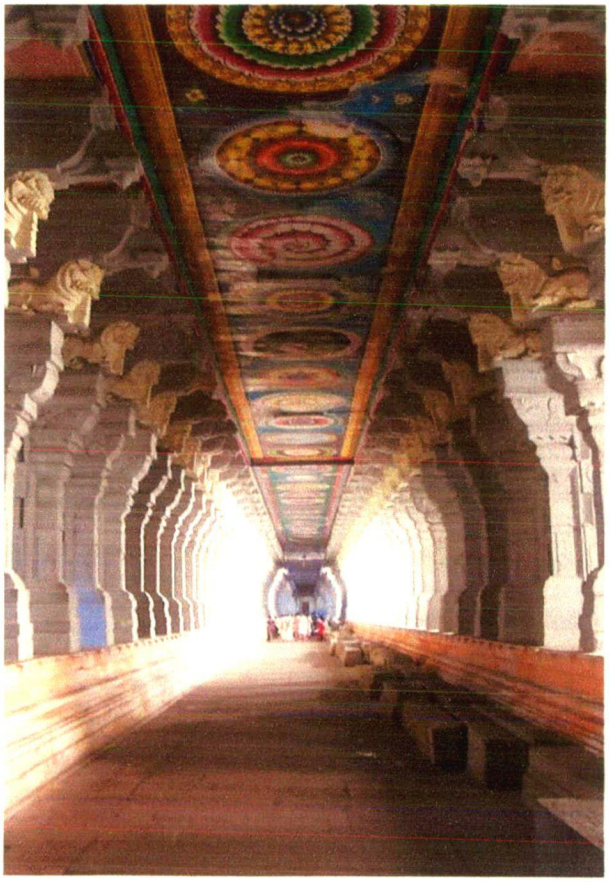
- The Ramanathaswamy temple as a proclaimed National Pilgrim center,
- A vast natural asset base with the virgin beaches at Dhanushkodi and Ariamaan.
- A large selection of hospitality establishments with support transport facilities.
- A significant selection of adventure and outdoor pursuits.

Ramanathaswamy Temple: The Holy abode of the Hindu God, Shri Ram (addressed so with all respect & humility) is a virtual paradise for the devout. No Hindu's journey is complete without a pilgrimage to both Varanasi and Rameswaram for the culmination of his quest for salvation and is hallowed by the epic 'Ramayana'. Rameswaram has been declared as one of the National Pilgrim Centers. The Ramanathaswamy temple by itself is a delight for every tourist. With its magnificent, imposing structure, long corridors, aesthetically carved pillars, the temple is adorned with a towering 38-metre 'Gopuram'.

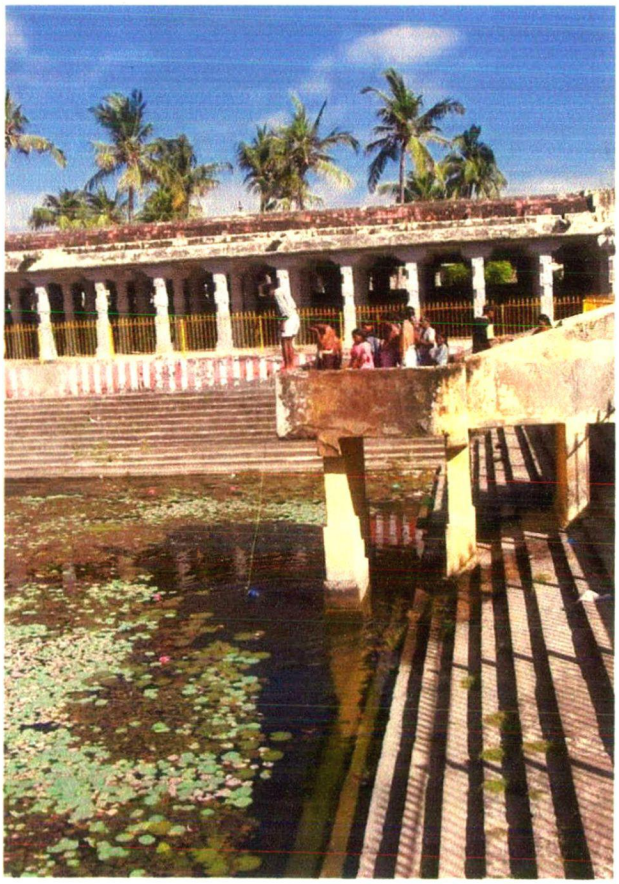
The temple itself was built by rulers since the 12th century with Sethupathy Maravar beginning the construction of the grand Ramanathaswamy temple that boasts of the 'Third Corridor', completed by his successor, Maravar – the longest one in Asia with a 197-metre span from East to West and a 133-metre span from South to North, the third largest in the world! It is said that Swami Vivekananda offered prayers at this temple in 1897.



(i) View of Main Gopuram, Ramanathaswamy Temple, Rameswaram



(ii) Third corridor of Ramanathaswamy temple - the third largest in the world



(iii) Pilgrims taking bath in one of the theerthams in Ramanathaswamy temple

Plate 4.1(a): Tourist Destinations in Ramanathapuram

Image source: Captured by the Author

Agnitheertham: The calm shallow water-spread of the sea, present hardly 100 meters in front of the temple gopuram is considered as sacred. A dip in the Agnitheertham is considered to remove the sins of the pilgrims. The other theerthams (holy water tanks) in and around the temple are also important for Pilgrims.

Jadayu Theertham: Jadayu, King of the Birds, who fought in vain with Ravana, the demon to save Sita, is said to have fallen down here as his wings were severed. Sand dunes surround the temple and the pond. The water in the pond is as sweet as that of a tender coconut.

Villoondi Theertham: Villoondi literally translated stands for 'buried bow'. It is quite well known that Lord Ram always carried a bow. According to legend, at this sacred spot, located around 7 kilometers from the main temple on the way to Pamban, is this puranic place, significant because it was at this place where Lord Ram is said to have quenched the thirst of Sita by dipping the bow into the sea water. Even to this day, tourists throng this place to see where potable water is available within the vicinity of seawater.

Gandhamathana Parvatham: A hillock situated 3 Kms to the north of the temple is the highest point in the island. There is a two-storied Mandapam, where Rama's feet (Padam) are found as an imprint on a chakra. Pilgrims throng in thousands to worship Gandhamathana Parvatham. Sukreevar Temple and Theertham are situated on the way to Gandhamadana Parvatham.

Dhanushkodi: The southernmost tip of the island is called Dhanushkodi. It was completely washed away by a cyclone in 1964. But the Kothandaramasamy Temple here remains intact. It is 18 Kms way from Rameswaram can be reached by road. A popular belief is that, it is where Vibishana a brother of Ravana surrendered before Rama. Dhanushkodi has a fine beach, where Sea surfing is possible.

Ramanathapuram: An ancient town, and now the head quarters of the district. It was from here the Sethupathis (Chieftains) ruled this territory. Ramalingavilasam Palace with good painting and Tomb of Thayumana swamigal, are the places worth visiting. A Museum is functioning here.

Devi Patinam: A coastal village is also known, as Navashabashanam.It is believed that Lord Rama worshipped Navagraha here. The temple near by here

is dedicated to Devi, who is said to have killed the demon Mahishasura at this spot. Hindus perform religious rites for their forefathers here.

Thiruppullani: Also called Dharbasayanam, the Vishnu Temple here, is dedicated to Lord Adi Jaganathaperumal. It is 64 Kms from Rameswaram.

Erwadi: The tomb of Sultan Ibrahim Syed Aulia, who came from Arabia via Cannanore is about 800 years old. Pilgrims from far off countries like Srilanka, Malaysia and Singapore are visiting this tomb. Santhanakoodu Festival is celebrated in February-March attracts thousands of pilgrims.

Satchi Hanuman Temple: This is where Hanuman said to have delivered the good news of sita's well being to Rama with an evidance choodamanai (Jewel) of Sita.

Upoor: Around 85 kilometers from Rameswaram is the Veyulugantha Vinayagar Alayam (Temple). It is believed that Lord Ram worshipped Lord Vinayagar (Elephant God) in this very temple on his journey to Sri Lanka.

Sethu Karai: A place of Puranic importance, Sethu karai (meaning the Sethu Coast) is an important pilgrim centre having religious significance owing to the belief that Lord Ram is said to have constructed a bridge from here over the sea waters to reach Sri Lanka. It is a hallowed place for Hindus as they conduct their religious rites in this place and is situated around 68 kilometers from Rameswaram and is near Erwadi Dharga.

Oriyur: Oriyur is one of the most revered pilgrim centers for Christians the world over as it is home to the martyrdom of St. John De Britto, a Portugese Jesuit better known as 'Arul Anandar'. It was in this place that the saint was beheaded in 1693 and the sand dune is said to have turned red, believed to be stained by the blood of the saint. Here, one can see a magnificent shrine with its Portugese façade that contains a captivating statue of Arul Anandar offering his neck in humble submission to the executioner. **[6]**

4.1.15 Major Festivals in Ramanathapuram

Temple: Thai Amavasai (Jan), Pongal Pilgrim Festival (Jan), Brahmothsavam (Feb – Mar), Maha Shivarathri (Feb – Mar), Ramalinga Prathista Festival (May), Thirukalyanam (July – Aug), Mahalaya Amavasai (Sep), Pradosham (every month) – All Saivaite temples, Navarathri (Sep – Oct), Arudhradarshanam (Dec)

(i) Lakshman Theertham

(ii) Vinayagar Temple at Uppor

(iii) Sethukarai

(iv) Ramanathapuram Palace

(v) Kothandaramar Temple *

(vi) Dhanushkodi

(vi)The Pamban Bridge *

(viii) The Railway Bridge at Pamban *

Plate 4.1(c): Tourist Destinations in Ramanathapuram

Image source : Captured by the Author, * District Administration,

Map 4.9: Tourist Destinations in Rameswaram Island

Source: Prepared by the Author

Erwadi Dharga: Santhanakoodu (Jan)

Oriyur Church: Our Lady of Good health (Sep)

4.2 Delineation of the Ramanathapuram Coastal Region

For the purpose of the study, the Ramanathapuram coastal region is identified as the contiguous and functionally homogenic region consisting of all the six development blocks with a coastal border. This coastal region is further delineated, functionally and geographically, into two sub-regions, namely, the coastal core region (or the coastal corridor) and the coastal hinterland. The coastal core region or the coastal corridor consists of all the villages where fishermen hamlets are located, thereby functionally linking it with the sea. Coastal hinterland is rest of the coastal regional belt lying behind the coastal core and supporting it (see map 4.10).

4.3 Description of the Coastal Region

Ramanathapuram District has a coastal line of 271Kms (Palk Strait – 130 Km & Gulf of Mannar – 141 Km) see map 4.11, which is about 25% share of the total coastal line of the state of Tamil Nadu. Next to Agriculture, fishing is an important occupation of the people of the district. There are four fish landing harbours at Thondi, Rameswaram, Mandapam and Valinokkam and 78 fish landing centres. The district has 184 fisherman villages and about 36453 fishermen are actively engaged in fishing operations. About 75000 to 80000 tonnes of fish of various varieties are caught in this district per annum. There are 5492 registered mechanized boats, 2860 country crafts, 850 catamarans in this district. **[2]**

4.3.1 Physiographic

The northern part of the coastline stretches from Sundarapandipuram to Thondi. Salt pans are common in this part of the coast. The sandy coastal area of Mudukulathur, Ramanathapuram and Rameswaram, in this area the coast is fringed by sand dunes with swamps at the back. The coastline in the stretch is generally trending towards south from where it takes an eastward trend towards Devipattinam enclosing Palk Strait. In the southern part of this stretch between Devipattinam and Keelakarai, there are raised beaches with sand bars parallel to

(i) Sand Dunes at Kundugal Village

(ii) Palm Trees along the coast of Rameswaram

(iii) Sea Grasses washed away at Thondi

(iv) Fishermen Settlements at Pamban South

(v) Industrial Waste dumped near Thankatchimadam

(vi) Dead Corals washed away at Pamban North

(vii) Landing Center at Mandapam

(viii) New Developments coming up at Thondi

Plate 4.2: Coastal characteristics of Ramanathapuram

Image Source:Captured by the Author

the present coastline. The southern coast of this district is fringed by a chain of islands numbering about 16 and shoals extending to a distance of 5 to 9 km offshore.

4.3.2 Geology

This stretch comprises mainly of coastal sands of quaternary and recent ages. Sub recent marine formations consisting of hard calcareous sandstone and grey calcareous clay are seen on Rameswaram Island and other islands. The sub-recent calcareous sandstone forms the basement rock for the present day coral reefs growing in the Gulf of Mannar, fringing Rameswaram Island and other islands. **[2]**

4.3.3 Coastal Geomorphology

Coastal plains, older deltaic plains, cuspate foreland, teri sand mounds, teri tidal complex are some of the geomorphic features observed in the stretch. The coastline in this stretch is fringed by a sand strandy plain over a width of about 1.5km to 3km. Beyond which runs a wide track of fluvio-marine sediments manifested in tidal flat, salt marsh and paleo tidal flat. The coastline between Rameswaram and Mandapam is a huge cuspate foreland bar built up with sand deposits representing repeated lowering of sea level. **[2]**

4.3.4 Economic setting in the Ramanathapuram coastal region

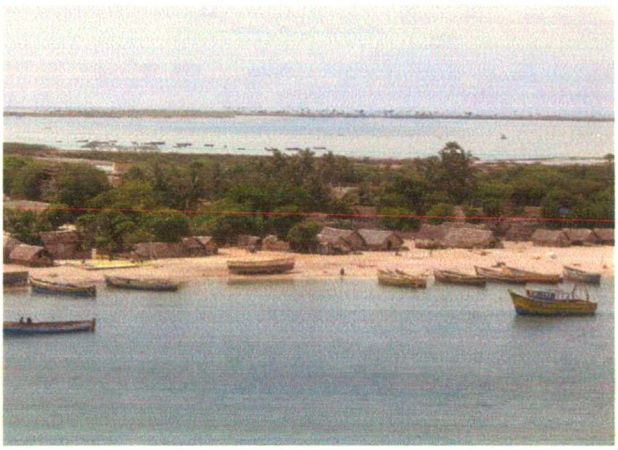
Fishery is the predominant industry in the coastal belt of the Ramanathapuram district. According to a Tamil Nadu marine fisherfolks census undertaken during 2000, 184 villages are located along the Ramanathapuram coast with an estimated population of 117291 of whom it is estimated 29568 are active fishermen.

Historically the Ramanathapuram coastline has been a significant region in maritime trade, including the trading of pearls with the Greek and Roman empires from the days prior to Augustus Caesar (63 BC–14 AD), as documented by the historian Pliny from the second century AD. The coast is famous for its chank (Xanchous pyrum) and pearl fisheries, both of which have been a government monopoly. Chanks are a particularly valuable cultural resource, with the sinistral

(i) Sand Dunes at Kundugal Village

(ii) Palm Trees along the coast of Rameswaram

(iii) Sea Grasses washed away at Thondi



(iv) Fishermen Settlements at Pamban South

(v) Industrial Waste dumped near Thankatchimadam

(vi) Dead Corals washed away at Pamban North

(vii) Landing Center at Mandapam

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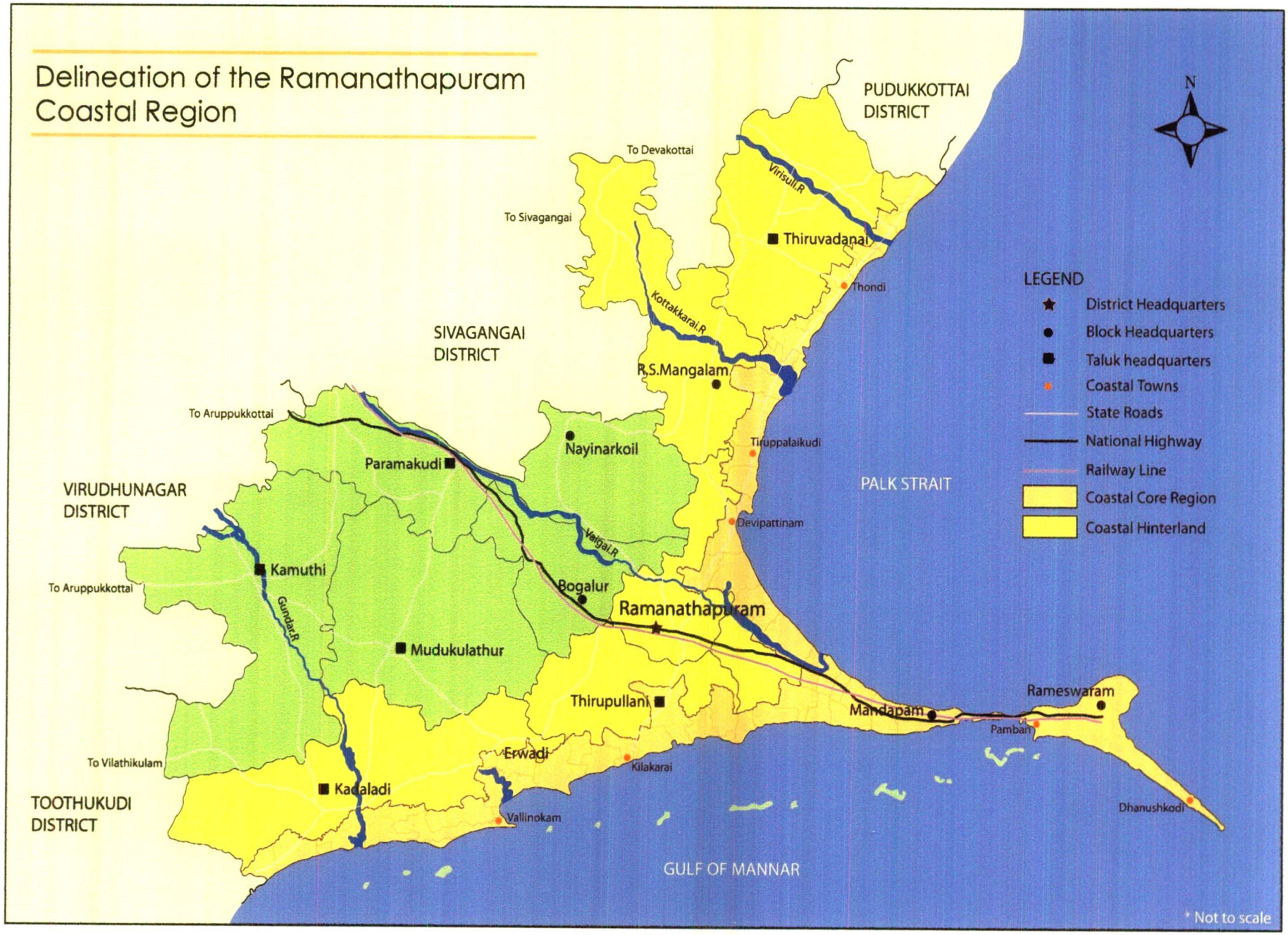
Image Source:Captured by the Author



Map 4.10: Delineation of Ramanathapuram Coastal Region

Source: Prepared by the Author

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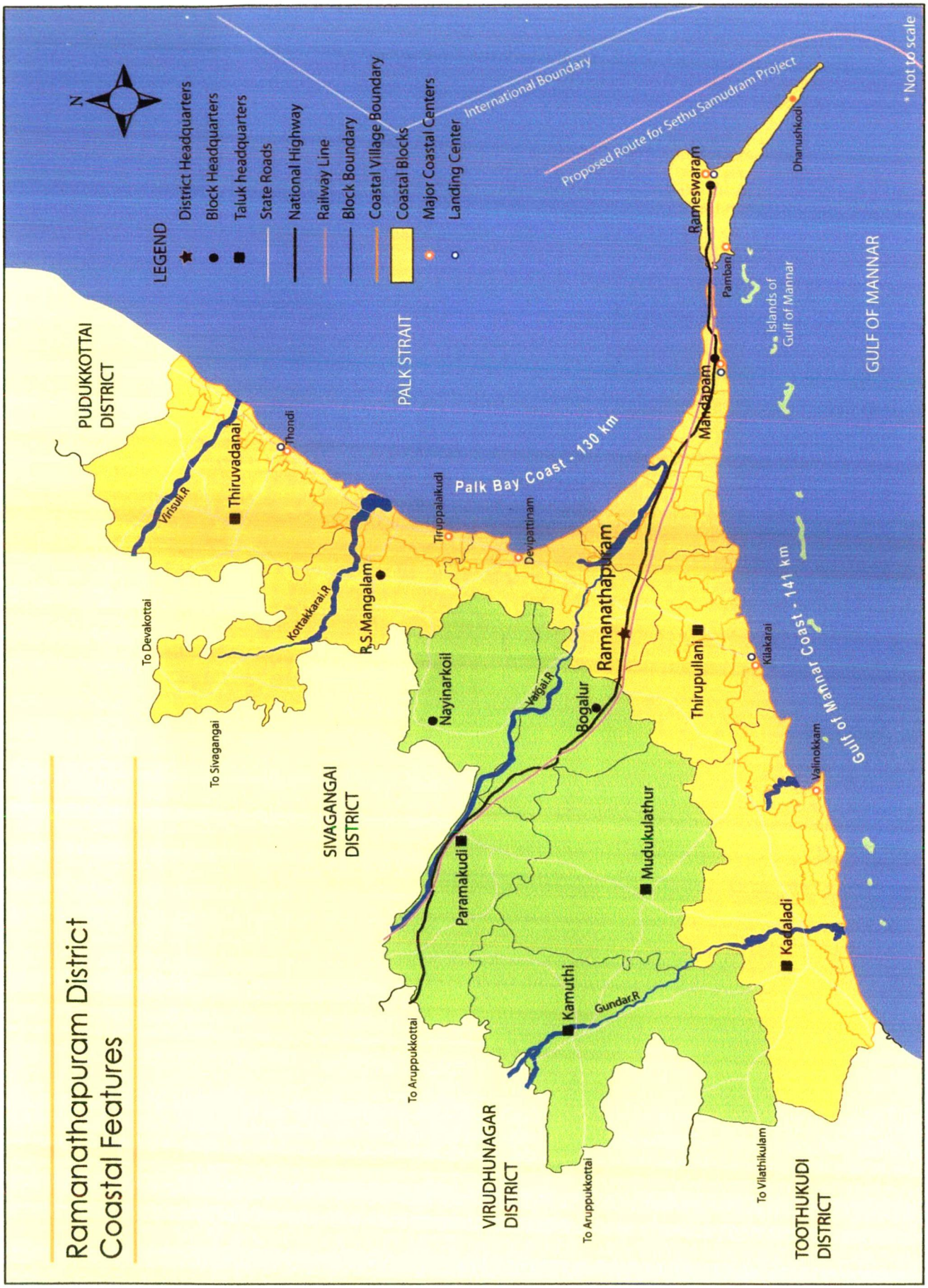


Map 4.11: Coastal Features of Ramanathapuram District

Source: Prepared by the Author

or right-handed whorled chank considered sacred and used in worship in Hindu temples.

While the pearl fishery has not been open since 1961 due to the absence of sufficient oyster populations, the chank fishery has continued on an annual basis until it was officially banned in recent years. Ramanathapuram contributed 23% to the overall marine fish production in the state during 1998–1999, the largest production of any district in Tamil Nadu, Traditional crafts were responsible for 39% of the overall production for Ramanathapuram.

Traditional or small-scale fishing is carried out predominantly in the 'trapped sea' between the islands and the mainland coast and in the shallow waters and reef areas surrounding the islands. Fishing takes place throughout the year, but changes in nature according to local availabilities of different species. Wind patterns generally restrict the use of small-scale crafts between the months of August and October, and during this period many fishermen simply switch to labouring on larger mechanized boats.

The infrastructure facilities along the Ramanathapuram coast include boat building yard, fishing jetty, ice plants, fish meal processing plants and dry docks. There are four fishing jetties each at Thondi, Mandapam, Keelakarai and Valinokkam. The ice plants are available at Pamban, Mandapam, Keelakarai, Erwadi and Thondi. Except Mandapam there are no other fish processing plant. The Mandapam jetty with a breakwater in the Gulf of Mannar side is a well developed one in all weather conditions. It can accommodate larger vessels and provide shelter for small trawlers during heavy winds. About fifty vessels can be berthed at a time.

In addition to fisheries-related occupations along the coast, there are opportunities for employment in salt extraction, particularly in the western side of the Gulf near Tuticorin, and also in Palmyrah (toddy) tapping and agricultural labour. Skilled work is also undertaken, with mat weaving common in Ramanathapuram district. Moving inland from the coast toddy tapping and agriculture are the predominant occupations with small business-related opportunities prevalent near Rameswaram in connection with the tourism in this area. **[11]**

4.3.5 Natural Resources

Water: Coastal belt in this stretch comprises of semi-marine deposits of quaternary age and the formation consists of sand, clay, silt, kankar, coral reefs. The groundwater potential in deep formations was remarkable in this stretch. Due to semi-marine conditions the quality of water is naturally poor.

Mineral: Gypsum, limonite and garnet sand, shell limestone and coral limestone are the mineral resources in this stretch. Small patches of limonite and garnet sands occur along the coast at Valinokkam, Keelakarai, Ariyamanur, Sunderadasmadam and north of Pamban. **[2]**

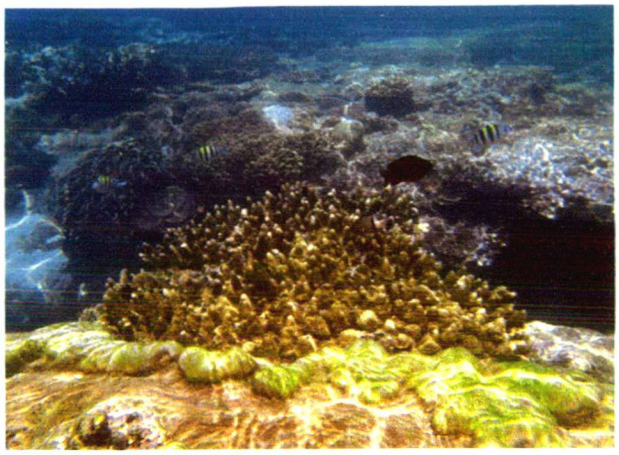
4.3.6 Environment / Ecology of Ramanathapuram Coastal region

4.3.6.1 Gulf of Mannar

The Gulf of Mannar Biosphere Reserve is located in the coastal marine zone of the Gulf itself. It is the first marine Biosphere Reserve not only in India, but in all of south and south-east Asia. The Reserve has been selected as an international priority site based on criteria such as bio-physical and ecological uniqueness, economic, social, cultural, scientific importance, national and global significance. The IUCN Commission on National Parks and Protected Areas, with the assistance of UNEP, UNESCO and WWF, identified the Reserve as being an area of "particular concern" given its diversity and special, multiple-use management status. The Reserve was one of six areas chosen for inclusion into an action programme to save India's protected areas for future generations on the basis of its threatened status and richness of biological wealth.(see map 4.12)

The reserve is comprised of a 560 km2 core area of coral islands and shallow marine habitat, surrounded by a 10 km wide, 160 km long buffer zone. The Gulf of Mannar Marine National Park comprises the core area of the Reserve and is made-up of 21 uninhabited islands ranging in size from 0.25 ha to 130 ha and lying between one and four km offshore, surrounded by shallow waters. The buffer zone is comprised of Gulf waters to the south and an inhabited coastline to the north.

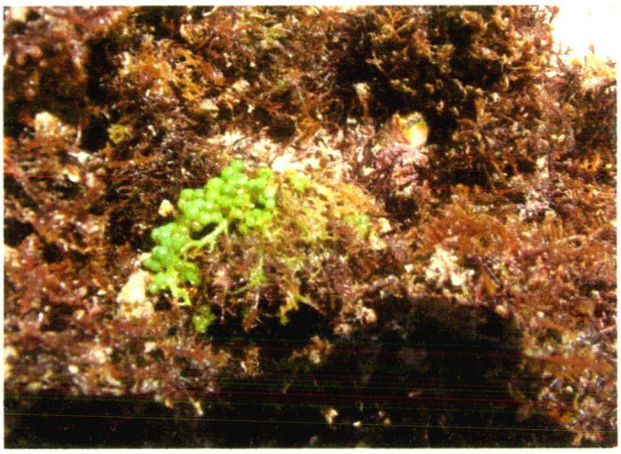
Seventeen different mangrove species occur within the Reserve and act as important nursery habitats. One species, Pemphis acidula, is endemic to the Reserve; five other mangrove species occur here and nowhere else in India. The shallow waters of the Park have the highest concentration of sea grass species



(i) Coral beds of Gulf of Mannar *

(ii) Sea Grass Meadows at Olaikuda

(iii) Star Fish near a snorkelling site



(iv) Fresh Sea weeds collected at Villondi Theertham

(v) Branching Corals washed away at Pamban

(vi) Ornamental Fishes

Plate 4.3: Marine resources of Gulf of Mannar

Source: Captured by the Author

** Image source: District Administration, Ramanathapuram*

along India's 7,500 km of coastline. All six genera and 11 species of sea grass recorded in India occur in the Reserve. Six of the world's twelve sea grass genera and eleven of the world's fifty species occur here. One species of sea grass, Enhalus acoroides, and a mono specific genus of sea grass is endemic to the Reserve. These same shallow waters are also known to have at least 147 species of marine algae (seaweed). These sea grass and algal beds support complex ecological communities and provide feeding grounds for many animals, including the globally endangered marine mammal dugong (Dugong dugong).

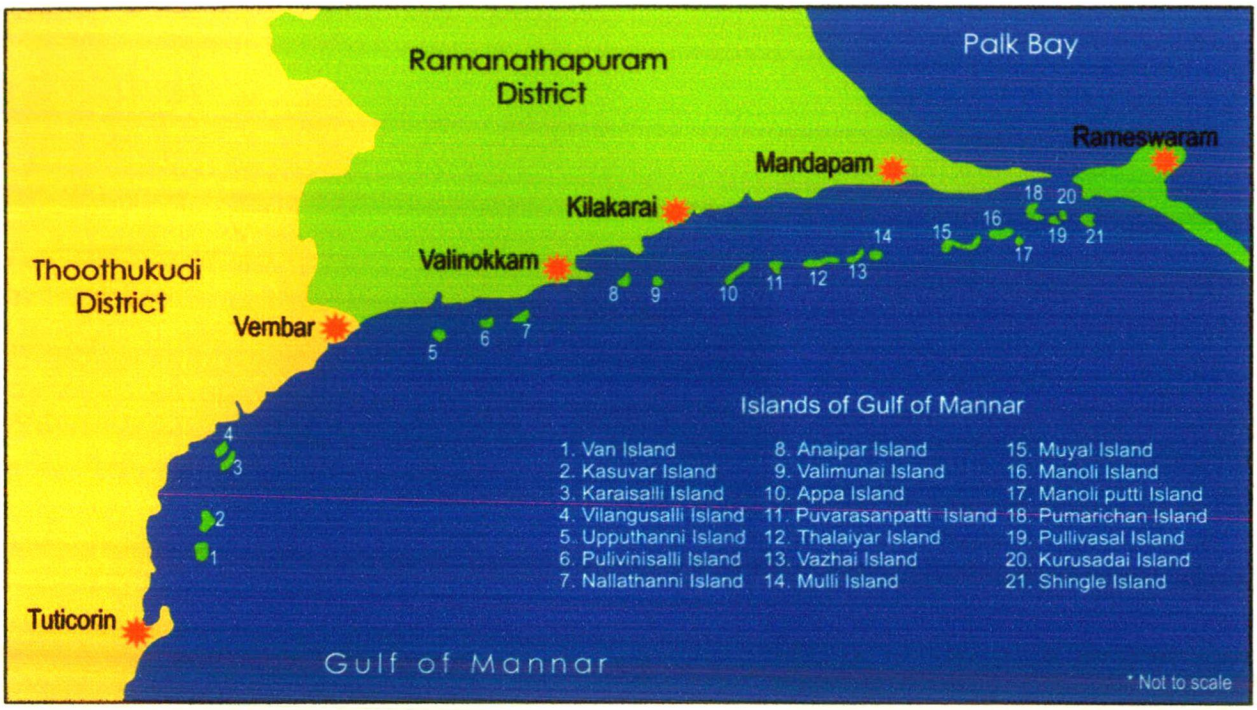
Productive fringing and patchy coral reef surrounding the Park's islands are comprised of at least 91 species of coral belonging to 37 genera. The islands are used by 168 migratory bird species. The sandy shores of most of the islands provide nesting habitat for sea turtles and all five species of marine turtles have been recorded nesting on the islands. Of the 2,200 fish species in Indian waters, 450 species (20%) are found in the Gulf, making it the single richest coastal area in the Indian sub-continent in terms of fish diversity. Over 79 species of crustaceans, 108 species of sponges, 260 species of molluscs, and 100 species of echinoderms occur in the Gulf.

The Park's Kurusadai Island exemplifies the biological significance of the Gulf. The island's surrounding shallow waters harbors three species of sea grass that are found nowhere else in India. Representatives of every animal phylum known (except amphibians) are found on this island. The island is also home to an endemic organism called Balanoglossus (Ptychodera fluva), a taxonomically unique living fossil that links vertebrates and invertebrates. The island is referred to in the region as a biologist's paradise. **[5]**

4.3.6.2 Islands of Gulf of Mannar

There are about Twenty one islands in Gulf of Mannar on the South eastern coast of India extending from Rameswaram island on the north and Tuticorin on the south between latitude 8 * 50' - 9° 15' N and longitude 78°13' - 79' I4'E. These islands and the sea around them upto 3.5 - 5 fathom depth, has been notified as a National Park under the provisions of the Wild Life Protection Act 1972. Gulf of Mannar along with islands was declared as the first Marine Biosphere Reserve (GOMMBRE) in South East Asia. Islands around Gulf of Mannar house a rich variety of fauna and flora that derives her the term

"Biologists Paradise". All 21 islands are coral islands of fringing and patch types covering an area of 623.12 hectares. (See map 4.12)



Map 4.12: Islands of Gulf of Mannar

Source: Prepared by the Author

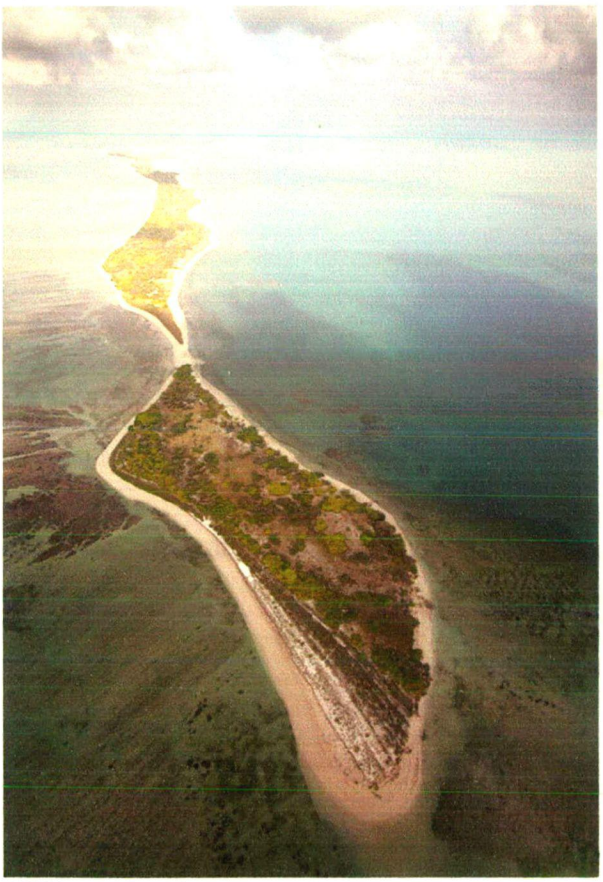
1. *Shingle Island:* Shingle Island has an area of 12.69 ha. Earlier Singhalese fishermen used to land and stay here during their fishing operation. Hence it was called Singala thivu, later termed as Shingle Island. Its northwest and northeastern shores are sandy, the southwestern shore is found full of dead corals. This island is 4 Kms away from Pamban. This area is good for snorkelling.
2. *Kurusadai Island:* Kurusadai Island has an area of 65.80 ha. This island is 3 km away from Pamban. The nearest land is Kundugal point 500 mt away. The southeast part of the island is sandy, while the northern part is muddy with marshy vegetation. Western part of the island is covered island is with live coral reefs. Main inhabitants of the island are Field rats, Birds, Moths, Beetles, Garden lizards and the rare Hemichordate representative Balanoglossus. Since the island having many marine species of animal life, it is called as "Marine Biologists Paradise". Fishermen camp here for few days for fishing activities.
3. *Pullivasal Island:* Pullivasal Island has an area of 29.95 ha. The island is about 5 Kms from Mandapam. This island has to be approached from

Poomarichan Island by crossing the channel separating the two islands. Eastern and southern shores are sandy while the northern part is muddy and marshy.

4. *Poomarichan Island:* Poomarichan Island covers an area of 16.58 ha. It is situated 5 Kms away from Mandapam. It is almost like a horse-shoe shaped island. It is a marshy island, wooded jungle with the water area enclosing a continuous reef. Fishermen from Mandapam and Pamban collect shells from this island.
5. *Manoli Island:* Manoli Island covers an area of 25.90 ha. It is situated at a distance of 6 Kms from the Mandapam camp mainland. Extensive reefs with live and dead corals are present on the southern and northern sides. The island has lagoon pools and open mud flats. The lagoon area is margined shoreward by mangroves and seaward by live corals. The northern and southern beach ridges are separated by an area of Thespesia wood land. Large numbers of birds visit this island during March to September. Fishermen and seaweed collectors are staying for a stretch of six or seven days with their families.
6. *Manoliputty Island:* This island covers an area of 2.34 ha., and is situated 6 Kms away from Mandapam camp. Bushes are abundant and patch corals are found around this island. It is a very small island separated from the nearby Manoli Island by extensive sand flat. Fishermen stay here for collecting seaweed and live shells.
7. *Hare Island:* This Island is largest of all 21 islands covering an area of 129.04 ha. It is 7 Kms away from Mandapam camp. Shore is sandy. Dense coconut gardens are found in this island. Human interference has brought some cattle, goats and monkeys to the island. Very good assemblage of coral reefs is found around the island. Tolerably good drinking water is present.
8. *Van Island:* Van Island covers an area of 16 ha. and is situated 6 km away from Tuticorin new harbour mainland. Construction of break waters in Tuticorin harbour in early 70's caused the depletion of sediment from the upstream side in the northwest direction to 1.62 km towards the mainland. Reef of Van Island is non-elongated with sharp corners and their developments are extensive on the south, southeast and northeast of the

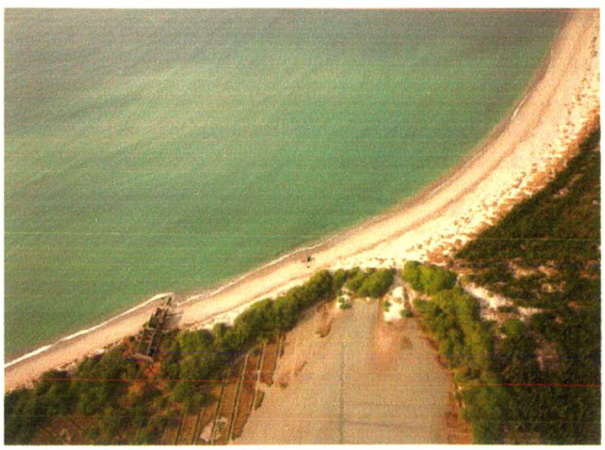
(i) Pullivasal Island *

(ii) Nalla Thani Island *



(iii)Musal Island *

(iv) Islands near Dhanushkodi *



(v) Arial view of Rameswaram Coast *

(vi) Arial view of Dhanushkodi settlement *

Plate 4.4: Aerial View of the Islands and Coast of Ramanathapuram

* Image source - District Administration, Ramanathapuram

island. Fishermen from Taruvaikulam and Tuticorin visit the island for collection of coral rubbles from the shallow water zone around the island.

9. *Koswari Island:* This Island covers an area of 19.50 ha. and is situated 7 km away from Tuticorin mainland. The whole island is covered with xerophytic vegetation. The reef area is small. The average depth of lagoon is about 2.5 m. Branching corals are seen at a distance of 200 meters from the shoreline, and then massive type of the corals heads and dominates with increase in the depth.
10. *Villanguchalli Island:* This Island covers an area of 0.95 ha. and situated about 15 km from Tuticorin mainland. This island reef is narrow and elongated. It is a very small island, completely strewn with coral rubbles, some bushes and grasses that are seen towards the middle of the island.
11. *Kariyachalli Island:* This Island covers an area of 16.46 ha. and is situated about 15 km away from the Tuticorin mainland. The reef area is small and depth exceeds 3 m in certain places. This island had best formed reef among all islands and now it is no more best due to exploitation for limestone. Fishermen from nearby villages are here for operation of bottom-set gill nets. Men from Erwadi collect seaweeds around this island.
12. *Upputhanni Island:* This Island is about 29.94 ha. and is situated opposite to Mukayur village. This island can be reached by vallam (motorized canoe) in 25 minutes from this village. The island is 8 km away from Vembar. It is a fairly big with plenty of coral rubbles. There are few trees here and there, with a number of tall bushes. The entire island is covered with grasses. Several fishermen from Naripaiyur camp here to quarry coral boulders buried in the centre of the island, thus disturbing the natural formation of corals in the island. They also camp here frequently for commercial exploitation of the seaweed Gelidiella sp. and Gracilaria sp. growing in the shallow waters around the island.
13. *Nallathanni Island:* This Island has an area of 110.00 ha. and is situated in 2 km from Mundel, a place near Valinokkam. Potable water is available. This is one of the biggest island having about 4000 coconut trees, palmyrah and other woody trees. A temple of Muniswaran god is present. People from mainland used to visit the temple on every Tuesday and Friday of the week. A good number of fishermen frequently visit this island for fishing operations.

They are also engaged in algae and live shell collection. Coral reefs and coral boulders are available all around the island at a distance of 0.5 km on the southern side and very near on the northern side.

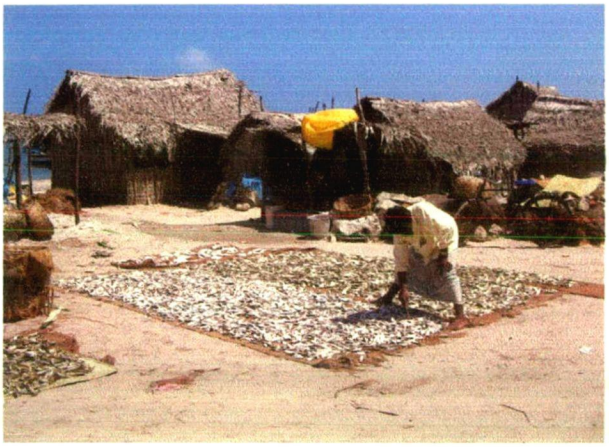
14. *Puluvinichalli Island:* This Island has an area of 6.12 ha. and it is 18 km away from Vembar. It has a good sandy beach. A fairly good portion of the island has thick vegetation. Few Thespesia trees are available on the eastern side. Fishermen from Keelakarai frequently visit this island, staying for a week for lobster fishing. Some people are engaged in algae and live shell collection. This island is surrounded by live coral all around except for a small stretch on the eastern side.
15. *Vallimunai Island:* This Island has an area of 6.72 ha. It is 9 km away from Keelakarai. It is a sandy island with shore strewn with coral rubbles. This island is completely covered with Acacia trees and tall bushes of Zizyphusjujuba. The southern comer of the island has been affected due to wave action. Fishermen visit this island for lobster fishing. Women and boys are engaged in algae and live shell collection. Live coral reefs are available in southwestern corner at a distance of 200 m from the shore. Dead coral reefs are available all around the island.
16. *Poovarasanpatti Island ('Kilangan Paar'):* This Island is 0.2S ha. in area and is visible only during low tide and fully submerged during high tide. Live corals are available in this area upto a distance of 100 m except on the northern side. Collection of seaweed is the only activity of the fishermen here.
17. *Other islands:* Appa Island has an area of 28.63 ha. and is situated 8 km away form Keelakarai. Talairi Island covers an area of 75.15 ha. and is in 15 km away from Keelakarai. Valai Island has an area of 10.15 ha. and is 15 km away from Keelakarai. Trap-net fishing is intensive in and around this island. Mulli Island covers an area of 10.12 ha. and is situated about 15 km from Keelakarai. Bushes are found throughout this island. **[5]**

4.3.7 Human Settlements

The coast of Ramanathapuram comprises of three taluks viz namely Tiruvadanai, Ramanathapuram and Kadaladi, six developmental blocks viz namely and five panchayats unions - Tiruvadanai, Rajasingamangalam,

(i) Boating Repairing yard at Mandapam

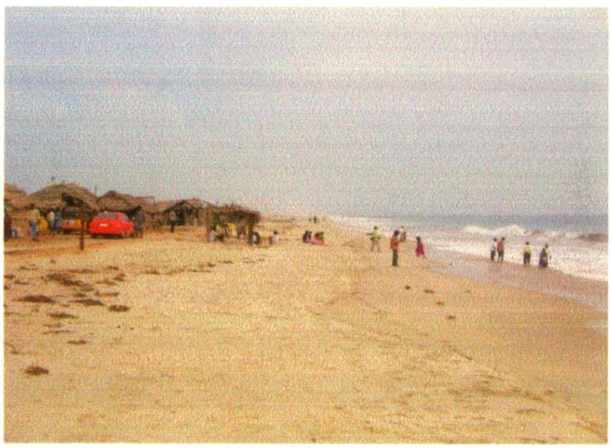
(ii) Net repairing near Vedalai



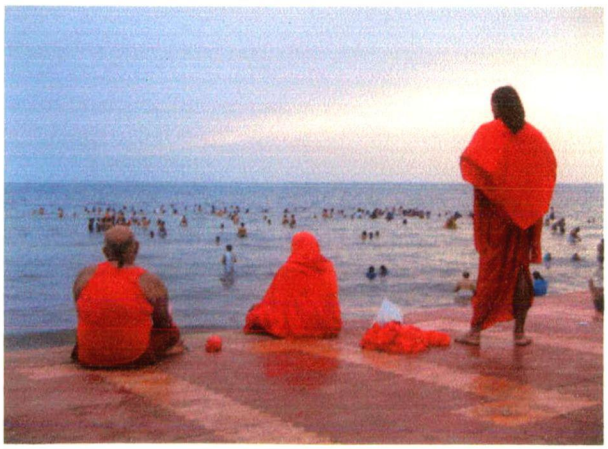
(iii)Fish Drying near Pamban Coast

(iv) Fishermen cleaning his nets at Sankumal

(v) Village Festival near Ariamaan



(vi)Recreational activities at Moonramchattiram



(vii) Religious Activities at Agni Theertham

Plate 4.5: Activities along the Ramanathapuram Coast

Image source: Captured by the Author

Ramanathapuram, Mandapam and Kadaladi. Thondi, Mandapam, Rameswaram and Keelakarai are the four major urban centers in this stretch.

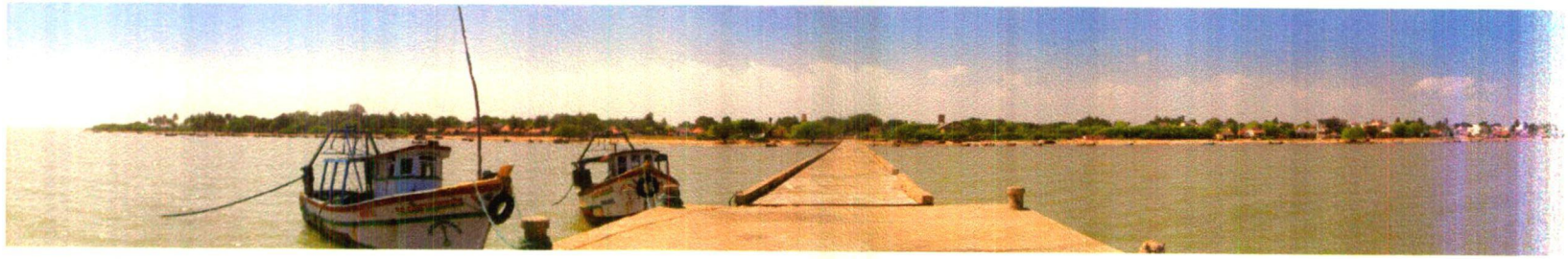
The residents of coastal villages in the Ramanathapuram pursue fishing as a primary occupation since agricultural activities have proved to be unproductive. Most of them are using traditional methods of fishing and are living in huts. Their economic condition is below poverty line and the neglected aspect is education. Inadequate supply of water, lack of proper medical and health care facilities, dissatisfactory power supply, etc., keep the fishermen in a permanently disadvantageous position both socially and economically. Their income is very low and is attributed to low productivity and improper marketing system and lack of additional vocations. Therefore, they have low standard of living. Majority of fishermen are in debt due to inadequate income from fishing.

4.3.8 Tourism

Almost all the tourism places in the district lies in the coastal region .In this stretch, Rameswaram is a sacred place for Hindus. This town is built on an island in the Palk Straits at the extreme south-eastern tip of the Indian Peninsula. It contains one of India's most venerated temples, a fine example of South Indian Architecture.

4.3.9 Climate

The climate in the Coastal region is marked by the monsoon seasons, with heavier rainfall during the north east monsoon from October to December. The average annual rainfall varies from 762 mm to 1270 mm and average monthly temperatures range from a maximum of 31°C in May to a minimum of 25°C in January. The south west monsoon season, from June to September, contributes little towards the annual rainfall, but periods of rough seas are reported around August. Tidal amplitude is only 0.5 m, increasing to a maximum of 0.81 m during spring's tides and falling to 0.2 m during neap tides. **[2]**



(i) Thondi, a major landing center. View from the jetty towards the coastal settlement.

(ii) Rameswaram, a National Pilgrim Center. View from low tides towards the island.

(iii) Villoondi Theertham, an unknown tourist destination. View from the Theertham towards the Island.

(iv) Gandhamathana Parvatham, a tourist destination in Rameswaram. View from the hill lock towards the coast.

Plate 4.6: 180^0 Panoramic Views of Ramanathapuram Coast

Source: Images Captured & Prepared by the Author

Chapter 5

Analysis of Development in the District and Coastal Region

This chapter analyses the situation of various blocks of the district in terms of

1. The existing level of development
2. Development potential and infrastructure

Analysis of the level of development of the district is attempted here through comparing the level of development of blocks by using key development indicators/parameters. The major part of the chapter, however, is devoted to more elaborate discussion of the development potential of coastal region which comprises of six blocks.

5.1 Analysis of Existing Infrastructure in the District:

From the inception this district is classified as industrially backward. There were 406 permanently registered industrial units only while forming this district. At present 4,050-registered small scale units are functioning and providing employment opportunity for about 8,950 persons. Besides, there are six large and medium scale industries functioning in this district providing employment to another 2300 persons.

Agriculture is the main occupation of the people in this district next to fishing. Only in Paramakudi there are a large number of handloom weavers producing sarees using polyester, cotton and art silk (viscos). There are about 76 electric line materials manufacturing SSI units at Paramakudi.

District Industries Centre: The policies and programme of Government for the development of rural industrialization based on the utilization of local resources and raw materials and locally available manpower and skill are translated into action through the various agencies under the Industries Department which are primarily concerned with the promotion of Small and Rural Industries. Provisions have been made to provide infrastructure facilities. Assistance is provided and growth centres have been promoted. Institutions like Tamil Nadu Industrial Investment Corporation along with Small Industries Service Institute of the Government of India and nationalized banks assume the responsibility for providing necessary inputs to this sector. This will go a long way in reducing

unemployment. Since Agricultural Sector has been fairly saturated, it is necessary to develop secondary sector of economic activity in order to improve the overall economy of the District, as well as to solve the mounting unemployment problem towards this objective.

This District Industries Centre is the institution at the district level, which provides all the services and support facilities to the entrepreneurs for setting up small and village industries. This includes identification of suitable schemes, preparation of feasibility reports, arrangements for credit facilities, machinery and equipment, provision of raw materials and extension services.

5.1.1 Infrastructure Facilities of the District

1. **Power:** The power supply to the district is from State Grid by Tamil Nadu Electricity Board. T.N.E.B.90M.W.Gas based Thermal power plant at Vazhuthoor.
2. **Road:** The district has 3574.56Kms long roads of which 133.20 Kms. form national highway No.49 and 59,70Kms form state highway, remaining portion are other roads.
3. **Rail:** The District has 105kms of meter gauge railway line connecting different places. The-line passes through and connects Paramakudi, Ramanathapuram, Mandapam Camp, Mandapam, Pamban and Rameswaram. Broad Gauge conversion work is going on.
4. **Sea Ports:** The District has long coastline, but does not have any major port, Rameswaram, Pamban, Keelakarai, Thondi are few minor ports. When the Sethu canal project commences Thondi and Rameswaram ports would be connected to Sethu canal. Special Economic Zones would also be located next to Rameswaram port and Thondi port.
5. **Airport:** There is one naval air strip/ground station at Perunkulam near Uchipuli.
6. **Water:** The main river that flows through the District is Vaigai and the tributaries are Gridhamal and Sarugani. There are 8 reservoirs, 511PWD Tanks and 1695 other Small Tanks. When they are full, they can irrigate a total of 65508 hectares of land. As per recent report of Satellite remote sensing program, there are few buried canals in Ramnad district with lot of under ground water potential with natural recharge facilities. There is a large

number of *ooranies*, to supply drinking water for the villages. There are 10698 wells and 437 tube wells in this district.

7. **Rainfall:** The District receives most of its rainfall from the North East monsoon as a rule. The rainfall is meager and irregular failure of the monsoon is frequently followed by excessive rains in the next. The minimum rainfall per annum is about 650mm and average rainfall is 827mm.
8. **Mineral Sources:** A reserve of 10 million tones of cement grade lime stone of 1 meter thickness spread over an area of 5 sq Km is available in Rameswaram Island. Gypsum is available in Kokkadi, Peraiyur, Tiruvadanai, Valinokkam and Keelakarai areas. Large quantities of clay deposits are also available in Athangarai in the river bed. Large quantities of seashells, oyster shells are also available.
9. **Islands:** There are around 21 islands available in the coastal belt between Rameswaram and Tuticorin. There are more coral reefs available. More boat services can be considered between islands and mainland so as to attract more no. of tourist to this area.
10. **Agriculture Based Activities:** Due to failure of monsoon and scarcity of water the agriculture system need be oriented on watershed basis only. More importance should be attached to water harvesting technologies, soil conservation technology and dry farming technologies; The District has got a total cultivated area 2, 20,515 hec Total irrigated area 65508 hec. During 2000-01 the following areas were under different crops.

    Rice is the stable food crop of this district. The area under millet is considerably reduced due to change of food habits of rural masses to rice. Eating rice is considered as a status symbol now.

    It is essential to change the mind set of the rural masses and to make them accept the importance of millets and small millets foodstuff. There is a big commission market for cotton, chillies, and other commercial crops at Paramakudi.
11. **Sericulture:** Paramakudi is one of the big handloom production centers where art silk, cotton, polyester sarees are manufactured.
12. **Forest & Horticulture:** In Ramanathapuram District 5,754 hec. land are under tree plantation. There are about 39,363 Ha. of other waste lands. There are about 13,497,000 Palmyra trees under 16,091 hec. There are about 8.5 crore

Palmyra tree in our country, out of which 5.01 crore trees are said to be in Tamil Nadu, that too particularly in Ramanathapuram District. Out of 13,497,000 trees in Ramnad 1/3 are only tapped 2/3 are not tapped. It is because of the hazards involved in tree climbing. There are not much of tree climbing machined used so far except saint mary device, which is not so popular, and to climb the tree it takes a lot of time by using saint mary device.

The "Pathaneer" (Neera) is available for only three months; every tree gives an average of 360 litres. 15% of pathaneer is sugar and other soluble minerals; there is about 8% of sugar.

13. **Floriculture:** Extensive cultivation of Rose & Jasmine can be under taken with extraction plants for Rose oil & Jasmine concentrate. Minimum 50 Hec. to be undertaken for each.

14. **Animal Husbandry:** Live stock population of the District is as follows:

Cattle	:	279426
Sheep	:	507718
Goat	:	409035

15. **Dairy Industry:** The district has chilling plants at Paramakudi and Kamuthi. Milk is at present collected from 287 societies. After catering to the local need they are sent to Aavin, Karaikudi for further processing.

16. **Marine Resources:** Ramanathapuram District has a coastal line of 271Kms. and takes 25% share of the total coastal line of the state. Next to Agriculture fishing is an important occupation of the people of the district. There area 4 fish landing harbors at Thondi, Rameswaram, Mandapam and Valinokkam and 78 fish landing centres. The district has 100 fisherman villages and about 36453 fishermen are actively engaged in fishing Operations. About 75000 to 80000 Tones offish of various varieties are caught in this district per annum. There are 5492 registered mechanized boats, 2860 country crafts, 850 catamarans in this district.

17. **Sea Weeds:** Yearly about 1709 Tones of Agrophytes and 10266 Tones of Alginophytes & other sea weeds of 10069 Tones are collected from the surveyed area of . 17,125 Ha. These are primitive types of plants grown in the inter tidal or sub tidal regions of the sea. The seaweeds are broadly grouped into Green, Brown, Red and Blue green algae. Seaweeds are used as human

food, live stock feed and raw material for the production of agar and sodium alginate, phyto chemicals are also manufactured from sea weeds.

18. **Pearl Culture:** Cultured pearls of good quality are produced in the Indian pearl oyster "pinotadafucata" by artificially inducing the oyster, to secret "mother of pearl" around an implented spherical material produced from shells. The pearl oysters are either produced through artificial breeding in Hatchery or collected from the natural beds.
19. **Chunk Industries:** Chunk Industry is a common placed industry. From chunks, bangles, rings, earrings etc. are manufactured and the same have a good and healthy market in North India. Till a few years ago, the entrepreneurs got the raw material i.e. chunk from the fisheries department. Now, due to the Government policy, chunks have been auctioned in lots and so the local units hitherto engaged in these activities have been closed.
20. **Ship Breaking Units:** Valinokkam in Mudukulathur Taluk is a natural harbour, but the advantage of this has not been fully utilized. There are 3 ship-breaking units, which can employ more than 1000 persons ship breaking at time. Due to several constraints such as uncertain and erratic power supply, non-availability of gas cylinders for welding/cutting etc., these units are not working properly. Valinokkam is not a customs port and hence the ships meant for breaking has to report at customs port, either at Madras or at Tuticorin for completing the formalities and then reach Valinokkam port for breaking. This also hinders the development of ship breaking industries in this area. Valinokkam is just 3 kilometers from the shore and has yet sufficient depth for ships. Further this area is free from cyclonic storms and port operations can be carried out for 11 months in a year.
21. **Salt:** Sea is the biggest store-house of salt. Ramanathapuram District is endowed with the longest coast line of 271 Km. In Ramanathapuram District salt is produced in swamps. Salt is on essential item of food and also an important raw-material for the manufacture of several basic chemicals. Heavy chemicals such as caustic soda, soda ash are manufactured with common salt. Salt is exclusively used in leather industries, in water softening, refrigeration, food processing ceramics and many other industries. Weather condition in Ramanathapuram district is extremely suitable for salt production. At present very few units are engaged in salt production in this district in Tiruvadanai,

Ramanathapuram, and Mudukulathur. 42000 Litres of Sea water is required to make one metric tone of salt. The total area available for salt cultivation is 6591 acres. Out of which 2358 acres already under cultivation remaining 4233 acres are yet to be taken up for salt production.

5.2 Analysis of Development at Block Level

In the following paragraphs, an attempt is made to (1) select a set of development indicators for identifying and comparing development at block levels, and (2) identify blocks of homogeneous development. The basic data at block level is given in Table 5.1.

Table 5.1: Basic data at block level

Sl. No.	Name of the Block	Density Per Sq. Km.	Females Per 1000 males	Increase in population since1991	Population in %		Literacy rate among	
					Rural	Urban	Male (%)	Female (%)
1.	Ramnad Municipality	1014	992	15.45	--	100	66.8	43.2
2.	Paramakudi Municipality	647	992	15.62	--	100	66.4	45.7
3.	Ramanathapuram	518	1017	14.14	100	--	57.4	43.2
4.	Tiruppullani	504	1016	10.76	73	29	54.2	37.2
5.	Mandapam	514	989	15.43	66	34	61.0	41.3
6.	Thiruvadanai	277	1047	10.56	81	19	47.8	30.7
7.	R.S.Mangalam	173	1009	10.99	--	--	47.2	31.4
8.	Paramakudi	220	1004	11.24	--	--	55.2	36.8
9.	Bogalur	143	1020	11.24	100	--	45.2	30.8
10.	Nainarkovil	177	1018	11.09	100	--	47.7	33.2
11.	Mudukulathur	396	1026	12.09	88	12	53.2	36.7
12.	Kadaladi	507	990	12.24	100	--	55.8	41.9
13.	Kamuthi	190	1014	12.06	89	11	52.2	40.4

Source: Census of India 2001

5.2.1 Sustainable Development Indicators

Indicators have been used for many years to provide with brevity and clarity parameters which might be of interest. Their functions are several and include description of a situation, identification of potential problems, support to decision making, and monitoring and evaluation of actions taken (***U.N., 1998; World Bank, 1997***).

Sustainable Development indicators are a tool which could be used for sustainable tourism development. These indicators are being developed for evaluating choices which are made during the developmental process and impacts made upon the natural and socio-economic environment. They provide a framework for evaluating existing situation, as well as, future developmental activities in the field of development.

5.2.2 Methodology followed for the definition of indicators

From the list of gathered set of indicators a selection was made for this study based on their representative quality and suitability for application in analysis of Ramanathapuram district development at the block level. Potential data availability was another factor that influenced indicators choice. Several indicators could not be estimated for want of data. The spatial level - local, regional or national - was another factor considered during the definition and the selection of indicators. This was addressed because some impacts of development are localized, while some other affect the whole region and not just the block examined. Some of the indicators proposed can be applied on both coastal and regional level while others address only one of the two.

5.2.3 Data sources

Identifying the appropriate datasets was a serious problem since no organized databases were available on the district or the contacted organizations. The main sources of information were:

- Ramanathapuram district handbook 2005
- Block statistical handbook
- Indian Census 2001
- Department of Fisheries Census 2000

Other potential data sources could be the Ministry of Agriculture and other professional associations.

5.2.4 Selected indicators

One major problem that was encountered was related to the lack of times series on most available datasets. It was preferred that all indicators were

estimated for the same year. The results of the indicators estimation are shown in Table 5.2.

For the sake of completeness, indicators which could be not estimated because of the lack of data, but which were considered significant are included as well. Although, data availability was considered when choosing indicators and thus influenced their selection to some degree, of major importance was the persistency on the notion of sustainable development. Therefore, despite the possible need for "better" indicators, it is believed that the present methodology and the approach followed are contributing to the establishment of a framework for the definition of sustainable development indicators. One issue that must be stressed is that choice and evaluation of indicators is closely tied to the criteria used for defining sustainable development.

Although no income data are available there is a perception that incomes in Ramanathapuram were lower than state average. Very less residents in the district are employed in tourism related jobs, while most are involved with agriculture (Paddy mainly) and fishing being the most dominant activity in the coastal region. In this way, it could be argued, that traditional activities as well as the diversification of local economic activities are supported.

Table 5.2: Analysis of development at Block level using Development Indicators

DEVELOPMENT INDICATORS	Tiruvadanai	R.S.mangalam	Ramanathapuram	Mandapam	Tirupullani	Kadaladi	Kamuthi	Mudukulathur	Paramakudi	Bogalur	Nainarkovil
Percentage of irrigated area to net sown area	44.43	47.29	61.21	46.24	53.8	28.85	21.91	27.98	53.8	38.34	33.96
Percentage of net sown area to total land area	55.4	55	32.7	27	40.7	43.8	48.7	64.6	36	52.5	51.3
Population served by a Nationalised bank	27865	10936.14	7301	7328	21091	139344	12606	43099	17304	18458	11791
Population served by a bank(all banks)	12384	5103.53	4239	5909	9587	8709	7091.25	6630.61	5768	3356	5240.55
No. of doctors per 1000 population	0.08	0.05	0.24	0.092	0.1	0.05	0.07	0.02	0.03	0.1	0.084
No. of nurses per 1000 population	0.21	0.11	0.35	0.23	0.15	0.05	0.07	0	0.17	0.08	0.36
Length of roads(total) per 100 sq km area	69.65	25.22	227.12	139.11	204.34	115.26	4.23	48.79	144.3	28.51	1.65
Length of roads per 100 sq km area											
Mud road(unsurfaced)	5.65	7.56	108.47	56.63	124.34	52.306	1.54	19.13	30.35	5.3	0
Saralai road	11.86	0	0	0	0	14.83	0.06	8.28	0	0	0
Metal roads	30.25	8.68	25.82	18.71	33.98	4.23	3.25	8.82	33.83	7.23	0.96
Tar roads(bitminous)	21.87	0	50.27	63.86	0	42.07	0.07	10.29	39.56	15.2	0.45
Cement-concrete roads	0	9.96	42.56	0	46.01	1.8	0.12	4.77	40.55	0.78	0.23
No. of Telephones per 1000 population	49.16	12.34	16.36	40.11	7.67	3.3	16.1	18.7	66.7	15.98	13.35
No. of Will phones per 1000 population	0	0	0	0	0.26	0	0	0	0	0.21	2.33
No. of Public call offices per 1000 population	3.14	0.41	0.71	0.5	0.39	0.06	0.23	0.15	0.59	0	1.54
No. of Post offices per 1000 population	0.07	0.27	0.083	0.038	0.18	0.11	0.06	0.09	0.04	0.27	0.27
No. of streetlights per 1 sq km of builtup area	3885.71	4127.9	4235	2184.3	783.13	518.3	978	1561	1315.81	1144.59	1011.37
No. of mechanized boats per 1000 fishermen	115.33	36.99	333.1	46.5	42.52	1.78	0	0	2245	0	0
No. of non mech. boats per 1000 fishermen	105	200.69	35.46	91.12	98.44	324.13	0	0	4518	0	0
No. of Livestock per 1000 population	294.69	745.48	420.51	389.1	522.76	939.42	480.73	428	457.67	930.27	608.71
No. of membership in agri.co-operative society per 1000 population	218.49	274.63	60.07	87.04	58.58	246.13	131.81	114.5	98.72	575.41	216.89
No. of membership in fishermen cooperative society per 1000 fishermen	0	0	0	0	32.79	0	0	0	0	0	0
Storage capacity in tons in ware housing per 1000 population	6.459	7.18	21.99	2.86	1.327	27.62	27.32	22.13	19.9	1.35	18.12

No. of landholdings per 1000 rural population	422.11	412.45	123.02	125.77	189.28	426.42	540.48	515.13	37.87	532	449.31
No. of tractors per 1000 rural population	0.53	0.39	2.13	0.74	1.83	0.66	1.37	0.59	1.72	0.89	0.16
Percentage of male literacy	30.79	32.48	37.76	36.44	33.17	32.75	35.84	29.61	43.17	35.38	33.76
Percentage of female literacy	19.63	27.66	32.71	31.66	28.56	24.02	25.37	17.13	39.2	24.53	24.71
Percentage of total literacy	50.43	60.14	70.48	68	61.73	56.77	61.21	29.61	82.37	59.91	58.47
Percentage of non workers to total population	52.3	66.7	25.11	56.95	35.35	28.99	48.52	38.25	29.31	52.43	24.39
Ratio of workers to non workers	01:01.1	01:.9892	01:00.8	01:01.9	01:00.6	01:05.8	01:00.7	01:00.8	0	0	01:00.3
Ratio of Cultivators to agricultural labourors	01:00.3	01:00.1	01:00.1	01:01.7	01:00.5	01:00.7	01:00.8	01:00.3	0	00:00.0	01:00.5

Table 5.3: Overall Ranking of the Blocks on the basis of Development

1. Ramanathapuram	**4. Mudukulathur**	**6. Nainarkovil**	**8. Tiruvadanai**
2. Paramakudi	**5. Bogalur**	**7. Tiruppullani**	**9. Kamuthi**
3. Mandapam	**5. Kadaladi**	**7. R.S.Mangalam**	

5.2.5 Results of Comparative Analysis

Overall rankings were determined by averaging 27 individual category rankings into a cumulative average (Refer table 5.3). So, what does it mean that Paramakudi ranked #2 in this study, or that Kadaladi ranked #5, or that Kamuthi ranked #9? These final total rankings were developed by averaging each blocks performance across 27 main performance areas. Paramakudi #2 ranking came from its total average of 58 across all 27 areas (the lower score the better), while Kamuthi averaged 78 across the same areas. Cumulative averages ranged from 54 for the highest-scoring block and 78 for the lowest-scoring block. The best possible score would be 27 (average of first place across all categories) and the worst possible score would be 101 (average of 3rd or 5th place across all categories.). In other words Paramakudi was more developed than Kamuthi in terms of the categories analyzed.

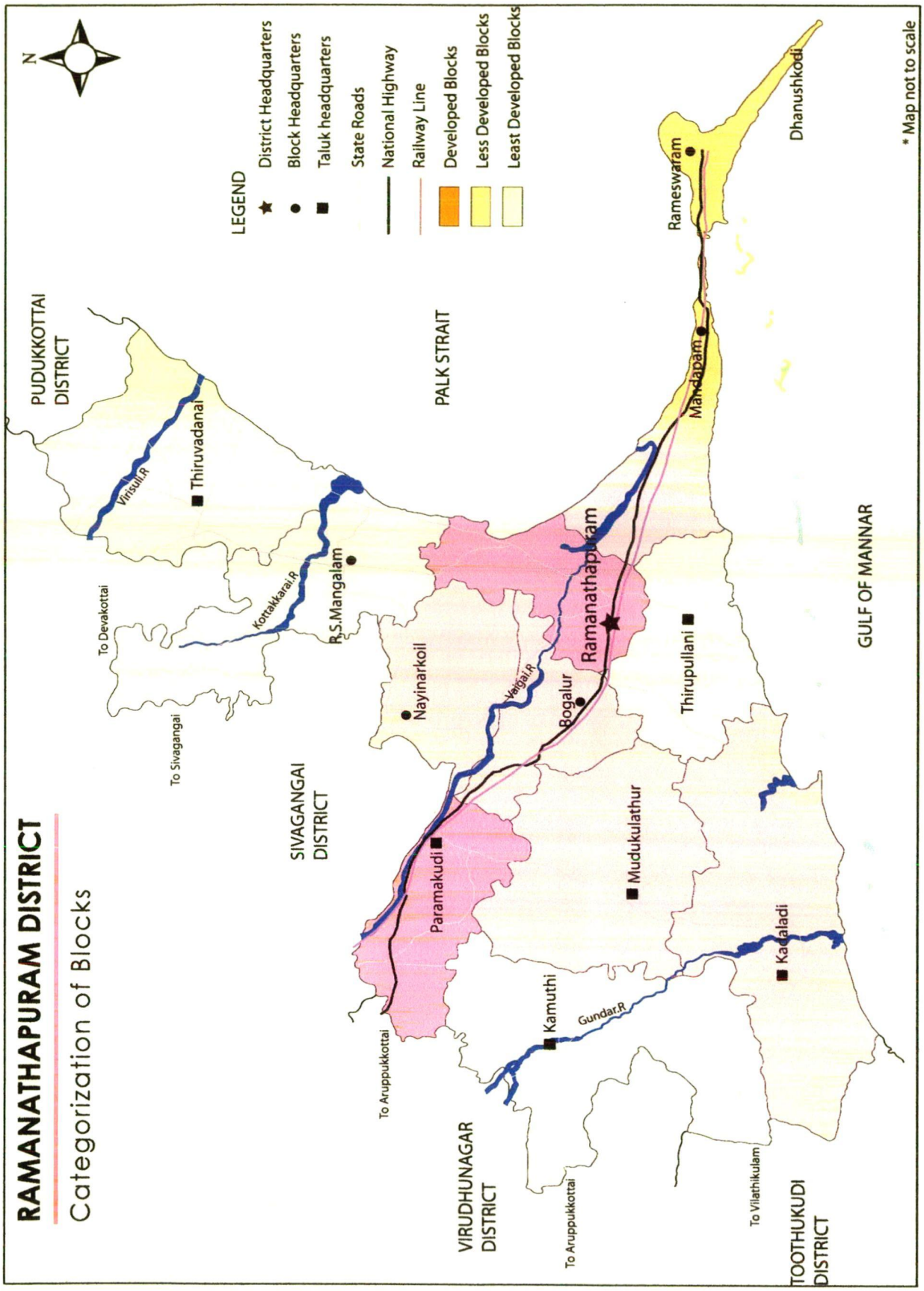
Based on the above overall ranking of the blocks and the comparison of the cumulative averages, the blocks can be broadly classified on the basis of development into three major categories - Developed Blocks, Less Developed Bocks, and Least Developed Blocks. (Refer table 5.4 & Map 5.1).

Table 5.4: Categorization of Blocks on the basis of Development

Developed Blocks	Less Developed Bocks	Least Developed Blocks
• Ramanathapuram • Paramakudi	3. Mandapam 4. Mudukulathur 5. Bogalur 6. Kadaladi 7. Nainarkovil	• Tiruppullani • R.S.Mangalam • Tiruvadanai • Kamuthi

5.2.6 Conclusion

One of the most striking problems estimating the indicators was the lack of proper data. This is relatively common in India since no special provision is taken regarding the availability and quality of necessary data other than those resulting from certain official surveys. Although tourism is one of the major economic activities in the country, lack of data, especially at a local scale, is striking. Moreover, since sustainable development indicators necessitate data other than those gathered for classical statistics, the problem is even worse. The need of



Map 5.1: Categorization of Blocks on the basis of Development
Source: Prepared by the Author

identification and systematization of data for sustainable tourism development appears to be imperative. In order to compensate the lack of data, surrogate indicators were introduced where possible. Undoubtedly, when an integrated evaluation of an area's tourism development is the target, there should indicators representative for each parameter related to sustainable development. It is believed that the evolution of research on the field of sustainable tourism indicators will contribute to the improvement of the quality and the quantity of data available.

Another problem concerning data relates to the time of their collection and therefore to the time on which the evaluation is referring. Although the right thing to do would be the indicators estimation for the same period of time, (this was actually done), and all estimated indicators refer strictly to a given period of time.

5.3. Basic Needs of Ramanathapuram Coastal Communities

Ramanathapuram has a long fishing tradition. One eighty four fishing communities inhabit the 271 km stretch of the coast. They include some 120,000 fishers, of whom 25,000 are engaged in active fishing. The skills of these fishermen are regarded highly all over India ***(BoBP 2001)***. Boats from the district are found along the entire coastline. It is only during the southwest monsoon (when a ban on trawlers is in force in most states) that they return to Ramanathapuram district.

Over the years, the intensity of fishing has increased dramatically - partly on account of the increase in the active fishing population; partly due to the lack of alternative income-generating opportunities; and partly due to motorization and mechanization of fishing crafts. The resource has not kept up with the increase of effort. Result: a sharp reduction in catch per unit effort (CPUE). Some traders estimate a 60-75% reduction over the last decade. The parallel increase in prices protected the earnings of fishers for a while from the effect of lower catches, but even this buffer is wearing off, and earnings are declining.

With competition running high during the past decade, conflicts among fishers, leading to violence, are endemic. The basis of these conflicts is the modernization drive of fishing vessels and gear for which State subsidy schemes have been in place since the 1960s. These schemes initially encouraged the introduction of mechanized trawlers; later, the motorization of vallams and

kattumarams. Despite the increasing fishing intensity in the district and the falling CPUE, no one has causally linked the problems to resource limitations. Until recently, Ramanathapuram fishers and the Government of Tamil Nadu were not ready to accept the fact that resource limits had been touched *(BOBP 2001)*. In fact, subsidy schemes for the purchase of craft, engine and gear are still in place. Modernization of vessels and gears is still regarded as a solution, although all signs suggest the contrary.

5.3.1 Field Survey of Coastal Villages

A field survey of seven coastal villages was done as a part of the dissertation project to determine the parameters considered to be essential for sustainable tourism development. Case studies at a local scale have a significant contribution in problem identification, analysis and prioritization, as they are focused on specific issues of coastal region which generalization misses.

5.2.2 Survey methodology

The aim of the survey was to investigate and prioritize the needs of fishing communities in Ramanathapuram Coastal region .In total, seven villages were surveyed, using the tools of group discussions and semi-structured interviews with individuals and groups of fisher folk.

The survey was conducted in seven villages located in Ramanathapuram coastal region namely Mullimunai, Sundarmadayam, Olaikuda, Kundugal, Vedalai, Kanchirankudi and Mundal. (See map 5.2).

The survey considered the following areas:

- Drinking water
- Sanitation
- Schools
- Health care
- Communication facilities
- Electricity
- Land availability and housing, and
- Road accessibility and public transportation

All these needs were selected after consultations with the various Government department officials, literature study and initial processing of the data.

5.2.3 Rationale for the selection of study villages

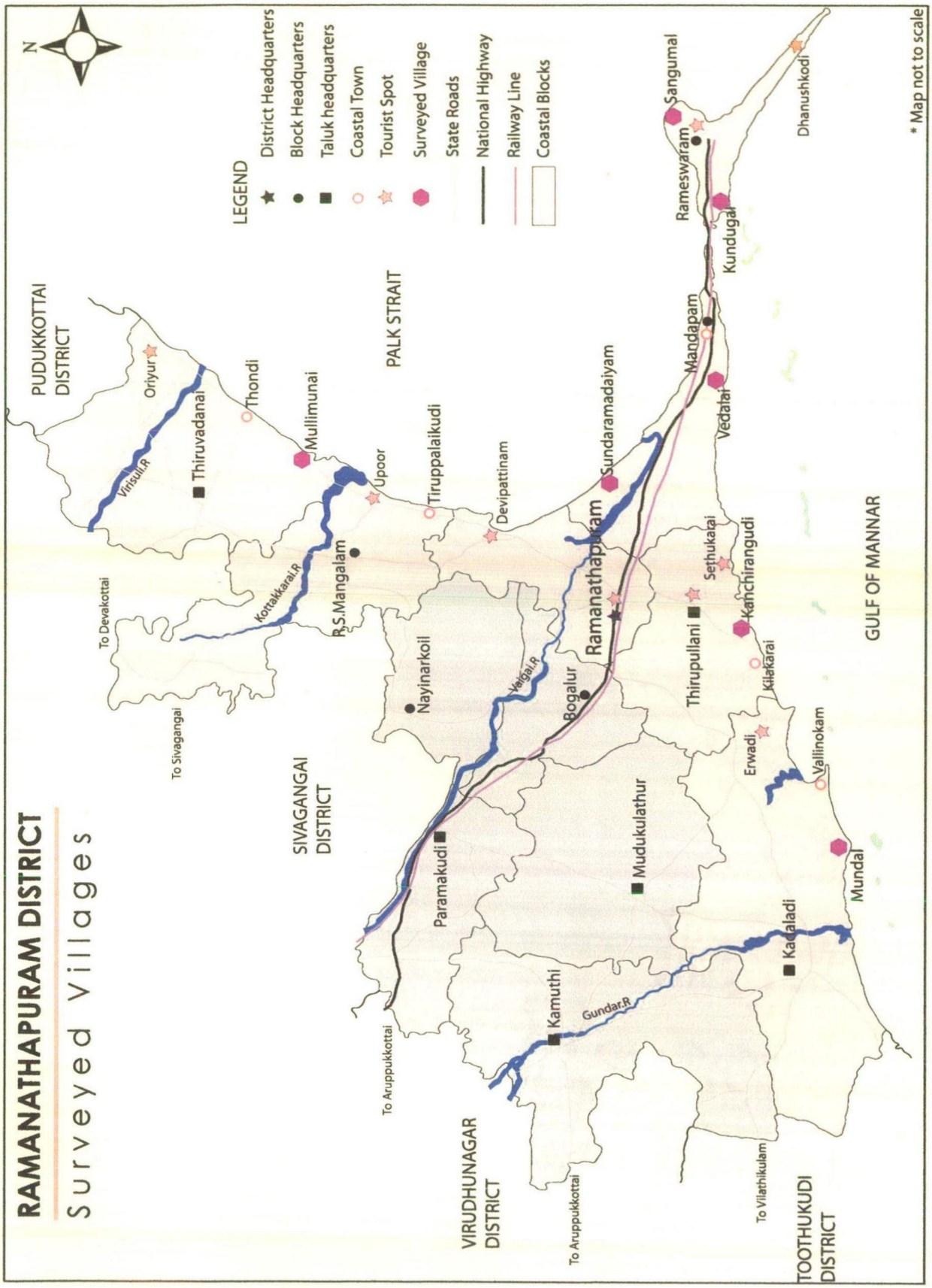
The seven villages were selected on a purposive basis to cover adequately the coastal region of Ramanathapuram district. The main criterion for selection of the villages is the proximity to or distance from an effective urban centre. The location of the villages near a tourist potential area or areas with small irrigation or areas with adequate facilities for agriculture has been also kept in mind while selecting the villages.

The selected villages are of medium size with multi-ethnic population and having variegated occupations though primarily dependent on fishing while some had one dominant community with one predominant occupation, like fishing, construction workers, etc.

5.2.4 General characteristics of the villages

In all the villages, the houses are located along the shore only a few metres away from the sea and are predominantly thatched (60% of households).Electricity is supplied to all the villages, but no sanitation facilities are present and all other services are located at walkable distance from the village.

Coconut and Palmyrah (toddy) palms provide a source of land-based labour opportunities. Goat rearing, mat weaving and construction labour are also undertaken as land-based activities with women only taking an occasional part. But the majority of households in these villages are involved in sea-based occupations, with only few percentage undertaking land-based options.



Map 5.2: Location of Villages Surveyed in the Coastal Region
Source: Prepared by the Author

Households also tend to be associated with a single livelihood option, with only 25% of households undertaking secondary activities.

5.2.3 Introduction

During the group discussions, fisher folk were asked to rank their problems in priority order from the most important (1) to the least important (9). In the final conclusion, only the three most important problems were confined , since fisher folk usually came up with only two or three problems that they regarded very important. Moreover, they found it difficult to rank and prioritize other problems. A complete ranking would be false, because it would suggest a tidy order of perceived needs that does not exist. A short list makes better sense than a complete list because action is possible only on the most important needs.

5.2.4 Overview

The pie chart summarizes the villagers perception of what was their No. 1 problem area. It shows what percentage of the villagers regarded a particular problem (drinking water, schools, health care, land availability, water for bathing & washing, sanitation) as their No. 1 problem.

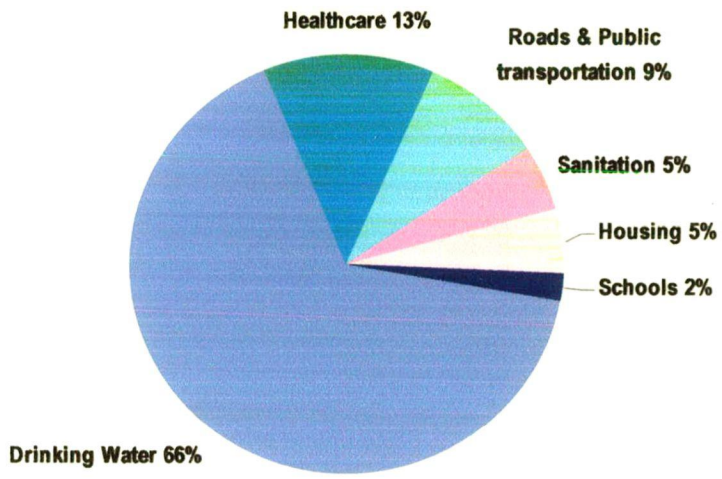


Figure 5.1: The No. 1 problem, as perceived by fishing communities in Ramanathapuram district
Source: Prepared by the Author

a) Safe drinking water:

Considering the long list of complaints, it is surprising that more than half of the villagers agreed on their No. 1 or most urgent problem as access to safe

drinking water. If we add those who regarded it as their No. 2 or No.3 problem, the number is a staggering 75% of all surveyed communities.

In the first few villages that considered safe drinking water their main concern, more than 20% regarded "water for washing and bathing" as also a problem. There is thus a high degree of unanimity about water being a vital need.

It is natural that demand for water is high in coastal areas that are densely populated and also used for intensive agriculture the intake of large quantities of water causes seawater to enter ground water reservoirs. This salination process further constrains the intake of drinking water in Ramanathapuram district, causing still more stress are a number of agricultural activities.

The villagers also complained about the short duration that water availability. Often they could tap or pump water only once every two days or for one hour every day. Erratic and insufficient power supply aggravated the problem even more. Without electricity, people were unable to operate the pumps that carried water to water tanks. Specific requests were made to increase the capacity of the water tanks, dig wells at appropriate places and strengthen the distribution network of pipelines.

b) Health care facilities:

About 13% of the surveyed villagers rated health care as their primary concern. Almost half of the fishing communities regarded health care as their 1st, 2nd or 3rd priority .Most villagers expressed a strong need for well-staffed government hospitals or primary health centers (PHC) that charge moderate prices and are open 24 hours a day to the public. Most private institutions are perceived as too expensive. Although government PHCs and hospitals are cheaper, they lack qualified staff and are open only a few hours a day.

The communities have to travel longer distances to reach a full-fledged hospital capable of tackling major problems. Overall, healthcare is the second-most important problem perceived by coastal fishing communities. The main hospitals for specialized help are in Ramanathapuram. So a community's access to major medical help may depend on how far it is from Ramanathapuram

c) Road access and public transportation:

Statistically speaking, road access is one of the less important problems. Only 9% communities have ranked it as their 1st, 2nd or 3rd priority need. It is clear that basic services such as drinking water and healthcare are regarded as

higher priorities. But improving coastal roads, linking villages with one another and shortening the routes to urban centers would improve the access of fisher folk to several services, such as health care and education. In fact, improving coastal roads would have a multiplier effect on development.

Better roads would generate a positive effect on fisher folk incomes. Reduced transportation costs would mean higher margins for producer and collector, wholesaler, distributor and fish vendor. Fisher folk would even be tempted to sell a part of their produce directly to a wholesaler or fish vendor in the urban market.

d) Sanitation:

Sanitation facilities are badly needed in coastal areas. The direct observations in the field confirm that sanitation facilities for handling and disposing sewage, solid and liquid waste are insufficient and unsatisfactory. About 5% of all villages regarded this service as their prime concern. Specific needs ranged from proper drainage, public and private toilets to garbage collection on a regular basis. Only a few rich families seemed to afford a private toilet inside or outside their homes. The majority of the fisher folk used the beach, streets or nearby private land as public conveniences.

Villagers complained that bad hygienic conditions in their village had spawned diseases. Almost everyone wanted immediate action to provide them with sanitation facilities such as public and private toilets and arrangements for regular garbage collection by local panchayats.

e) Land availability and housing:

Another major concern of coastal people in Ramanathapuram coastal region is the scarcity of land. The majority of the coastal fishing communities live on a small strip of land, adjacent to the beach. Pressure on land is mounting because all the communities have seen a steep rise in population size.

f) Schooling:

Two percentages of the communities ranked schooling as problem area no.1. Villagers complained about the low standard of teaching, especially at primary, secondary and higher secondary schools. They wanted properly staffed and well-equipped schools and well-trained teachers.

Almost half of the respondents were happy with the quality of schooling. The other half complained about the non-commitment of staff, the lack of discipline in school and the dearth of basic facilities to support the teaching of

their children. Others complained about the non-availability of roads and bus services to bring schools within easy reach.

g) Electricity:

All the coastal villages in the district have been electrified. Mostly, 50 to 90 per cent of the households have access to electricity. Most villagers complained about power cuts and low voltage. In addition, few communities also specifically asked for street lighting. Others claimed that proper maintenance of the existing infrastructure would improve matters.

h) Communication facilities:

Telephone services did not rank among the top priorities of the villagers. Most people complained about telephone services but gave it a priority lower than 3. But the fisher folk were unanimous in requesting access to a public telephone booth with a STD connection.

5.3.5 Conclusion:

The coastal fishing communities of Ramanathapuram district were asked to identify and rank their priorities, concerning needs for basic services, from a list: electricity, health care, land availability and housing, road access, safe drinking water, sanitation, schools, and communication facilities. These basic needs had been identified by the fisher folk themselves during consultations in Ramanathapuram coastal region.

In this process the three main problem areas mentioned by villagers were analyzed. In addition, group discussions provided valuable comments and specific requirements to deal with their problems. In short, the main problems in the Ramanathapuram coastal region relate to drinking water, public transportation and health care.

5.4 Analysis of Tourism Potential and Infrastructure in Coastal Region

The analysis of the tourism in Ramanathapuram district is based on the questionnaire survey, on-site interviews, and direct observations during the field surveys (see Appendix III for survey questionnaire). The survey was conducted in three different parts. The first part was a reconnaissance trip to all the tourism spots in the district for gathering first hand information on tourism. The second part was a questionnaire survey and semi structured interviews, involving visits to all the principal tourist destinations in Ramanathapuram district. In each destination, interviews were conducted with key stakeholders in the tourism industry including vendors, shop keepers (both small and medium enterprises), drivers and government authorities. (See Appendix IV for a list of Stakeholders). The final part of the survey consisted of visits to potential tourist places in the coastal region after gathering information from the District Tourism Department, visiting tourists, other government departments, etc.

In this analysis, the focus is on current statistics describing the tourist inflow, the facilities available for tourist, the quality of infrastructure services, the overall problems of tourism, barriers to growth and their projected impact on the tourism sector.

The purpose of this analysis is to provide an insight of tourism related information in Ramanathapuram District. It consist of the following

- Providing an analysis of the tourism base in Ramanathapuram coastal Region.
- Utilizing the analysis to propose new developmental recommendations relating to any proposed site development outcomes.
- Identification of new tourism potentials and features that will influence the proposed tourism Development plan for the study area.
- Outlining key tourism related issues that will need to be addressed with regards to development of the Coastal region.

5.4.1 Overview of Tourism in Ramanathapuram district

Ramanathapuram offers a wide range of tourism attractions (See Map 4.8 & 4.9) from ancient temples to key historical sites to virgin beaches. Development of the tourism dates back to the history of the Ramanathapuram region with an

influx of tourists from the all over the country. These tourists were mainly attracted to the holy Island of Rameswaram.

5.4.2 Baseline Data

Acquiring current and accurate statistics concerning any Ramanathapuram tourism industry is challenging to say the least. In the tourism industry a series of specific quantitative and qualitative indicators are monitored by the district tourism department and by relevant industry stakeholders; however, these numbers are contradictory or counter indicative in nature.

Since the focus of this analysis is on the development of tourism as a means of economic growth, the baseline data presented below is concentrated on incoming tourist and the structure of tourism infrastructure available in Ramanathapuram.

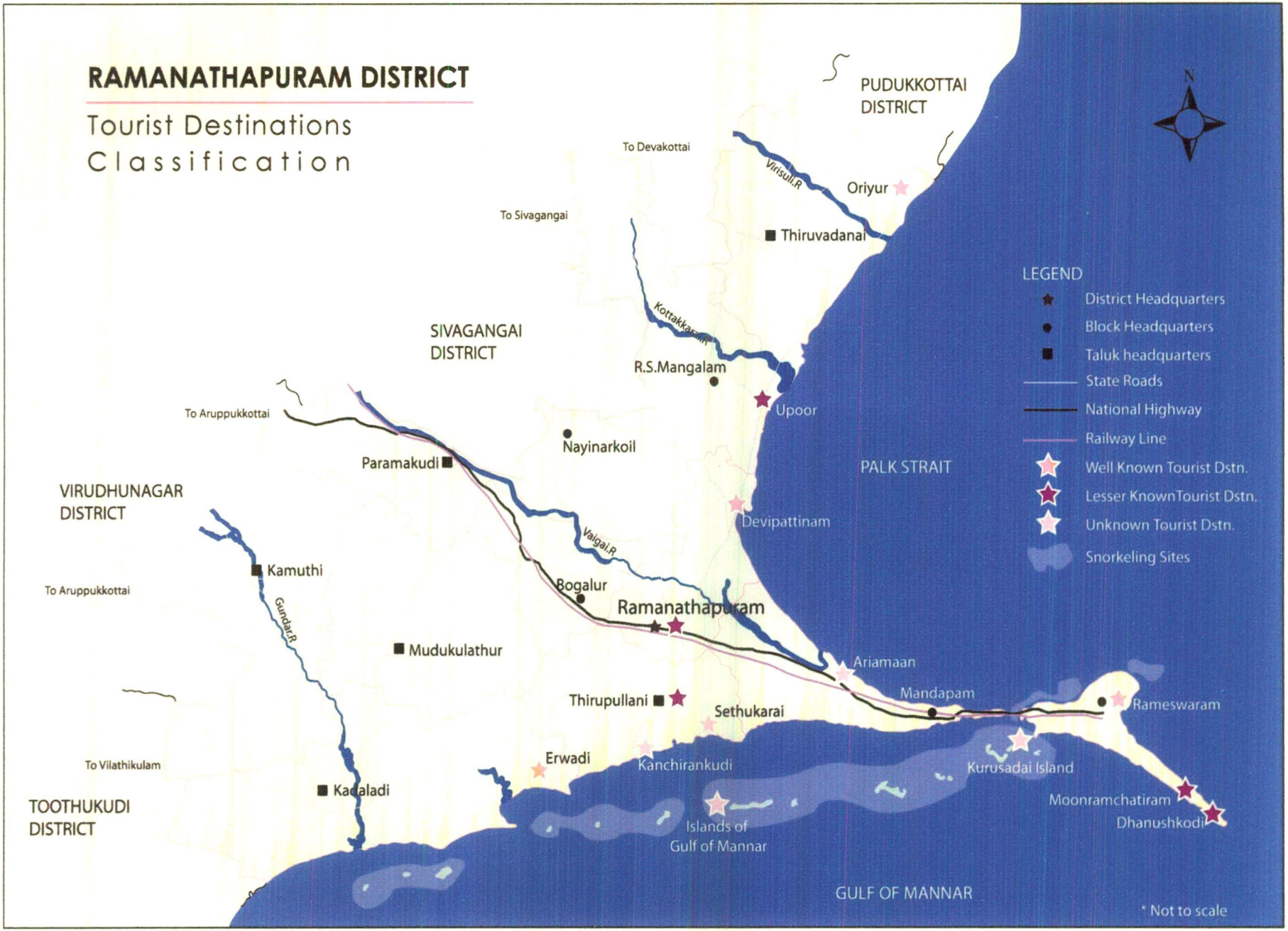
The tourist spots in the Ramanathapuram Costal region can be broadly classified into

- Well Known Tourist Spots
- Lesser Known Tourist Spots, and
- Unknown Tourist Spots

The classification is based on the inflow of tourist, the popularity of the place among the tourists, the analysis of the facilities in and around the tourist place, the quality of service in the tourist place, etc.(see map 5.3 & 5.4)

Table 5.5: Tourist spot wise classification

Well Known Tourist Spots	Lesser known Tourist Spots	Unknown Tourist Spots
1. Ramanathaswamy Temple	1. Jadayu Theertham	1. Villondi Theertham
2. Agni Theertham	2. Kothandaramaswamy Temple	2. Sethukarai
3. Devipattinam	3. Gandhamathana Parvatham	3. Kanchirankudi beach
4. Erwadi Dharga	4. Moodramchathiram	4. Ariamaan beach
5. Oriyur Church	5. Ramanathapuram Palace and Museum	5. Sankumal beach
	6. Tiruppullani	6. Kundugal beach
	7. Nambu Nayaki Temple	7. Islands of Gulf of Mannar
	8. Dhanushkodi	8. The Snorkelling sites in Gulf of Mannar
	9. Upoor temple	



Map 5.3: Classification of Tourist Destinations in Ramanathapuram

Source: Prepared by the Author

a. Employment: Auto Rickshaw Drivers - The total Auto Drivers in the Rameswaram Island engaged in tourist activity accounts for 431. They mainly operate the tourist services from the Rameswaram Main Bus Terminus in shifts and the service is available 24 hours. They provide a site seeing package of all the major Tourism spots in the Island for Rs.150.Visit to Dhanushkodi is offered as a different package for an additional amount of Rs.100.Only 15% to 20% of the tourists who land in Rameswaram use this service and the second time visitors do not prefer the sight seeing package. The auto service is the only mode of transport to the tourist areas in the Rameswaram Island apart from the main temple and Dhanushkodi.

Tourist Guide - Around 472 locals and 45 other state people are working as tourist guides in Rameswaram. The majority of the tourist guides are engaged for pouring water from the 22 theerthams in and around the temple and also guiding to different places in and around the main temple. They work in alternate shifts (days). The pilgrims interested in the guide service (including pouring of Theertham water) have to pay Rs.7 for the temple administration and Rs.10 for the guide (per head). On an average each tourist guide gets around ten tourists per day in normal season and 15 to 20 tourists in peak season. The tourist guides consider school vacations, weekends and temple festivals as peak season.

There was no data available regarding the number of waiters/waitresses and hotel workers. These types of jobs tend to be lower paying and seasonal.

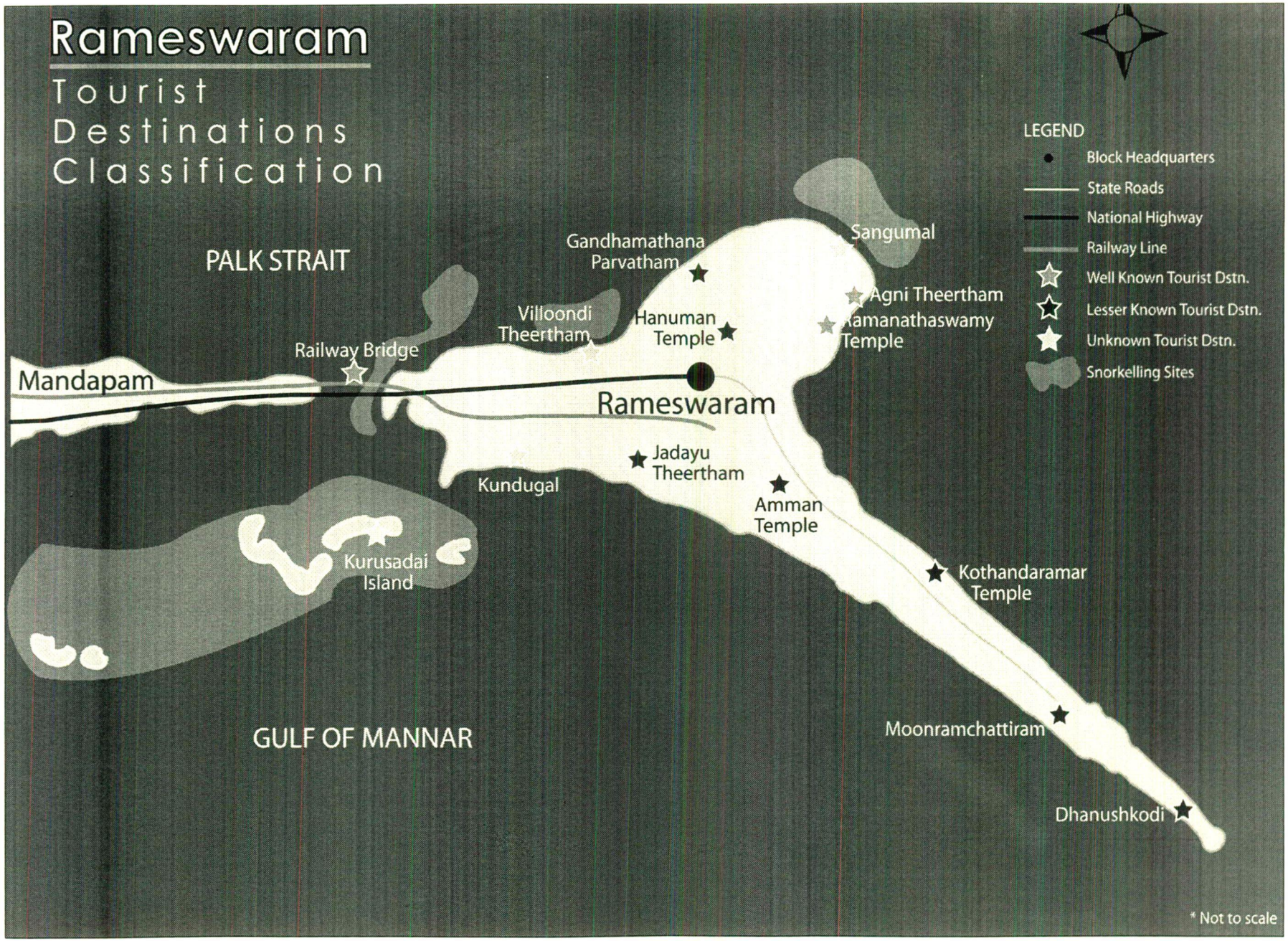
b. Tourist Arrival in Ramanathapuram - 2005

The tourist arrival to Rameswaram is significantly higher when compared with the other tourist destinations in the district. Both in terms of Indian tourist and foreign tourist Rameswaram tops the chart (see figure 5.2 & 5.4)

Among the other tourist destinations in the district, foreign tourist arrival to Erwadi is higher and Tiruppullani tops the Indian tourist arrival (see figure 5.3 & 5.5)

Figure 5.6 & 5.7 suggests that the busiest months for Indian tourist are traditionally April and May with lull periods being evident during February and March (School examinations). It is evident that the December/January periods should be key months (due to holiday periods).

There was no other data available regarding the number of tourist accommodations, tourist spending



Map 5.4: Classification of Tourist Destinations in Rameswaram Island

Source: Prepared by the Author

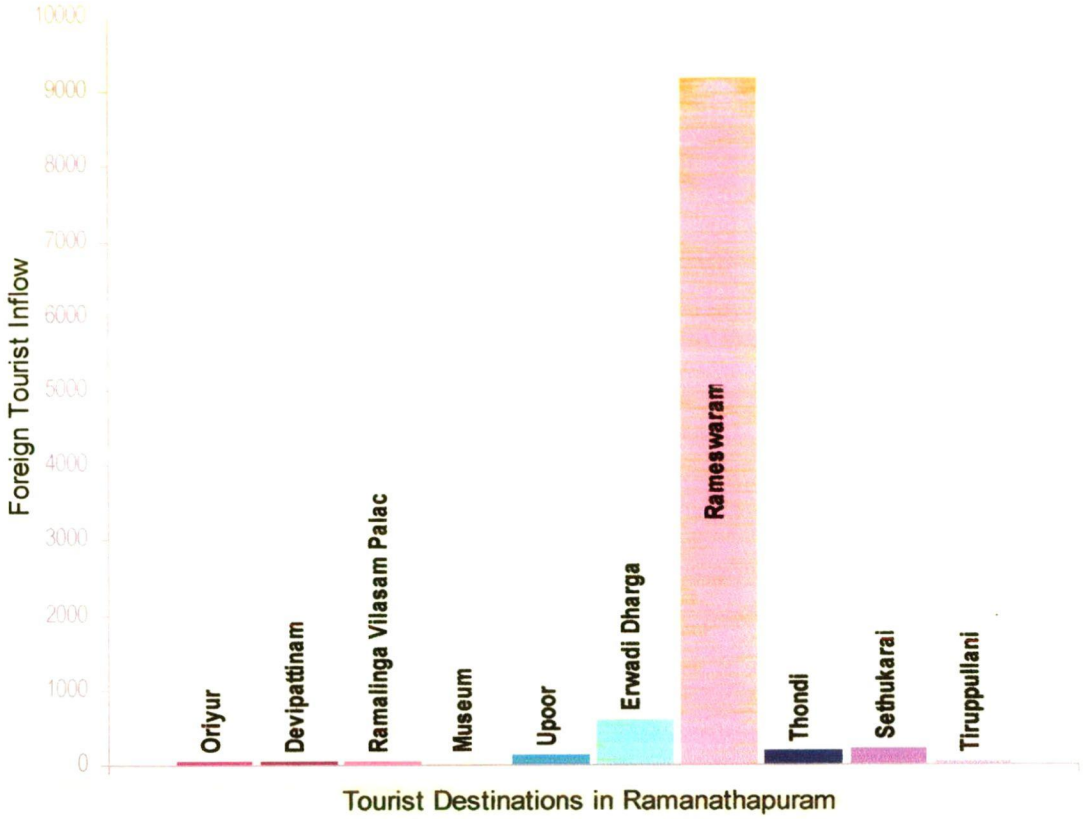


Figure 5.2: Structure of foreign tourist's arrival in Ramanathapuram – 2005
Source: Prepared by the Author

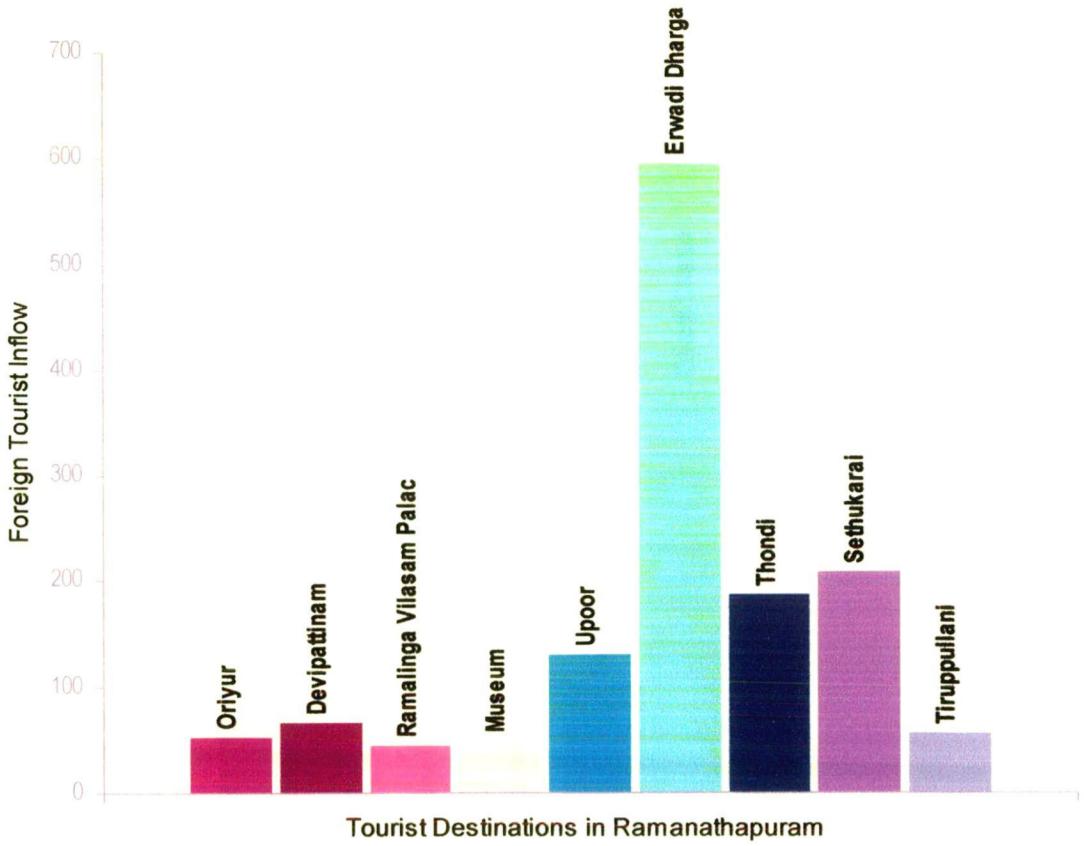


Figure 5.3: Structure of foreign tourist's arrival in Ramanathapuram (excluding Rameswaram) – 2005
Source: Prepared by the Author

Table 5.6: Indian Tourist arrivals in Ramanathapuram district – destination wise in 2005

Month	Tourist Spot										
	Oriyur	Devipattinam	Ramalinga Vilasam Palace	Museum	Upoor	Erwadi Dharga	Rameswaram	Thondi	Kurusadai Island	Sethukarai	Tiruppullani
January	11510	38413	800	28	12313	28681	389172	5729	-	29575	35336
February	11321	32548	542	36	11578	27169	398766	4589	-	30587	38717
March	11234	30425	438	21	12146	24314	384141	4927	-	30124	43125
April	26730	52650	529	80	20590	38650	465980	6265	-	45850	55000
May	27320	53156	900	35	22120	40526	501427	7034	-	48714	60321
June	26130	47210	1255	19	9250	30625	495870	6155	-	44619	55157
July	27423	48122	739	6	8225	27456	498012	5250	-	46814	53603
August	27628	48693	745	8	6310	28319	499212	5818	-	47629	54425
September	28154	49319	120	44	7520	29213	501256	6326	-	49898	64319
October	29224	50128	126	49	8321	30110	523110	6854	-	50143	68225
November	20110	45126	110	38	6124	28330	510120	5739	-	47628	60114
December	22013	48223	180	43	7427	75414	604413	6410	-	53148	70613
Total	**268797**	**544013**	**6484**	**407**	**131924**	**408807**	**5771479**	**71096**	-	**524729**	**658955**

Table 5.7: Foreign Tourist arrivals in Ramanathapuram district - spot wise in 2005

Month	Tourist Spot										
	Oriyur	Devipattinam	Ramalinga Vilasam Palace	Museum	Upoor	Erwadi Dharga	Rameswaram	Thondi	Kurusadai Island	Sethukarai	Tiruppullani
January	4	6	6	3	21	24	405	25	-	-	7
February	3	4	3	5	12	29	374	29	-	-	5
March	3	5	4	15	17	395	319	39	-	-	6
April	5	5	-	-	35	22	312	13	-	30	5
May	6	7	11	5	28	23	450	14	-	33	6
June	3	4	6	3	10	12	375	10	-	22	2
July	4	5	1	2	7	11	450	6	-	19	1
August	5	6	1	3	-	12	950	7	-	13	2
September	6	7	1	2	-	18	1001	8	-	19	4
October	7	8	2	3	-	20	1545	13	-	24	7
November	2	3	4	3	-	10	1200	8	-	21	3
December	4	6	6	5	-	19	1800	16	-	28	9
Total	**52**	**66**	**45**	**49**	**130**	**595**	**9181**	**188**	**-**	**209**	**57**

Table 5.8: Facilities and quality of Services in Ramanathapuram Tourist destinations

	Ramanathaswamy Temple	Agnitheertham	Jadayu Theertham	Villoondi Theertham	Gandhamathana Parvatham	Kothandaramaswamy Temple	Moodramchathiram	Dhanushkodi	Ramanathapuram	Devipattinam	Upoor	Oriyur	Tiruppullani	Sethu Karai	Erwadi	Nambu Nayaki Amman Temple
Category																
• Religious	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Natural	×	✓	×	✓	×	×	✓	✓	×	✓	×	×	×	✓	×	×
• Cultural	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Others	×	×	×	✓	×	×	×	×	×	×	×	×	×	×	×	×
Other attractions of the place	×	✓	×	✓	×	✓	✓	✓	✓	✓	×	×	×	✓	×	×
Type of connected Road																
• Black topped	✓	✓	✓	✓	✓	×	✓	×	✓	✓	×	×	✓	✓	✓	×
• Metalled	✓	-	-	-	-	×	-	×	-	✓	×	×	×	×	×	×
• Dust road	-	-	-	-	-	×	-	✓	-	-	✓	✓	×	×	×	✓
Mode of Access from nearest town	-	Walk	Auto/ O.V	Auto/ O.V	Auto/ O.V	Auto/ O.V	Bus/ O.V	Local Van	-	Walk/ O.V	-	bus/ O.V	-	Auto/ O.V	-	Auto/ O.V
Distance	-	100 m	1/2km	7km	3km	10km	19km	6km	-	200m	-	6km	-	5km	-	2km
Type of Tourism																
• Pilgrimage	✓	✓	✓	✓	✓	✓	×	✓	×	✓	✓	✓	✓	✓	✓	✓
• Leisure	✓	✓	×	✓	×	×	✓	✓	×	×	×	×	×	×	×	×
• Study-educational	×	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• others	×	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	×
Facilities available for Tourist																
Accommodation																
• Hotel	✓	✓	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Guest House	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×

• Lodge	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	✓	×
• Community rest place	✓	×	×	×	×	×	×	×	×	×	×	✓	×	×	✓	×
• Others	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Eating Place																
• Hawkers	✓	×	×	×	✓	×	×	×	✓	✓	×	×	×	×	✓	×
• Shops	✓	×	×	×	×	×	✓	×	✓	✓	✓	✓	✓	×	✓	×
• Restaurants	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Others		×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
Transportation																
• Public transport	✓	×	×	×	×	×	✓	×	✓	✓	✓	✓	✓	✓	✓	×
• Taxi	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Auto	✓	✓	✓	✓	✓	×	✓	×	✓	✓	✓	×	✓	×	✓	✓
• Shared vehicle	✓	×	×	×	×	×	✓	✓	×	×	×	×	×	×	×	×
• Own vehicle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
• Others	✓	×	✓	×	×	×	×	×	×	×	×	×	×	×	×	×
Communications facilities																
• PCO	✓	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	×	✓	×
• STD	✓	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	×	✓	×
• FAX	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	✓	×
• Internet	×	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Mobile facilities	✓	×	×	×	×	×	×	×	✓	✓	×	×	×	×	×	×
																×
Entertainment	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
Shopping																
• Grocery	✓	×	×	×	×	×	×	×	✓	✓	✓	✓	✓	×	✓	×
• Medical	✓	×	×	×	×	×	×	×	✓	✓	×	×	✓	×	✓	×
• Fancy	✓	×	×	×	✓	×	✓	×	✓	✓	×	×	×	×	✓	×
• Household	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Others	✓	×	×	×	✓	×	×	×	✓	×	×	×	×	×	×	×
Medical Facilities																
• First aid center	✓	×	×	×	×	×	×	×	✓	×	×	✓	×	×	✓	×
• Clinic	✓	×	×	×	×	×	×	×	✓	×	✓	✓	✓	×	✓	×
• Health centers	✓	×	×	×	×	×	×	×	✓	✓	×	×	✓	×	✓	×
• Hospital	×	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×

Others																
• Police booth	✓	✓	×	×	×	×	✓	✓	✓	✓	×	×	×	×	✓	×
• Taxi stand	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Bus stand	✓	×	×	×	×	×	✓	×	✓	✓	✓	✓	✓	✓	✓	×
• Parking space	✓	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×
• Post office	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	✓	×
• Bank	✓	×	×	×	×	×	×	×	✓	✓	×	×	×	×	✓	×
• Petrol station	✓	×	×	×	×	×	×	×	✓	×	×	×	×	×	×	×
• Tour operators	✓	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Quality of Services (Good / average / bad)																
Water supply	Good	Bad	Bad	Bad	Avg.	-	-	-	Avg.	Bad	Bad	Avg.	Bad	Bad	Avg.	Bad
Electric supply	Good	Avg.	Good	Avg.	Good	-	-	-	Good	Good	Good	Good	Good	Bad	Good	Avg.
Solid waste management	Avg.	Bad	Bad	Bad	Bad	-	-	-	Avg.	Bad	Bad	Bad	Bad	Bad	Bad	Bad
Road & street lighting	Good	Avg.	Avg.	Avg.	Avg.	-	-	-	Good	Bad	Bad	Bad	Avg.	Avg.	Avg.	Bad
Public convenience	Bad	Bad	Bad	Bad	Bad	-	-	-	Bad	Bad	Bad	Bad	Bad	Bad	Bad	Bad

Note: O.V - Own vehicle

Overall rating for the listed tourist destinations is given below with respect to availability of tourist facilities and other tourism related parameters

Table 5.9: Overall Rating for Tourist Destinations

1. Ramanathaswamy Temple	**5. Tiruppullani**	**8. Moonramchathiram**	**12. Nambu Nayaki Amman Temple**
2. Ramanathapuram	**6. Oriyur**	**9. Gandhamathana Parvatham**	**13. Sethu Karai**
3. Erwadi	**7. Agnitheertham**	**10. Villoondi Theertham**	**13. Jadayu Theertham**
4. Devipattinam	**7. Upoor**	**11. Dhanushkodi**	**14. Kothandaramaswamy Temple**

5.4.3 Assessment of the facilities:

- Lack of recreational facilities and secondary tourist interest is a very serious handicap in Ramanathapuram district.
- Lodging facilities for middle income and Low income group is of sub standard quality and insufficient capacity during peak periods of tourist activity.
- The section of people who can least afford to take hotel rooms is forced to either stay overnight in poor quality accommodation or take a return journey the same evening.
- As far the high income group and the foreign tourist is concerned ,these people have the inclination and money to stay longer in Rameswaram, but present Rameswaram does not have anything to hold their interest for longer than a day.
- In Rameswaram Island, there are no public transportation facilities to the tourism destinations, apart from the Main temple and Dhanushkodi. The autos and taxis drivers have a monopoly over the transportation industry here.
- Water supply, Solid waste management and public convenience in almost all the tourism destinations are of bad quality.

5.4.4 Barriers to Sustainable Tourism Development in Ramanathapuram Coastal region

- **Government Regulations**

The government regulations of the Forestry Department restricting access to 20 of the islands in the Gulf of Mannar, the Fisheries Department restrictions upon access to Kurusadai island and the Coast Guard restrictions to boating in the Gulf of Mannar are perhaps the most severe barriers to the development of tourism activities involving boating, snorkelling, SCUBA diving, nature walks, and the like in the coastal region. In addition land regulations limiting development of enterprises prevent the landless poor from developing enterprises in their place of residence. In Rameswaram government regulations prohibit the establishment of any foreign exchange counter. This severely inconveniences foreign tourists.

- **Lack of Infrastructure**

Lack of good quality roads throughout the coast and lack of hotels and restaurants severely limit tourist traffic in these areas. Sanitation and waste disposal systems are totally lacking in most areas. Even in Rameswaram lack of effective waste disposal and sewage treatment systems leads to pollution of the

sea and unsightly and unhygienic rubbish dumps scattered all around. Similarly drainage systems are blocked and smelly, deterring tourists from staying in certain lodges. In most of the villages along the coast lack of potable fresh drinking water is a massive problem and a major barrier to development of tourism facilities.

- **Lack of tour operators**

Poor perception by external tour operators due to lack of knowledge about the region, tend to view Ramanathapuram as a quaint region, but one that has a low standard of accommodation and poor medical standards in case of emergencies and especially outside the major towns.

- **Lack of Awareness**

Less than 50% of those on the coast of the Ramanathapuram are aware of the biosphere reserve's existence and elsewhere awareness is negligible, even amongst educated sectors of society in and around Ramanathapuram.

- **Lack of human Capital**

Traditional fishermen and fisherwomen in the communities along the coast and the rural people living a little inland, lack skills for tourism development. Generally they are skilled at certain types of fishing and fishing related skills (net manufacture and maintenance, processing of fish, seaweed diving, chank diving, etc.). In some communities where palmyra trees and / or coconuts are abundant many are skilled in palmyra basket / mat weaving and coconut thatching. Some women are skilled in shell handicraft making.

- **Low capacity to meet tourist expectation**

Most of the village people, except those in the immediate vicinity of Rameswaram (e.g. Sankumal village) lack awareness of what tourism is and what tourists might need or expect. They have little education have had very limited opportunity to interact with tourists. Hygiene and sanitation in the local community is lacking and use of beaches as common toilets appears to be the norm throughout the coast.

- **Lack of Land ownership**

Most of the people on the coast of the Ramanathapuram are landless especially the fishers who live close to or on the beach. This makes it very difficult for them to start any formalized/ government approved enterprise since it is required to show land documents for a location before developing any

enterprise upon it. This makes it particularly difficult to put huts for tourists on the beach and get them approved as tourist accommodation for example.

- **Lack of Linkages between formal and informal sectors**

Currently formal sectors such as the Tamil Nadu Tourism Development Corporation and the registered hotels and lodges have poor linkages with the informal sectors providing boating facilities, village tourism opportunities or guided tours. Similarly in the handcraft business, few large companies tend to control production and marketing of local shell handicrafts and baskets for tourists, excluding small-scale operators from the market. Poor fishers also fail to sell their fish on the open market due to exploitative buy back agreements with fish traders-cum-moneylenders who offer them poor prices.

- **Tourist Safety**

There have been number of boating accidents in the Gulf of Mannar and near the waters of Rameswaram. This has been very off-putting to fishing communities interested in taking tourist boating trips. Life-belts and life-buoys are not customary in the boats that currently are used for tourist trips (i.e. ordinary fishing boats). Although the people of the fishing communities tend to be string swimmers the same cannot be said for the average Indian tourist who might be interested in a boat trip, and even those who swim may be inexperienced in swimming in the sea with its associated currents and tides.

- **Security issues**

The waters of the Ramanathapuram district form a haven for Sri Lankan refugees and in particular Tamil Tigers fleeing to safety. The Coast Guard has responsibility to protect India's shores from illegal immigration and smuggling.

- **Location**

The Ramanathapuram has beautiful blue sea, inviting beaches, fresh sea air and fascinating biodiversity. In addition Rameswaram and Dhanushkodi are enormously important places for Hindu pilgrimage. The Ramanathaswamy temple is visited by millions of Indian pilgrims each year. Despite the unspoiled beauty of the coastline and waters, only the holy town of Rameswaram and its Ramanathaswamy temple and nearby Dhanushkodi are well-established tourist destinations in the Ramanathapuram district. Many of the other beautiful locations along the coast are remote in the sense that road access to them is very poor

5.4.5 Analysis of Strengths, Weaknesses, Opportunities and Threats of Sustainable Tourism Development in Ramanathapuram coastal region

STRENTHS	WEAKNESSES
• Beauty of the location • Religious attraction of the area • Scientific value of the area(Gulf Of Mannar) for study • Old facilities that can be easily renovated • Variety of attractions – temples, bathing spots, beaches, etc. • Safety – relatively low crime • The existence of enterprises that have already started on a small informal scale	• Lack of Infrastructure – such as roads, sufficient drinking water, waste disposal, etc. • Shortage, low quality, slow privatization of accommodations • Low promotion by the government • Low computer usage – no quality website and no online reservations • Scattered attractions – combined with poor infrastructure makes a tour difficult and expensive. • Less tour operators
OPPORTUNITIES	**THREATS**
• Existence of skills or knowledge about marine life • Availability of technical advice and skills • Interest among tourist - both national and international • More aggressive government promotion of Ramanathapuram coastal region as tourist destination • Improvement of infrastructure – transport, telecommunications, accommodations, etc. • Establishment of new seaside resorts. • Increasing differentiation of tourism packages	• Potential negative environmental impacts – damage to coral, pollution by sewage, motor boats, rubbish, etc. • Overly bureaucratic regulations for developing the opportunities • Wavering government support for tourism development • Over reliance of low end market segments • Potential for too many tourist

5.4.6 Recommended Improvements in Tourism Facilities

- Improvements required in and near tourist areas are
    - construction of public facilities
    - public toilets
    - parking spaces
    - rest sheds
    - gardens, seat, etc.
- **Special tourist buses** connecting all the tourist spots in Rameswaram should be planned. This will also benefit in large the coastal communities who don't have transportation facilities.
- **Art gallery** should be established to boost the local artisans and the art products of the self help groups.
- **Open air theatre** for cultural programmes
    - The design should in the backdrop of sunset in beaches, palm trees and boats arriving.

Other Recommendations for Improvement

- Number of low cost hotels should be increased
- Cloak rooms should be provided in the Rameswaram Bus stand and railway station of sufficient capacity.
- Creating additional points of interest in and around Rameswaram so that Tourist cannot possibly hope to cover all items in one day.
- Having activities after sunset of such interest that tourist are reluctant to leave without seeing them.
- Offering such varied recreational facilities that tourist are kept pleasantly occupied even during a long stay.

Chapter 6

Blue Print for Sustainable Development

6.1 Proposals for Sustainable Management of Groundwater Resources

All attempts are being made to maximize food production to meet the growing demands of the increasing population. The indiscriminate development of groundwater resources has often led to large scale depletion of water table, rising cost of groundwater pumping, fall in agricultural production etc., Public awareness on the impact of over exploitation of groundwater resources has to be created so as to prevent occurrence of the problems discussed earlier. Groundwater awareness programme had been conducted in Kundrakudi block recently and there is a good response from the public.

However the assessment of groundwater potential in Ramanathapuram District, carried out by the Groundwater Department, indicates that there is no excessive exploitation in this district.

6.1.2 Suggestions for Groundwater Management

In view of the problems that arise due to over exploitation of groundwater, some suggestions are made for adoption of suitable management strategies:

1. **Regulation in the utilization of groundwater by enacting legislation.**

Large scale groundwater exploitation is resorted to by a number of Government agencies and private individuals,

a) To maximize agricultural production.

b) To provide drinking water supply to urban and rural areas and

c) To provide water supply for industrial uses.

But, while executing schemes for groundwater development, groundwater discipline is not observed by most of the agriculturists. Such haphazard development of groundwater will create lot of socio-economic problems and may also cause permanent damage to groundwater aquifers. Hence, it is very essential that groundwater legislation is enacted to regulate the development of groundwater. Such legislation is under the active consideration of the Tamil Nadu Government.

2. **Artificial recharge to augment groundwater resources**

In Ramanathapuram District, there are more than eight thousand irrigation wells (energized). Apart from this, large numbers of boreholes have been drilled for providing drinking water supply. One of the commonly adopted methods for artificial recharge is construction of percolation ponds. Already the Agricultural Engineering Department has constructed a number of percolation ponds in this district.

The scope for constructing further percolation ponds/check dams is to be explored in areas where surplus surface water is available: The existing ponds can be rejuvenated by way of desilting and by adopting catchment treatments to improve quality and the availability of groundwater in the surrounding areas.

3. **Adoption of suitable policies with regard to pricing and credit facility**

Apart from the above, other aspects to be considered are electricity pricing and the present credit policies. At present electricity is supplied either free or at a subsidized rate for running agricultural pump sets. Both the small farmers as well as big farmers are benefited by this scheme. Since electricity is made available at highly subsidized rates, there may be a tendency on the part of the users to resort to large scale pumping of groundwater over and above the actual irrigation requirements, thus depleting the groundwater storage. Hence, it is considered desirable that nominal charges are fixed suitably for pumping groundwater so as to have proper control over exploitation of groundwater resources.

4. **Change in cropping pattern:**

The existing cropping pattern in Ramanathapuram district is as follows:

1.	Single crop lands	Paddy, Pulses or Gingelly
2.	Double crop lands	Paddy, Cholam, Ragi, Cumbu, Gingelly, Groundnut, Cotton

Besides this, groundwater coupled with Tank water is also used to raise the following cropping system.

1. Sugarcane - Sugarcane - Rice (2 years rotation)
2. Wet land Banana - Rice ($1^1/2$ year duration)

The extensive research on the feasibility for changes in cropping pattern from its existing traditional practice, the Rice-Rice-Pulses to Rice-Groundnut, Pulses or Gingelly has indicated that there is possibility for reduction in the requirement of water with increase in yield and more income compared to the traditional practice hitherto followed.

Change in cropping pattern in hot-spot areas is to be adopted. Agricultural department can make necessary study in this regard and suggest suitable cropping patterns which are not water consuming in critical areas. Dry land farming's can also be taken-up to a large extent. Drought resistant plants like mango, tamarinds etc. are already coming-up successfully in drought prone areas.

5. **Popularizing micro-irrigation schemes:**

As groundwater is becoming a scarce commodity, it has to be judiciously used by adopting water conservation techniques like sprinkler and drip irrigation. These techniques can be utilized where groundwater development is on the higher side. By applying these techniques groundwater can be substantially conserved for extended irrigation. Large areas can also be brought under sprinkler and drip irrigation systems. For this purpose, institutional finance is provided with attractive subsidy. Horticultural crops like coconut, mango, sapota, tamarind etc., can be developed advantageously by adopting these techniques and short term crops like groundnut and vegetables can also be cultivated. Hence, these new techniques have to be popularized among the farmers.

In view of the heterogeneous conditions prevailing in the State in general, and Ramanathapuram District, in particular, area specific study on conservation, augmentation and management of available groundwater has been initiated. However, further in-depth studies have to be taken-up in these fields.

6. **Seawater intrusion:**

To arrest seawater intrusion, check dams across the rivers, construction of percolation ponds, preventing over exploitation of groundwater may be adopted.

In the coastal area of this district, coconut plants (salt resisting crops) have been cultivated by excavating open wells in the sand dune areas upto a depth range of 3 to 5 m below ground level. For drinking purpose numbers of desalinization plants are proposed along the coastal regions of this district by Tamil Nadu Water supply and Drainage Board.

6.1.3 Summary of Recommendations

- In areas where depletion of water-table is observed, percolation ponds may be constructed to enhance recharge to groundwater storage, thus preventing depletion of water-table condition. For this purpose, specific studies are to be conducted to select the favorable locations for percolation ponds by taking into consideration the hydrogeological conditions and availability of surplus surface water.

- Even shallow aquifer indicates poor quality both in pre monsoon and post monsoon periods except in few pockets. The only way to improve the quality is by constructing percolation ponds and check dams covering the entire district.
- Along the coastal belt area mainly coconut is raised by using shallow depth open wells of perched water. Strict legislation may be framed to avoid over exploitation of groundwater in this area of 10 km radius from the coast to avoid seawater intrusion.
- To minimize the drinking water problem due to poor quality of groundwater in major part of the district, method of desalinization of groundwater may be adopted. The cost of desalinization for one litre is ranging from 4 paise to 13 paise according to the maintenance cost of the desalinization plants. At present, there are 11 nos. of desalinization plants maintained by TWAD Board and 5 more plants are proposed for drinking purpose to the public. (See Appendix –V for the Recommended Recharge Structure in Ramanathapuram District)

6.2 Proposals for Infrastructure

Based on the analysis of existing levels of development and resource potentials, a number of plan proposals have been made for the sustainable development of Ramanathapuram coastal region.

- **Power:** One solar power generation unit can be set up, as there is very good sunshine throughout the year. One 30 M.W. Vacumised parapolic reflector array or solar thermal power plant using oil (as working fluid at 300°c) may be set up in a 500 sq mt area near every town with insulated boilers and energy storage devices during non sunshine periods.
- **Road:** East coast road from Ramanathapuram to Tuticorin should be made as national highway and Tuticorin Port should be connected to Ramanathapuram. All the coastal roads should be improved, linking villages with one another and shortening the routes to urban centers. This would improve the access of fisher folk to several services, such as health care and education. In fact, improving coastal roads would have a multiplier effect on development.
- **Rail:** The entire stretch of 105 Kms. should be made as broad gauge double track railway line. There should be a coastal railway ling between Ramanathapuram to Tuticorin and Ramanathapuram to Chennai.
- **Sea Ports:** The Sethu Canal project of a Sea Canal is now getting implemented because of that instead of going round Sri Lanka all ships can

pass through Sethu Canal which will save two days of sea voyage and reduce 260 Kms of distance. A programme to construct a few Jetties at Pamban Island to augment fishing activity in the region should be supported by Tuticorin Port Trust.

To cater to increase in trade envisaged due to this project and to transfer the benefits to local population, a minor port facility should be created in Ramanathapuram coastal region in consultation with State Authorities.

- **Airport:** Helicopter /feeder air services from Chennai/Madurai can be started. A new airport can be located in the district.
- **Water Resources Development** The water is the most scares commodity in this area. NABARD has classified this district as white area as for as underground is concerned but the waters available underground is not always soft or potable but saline. The saline water is now desalinated by R.O. process for drinking water supply. In the same way more, large desalination plants may be put up so that more subsoil water will be available for irrigation also in the required villages.

  During excessive and heavy rains the rain water runs off into sea only. Therefore storm drain and flood control systems are to be installed, excess water should be pumped into subsoil underground reservoir both natural and artificial underground storage points so as to utilize that water during lean period. 2500 ooranies of one lakh Kiloliters storage capacity may be constructed with filter beds and over head tanks to supply drinking water. Half acre farm ponds for every 5 across tank may be dug and provided to all cultivators.
- **Mineral Sources:** Utilizing the mineral deposits available at Rameswaram, one mini cement plant can be put up in Athangarai. Gypsum available from Ramanathapuram district can also be used in the production of cement. Near Mandapam using seashells & oyster shells we can put up few calcium carbide units also. Coal fields have recently found in this district.
- **Sustainable Development of Islands:** More boat services can be considered between islands and mainland so as to attract more no. of tourist to this area. Every Island should be planted with more coconut, palm trees and other fruit bearing trees so as to make them attractive for tourist. Rameswaram Island can be made as a free port zone and Singapore model

authority can be installed at Rameswaram Island and development made under the paramount control of Govt. of India. Hoover crafts and luxury cruisers can be operated in these parts to encourage tourism

- **Agriculture Based Activities:** One chilly oleoresin and spice oil factory may be put up with foreign buyer arrangements at Paramakudi. Few cotton ginning mills can be put up, which will supply cotton to spinning mills. As we get 2000 mt of cotton produce per year. From Groundnut we can get Groundnut oil. From cotton seeds also we can extract cotton seed oil, by expellers. The same expeller can be used for palm oil production etc. For sunflower seed hulling factories can be set up. One edible oil refinery may be put up based on the above vegetable extracted oil factories in this district. One malt factory and infant baby food factory can be set up in this district. One industrial alcohol unit can be set up to produce power alcohol from millets and grains. One mass grain storage godown and few pulse processing mills can be planned for this district near Parthibanur. Modern rice mills and roller flour mills can be put up herein this district.

  We can cultivate, puthina leaves, marikolundu, and coriander leaves and we can extract essential oils from them. Extensive grapes farming may be taken up and wine processes may be established in this district.

- **Forest & Horticulture:** One palm sugar factory may be planned near Sayalkudi. As the tapping of palmyrah pathaneer is highly seasonal job and for another 9 months that becomes jobless, people do not prefer to go for alternate employment

  To arrest this between palmyrah trees fodder grass can be grown under silvipasture; animal husbandry may be popularized. The palm trees can be watered using drip irrigation and fodder plants with sprinklers. From female palmyrah trees we can get palm fruits from July to September. An average fruit is 627 grams with fruit juice 184 grams and other portion form palm nuts removing the hard cover of nut we can get a soft portion Palmyra seed kernel; from which we can produce oil by first cooking that in a boby boiler and crushing in an expeller. This will increase the use of Palmyra plantation recently neglected by our people, which were earlier considered as a karpagataharu lime coconut tree.

In the palmyrah Grove area no more honey bee activity can be encouraged as neerah tapes say honey bee will suck all tree neerah. But if allowed then the land will flow with milk & honey. Revenue Department has booked 13034 Hec. for proposes cultivation out of which Sandal wood & Casuarinas may be cultivated. Now prosophis julifiora is extensively used for making charcoal. We can plan for large no. of agarpathi industries in this area, activated carbon manufacturing units and other related industries like paper manufacturing using karuvela udai trees can be taken up. Planting of Dates trees may be undertaken in large tracts of lands. Cross breed of native Dates with Israeli Dates may be undertaken. Next to palmyrah we can plant Sandal wood trees and teak trees. Jojoba and Salvadora plantation can be taken in large tracts of lands so that more Industries like jojoba oil extraction, Lubrication oils and slow burning candles manufacturing based of Hydrogenated jojoba oil can be taken up. Jatrobha curass can also be planted from which bio diesel can be extracted & used. Salvadora can yield us more, non edible oil for soap Industries.

Under horticulture more of Mango, Cashew, Tamarind, Sapota, Guava, Pappaya trees can be planted which in turn will give raise to Fruit Juice manufacturing and concentrating units in this district. Oil palm cultivation can also be popularized in large tracts of lands and near coastal belt more coconut plantation is to be tried. As this district has the largest coastal area of 265 Kms. and said to be having 5 crores of coconut trees in this district making this district to get the first place for coconut plantation in the state as per few unconfirmed sources. Which will give raise to more coir fibre units, rubberised coir mates and coir cushion articles, Tamarind juice extractor unit other juice & pulp extraction units. Oil seeds like Sunflower, castor, Gingelly can give us more edible oil Industries.

From castor oil we can produce lubricants and from hydrogenated caster oil wax and from trans-esterification of caster oil with ethyl alcohol we can get products a substitute for diesel oil.

- **Floriculture:** Extensive cultivation of Rose & Jasmine can be under taken with extraction plants for Rose oil & Jasmine concentrate. Minimum 50 Hec. to be undertaken for each in Rameswaram.

- **Animal Husbandry:** In the southern Border of Ramanathapuram district Vembar River is flowing. There is a famous breed named Vembar sheep from this place. Therefore more number of sheep farms can be located within this area. By silvi pasture we can inter crop forest & horticulture plantation or fodder grass, so that more number of cattle may be grown. Few cattle slaughter houses and cattle meat processing and canning industries can be started in this district.
- **Poultry:** One or two chick hatchery may be started for this district. One poultry chicken meal processing and canning unit can be put up here. Large scale poultry farming may be undertaken in this district. One snake venom extraction unit may be set up in this district to produce anti venom.
- **Marine Resources:** Ample scope for starting boat building & repairing centres. Large boat building units can be set up in the coastal region. There are one or two cold storage & deep freezer & fish processing units in this district. We can put more number of fish meal processing & exporting units in Devipattinam, Thondi,. Fish canning & Fish pickles units can also be set up in.
- **Pearl Culture:** Main areas for setting up pearl culture units would be the Gulf of manner & Kurusadai Island near Pamban offer the conditions essential for pearl culture.
- **Ship Breaking Units:** Removal of the constraints mentioned in the analysis will pave the way for the development of ship breaking industries in this area. There is also potential for the development of ship building industries in this area. With the advent of more no. of ship breaking industries in this area, there will be possibilities for the establishment of more no. of steal re-rolling mills which provide more employment opportunities to the people in this most backward area.
- **Salt:** By Vacuum pan evaporation technique more purified salt can be produced in the coastal region. Down stream salt refineries, Iodized and free flow salt can be manufactured along with industrial products like caustic soda, and Soda ash etc.

6.3 Sustainable Industrial Development in the Coastal Region

On the basis of studies already undertaken by the Department of Industrial Development, Tamil Nadu Govt. a number of sustainable, small scale and cottage

industries, using the local, regional and marine resources have been identified and a select list is given below, with the estimated investment requirement given against each of the item.

The lists of viable projects in Ramanathapuram coastal region are,

List of Viable Projects	Estimated Investment
1. Tamarind paste	10 lacs
2. Masala	40 lacs
3. Processing sea feeds	50 lacs – 1 crore
4. Fish meal	50 lacs
5. Dried jelly fish	50 lacs
6. Meat processing	50 lacs
7. Cattle feed	30 lacs
8. Poultry feed	30 lacs
9. Ornamental fish	20 lacs
10. Natural dyes	60 lacs
11. Tartaric acid from tamarind	50 lacs
12. Banana powder	60 lacs
13. Tapioca Starch	70 lacs
14. Herbal drink concentrates	30 lacs
15. Fruit processing	40 lacs
16. Leaf cups & plates	20 lacs
17. Bananas stem fibre processing	15 lacs
18. Organic manure processing (Vermicompost)	30 lacs

6.4 Outline of Tourism Proposals

(See Map 6.1 for the proposals)

6.4.2 Outline of Education Tourism Proposals

- **Field study centre in Kurusadai Island for scientists and university students**

This would involve the renovation of the existing field study centre on the island. On the stipulations of the Fisheries Department, the place would be

A CD Rom which would also double as a website with information and photographs on the Gulf of Mannar, marine biodiversity, the Biosphere Reserve, history of Rameswaram and other places of interest including their religious significance should be developed as a resource for interpretive centres, schools, tourist information centres, tourist attractions and to enable foreigners outside India to discover more about the area. The product should be produced by a private sector computer & education specialist with high quality technical inputs about the marine biodiversity from CMFRI and other centres of excellence within India and worldwide. Its distribution through government departments and schools should be unlimited and funding should come from grant aid if possible rather than making the resource pay for itself by sales.

- **Student conservation volunteer holidays**

Following the example of successful conservation volunteer programmes in other programmes this product should aim to involve committed and well-informed groups of biology or related students in conservation activities. The students might stay at the Kurusadai centre or in local schools or youth hostels on a very low cost basis and would be supervised by well-trained specialists in conservation biology. Volunteers should be old enough to behave responsibly and not need too much supervision. Activities that might be appropriate for the volunteers could be planting out mangrove saplings in degraded mangrove areas, helping to dump coral rubble to prevent erosion of coral island and further degradation of coral, conducting *non-invasive* studies of the distribution and abundance of various indicator species of ecosystem well being (e.g. certain seaweed species) or of plant species of special interest on the islands (e.g. the endemic mangrove species *Pemphis acidula*), making studies on bird life on different islands or in different habitats along the coast to provide comprehensive checklists, and so on.

6.4.2 Outline of Religious Tourism Proposals

- **Package tour of religious sites**

This should be organised by private tour companies but should where possible involve *local* travel agents, vehicle operators and guides not outsiders. The tours should be bookable from outside the area but tourists should transfer from their long distance tours to the local transportation to make the tour. This is

important to ensure that the tours generate local income. The tours should cover all the various important religious sites in the Ramanathapuram coastal region. The tour guides should operate strict rules about littering and provide litter disposal facilities on the bus. Tourists should be encouraged to avoid spoiling the environment of the temples and tanks. A visit to the GOM interpretive centre mentioned above should be included in the tour. If possible the tour might also include visits to Women's Handicraft Cooperative producers to enable tourists to purchase fair-trade handicrafts direct from the producers and prices reasonable to the producers and tourists.

Apart from the road ways the packaged tour could also be arranged using waterways. The tourist spots along the coast of Ramanathapuram can be linked using boats. The tourist spots of Rameswaram Island can also be connected using waterways and operated as a different package. The boat services should be strictly operated by local fishermen only. No outsider should be encouraged as this will not serve the purpose of providing local jobs. Three to four fishermen settlements can be clubbed as one unit for operating the boat service, as this provide equal distribution of income among the fishermen's.

The boat services should be of three routes;

1. Devipattinam to Rameswaram via Pamban north,
2. Sethukarai to Rameswaram via Pamban south,
3. Tourist spots in Rameswaram

- **Renovation of lesser known temples and tanks**

This is a pre-requisite to the successful development of the package tour above. Renovations should be done tastefully in line with traditional architecture and styles. Advertisements painted on temple walls should be avoided. Renovation of tanks to improve their water harvesting capacities would form the dual purpose of making more pleasant bathing facilities for pilgrims and also providing emergency irrigation during droughts.

- **Yoga / meditation ashram**

This would involve the expansion of existing facilities in the ashram rather than creation of new ones (Swami Pranavananda). Accommodation would need to be developed on two levels: small simple huts equipped with bed and mosquito net within the compounds of fishing families to enable ashram visitors to stay as paying guests with village families and a small guest house for visitors near the

ashram to be run cooperatively by a group of village women. The tourist huts should be separate rather than rooms within the villager's homes to provide sufficient privacy for the tourists and also avoid awkward cultural issues of entertaining unknown male guests at home. Simple local food should be available with families and in the ashram itself, payable on a per meal basis. Existing meditation facilities will probably suffice unless numbers increase enormously. Training of one of the village girls in yoga to an advanced level, together with English language would enable trainers in yoga to come up from within the community. Placement of an expert yoga teacher in the ashram for a year or two until the appropriate skills can be developed in the community would be a good solution. Rules about no alcohol, no smoking and no drugs should be enforced with visitors and anyone breaking the rules requested to leave.

6.4.3 Outline of Nature/leisure Tourism Proposals

- **Snorkelling boat trips to coral near Sankumal village (on the Palk bay side of Rameswaram)**

This activity is already happening but needs to be legitimised. The villagers own some snorkelling gear and take out tourists most days in the good viewing season (March to August) and also during mid-January to February when the waters are beginning to clear after the NE monsoon. Currently the Coast Guard (CG) and Forest Department (FD) intercept fishing boats carrying tourists, partly due to the CG's remit to control illegal smuggling and immigrants from Sri Lanka and partly because of the FD's remit to protect the Gulf of Mannar marine natural resources under 1972 Wildlife Protection Act. The reef where the tourists are taken is close to Sankumal village only a few 100 metres from the beach.

Being on the north side of Pamban Island this is in fact not in the Gulf of Mannar and so should not be subject to restriction for nature conservancy reasoning. This reef is somewhat degraded (it is said to have died suddenly in 1977 after heavy rains and has only a small proportion of live coral) and continues to be damaged by local fishermen standing on it for fishing at low tides. However some colorful fish and other marine species can be viewed by beginner snorkellers here with no impact on the protected areas further from the shore. Since the reef is subject to use by villagers anyway, some additional pressure from snorkellers and people watching from boats is not likely to be as deleterious

industries, using the local, regional and marine resources have been identified and a select list is given below, with the estimated investment requirement given against each of the item.

The lists of viable projects in Ramanathapuram coastal region are,

List of Viable Projects	Estimated Investment
1. Tamarind paste	10 lacs
2. Masala	40 lacs
3. Processing sea feeds	50 lacs – 1 crore
4. Fish meal	50 lacs
5. Dried jelly fish	50 lacs
6. Meat processing	50 lacs
7. Cattle feed	30 lacs
8. Poultry feed	30 lacs
9. Ornamental fish	20 lacs
10. Natural dyes	60 lacs
11. Tartaric acid from tamarind	50 lacs
12. Banana powder	60 lacs
13. Tapioca Starch	70 lacs
14. Herbal drink concentrates	30 lacs
15. Fruit processing	40 lacs
16. Leaf cups & plates	20 lacs
17. Bananas stem fibre processing	15 lacs
18. Organic manure processing (Vermicompost)	30 lacs

6.4 Outline of Tourism Proposals

(See Map 6.1 for the proposals)

6.4.2 Outline of Education Tourism Proposals

- **Field study centre in Kurusadai Island for scientists and university students**

This would involve the renovation of the existing field study centre on the island. On the stipulations of the Fisheries Department, the place would be

reserved for school, college and university students and scientist's exclusive use and would not allow ordinary leisure tourists to visit. No cooking or fires would be allowed and cooked food would have to be brought from Pamban village. Strict regulations on dumping of waste would be necessary (i.e. all non-biodegradable waste would be returned to the mainland). Renovation of the toilets, to check that an appropriately sized septic tank without seepage was functional, would be essential. If there would be likelihood of seepage of sewage into the aquifer from the toilets then shallow temporary composting pit latrines would need to be dug and properly used instead.

Areas where snorkelling is permitted and where it is banned should be defined and clearly demarcated. All visitors to the island should attend an obligatory lecture or video on the biological importance of the island, all the rules about its use and the reasons for imposing them. Punishments for violating rules should be enforced and involve hefty fines, especially collection of biological samples.

- **Interpretive centre on the Gulf of Mannar and its biodiversity**

This would take the form of an information centre but using colourful and wherever possible interactive display material about the Marine Biosphere Reserve. Interpretive material should be clearly given in English, Tamil and Hindi. A video on the area should be developed and shown here and a computer with CD Rom about the Gulf of Mannar made available for visitors to access information. It should be conveniently located within walking distance of the Ramanathaswamy temple and other tourist facilities on Pamban island, in order to attract the maximum number of visitors. If possible, if economics allow, no entrance charge should be levied so that the maximum number of tourists would be encouraged to come and find out about the Biosphere Reserve. Such a centre could also act as a 'nodal point' for authorised ecotourism boat operators, snorkelling trip operators, the proposed snorkelling and diving school, island trip operators, nature guides and fair trade handicraft vendors.

- **Oceanarium with examples of marine wildlife kept in large well-managed tanks**

In contrast to the CMFRI aquarium, which is a large hall with relatively small tanks, the oceanarium would be designed to create an underwater wildlife experience for the visitor, through special effects, video clippings and actual exhibits of live marine wildlife in very large tanks. It should be developed as a

commercial enterprise but with high-level technical and advisory inputs from specialists such as CMFRI scientists. The place should be subject to regular inspection by such experts to ensure that quality wildlife husbandry and only limited numbers of rare specimens were kept there. Interpretive material should be clearly given in English, Tamil and Hindi.

Safety and hygiene would be of the utmost importance. Lessons and expert advice should be acquired from similar such attractions from other countries.

- **Modernisation and upgrading of the museum and aquarium of the CMFRI for school groups and students**

Since the CMFRI does not open on public holidays and does not allow foreigners, upgrading of their museum and aquarium should only be done on a limited scale and not for large influxes of ordinary Indian tourists. However, with small inputs and changes in management the existing facilities could function as an excellent educational facility for Indian school / university students. Provision of clear, colourful and interesting interpretive material in Tamil, Hindi and English for existing exhibits is the first priority. In the museum improved lighting and addition of more colourful and accessible material for students should be a priority. Photographs of live specimens in their natural habitats to accompany the many pickled ones in bottles should be added to give context and meaning to the exhibits. The entrance rates should be subsidized for school students so that more school students visit the museum and aquarium.

- **Snorkelling and scuba diving school**

This facility should be developed as a private concern but with quality technical inputs on safety and precise information inputs on marine wildlife. The school should develop a snorkelling pool and a pressurized trial SCUBA diving tank with artificial corals for teaching and supervising students before taking them out into the sea. Very particular care should be taken in developing safety procedures, especially in the case of scuba diving. Divers and snorkellers should only be allowed out into the open sea when they have shown competency not only at using the equipment safely but also in behaving in ways that do not damage the corals or other marine life. A short class / examination in this diving school should form an obligatory part of a snorkelling boat trip.

- **Production of an interactive CD Rom / Website on the Gulf of Mannar and Ramanathapuram Tourism**

A CD Rom which would also double as a website with information and photographs on the Gulf of Mannar, marine biodiversity, the Biosphere Reserve, history of Rameswaram and other places of interest including their religious significance should be developed as a resource for interpretive centres, schools, tourist information centres, tourist attractions and to enable foreigners outside India to discover more about the area. The product should be produced by a private sector computer & education specialist with high quality technical inputs about the marine biodiversity from CMFRI and other centres of excellence within India and worldwide. Its distribution through government departments and schools should be unlimited and funding should come from grant aid if possible rather than making the resource pay for itself by sales.

- **Student conservation volunteer holidays**

Following the example of successful conservation volunteer programmes in other programmes this product should aim to involve committed and well-informed groups of biology or related students in conservation activities. The students might stay at the Kurusadai centre or in local schools or youth hostels on a very low cost basis and would be supervised by well-trained specialists in conservation biology. Volunteers should be old enough to behave responsibly and not need too much supervision. Activities that might be appropriate for the volunteers could be planting out mangrove saplings in degraded mangrove areas, helping to dump coral rubble to prevent erosion of coral island and further degradation of coral, conducting *non-invasive* studies of the distribution and abundance of various indicator species of ecosystem well being (e.g. certain seaweed species) or of plant species of special interest on the islands (e.g. the endemic mangrove species *Pemphis acidula*), making studies on bird life on different islands or in different habitats along the coast to provide comprehensive checklists, and so on.

6.4.2 Outline of Religious Tourism Proposals

- **Package tour of religious sites**

This should be organised by private tour companies but should where possible involve *local* travel agents, vehicle operators and guides not outsiders. The tours should be bookable from outside the area but tourists should transfer from their long distance tours to the local transportation to make the tour. This is

important to ensure that the tours generate local income. The tours should cover all the various important religious sites in the Ramanathapuram coastal region. The tour guides should operate strict rules about littering and provide litter disposal facilities on the bus. Tourists should be encouraged to avoid spoiling the environment of the temples and tanks. A visit to the GOM interpretive centre mentioned above should be included in the tour. If possible the tour might also include visits to Women's Handicraft Cooperative producers to enable tourists to purchase fair-trade handicrafts direct from the producers and prices reasonable to the producers and tourists.

Apart from the road ways the packaged tour could also be arranged using waterways. The tourist spots along the coast of Ramanathapuram can be linked using boats. The tourist spots of Rameswaram Island can also be connected using waterways and operated as a different package. The boat services should be strictly operated by local fishermen only. No outsider should be encouraged as this will not serve the purpose of providing local jobs. Three to four fishermen settlements can be clubbed as one unit for operating the boat service, as this provide equal distribution of income among the fishermen's.

The boat services should be of three routes;

1. Devipattinam to Rameswaram via Pamban north,
2. Sethukarai to Rameswaram via Pamban south,
3. Tourist spots in Rameswaram

- **Renovation of lesser known temples and tanks**

This is a pre-requisite to the successful development of the package tour above. Renovations should be done tastefully in line with traditional architecture and styles. Advertisements painted on temple walls should be avoided. Renovation of tanks to improve their water harvesting capacities would form the dual purpose of making more pleasant bathing facilities for pilgrims and also providing emergency irrigation during droughts.

- **Yoga / meditation ashram**

This would involve the expansion of existing facilities in the ashram rather than creation of new ones (Swami Pranavananda). Accommodation would need to be developed on two levels: small simple huts equipped with bed and mosquito net within the compounds of fishing families to enable ashram visitors to stay as paying guests with village families and a small guest house for visitors near the

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6.4.3 Outline of Nature/leisure Tourism Proposals

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This activity is already happening but needs to be legitimised. The villagers own some snorkelling gear and take out tourists most days in the good viewing season (March to August) and also during mid-January to February when the waters are beginning to clear after the NE monsoon. Currently the Coast Guard (CG) and Forest Department (FD) intercept fishing boats carrying tourists, partly due to the CG's remit to control illegal smuggling and immigrants from Sri Lanka and partly because of the FD's remit to protect the Gulf of Mannar marine natural resources under 1972 Wildlife Protection Act. The reef where the tourists are taken is close to Sankumal village only a few 100 metres from the beach.

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as it would be in more 'untouched' areas of coral and the activity there will draw tourists away from the really sensitive areas. In addition, by operating short boating trips for tourists the people of this village get valuable and necessary added income. Safety is less of a concern since the reef is so close to shore and no deep or rough waters have to be crossed to get to it.

- **Village tourism in Sankumal for model eco-beach in Rameswaram locality**

As with the boating and snorkelling activities small-scale village tourism for foreign backpacker budget tourists already exists. The villagers have already built a few huts from local materials in which tourists stay from time to time. A few visitors come back repeatedly and stay for longer periods than most tourists (1-6 months), other stay a few days. As with the boating activities, the tourism accommodation is not authorised which means that police come and ask questions and harass the villagers. Authorization of the huts is difficult to obtain because the villagers on the beach do not have land papers, as the area is government land. Should it become possible to either acquire the necessary papers or bypass the authorization requirement through agreement with the local police, small-scale expansion and improvement of the existing village facilities could prove successful. Basic huts made of coconut thatch are sufficient, but provision of a bed and a paraffin lamp in each might make them more attractive. Digging of shallow pit compost toilets for both the villagers and the tourists is necessary if the beach is to be cleaned up and made attractive for tourists to sit, sunbathe and swim. Preparation of home-cooked fish, tea, coffee, and fish barbecues on the beach could be organised by the villagers providing them with increased revenue from the tourists. Sale of fruit, coconut water, and snacks to tourists who are enjoying the beach might also be a possibility for extra earnings. A small teashop already exists on the road by the beach, which could be expanded and made more appealing to tourists. Shortage of water resources however may limit the potential of expansion.

- **Development of eco-beach resort on the road to Dhanushkodi along with activities of bird-watching, boat trips, nature walks, etc.**

The stretch of beach on the Gulf of Mannar side of the Dhanushkodi peninsula, beside the road out of Rameswaram towards Dhanushkodi a few kilometers beyond Ramakrishnapuram, is beautiful, relatively deserted and clean

compared to the other stretches of Ramanathapuram coastal region. The sea is clean clear and blue but the beach slopes steeply into the sea such that the water gets deep rather quickly and strong currents may occur along the shore. Small, scattered communities of fisher people have settled on the beach and they are involved in traditional shore seine fishing from the beach. There are no facilities for tourists in the area at present. If training in tourism management could be provided to the people along the beach and authorization obtained from the necessary authorities (e.g. Forest Department), a small low-impact resort of the kind described for Sankumal village might be possible. Collections of coconut thatch huts, compost pit latrines, and basic sun-shelters and restaurants serving drinks and local snacks would be sufficient to attract foreign tourists seeking a deserted beach for sunbathing, swimming and relaxation. The attractiveness of the area is higher than Sankumal, since the beach and water are cleaner and the place more deserted, but the awareness of the local communities about tourism and tourist expectations much lower. Transport from Rameswaram and the facilities available there is lacking and auto-rickshaws, who have a monopoly on the route are expensive. The peninsula has excellent opportunities for bird watching (flamingos, a variety of coastal waders, fish eating birds of prey and so on) and boat trips may be possible from the vicinity. The village of Dhanushkodi itself (much further down the peninsula from the area suggested above) was destroyed in a 1964 cyclone and is now a collection of fisher people's temporary huts in the midst of ruined buildings. Currently people can take buses or auto-rickshaws to the end of the pitch road and then ride in 4- wheel drive fish truck across the sand to the tip of the peninsula. No tourism facilities (can be developed formally in the area since the government banned human habitation of the place after the cyclone. However trips out to this area and the tip of the peninsula can continue with the potential for adding bird watching and beach combing nature walks in the mornings and evenings for interested tourists from the suggested resort (or from the suggested yoga ashram). Training of nature guides in bird identification / use of binoculars and in identification of shells and other organisms on the beach would be necessary to accompany this activity.

- **Glass-bottomed boat trips to coral areas.**

Many tourists are interested in seeing marine life but may not be comfortable with swimming, diving and snorkelling. Development of special

tourist boats with glass panels for viewing marine wildlife could prove very successful and generate a lot of income for operators, whilst also raising awareness about marine biodiversity. Safety issues would need to be addressed and the boats would have to be equipped with life buoys to throw to anyone falling overboard. Life belts need to be supplied for all passengers, including children. The boats should be flat-bottomed for viewing coral reef with minimal damage and they would need to be kept extremely clean and well maintained if effective viewing were to be possible. Boat operators or special marine wildlife nature guides would need to be trained in identification of species with English, Tamil and Hindi names and some explanation about their biology to make the trips interesting and educational for tourist. Strict limits on the number of people per boat and the number of boats allowed to visit different areas need to be established and enforced. Studies on the impact of glass-bottomed boats on the corals need to be carried out. Areas allowed for viewing from glass-bottomed boats and those from which all activities are banned need to be defined and clearly demarcated with buoys of different colours etc. Fines for straying into restricted areas should be levied.

- **Day trips to Nallathanni and / or other islands (e.g. Musal or 'Hare' Island) from Rameswaram or Mandapam**

As mentioned above with reference to potential pilgrimage tours to the Muniya Swami shrine on Nallathanni island, the village of Keeha Mundal on the mainland near Nallathanni Island already operates unofficial boats. If Forest Department permission could be given to the communities, such trips could easily be diversified to include nature-watching activities instead of or in addition to making offerings at the shrine. Since the fishers have good knowledge of sea life already it is a simple matter of teaching them to communicate this in Tamil and English, and perhaps also Hindi, to turn them into qualified nature guides. Villagers in the communities along the coast south of Mandapam have very little interaction with foreign tourists and lack awareness about what these tourists might expect or want. They would require training and awareness- rising about tourism, hygiene, sanitation, and biodiversity conservation issues. Snorkelling equipment would need to be brought in from outside and the local people trained in its safe and coral-friendly use. They would then need to qualify as trainers to teach tourists how to snorkel with minimal damage to corals and other marine life.

Selection of which islands to exploit for nature observation should be done with the concern of government departments and research organizations. Both Musal and Nallathanni islands in fact, having been privately owned in the past, contain vegetation that is much *more altered* (i.e. coconut and palmyra plantation) than that found on Kurusadai which has more indigenous / virgin vegetation. Road transport to the coast nearby Nallathanni island is difficult as road condition is very poor whereas Musal (Hare) islands can be more easily reached by boat from Mandapam.

- **Fish barbecues around fires on the beach in fishing villages for tourists (especially foreigners)**

Local fisherwomen are highly skilled in the preparation of fish and tourists enjoy eating fresh fish from fishing areas. An easy small-scale enterprise that could be developed for tourists would be barbecuing fish over a fire after dark on beaches. Other attractions could be added to the entertainment such as folk singing and dancing around the fire, depending on the interests of the tourist. Training in food hygiene would be a useful preparation for the development of such enterprises.

- **Development of a neighbourhood friendly 'eco-resort' hotel**

Currently the local poor of the Ramanathapuram coastal region do not have the capacity to fulfill the expectations of richer tourists looking for luxury accommodation and facilities. However a hotel of this standard, if managed along the right lines, has the potential to provide employment for many local people and can promote understanding and appreciation of local culture. The hotel could be centered round local fishing culture and might provide tourists opportunities to observe and / or participate in traditional fishing activities. Shell handicraft making, weaving of palmyra and coconut thatching and net-making (e.g. for tourist hammocks) could be demonstrated on the premises and fair trade in resulting handicrafts could be developed. The high quality of service demanded by tourists from this hotel would help to set appropriate hygiene and safety standards for use with other tourists. A suitable location might prove difficult to find because of shortage of water in and lack of land document availability for coastal common lands. Hence a fishing village just inland, where the new agar and desalination plants are being developed, might be appropriate. The resort could be a short drive away from the busiest tourist centres like Rameswaram,

Devipattinam, etc., providing the tourist with a feeling of being in 'untouched India'.

- **Pearl culturing by tourists**

The CMFRI has developed pearl cultivation and has pearl cultivation trials at Kurusadai Island. The interest in the pearl cultivation could be harnessed as an eco-tourism activity to generate revenue for local people managing pearl oysters. Tourists could buy the artificial pearl seeds and pay to be allowed to implant them into their own oysters. A basket of implanted oysters for each tourist could then be labeled and maintained for the 6-8 months by pearl cultivators from the local community. The following year tourists could then return to see how many pearls their oysters produced. If they wanted to keep the pearls then fixed prices for pearls of different qualities should be payable to the pearl cultivators to compensate them for their efforts in maintaining the oysters and for loss of earnings from not selling the pearl in the open market. Tourist would thereby acquire personalized pearls at reasonable prices and pearl cultivators would gain added income.

6.4.4 Descriptions of other Environment Friendly Enterprises

- **Recycling enterprise, especially finding use for plastic bottles**

Although no technologies for recycling of plastic bottles were encountered (other than tying them to a pole by the road to help villagers find their way in the dark!) there may be some way of recycling plastic bottles. This needs to be investigated further as plastic bottle resources are plentiful.

- **Paper bag production (if possible using recycled materials)**

Although Tamil Nadu state has a ban on plastics, plenty are still in use in shops in Ramanathapuram district and plastic waste is dumped almost anywhere. Locally produced low-cost paper products to replace plastic bags would be an excellent enterprise if a local ban on plastics could be exercised. To start with simple recycling of used newspapers and magazines by making them into paper bags would be appropriate. Later local paper making enterprise options could be sought. Women of the Dhan Foundation's Federation of Self Help Groups might be able to undertake this kind of enterprise cooperatively.

- **Tailoring of cotton bags by tailors trained by ashram tailoring**

training centre

If plastics are to be replaced then reusable cotton bags should have more demand. Although cotton cloth for such bags would have to be imported from elsewhere in the state, tailoring skills and sewing machines are available to women trained in the tailoring school of Swami Pranavananda's ashram. Through the new enterprise the women could become organised into a cooperative or producers society for sewing and printing designs on to bags. Marketing of the bags would need to be addressed before the enterprise was developed.

- **Palm basket making for replacement of plastic packaging**

Palm basket making is already an occupation for many women in villages where palmyra is common. However the women have to work under exploitative conditions with very low pay. If women's self help groups in villages where palmyra weaving is common could organise women into palm basket enterprises for packaging to replace plastics, and fair trade marketing could be coupled with this, basket weaving might become more profitable for women.

- **Marketing of non-plastic alternatives accompanied by area-wide ban on plastics**

As mentioned above fair trade marketing of non-plastic alternatives and of other goods such as handicrafts is central to the success of the enterprise. This may call for a specialist marketing component to be established for eco-enterprise products. The federation of women's self help groups in the area might be an appropriate type of organisation to assist with this, or maybe a local NGO.

- **Production of bio-fertilizers from hotel / restaurant and temple organic wastes**

Hotel, restaurant and temple organic waste, although providing food for stray cows and pigs is unsightly, smelly and unhygienic. Since so many tourists pass through Rameswaram and consume their food from banana leaves, and restaurants must also produce large amounts of vegetable peelings, vast amounts of biodegradable waste are available. Eco-enterprise organising the collection and composting of this waste could help to clean up the town and provide income for groups of women and / or men in the area. Composting is likely to be technically feasible, especially as MSSRF has techniques readily available. Market support to sell the bio-fertilizer may be necessary through Federations of Self Help Groups or local NGOs, especially as agriculture along

the coast is extremely limited.

- **Bicycle rental enterprise with bicycle workshop**

Since foreign tourists like to rent bicycles, opportunities exist for bicycle rental and maintenance enterprises associated with places for foreign tourists to stay such as the yoga / meditation ashram. With the women's leadership already established in this community the enterprise could be entirely run by local women. It could also be replicated by women in Sankumal where village tourism might be developed.

- **E-mail & internet facility for tourists**

Since the district industrial center will be establishing a computer training centre run by women entrepreneurs, an enterprise providing e-mail and internet facilities to tourists could be profitable.

- **Women's cooperatives to make tourist trinkets and materials for worship in the temple**

The Federation of Self Help Groups could organise cooperatives or other organizations for the production and marketing of handicrafts made by women (e.g. shell handicraft-making, cotton wicks, cotton oil lamps, palm leaf baskets for offerings, and so on). Enterprises managed by the handicrafts producers themselves might ensure better working conditions and fair trade marketing.

- **Introduction of small-scale low-cost solar fish driers**

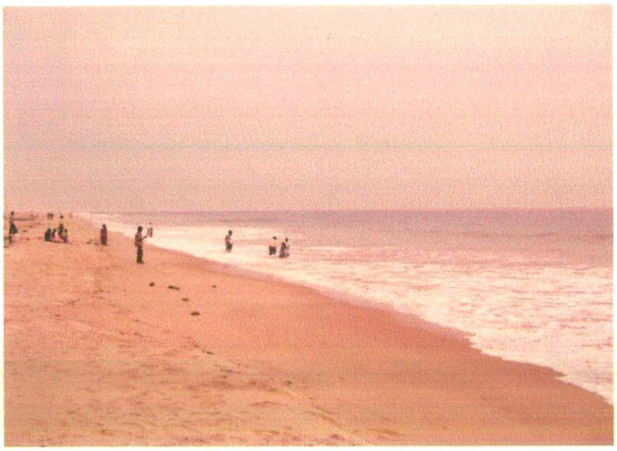
Fisher women are traditionally involved in fish drying. Solar driers could increase the rate of drying and make the processes more hygienic. Perhaps Fisherwomen's Cooperative Societies or Self Help Groups could cooperatively manage fish drying units for better quality dried fish. Opportunities for decreasing conflict between mechanized and traditional fishers might exist if traditional fishers involved in drying fish were able to purchase trawlers' trash catch for low prices.

- **Female guides and taxi / auto-rickshaw drivers for women travellers**.

Lone women travellers can be plagued by unwanted sexual harassment on their travels and hence would prefer whenever possible to travel with female guides or drivers. The local women could be trained and an association of female drivers and guides can be established. This would be an innovative way for women of fishing communities to diversify their livelihoods and could provide opportunities for fruitful cultural exchange between the women.

(i) Villondi Theertham

(ii) Dhanushkodi



(iii) Moonramchattiram

(iv) Thondi

(v) Ariamaan

(vi) Kanchirankudi

(vii) Sethukarai

(viii) Kundugal

Plate 6.1: Potential Beaches for development in Ramanathapuram

Image Source: Captured by the Author

Sustainable Tourism Development in Ramanathapuram Coastal Region

Map6.1:Tourism Proposals

Chapter 7

Prioritization, Plan Implementation and Policy Recommendations

7.1 Prioritisation of Potential Tourism Proposals

Now that the potential tourism proposals and enterprises have been described and the general barriers to development have been analyzed, it is necessary on the basis of all this information to prioritize them under the four headings (educational tourism, religious tourism, nature / leisure tourism and new enterprise). In order to do this a prioritization analysis has been prepared (Refer table 7.1). This includes for each proposal or enterprise a list of potential stakeholders who might be involved, a very rough feasibility index, a rating for its community development qualities and a rating for its environmental sustainability. The feasibility index is based on discussion with stakeholders in the field, results of the analysis, but is not based on economic calculations.

The feasibility index ranks are as follows:

5 - Feasible and highly likely to be successful;

4 - Probably feasible and likely to succeed;

3 - May be feasible and successful - needs careful analysis to find out;

2 - Not very likely to be feasible but the idea warrants investigation;

1 - Probably not feasible though the idea warrants further investigation;

0 - Not feasible at all at this time

A community Development rating of each proposal or enterprise in terms of its potential impacts, barriers to its development, is also given as follows:

*** - Highly desirable (will greatly benefit the community)

** - Desirable (should provide net benefits to the community)

* - Acceptable (should not have negative impact on the community but may not benefit them)

The potential environmental impact of the proposals and enterprise is summarized under the following categories:

A* - very positive i.e. substantial net environmental benefits

A - positive i.e. net environmental benefits

B - neutral i.e. should have no negative impacts if properly managed

C - possibly negative i.e. has potential to impact negatively on the environment

D - negative i.e. will most likely impact negatively on the environment

Table 7.1: Prioritization of potential tourism proposals and new enterprises

Rank	Proposal	Community Development Rating	Environmental Impact Rating	Feasibility Index	Key stakeholders to be involved
	Educational tourism products				
1	Interactive CD Rom cum Website on Ramanathapuram Tourism	*	A	5	• Private sector computer education specialist to compile the CD Rom
1	Interpretive centre on the Gulf of Mannar	**	A	4	• Fisheries Department • Forest Department • Tamil Nadu Tourism Development Corporation • Tourist users of the centre
2	Field study centre in Kurusadai Island	**	B	4	• Fisheries Department • Forest Department • School, universities • Scientists • Boat operators
3	Student conservation volunteer holidays	*	A	4	• Interested students • Colleges and universities providing training in biological studies • Tutors in conservation studies • Fisheries Department • Forest Department
3	Oceanarium	*	B	3	• Private sector entrepreneurs • CMFRI scientists • Technical specialists on marine life husbandry, safety etc. • Visitors to attraction • Fisheries Department • Forest Department
4	Modernisation and upgrading of the museum and aquarium of the CMFRI	*	B	2	• CMFRI • Schools, colleges & universities • Fisheries Department • Forest Department
5	Snorkelling and scuba diving school	*	B	2	• Private sector entrepreneur • Fisheries Department • Forest Department • User of the school
	Religious tourism products				
1	Package tour of religious Sites(both roadways &	***	C	5	• Tour operators • Temple authorities

	waterways)				• Temple guides • General tourist guides • Handicraft and tourist trinket vendors
2	Yoga / meditation ashram	***	B	5	• Promotion of ashram to interested religious organizations
4	Renovation of lesser known temples and tanks	*	B	3	• Temple authorities • Construction companies
	Nature / leisure tourism products				
1	Fish barbecues around fires on the beach	***	B	5	• Fisher people (e.g. of Sankumal village) • Tourists • Police / Coast guard • Forest Department
1	Snorkelling boat trips to coral near Sankumal village	***	C	4	• Boat operators • Forest Department • Coast Guard • Tourists interested in snorkelling or boat trips
2	Glass-bottomed boat trips to coral areas.	*	C	4	• Boat operators • Forest Department • Coast Guard • Tourists interested in boat trips to view nature
2	Day trips to Nallathanni, Musal (Hare) and / or other islands.	*	C	3	• Interested tourists • Forest Department • Fishing communities nearby • Entrepreneurs to operate shops and refreshment facilities for visitors • Coast guard • Boat operators
3	Luxury neighbourhood friendly 'eco-resort' hotel	**	B	4	• Interested 'better-off' tourists • Hotel company with ethical policies • Local fishing community • Local artisans • Local guides and boat operators
3	Pearl cultivation by tourists	**	B	4	• CMFRI • Boat operators • Communities working in pearl cultivation with MSSRF • Interested tourists
4	Village tourism in Sankumal	***	B	3	• Forest Department • Sankumal village community • Foreign budget tourists • Police / Coast guard
5	Eco-beach resort on the road to Dhanushkodi	**	B	2	• Interested tourists • Forest Department • Fishing communities nearby • Police • Vendors • Entrepreneurs to make huts, sun shelters, refreshment facilities

					etc
6	Eco-beach resort on mainland near Nallathanni Island, Sethukarai, Keelakarai and Kanchirankudi and Ariamaan	**	B	2	• Interested tourists • Forest Department • Fishing communities nearby • Police / coast guard • Vendors • Entrepreneurs to make huts, sun shelters, refreshment facilities etc.
	New enterprises				
1	E-mail & internet facility for tourists	**	B	5	• Trained computer user women • SHG's
1	Bicycle rental enterprise with bicycle workshop.	***	A	4	• Tourists who need bicycles • Other bicycle riders who need maintenance facilities • Women entrepreneurs
2	Small-scale low-cost solar fish driers	**	B	4	• Solar drier producers • Traditional fishers • Mechanized fishers • Women who dry fish • SHGs / Federation of SHGs
3	Palm basket making for replacement of plastic packaging	***	A*	3	• Palmyra growers • Women entrepreneurs skilled in basket making • SHGs / Federation of SHGs • Consumers • Existing palm basket producing companies
3	Tailoring of cotton bags to replace plastics with tailors trained by ashram tailoring training centre	***	A	3	• Women entrepreneurs skilled in tailoring • SHGs / Federation of SHGs • Consumers • Cotton cloth traders
3	Marketing of non-plastic alternatives accompanied by area-wide ban on plastics	***	A*	3	• Producers of alternatives to plastics • Market facilitator (e.g. Federation of SHGs, local NGO, specially formed fair trade organisation, • Buyers
3	Production of biofertilisers from hotel / restaurant and temple organic wastes	**	A*	3	• Restaurant / hotel / temple staff • Composting entrepreneurs • Buyers / users of biofertilisers
4	Women's cooperatives to make tourist trinkets and materials for worship in the temple	***	B	3	• Skilled women • SHGs / Federation of SHGs • Buyers of handicrafts • Retailers
5	Female guides and taxi / auto-rickshaw drivers for women travellers.	**	B	2	• Interested women • Swami Pranavananda • Taxi / auto- drivers associations • Associations of guides
6	Recycling enterprise, especially finding use for plastic bottles	*	A*	1	• Entrepreneurs • Municipal authorities in charge of waste disposal

7.2 Means of overcoming the barriers to Sustainable Tourism Development in Ramanathapuram Coastal region

- **Government Regulations**

Pressure groups need to be formed and / or mobilized to advocate for changes in regulations such that careful and controlled tourism development is allowed to develop. Such changes should still enable the Coast Guard to maintain security and the Forestry Department to uphold the 1972 Wildlife Protection Act. However, diversification of use of marine resources away from purely extractive fishing, which is severely damaging biodiversity, towards wildlife viewing needs to become possible by changing regulations. It may be necessary to make a special-case regulatory body comprising all three government departments and other stakeholders at different levels for this process to become possible. This has already been attempted in the formation of a committee for the management of the biosphere reserve, but since this committee has so far never met and had not been given any legal regulatory responsibilities so far it is effectively non-existent. Resurrection of this committee or formation of a new one with legal clout of its own is a matter if utmost priority not only for the development of the products and enterprises suggested here but also for the development of a sustainable and effective management plan for the marine biosphere reserve.

- **Infrastructure**

If tourism has to be developed down the coast or on any of the islands south of the Kurusadai cluster, improvement and expansion of the east coast road system is crucial. Similarly effective sewage treatment systems to avoid pollution of the biosphere reserve waters *must* be introduced, especially in the populated tourist centre of Rameswaram. In villages composting toilets that require very little water, shallow pits and only need organic material such as dry coconut leaves to function should be introduced on a large scale. General improvements in drainage systems and drinking water supplies are also called for on a large scale.

- **Human Capital**

Skill development training in each of the eco enterprises suggested, using materials locally available to communities wherever possible, should be a major part of any intervention. Similarly training in basic hygiene and sanitation,

compost toilet making and usage, hygienic cooking, simple tea stall or small hotel management, guiding for religious tours and nature tours, snorkelling and SCUBA diving with strong emphasis on safety regulations and on identification of wildlife will be necessary.

- **Organizational Strength**

Capacity building of fisher's cooperative societies, women's self help groups and other community-based organization (CBOs) as well as of tourist guide associations, hotel associations etc needs to be undertaken. The approach to strengthening such local institutions should not only increase the ability of the institutions to protect their own member's interests, provide credit and other forms of support, but should also provide training in conflict resolution approaches and resource management issues.

- **Awareness**

Large scale awareness and education programmes about the Gulf of Mannar Marine Biosphere Reserve in schools, universities, with local communities and tourists in the Gulf of Mannar is crucial if support for conservation objectives to be attained. Development of an interpretive centre in Rameswaram would also assist this process. Posters and promotional material, using school children's participation in the form of poster competitions, should be developed and widely distributed.

- **Land ownership**

Changes in regulations concerning use of beaches or of land upon which a family has been living for a certain length of time need to be instigated. This could involve relaxation of certain rules or perhaps some special agreement between certain communities and the Forest department. Advocacy by NGOs, CBOs and the Federation of SHGs or by pressure groups may be needed to assist this process.

- **Capacity to meet tourist expectation**

For the development of village tourism and for poorer people to access jobs as tourist guides, nature guides, boat operators and so on, training about tourism should be provided through a programme to develop the various tourism proposals. Training should explain what kind of interests and concerns different groups of tourists have, especially foreign tourists whose expectation as may be quite different from those assumed by community members. A major sanitation

programme of building and using compost toilets in coastal villages as well as beach clean-up programmes removing rubbish should be initiated.

- **Lack of Linkages between formal and informal sectors**

Promotion of 'fair-trade' practices in the tourism industry needs to be developed with a system of authorization or certification of those who practice more equitable fair trading and employment. Strengthening of linkages requires changes in consumer behavior / demand which would then fuel a change in attitude of authorities and formal sector actors in tourism markets.

- **Lack of financial capital**

The work of the Dhan Foundation and the Federations of Self Help Groups in the coastal region is a key step already being taken to reduce dependence of poor fishing communities upon money lenders and fish traders. Already some Self Help Groups (for savings and credit purposes) have been formed and they have joined the Federation, enabling them to access more and more credit. These activities need to be expanded to all communities and strengthened over time to provide micro-credit for small business and for managing in the off-seasons to as many as possible.

- **Tourist Safety**

In the development of tourism activities like boat trips, snorkelling, SCUBA diving, basic safety equipment and procedures are pre-requisites to a successful enterprise. Accidents, apart from causing deaths and injuries, can quickly ruin the reputation of a destination or product. For boat trips, well-maintained boats and life jackets for all passengers including children are essential. Similarly, raining in safe snorkelling practices and especially SCUBA diving practices should be obligatory for all boat trip operators and tourists

- **Security issues**

Regulations enabling tourist leisure boats to function in clearly defined areas and limited numbers need to be introduced. Communications between coast guards and other boats need also to be improved so that any suspicious unauthorized boat users could be intercepted.

- **Location**

Road building and improvements in infrastructure and tourist facilities are necessary pre requisites to developing new locations for tourism on the coast of the Ramanathapuram. Once infrastructure development gets underway the Tamil

Nadu Tourist Development Corporation needs to promote other locations in the Ramanathapuram as tourist destinations.

7.3 Implementation of Plan Proposals for Sustainable Tourism Development

On the basis of information gathered in Ramanathapuram coastal region and analysis of the potential and infrastructure, the following recommendations for sustainable Tourism Development can be drawn.

i) The multi-stakeholder committee for 'Strengthening the management of the Gulf of Mannar Marine Biosphere Reserve' should be reactivated.

ii) In order for marine resource management to be improved, and for tourism, new enterprise and any other diversification of livelihood strategy for the poor fishing communities who depend upon marine resources of the area to be developed, barriers to development need to be addressed.

The barriers and actions to remove them are summarized as follows:

1. A supportive environment policy should be developed

Government departments of Forests, Fisheries, Coast Guard and Tourism should coordinate and collaborate towards the common aim of protecting biodiversity of the marine resources in the biosphere reserve whilst enabling sustainable exploitation of the area to maintain the livelihoods of the poor who live along the coast.

Specifically this would involve:

a) Replacement of current restrictions on access to the islands and waters with regulations enabling fixed quotas of tourists, students and scientists to allow access to clearly defined areas for clearly stipulated activities by different types of visitor (e.g. scientists and students on Kurusadai island, , restricted numbers of nature walkers, snorkellers, glass- bottomed boat trippers to Musal and Nallathanni islands and their coral reefs, general boating and snorkelling tourists to Sankumal coral reef).

b) Relaxation of rules concerning need for land documents to develop tourist huts on the beach.

2. Infrastructure development

In order to facilitate sustainable tourism development in Ramanathapuram coastal region the following infrastructural improvements are called for:

- Improvement of the roads down the east coat between Mandapam & Thuthukodi (Tuticorin) and widening & up gradation of the Sundarapandiyapattinam and Devipattinam road.
- Construction of sewage processing plants for Rameswaram and for Mandapam,
- Construction of septic tanks with low seepage rates into the aquifers for toilets in tourist facilities with smaller numbers of visitors.
- Improvement and expansion of drinking water supplies for coastal communities.
- Improvement of solid waste disposal facilities along the coast, especially in the Rameswaram area.
- Effective implementation of the ban on plastics for Tamil Nadu.
- Improvement of drainage systems in the coastal region, especially in Tourist spots.
- Promotion of shallow, compost toilets (one for every household) for communities along the coast and eco-beach resorts and planting of coconut trees on the site once full.
- Improvement of desalinization processes such that the water is less damaging to human health.

3. **Awareness-raising**

In order to generate a demand for sustainable tourism and also to help communities to realize the importance of the biodiversity in the Marine Biosphere Reserve a broad-reaching awareness raising programme is necessary with the following components:

Biodiversity conservation awareness

- Creation of an educational CD Rom / Website on the Gulf of Mannar it's biodiversity, history and cultural significance;
- Creation of posters, pamphlets and videos in Tamil, English and Hindi about the Gulf of Mannar and its biodiversity;
- Introduction of a biodiversity conservation awareness programme in schools with competitions for posters, pamphlets and street dramas, environmental clean-up action groups and activities;
- Construction of an interpretive centre on the Gulf of Mannar in Rameswaram near current tourist centre;

- Modernization of the CMFRI aquarium and museum to educate school and university students about the Marine Biosphere Reserve.

4. **Tourism awareness:**

Local fisher people of the coastal region lack awareness about tourism especially foreign tourists (i.e. what kind of attractions tourists like, what behavior they feel comfortable with, what they like to buy, and so on). In order for village tourism to be possible and for local people who know about marine biodiversity to share their knowledge with tourists, training about tourism should be provided for fishing communities.

5. **Conflict resolution:**

As marine biodiversity is becoming destroyed through unsustainable exploitation of resources, conflicts between stakeholders increase. This is especially the case between the mechanized boat owners who conduct environmentally damaging trawler fishing and the traditional or country boat fishers who fish using traditional, less intensive techniques. Conflict also occurs between different governments departments over control of the resources. Special efforts to resolve conflicts by working with different stakeholder groups separately and then bringing them together is urgently called for. This is a pre-requisite to the effective functioning of the multi-stakeholder committee for Strengthening the Management of the Marine Biosphere Reserve and for bringing about a sustainable community-based fisheries management plan.

6. **Skill Development:**

The poor who need to diversify their livelihoods away from extractive fishing, lack skills to do so. Various areas of skills development need to be offered to fishing community members such as:

- Tourist guiding;
- English and Hindi Languages;
- Nature guiding with specialist areas including bird identification, plant identification, marine life identification;
- Snorkelling and SCUBA diving with attention to coral conservation and safety of divers / swimmers; Life-saving;
- Hygienic food preparation (national & international cuisines);
- Basic primary health and sanitation;
- Low-cost compost toilet building;

- Hotel and lodge management;
- Computer and internet skills;
- Basket making;
- Shell handicraft making;
- Composting of kitchen wastes (including vermiculture and Effective Micro organisms);
- Improved fish drying / use of solar driers;
- Pearl cultivation;
- Bicycle maintenance;
- Tailoring;
- Paper making;
- Taxi and auto-rickshaw driving and boat operation.

7.4 Conclusion

The Ramanathapuram Coastal Region is an area of outstanding beauty and fascinating biodiversity that is currently under enormous pressure from over-exploitation of fishery resources. The fishing people who live along the coast associated with the reserve depend solely upon marine resources for their livelihoods. Since supply of fresh water is severely limited and the soils are mainly sandy that is unsuitable for most kinds of agriculture, options for diversification of fishing community livelihoods are severely limited. This means that alternative less extractive exploitation of marine resources needs to be developed through development of sustainable tourism.

Three types of tourism have been identified as suitable for Sustainable development in the Ramanathapuram Coastal region, namely: educational tourism, religious tourism and nature or leisure tourism. In brief the types of proposals are summarized as:

Educational tourism: CD Rom / Website, Interpretive centre, Field study centre on Kurusadai island, oceanarium (aquarium for showing marine life), student conservation volunteer holidays, improvements in CMFRI's aquarium and museum, snorkelling and diving school.

Religious tourism: package tour of religious site, Yoga ashram development with village tourism, renovation of temples and tanks.

Nature / Leisure tourism: boat trips for snorkelling, diving or viewing through

glass-bottomed boat; eco beach resorts for village tourism; fish barbeques on beach; pearl cultivation by tourists; luxury eco-resort on fishing village theme.

In addition a number of new enterprise options have been suggested in the following categories:

Tourist service related businesses: e-mail and internet facility; bicycle hire and maintenance; female guiding and taxi service for lone women travellers;

Fair trade / cooperative production for fisher women: dried fish, shell handicrafts and temple offerings; palm baskets, cotton bags, bio fertilizers; recycled newspaper bags;

On the basis of feasibility, impact upon the community and impact upon the environment the enterprises have then been ranked in order of priority.

The prioritized tourism and new enterprise options can be undertaken as an integrated part of developing a multi-stakeholder plan for sustainable community-based marine resource management. Alongside this, infrastructural barriers will need to be overcome and awareness raising aspects tackled. Finally through skill development and further capacity enhancement of CBOs enterprise development can get started. However it is important to make participatory business plans and market analysis of the options and to conduct research into the carrying capacity of different areas in the coastal region to verify that the proposals and enterprises are not environmentally damaging and have a firm economic basis.

7.5 Limitations of the study

As mentioned in the introduction chapter, the limitation of this study is mainly on account of the non availability of the data on multifarious aspects of the environment in coastal region of Ramanathapuram. The remoteness and the backwardness status of the study area also contributed to the inaccessibility of information on various key developmental aspects.

Further research should to be conducted on the proposals and suggestions, under the following topics:

- Market analysis of each of the various tourism proposals and new enterprises suggested in the proposal with emphasis on possibilities to restrict or prevent middlemen from preventing profits reaching the coastal communities.

- Carrying capacity assessment for all the proposed tourist spots in terms of development of tourism and of enterprises listed in the proposals.
- Detailed stakeholder analysis leading to managing of stakeholder conflict and developing community based sustainable fisheries management plans for coastal areas.

7.6 Institutional Initiatives needed for Sustainable Development

There are a number of different organizations involving or impacting upon the coastal communities, which have the potential to support them in diversifying their livelihoods. These organizations and their for need capacity strengthening are listed below:

1. Panchayat, District and State level government need training in:
    - Participatory planning;
    - Sustainable resource management;
2. Women's Self Help Groups (SHGs), other Community Based Organizations (CBOs), need strengthening in:
    - Cooperative formation and management;
    - Advocacy (i.e. land rights, women's rights, etc).
3. NGOs
    - Promote local community development and participation through networks and self help groups.

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Annexes

ANNEXURE - I

Recommended Recharge Structure in Ramanathapuram District

Village wise action plan for Bogalur block, Ramanathapuram district.

Sl. No.	Village Name	Village No.	Recommendations
1	Chitrangudi	52	Desilting of drinking water oorani to be done
2	Sonaipriyankottai	53	Desilting of drinking water oorani and open wells in the drinking water oorani to be done
3	Lalachembur	55	Desilting of drinking water oorani to be done
4	Kandialn	56	Desilting of drinking water oorani to be done
5	Enathi	57	Desilting of Enathi kanmai, kottagai oorani and open well in Enathi kanmai
6	Kilasirabathu	76	Desilting of Melapanaiyur kanmai
7	Melasirabathu	77	Desilting of drinking water oorani to be done
8	Marandai	79	Desilting of drinking water oorani to be done
9	Punecasal	80	Desilting of open well in the drinking water oorani to be done
10	Vepakulam	81	Desilting of drinking water oorani to be done
11	Appanur	82	One shallow circular open wells at Arianavaram and malatar river to be sunk
12	T.M.Kottai	99	Desilting of drinking water oorani to be done
13	T.Karisalkulam	100	Desilting of drinking water oorani to be done
14	Kokkarankottai	101	Desilting of drinking water oorani to be done
15	Kondanalampatti	102	Desilting of drinking water oorani to be done
16	Taraikudi	103	Desilting of drinking water oorani to be done
17	Sayalkudi	108	Desilting of drinking water kanmai and oorani to be done
18	Nedungulam	110	Desilting of drinking water oorani to be done
19	Avadanadai	112	Shallow circular open well to be sunk and desilting of drinking water oorani
20	A.Usillangulam	115	Desilting of drinking water kanmai and oorani to be done
21	Kadaladi	116	Desilting of drinking water kanmai and oorani to be done
22	Meenangudi	117	Desilting of drinking water oorani and shallow circular open well to be sunk.
23	Kadugusandai	118	Desilting of drinking water oorani to be done
24	Periakulam	119	Desilting of drinking water oorani to be done
25	Mriyur	120	Desilting of drinking water oorani to be done
26	Kilkidaram	124	Desilting of drinking water oorani to be done
27	Melakidaram	125	Desilting of drinking water oorani to be done
28	Melselvanur	128	Desilting of drinking water oorani to be done
29	Oraivayal	129	Desiitning of existing oorani
30	Peykulam	132	Desilting of drinking water oorani to be done

31	Sikkal	134	Dsilting of drinking water oorani
32	Idampadal	135	Desilting of drinking water oorani to be done
33	Siraikulam	136	Desilting of drinking water kanmai and oorani to be done
34	Tanichiyam	137	Desilting of drinking water oorani to be done

Village wise action plan for Mandapam block, Ramanathapuram district.

Sl. No.	Village Name	Village No.	Recommendations
1	Pirapauualasai	63	Shallow Dug well may be constructed

Village wise action plan for Tiruvadanai block, Ramanathapuram district.

Sl. No.	Village Name	Village No.	Recommendations
1	Pullur	58	Existing oorani to be desilted
2	Parur	38	Shallow circular open well is to be constructed
3	Arasur	36	Shallow circular open well is to be constructed
4	Odavayal	72	Existing oorani to be desilted
5	Machur	71	Existing oorani to be desilted

ANNEXURE - II

Various activities that can be taken up in the Coastal Regulation Zone area and the locations where they can be set up based on the category of the Coastal Regulation Zone is given below.

Sl. No.	Activities	CRZ – I (i)	CRZ – I (ii)	CRZ - II	CRZ – III (HTL – 200)	CRZ – III (200 – 500)	CRZ - IV
1	Agriculture	×	✓	✓	✓	✓	✓
2	Airstrips	×	×	×	×	×	×(Lak)
3	Ash from TPS	×	×	×	×	×	×
4	Blasting Underwater	×	×	×	×	×	×
5	Bridges	×	✓	✓	✓	✓	✓
6	Complex commercial	×	×	✓	×	×	×
7	Control erosion	×	✓	✓	✓	✓	✓
8	Conveying systems	✓	✓	✓	✓	✓	✓
9	Demolition / reconstruction of archaeological, heritage, public structures	×	×	✓	×	×	×
10	Dispensaries	✓(SB)	×	✓	✓	×	×
11	Drainage	×	×	✓	✓	✓	✓
12	Drains storm water	×	×	✓	✓	✓	✓
13	Drawal groundwater	×	×	✓	×	✓	✓
14	Drying fish	×	×	✓	✓	✓	✓
15	Edible oils storage o	×	✓	✓	✓	✓	✓
16	Effluents treated	×	×	✓	✓	✓	✓
17	Energy non conventional	×	×	×	✓	✓	✓
18	Energy projects atomic	✓	✓	✓	✓	✓	✓
19	Facility embarkation	×	×	×	×	×	×(Lak)
20	Fertilizers storage	×	✓	✓	✓	✓	✓
21	Fields play	×	×	✓	✓	✓	✓
22	Fisheries (aquaculture)	×	×	×	×	✓	✓
23	Food grains storage	×	✓	✓	✓	✓	✓
24	Forestry	×	×	✓	✓	✓	✓
25	Hatchery	×	×	✓	✓	×	×
26	Horticulture	×	✓	✓	✓	✓	✓

27	Shipyards expansion	×	✓	✓	✓	✓	✓
28	Industries new	×	×	×	×	×	×
29	Information technology	×	×	×	✓(SEZ)	✓(SEZ)	×
30	Jetty	×	✓	✓	✓	✓	✓
31	Landfill	×	×	×	×	×	×
32	Lines transmission	✓	✓	✓	✓	✓	✓
33	LNG	✓	✓	✓	✓	✓	✓
34	Minerals rare	×	×	✓	✓	✓	✓
35	Mining coral	×	×	×	×	×	×
36	Oil and gas exploration	✓	✓	✓	✓	✓	✓
37	Parks	×	×	✓	✓	✓	✓
38	Pipelines	✓	✓	✓	✓	✓	✓
39	Plants desalination	×	×	✓	✓	✓	✓
40	Plants thermal power	×	×	×	×	×	×
41	Ports / harbours expansion	×	✓	✓	✓	✓	✓
42	Prevention of salinity	×	✓	✓	✓	✓	✓
43	Processing fish	×	×	×	×	×	×
44	Products POL	×	×	×	✓	✓	✓
45	Projects defence	×	✓	✓	✓	✓	✓
46	Projects SEZ	×	×	×	✓(SEZ)	✓(SEZ)	✓
47	Quays	×	✓	✓	✓	✓	✓
48	Radars weather	✓	✓	✓	✓	✓	✓
49	Rain shelters public	✓(SB)	×	✓	✓	×	×
50	Reclamation of land	×	✓(P&H)	✓(P&H)	✓(P&H)	✓(P&H)	✓(P&H)
51	Regulators Tidal	×	✓	✓	✓	✓	✓
52	Resorts beach	×	×	✓	×	✓	✓
53	Roads	×	×	✓	✓	✓	×
54	Saltpan	×	✓	✓	✓	✓	✓
55	Sand dunes altering	×	×	×	×	×	×
56	Sand / rock mining	×	×	×	×	×	×
57	Schemes housing	×	×	✓	×	×	×
58	Schools	✓(SB)	×	✓	✓	×	×
59	Sea – links	✓	✓	✓	✓	✓	✓
60	Sewerage	×	×	✓	✓	✓	✓

62	Structures reconstruction	×	×	✓	✓	✓	✓
63	Supply water	×	✓	✓	✓	✓	✓
64	Toilets community	✓(SB)	×	✓	✓	×	×
65	Units dwelling	×	×	✓	×	✓	✓
66	Waste municipal	×	×	×	×	×	×
67	Wharves	×	✓	✓	✓	✓	✓

Legend

CRZ-I (i) – Ecologically sensitive areas

CRZ-I (ii) – Inter-tidal areas

CRZ-II – Built up areas

CRZ-III – Rural areas

CRZ-III (HTL to 200 metres) – No Development Zone within rural areas

CRZ-IV – Andaman & Nicobar Islands and Lakshwadweep Islands

Lak - Lakshadweep

P&H – Port & Harbours

SB - Sunderbans

SEZ – Special Economic Zone

ANNEXURE - III

Guidelines for Preparation of Integrated Management Plan for CMZ II Areas

The entire notified Corporation, Municipality, Panchayat, revenue area, shall be the outer boundary of the APC.

- IMPs will be prepared for these areas indicating all present and future developments, conservation and preservation schemes.
- Integrated Management will address vulnerability to human life and property based on vulnerability lines prepared by Ministry of Environment & Forests.
- No constructions shall be permitted on the seaward side of any existing (as on 2004) approved building or a tarred or surfaced road in the area.
- All the existing roads including the internal roads shall be strengthened, as these roads will serve for the purpose of livelihood, communication, relief and evacuation measures.
- Adequate cyclone shelters shall be constructed taking into account the population of the area.
- The new schools, market areas and other public facilities, where large number of public congregate shall be located beyond the vulnerable area.
- Along the seaward side sufficient bio shield with local vegetation, trees including mangroves shall be planted
- The beaches shall be left free of any development.
- Appropriate coastal protection structures be constructed where ever required on a scientific basis
- New houses and settlements be planned landward of the vulnerability line.
- Sand dunes being natural speed breakers in the event of hazards shall be maintained or regenerated by planting shrubs or through appropriate measures.
- All the areas notified by the Ministry of Environment & Forests as CMZ I be clearly demarcated in the plan and for their conservation by the Ministry of Environment & Forests.
- The IMPs will be approved by the proposed NISCM of the Ministry.
- The enforcement and monitoring will be the responsibility of the concerned state/Union Territory Coastal Zone Management Authorities.

ANNEURE – IV

Questionnaire for Known/Less Known Tourist Destinations

Name of the place: _____Category: Religious/Natural/Cultural/Others

Name of the village: _____Block: _____Popn.:_____

Other attractions of the place:

Nearest town/village centre:

Type of connected road: Black topped/Metalled/dust road _all weather/Fair weather

Mode of access from nearest town: _____Distance:

Type of tourism: pilgrimage/leisure/study-educational/others

Type of tourist: Local/regional/national/international

Tourist inflow: 2005 2004 2003 2002 2001

Peak season: Lean season: Off season:

Facilities available for tourist:

Accommodation (beds) : Hotel/Guest house/Lodge/Community rest place/others

Eating place : Hawkers/shops/Restaurants (Regional-National-International)/others

Transportation : Public transport/Taxi/Auto/shared vehicle/own vehicle/others

Communication facilities : PCO/STD/Fax/Internet/ Mobile facilities

Entertainment :

Shopping : Grocery/medical/fancy /household/others. No.<10/11-20/21-50/51-100/>100

Medical Facilities : First aid center/Clinic/Health centers/Hospital

Police booth/Taxi stand/Bus stand/Parking space/PO/Bank/Petrol Station/Tour operators/

Any other ( )

Quality of services (good/bad/average)

Water supply :

Electricity supply :

Solid waste management :

Road & street lighting :

Public convenience :

Common problem faced by a tourist:

ANNEXURE - V

Stakeholders Contacted/surveyed in this Study:

Tourists

- Tamil Nadu state tourists
- Indian National tourists
- Foreign tourists

Government authorities

- Department of Fisheries, Chennai & Ramanathapuram;
- Central Marine and Fisheries Research Institute (CMFRI), Mandapam ;
- Department of Forests, Ramanathapuram;
- Directorate of Economics and Statistics, Chennai & Ramanathapuram;
- District Industrial Center, Ramanathapuram;
- Water resources organisation, PWD, Ramanathapuram
- Tamil Nadu Tourism Development Corporation

Tourism market related

- Hoteliers (lodges and restaurants)
- Vendors / traders in tourist / religious goods
- Local travel agencies
- Outside tour operators
- Tourist guides
- Boat operators
- Auto drivers

Fishing related

- Traditional fishers
- Fish traders
- Fishermen's associations

Development related

- District Rural Development Organisation, Ramanathapuram
- NGOs working in the area

ANNEXURE - VI

Abbreviations used in the Report

BoBP	Bay of Bengal Programme
CBO	Community Based Organizations
CMFRI	Central Marine Fisheries Research Institute
CRZ	Coastal Regulation Zone
CZM	Coastal Zone Management
DoEF	Department of Environment and Forests
EEAA	Egyptian Environmental Affairs Agency
ESCAP	Economic and Social Commission for Asia and the Pacific, UN
ICZM	Integrated Coastal Zone Management
IUCN	International Union for the Conservation of Nature
MSSRF	M.S. Swaminathan Research Foundation
MoEF	Ministry of Environment and Forests (Government of India)
NABARD	National Bank for Agriculture and Rural Development
NGOs	Non-governmental Organization
PWD	Public Works Department
RSSTI	Red Sea Sustainable Tourism Initiative
SHG	Women's Self Help Groups
TDA	Tourism Development Authority
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WWF	World Wildlife Fund