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Coastal Resources and Management of Tamil Nadu



ENVIS Centre, Department of Environment, Government of Tamil Nadu
Panagal Building, No.1, Jeenis Road, Saidapet, Chennai-600 015. Tel: 044 24331243
Fax: 044 24336594 Email: tn@envis.nic.in Website: www.envis.tn.nic.in

Coastal Resources and Management of Tamil Nadu

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. The coastline of Tamil Nadu has a length of about 1076 kms and constitutes about 15% of the total coastal length of India. It stretches along the Bay of Bengal, Indian Ocean and Arabian Sea.

Table 1. Coastal length of Tamil Nadu

S.no.	Coastal information	Tamil Nadu		
		E.coast	W.coast	Total
1.	Coastal length (in km)	1016	60	1076
2.	Continental shelf (in sq.km)			41412
	up to 50 m depth	22411	844	23255
	51 m - 200 m depth	11205	6952	18157
3.	Exclusive Economic Zone (million sq.km.) Extends to 200 nautical miles from shore	-	-	0.19
4.	Territorial waters (in sq.km) (approx.)	-	-	19000

The coastal areas are assuming greater importance, owing to increasing human population, urbanization and accelerated developmental activities. These anthropogenic activities have put tremendous pressure on the fragile coastal environment. To protect the coastal community, from the natural disaster coastal area planning for locating coastal communities in safer areas, protecting and propagating the natural protecting systems such as mangroves, coral reefs, shelter belt plantations, along with installation of early warning systems, can be thought of (M.S.Swaminathan, 2005, Review on Coastal Regulation Zone notification 1991).

I. Ecologically Important Coastal Areas of Tamil Nadu

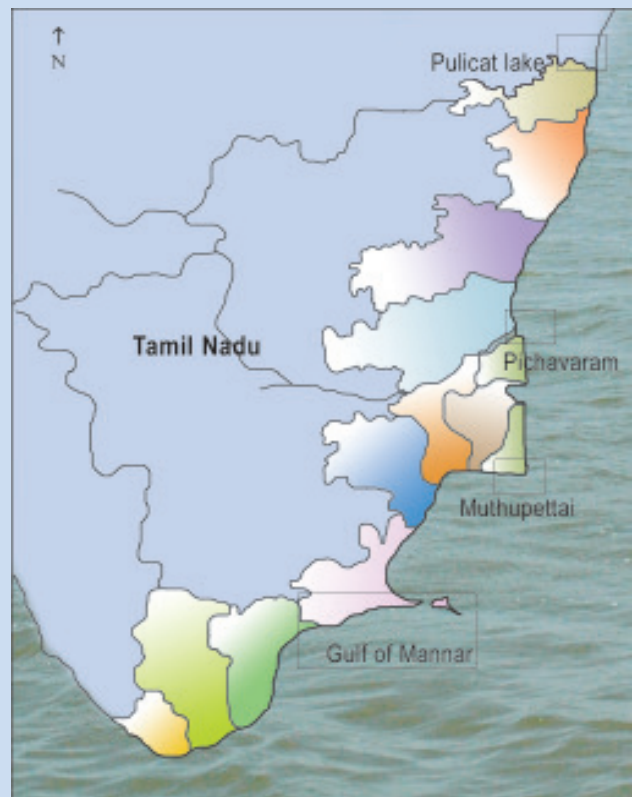


Fig. 1. Coastal districts of Tamil Nadu

The Tamil Nadu coast is straight and narrow without many indentations except at Vedaranyam. Fringing and patch reefs are present near Rameswaram and Gulf of Mannar. Pitchavaram, Vedaranyam and Point Calimere have well developed mangrove systems. In Tamil Nadu about 46 rivers drain into Bay of Bengal



forming several estuaries adjoining coastal lagoons. The Cauvery river and its tributaries form a large delta supporting extensive agriculture. The other landforms of the Tamil Nadu coast are rock outcrops of Kanyakumari, mudflats, beaches, spits, coastal dunes and strand features. Deposition is observed at Point Calimere, Nagapattinam and South Madras while erosion is reported at Ovari Paravarnattam, Mahabalipuram and North Madras near Ennore. Rich deposits of heavy minerals are available in Muttom-Manavalakuruchi coast. The southern tip is also known for the Tera sands (M.S.Swaminathan, 2005).

Tamil Nadu is endowed with one of the largest and richest fisheries in India. The State has 1.9 lakh sq. m of Exclusive Economic Zone (EEZ) covering the four coastal zones, besides 21 coral islands in the Gulf of Mannar, with rich habitats of corals, coastal lagoons (Pulicat lake and Muthupet swamp) and estuaries. The unique topography of Tamil Nadu with the Gulf of Mannar and Kanyakumari in the south, and Pulicat Lake, which is the second largest lagoon in the country, in the north, has resulted in an abundance of endemic species and a large number of high value potential resources. Nearly one-third of the seaweed resources of the Indian Ocean are found along the coast of Tamil Nadu, particularly in the Gulf of Mannar.

Table 2. Ecologically Important Coastal Areas of Tamil Nadu

S.no.	District	Coastal Areas	Ecological importance
1.	Ramanathapuram	Gulf of Mannar (Islands between Rameswaram-Tuticorin)	Coral Reef
2.	Nagapattinam	Vedaranniyam, Muthupettai	Mangroves
3.	Cuddalore	Pichavaram	Mangroves
4.	Thiruvallur	Pulicat Lake	Lagoon

II. Importance of Coastal Ecosystem

A. Coral Reefs

In Tamil Nadu coral reefs are found in Gulf of Mannar and Palk bay. Coral reefs are one of the most productive and complex coastal ecosystems with high biological diversity. They occur in shallow tropical areas where the seawater is clean, clear and warm. The

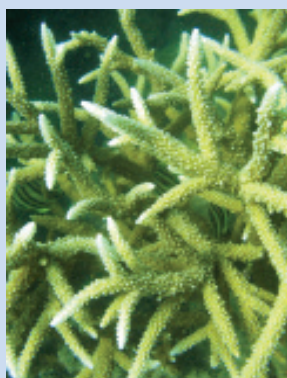


Photo courtesy : TNFD, Raminad

high productivity is owing to the combination of its own primary production and support from its surrounding habitat. Reef building corals are a symbiotic association of coral animals and zooxanthellae, which is a microscopic algae. Coral reefs provide shelter from natural calamities and also provide shelter for a rich collection of fauna. Corals fall under the Schedule I of the protected species. (M.S.Swaminathan, 2005).

B. Mangroves and Bio-shield

Mangroves are spread over 35 sq.km in Chidambaram, Cuddalore, Nagapattinam, Ramanathapuram and Thanjavur (Muthupet) (State of Forest Report, Forest Survey of India, 2003). In Cuddalore mangroves are found in Pitchavaram and located about 225km south of Madras. Pitchavaram mangroves are bathed in the Vellar-Coleroon estuarine complex and spread to an area of 1100ha. The Pitchavaram area consists of 51 islets (small and large), which are traversed by numerous creeks, gullies, channels and canals. Pitchavaram mangrove possess 13 species of true mangrove plants (Ramachandran, 2001, Coastal Environment and Management).

Mangrove forest establishes in coastal areas where river water mixes with seawater. These areas are called estuarine or brackish water environment of coastal zone. Mangrove forests located in the estuarine environment are intersected by a number of small creeks and channels and in many cases large open water bodies are also found associated with them. Mangrove forests and associated tidal creeks, channels and lagoons together constitute mangrove wetlands. These mangrove wetlands provide a variety of protective and productive services to the coastal communities (M.S.Swaminathan, 2005).



Pichavaram mangrove forest protected 6 hamlets against the fury of tsunami in Tamilnadu coast on 26 December 2004. Mangrove forest reduced the impact of the tsunami by two ways: a) velocity of the tsunami water greatly reduced after it entered into the mangroves due to friction created by thick mangrove forest and b) volume of water reaching a point is greatly reduced (www.mssrf.org).

1. Mangrove wetlands mitigate the adverse impact of storms, cyclones and tsunami in coastal areas.
2. They reduce coastal erosion and gains land by accreting sea and adjacent coastal water bodies.
3. They act as breeding, nursery and feeding grounds for many commercially important shrimps, fish, crabs and molluscs.
4. They enhance the fishery potential of adjacent coastal waters by providing them with large quantities of organic and inorganic nutrients.

C. Estuaries

An estuary is a semi-enclosed coastal body of water, which has a free connection with the open sea and within which sea water is measurably diluted with fresh water derived from 'land drainage'. Estuaries depend on fresh-water flow from upland rivers in order to maintain their characteristic processes. The important estuaries found in Tamil Nadu are Ennore estuary, Cooum estuary, Adyar estuary, Muttukadu backwaters, Uppanar estuary, Vellar estuary, Kollidam (Coleroon) estuary, Kaveri (Cauvery) estuary, Agniar estuary, Kallar estuary, Pinnakayal and Pullavazhi estuaries, Athankarai and Kanjirangudi estuaries, Kottakkarai, Uppar, Vaigai, Kottakkudy and Thengapattanam estuaries (www.casmbenvis.nic.in).



Fig. 2. Adyar estuary

The outstanding feature of estuaries, from the aspect of applied ecology, is the high productivity, which results from the constant supply of nutrients to a sheltered but dynamic habitat. Estuaries and tidal marshes are regarded as amongst the most fertile natural areas in the world. The greatest immediate commercial value of this high productivity, spawning, nursery and feeding ground, beds for clams and mussels, sea grass beds, sites of mangrove, marsh stability, transports nutrients (M.S.Swaminathan, 2005).

D. Lagoons

Lagoon is shallow body of brackish or seawater partially separated from an adjacent coastal sea by barriers of sand or shingle, which may leave narrow openings through which seawater can flow. Coastal lagoons are usually found on low-lying coasts and are normally aligned with their largest diameter parallel to the seashore. In Tamil Nadu lagoons are found in Pulicat, Muttukadu, Muthupet and Gulf of Mannar (www.casmbenvis.nic.in). Lagoons are highly productive ecosystems. Large oscillations in the populations of individual species occur. Many species migrate into lagoons to feed, thereby taking advantage of the considerable production of organic matter and the lack of competing species: although phytoplankton and benthic plants are the primary producers on which the ecosystem ultimately depends, much of their production is consumed only after its decay and decomposition by microbial organisms (Dr.M.S.Swaminathan, 2005).

Pulicat lake, the second largest brackish water lake in India, lies almost parallel to the Bay of Bengal. The Pulicat Lake extends over the Ponneri and Gummidipundi taluks of Thiruvallur district in Tamil Nadu and Sulerpet and Tada taluks of Nellore district in Andhra Pradesh and covers an area of about 469 sq.kms. Pulicat lake evolved around 6000 years ago at the peak of Holocene sea level rise by the growth of coastal sand barrier across the eastern side of the captured river plain. The lake extends to about 59 km from north to south direction with a maximum width of 19 km. in east west direction in the northern sector of the lake. Pulicat lake is known for its rich biodiversity, it includes 49 species of Phyto plankton, 88 species of Zooplankton, 57 species of Benthos, 39 species of fishes and 212 species of birds inhabiting in this lake. (Ramachandran, 2001).

Fishery Resources of Tamil Nadu

Tamil Nadu with 0.19 million Sq.Km. of EEZ and a continental shelf of about 41,412 Sq.km. is a leading State both in culture and capture fisheries. It has emerged as a major exporter of marine products. The inland fisheries sector has about 3.71 lakhs ha. of water spread area comprising reservoirs, major irrigation and long seasonal tanks, short seasonal tanks and ponds, estuaries, backwaters etc. which are suitable both for capture and culture fisheries. About 5,000 ha. of water spread area is being utilised for fresh water aquaculture. There are 56,000 ha. of brackish water area available for aquaculture production, of which about 4,455 ha. are actually under production (Fisheries policy note 2006-07).



Fig. 3. Nagapattinam fishing harbour

GULF OF MANNAR Marine Biosphere Reserve

Gulf of Mannar is one of the most important coral reef reserves of India that has a very high productivity. The reefs are developed around a discontinuous chain of twenty-one islands that exist along 140 km stretch between Rameshwaram and Tuticorin. The Gulf of Mannar Marine National Park was established in the year 1983 to conserve and restore the ecosystems of the Palk Bay and the Gulf of Mannar in the southeast coast of India. Subsequently, the Gulf of Mannar Marine Biosphere Reserve was set up in Feb. 1989. Lying between India and Srilanka, covering an area of about 10,500 sq.kms., it runs along (mainland) India coast to about 170 nautical miles. The total island area is approximately 560 ha. The Gulf of Mannar area is known for its biological wealth. Along the east coast of India, the coral formation is mainly confined to Gulf of Mannar and Palk Bay. A total of 94 species of corals belonging to 37 genera have been recorded here. Although the coral reef formations are estimated to cover an area of 100 sq.km., more than 106 species of marine algae and 11 species of sea grasses and marine invertebrates are found in abundance. The Kurusadai island in this region is commonly known as the paradise of zoologists. The endangered marine mammal *Dugong dugon* was found in abundance once, but became rare now (Ramachandran, 2001).



Fig. 4. Map of Gulf of Mannar islands

Table 3. List of Coastal Protected areas and their protection status

Tamil Nadu	Protection status	Area km ²	Importance
Gulf of Mannar	NP	200	Coral islands
Pulicat	WLS	60	Lagoon and waterfowl
Point calimere	WLS	10	Lagoon, swamp and waterfowl
Pichavaram	WLS	11	Mangrove and Waterfowl
Kazhiveli	WLS	10	Waterfowl

NP - Marine National Parks, WLS - Wild Life Sanctuary

III. COASTAL MANAGEMENT

A. Coastal Regulation Zone Notification, 1991

The Ministry of Environment and Forests, GOI, dated 19th February, 1991 Notification declared coastal stretches as Coastal Regulation Zone (CRZ) and restrictions were imposed on the setting up and expansion of industries, operations and processes, under the Environmental Protection Act 1986 to protect the 500 meter zone from the high tide line and along rivers and creeks into the area of tidal action. In Tamil Nadu, the CRZ is categorized under three categories as below:

Category	
CRZ I Ecologically sensitive and important areas	National Parks, Sanctuaries, Reserved Forests, Mangroves, Estuaries, Corals, areas close to breeding grounds of fish and other marine life, areas of outstanding natural beauty.
CRZ II Developed area	Developed area is referred as the area within the municipal limits which is already substantially built up and which has been provided with drainage and approach road and other infrastructure facilities, such as water supply and sewerage mains which were present before 1991.
CRZ III Undisturbed areas	This will include coastal zone in the rural areas (developed and undeveloped) and areas within municipal limits where substantial development has not taken place.

B. Coastal Management Zone

An expert Committee under M.S. Swaminathan was constituted by the Ministry on 19th July, 2004, for comprehensively reviewing the CRZ Notification, 1991, in the light of findings and recommendations of previous committees, future pronouncements, representations of various stakeholders and suggest suitable amendments, if necessary, to make the coastal regulatory framework consistent with well established scientific principles of coastal zone management. The committee has submitted its report to the Ministry on

14th February 2005. M.S.Swaminathan report has suggested to include setback lines in the zone categorized as CMZ II and III based on vulnerability of the coast. It has been recommended to have four management zones, which will have integrated management plans for their management.

C. Coastal Zone Management Authority

The Government of India, MoEF has constituted an authority namely, the Tamil Nadu Coastal Zone Management Authority, to enforce the CRZ notification. The Chairman of the Authority is the Secretary to Government, MoEF and the Director, Department of Environment is the Member Secretary. Project proposals attracting CRZ regulations are scrutinised by this authority and appropriate action is pursued.

D. Green Squad

The Government of India has emphasized that violations along the coast should be checked by the State Government through increased surveillance. Hence the Department of Environment has setup a green squad for monitoring CRZ violations.

E. Aquaculture Authority

Considering the environmental damages of aquaculture practices, the Supreme Court of India banned aquaculture within CRZ and entrusted the job of issuing clearance to the farms for the existing/proposed farms outside the CRZ to the Aquaculture Authority constituted as per the directions of the Supreme Court of India with headquarters at Chennai. To assist the Authority in regularizing shrimp farming, State level committee and district level committees have been constituted in the State (www.aquaculture.tn.nic.in).

EMERGENCY TSUNAMI RECONSTRUCTION PROJECT (ETRP)

To manage the coastal zone of Tamil Nadu, the following activities are envisaged under the World Bank assisted Emergency Tsunami Reconstruction Project by the Department of Environment.

1. Demarcation of HTL along the coast of Tamil Nadu

The coastal stretches of seas, bays, estuaries, creeks, rivers and back waters which are influenced by tidal action (in the landward side) up to 500 m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) and the HTL are declared as CRZ. HTL means the line on the land up-to which the highest

water line reaches during spring tide. The HTL demarcation on the coast, HTL will have to be marked for the tidal influenced water bodies like creeks, rivers and back waters. On completion of HTL survey, the HTL will be superimposed on village cadastral maps containing survey numbers in 1:5000 scale. This will help to identify setback lines as prescribed in the CRZ notification.

2. Preparation of Integrated Coastal Zone Management Plan (ICZMP)

The coastline has a mixture of land uses like urban areas, ports, industries, rural settlements involved in agriculture, fisheries and tourism. To achieve economic prosperity without sacrificing ecological security it has been proposed for an area specific management plan to ensure overall development of the coastal area. Judicious utilization of resources will be arrived based on carrying capacity based Development plan. It will ensure integration sustainable development of coastal stretches and conservation of ecologically sensitive areas. This will be in the form of maps in 1:5000 scale.

3. Erection of stone pillars on HTL reference points along the coast of Tamil Nadu

To facilitate the coastal community to identify the HTL on ground, HTL stone pillars will be fixed along the coast wherever necessary. These pillars will be suitably marked as HTL pillars.

4. Coastal Vulnerability Maps of Tamil Nadu

Tamil Nadu coast is prone to recurrent cyclones. Low lying area like Nagapattinam has been identified as potential area for inundation due to sea level rise. The recent tsunami has devastated extensive stretches of coastal areas of Nagapattinam, Kanyakumari, Cuddalore and Chennai. The damage was more in areas, which are low lying and flat devoid of any vegetation. Hence multi hazard vulnerability maps are proposed to be prepared. The elevation, geology, geomorphology, sea level trends, horizontal shoreline displacement (erosion/accretion), tidal ranges and wave heights will be taken into account. The data will be plotted on GIS based 1:5000 scale cadastral maps. The present as well as desirable type of land use will be indicated. Suitable civil structures and bio shields will be proposed based on the need of the coastal area to prevent further damages.

5. Preparation of Training Modules & conducting Training and Awareness programmes on ICZMP

The concept of ICZMP and coastal vulnerability are relatively new. Suitable training modules will be

developed for various stake holders. Training programmes at different levels will be taken up for Panchayat leaders, officials of Government departments/ local bodies. Special programmes will be developed for coastal community and student community.

6. Bioremediation of selected water bodies in Chennai, Cuddalore, Nagapattinam and Kanyakumari Districts

Tamil Nadu coast is bestowed with number of surface water bodies. These water bodies serve as important fishing grounds for the local fishermen. Suitable measures for abatement of pollution in these water bodies through various options including bioremediation will be taken up. These activities include prevention of pollution from point sources, desilting, dewatering, bio-remediation, lake beautification etc.

Events

ENVIS Advisory Committee Meeting



To take stock of the achievements and shortcomings of the Envis Centre of the DoE an ENVIS advisory committee meeting was held on July 21st, 2006 at DoE, Chennai. The meeting was chaired by Dr. D.Bandyopadhyay, Director, ENVIS, MoEF, GoI. Dr. C. Thomson Jacob, Senior Programme Officer, ENVIS Centre made a detailed presentation of the “ENVIS activities and the Action plan for the year 2006-07”. The suggestions made by the advisory committee members are being followed up.

Awareness on Coastal Regulation Zone

The DoE, has conducted awareness workshops on CRZ among the coastal communities in the 13 coastal districts of Tamil Nadu. Thiru K.S.Neelakantan, I.F.S., Director of Environment inaugurated the workshop

on July 12th at Kaniyakumari and it was concluded at C.P.R.E.E. Centre, Chennai, on August 25th. ENVIS team comprising of Dr. C. Thomson Jacob and Mr. J.D.Marcus Knight made a detailed presentation on the coastal resources of Tamil Nadu and briefed the activities of ENVIS. Thiru M. Sathyan and Thiru B. Ramasundar from the DoE explained the importance of implementing the CRZ notification and the advantage of ICZMP. They have also highlighted the objectives of ETRP funded by the World Bank. Government officials, NGOs and fishing community representatives were present in the training programmes.

Ozone Day Celebration

To commemorate the “International Ozone day”, Department of Environment has organised Ozone day celebration at Don Bosco Matriculation Higher Secondary School, Vellore. The theme for the Ozone Day for the year 2006 is “Protect the Ozone Layer: Save Life on Earth”. Thiru K.S.Neelakantan, I.F.S., Director delivered the inaugural address and emphasized the importance of phasing out Ozone depleting substances like CFC. Thiru Dharmendra Pratap Yadav, IAS., District Collector presided over the function. Prof. K.M.Kader Mohideen, Member of Parliament delivered the special address. Dr. Udayshankar, I.E.S., Deputy Secretary (EE), MoEF said that Eco clubs have been formed in 70,000 schools throughout India under the NGC Programme and out of these, 7,500 are in Tamil Nadu. ENVIS Team conducted an awareness programme to the school students on the “Importance of protecting the Ozone Layer” and briefed the importance of “Eco campus initiatives”. A quiz contest on “Ozone Depletion” was also conducted by the ENVIS team. Thiru K.S.Neelakantan, I.F.S., distributed the prizes to the winners of the quiz contest.





The President of India, Dr. A.P.J. Abdul kalam's speech on the Technology Day, May, 2006

Scientists of Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar have developed an important thickening agent Carrageenan using seaweed called *Kappaphycus alvarezii* that bestows useful properties to many commercial products such as toothpaste, ice-cream, pet food and soft capsules. They are developing value added products such as bio-degradable polymer from carrageenan and have even used the seaweed to produce low sodium vegetable salt for the first time in the world. Seaweed cultivation can be taken up as a mission oriented activity by fishermen co-operatives and self-help groups of the coastal areas, particularly in PURA (Providing Urban Amenities in Rural Areas) complexes.

(Source: <http://presidentofindia.nic.in>)



District Level Environmental Awareness

ENVIS Centre is creating Environmental awareness among school and college students in Tamil Nadu. The Environmental awareness program was inaugurated on 4th August by the Chief Education Officer Ms. S. Amudhavalli at Natarajan Damayanthi Higher Secondary School, Velipalayam, Nagapattinam. Dr. C. Thomson Jacob, S.P.O and Mr. K.P. Raghuram, Programme Officer made a presentation on “Web based Environmental Education” to the school students. Similar programme was also organized in Tanjavur.



Coastal Cleanup Day

Every September 16th is being observed as “Coastal Cleanup Day.” UNEP-South Asian Cooperative Environmental Programme (SACEP) along with Coast guard, Department of Environment, NIOT and Loyola

College have jointly organized an “International coastal clean up day” on September 16 at Chennai. Nearly 3000 people participated to clean the coastal stretch between Marina beach to Mahabalipuram. About 18 tonnes of garbage was cleared from Marina beach. Loyola college has won the overall trophy for their participation in the Coastal cleaning.

Weblinks on Coastal Resources

Department of Ocean Development	www.dod.nic.in
Aquaculture Authority	www.aquaculture.tn.nic.in
Institute of Ocean Management	www.iomenviis.nic.in
National Institute of Ocean Technology	www.niot.res.in
Centre of Advanced study in Marine Biology	www.casmbenviis.nic.in
Marine Products Export Development Authority	www.mpeda.com
Environmental Appraisal	www.envfor.nic.in/divisions/iass/quest/questi2.pdf
Reef India	www.reefindia.org

ENVIS Team

Thiru K.S. Neelakantan, I.F.S., Director	Thiru K.S.S.V.P. Reddy, I.F.S., Additional Director	Dr. C. Thomson Jacob Senior Programme Officer	
Mr. K.P. Raghuram Programme Officer	Mr. J.D. Marcus Knight Information Officer	Mr. K. Gopinath Web Designer	Ms. T. Indra Devi I.T. Assistant

Editorial Board: Editor-in-chief: Thiru K.S. Neelakantan, IFS., Director, Editor: Thiru K.S.S.V.P. Reddy, IFS., Associate Editor: Dr. C. Thomson Jacob Layout: K. P. Raghuram. Photos: K. P. Raghuram Printed at Nagaraj & Co., Chennai-41

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