

SYNOPSIS

“COASTAL MANAGEMENT IN NAGAPATTINAM DISTRICT USING GEO-SPATIAL TECHNOLOGY”

The coastal area is region where interaction of the sea and land processes occurs. Both the terms coast and coastal are often used to describe a geographic location or region. The coast, also known as the coastline or seashore, is the area where land meets the sea or ocean, or a line that forms the boundary between the land and the ocean or a lake. Precise line that can be called a coastline cannot be determined due to the Coastline paradox. While many scientific experts might agree on a common definition of the term "coast", the delineation of the extents of a coast differ according to jurisdiction, with many scientific and government authorities in various countries differing for economic and social policy reasons.

Importance of the Coast

The coast is of crucial social, economic and ecological significance. World's population lives within 60 kilometers of the coast. While the coastline is the primary location focus for human settlement, the World Coastal Conference (1993) considered the 'coastal zone', as an area, to cover less than 15% of the Earth's land surface. Coastal locations are required or preferred for many activities, and coasts can support multiple-uses although individual activities often occur in competition and conflict with others or to their total exclusion of others. The use and demand for coastal resources have both extended and intensified, giving rise to concerns over environmental degradation including shoreline erosion and sea defense, habitat loss. Pollution and reduction of biodiversity. Increasingly, such problems are seen within the context of a future, accelerated rise in sea level due to global warming and uncertainty over how individual coastlines will respond.

The Nagapattinam district coastline over 181 kilometers and supports over 50per cent of Nagapattinam richest and most sensitive ecological areas. Population studies show an increasing trend toward large scale urbanization with Nagapattinam cities located directly on the coast or within easy reach. This brings further population pressure to bear on many coastal areas. Tourism and recreation are now among the most potent threats to environmental conservation. The United Nations Environment Programme, for example, has

predicted that from 1984 to 2000 Mediterranean coastal tourism development and associated infrastructure will have increased by 80 per cent (Brinkhorst, 1991). Tourism is only the most recent activity to exploit coastal resources. The principal issue for the European coastline is whether the current and future level of exploitation of the coast can be sustained without the continued degradation of the environment.

Current environmental management supports the concept of ecologically sustainable development as the goal of economic and environmental policies. The underlying theory recognizes the dependence of economic development on the effective management of natural resources and the maintenance of sustainable yield from ecosystems. It implicitly recognizes that long-term growth in economic welfare per capita is only feasible if economic growth and environmental. The protection, maintenance, enhancement and restoration of ecological values at the coast are complex challenges for sustainability because the economic and environmental systems involved cut across international, national, regional and local levels of administration. Meeting the objectives and criteria of ecologically sustainable coastal development can only be achieved following a high degree of coordination among the various levels of government and the many agencies involved, within a national framework. Traditional sectoral approaches to managing resources, activities and development in coastal areas are inadequate because while numerous laws and regulations consider coastal issues, explicit policies for managing the coastal environment are generally absent at national level.

Coastal Rescores

Coastal plains are flat, low-lying areas adjacent to coastlines. They may be separated from surrounding areas by hills or mountains, or they may transition gradually into higher ground. Partly because they were underwater at some time in the past, they are often areas of rich, fertile soil as well as repositories of important natural resources. They may support forests, and because of sediment that has been deposited there, can be rich in minerals. The plains along the Coast in the Nagapattinam s are an important repository for natural gas and other fossil fuels.

Coastal resources management includes a wide array of management practices such as: landuse planning inspection and control of adherence to decisions; solution of land tenure issues. settling of water rights; issuing of concessions for plant, animal and mineral

extraction (e.g. wood and National Action Plan for Agriculture (NAPA).Coastal Resources Management non-wood forest products, fishery resources, hunting, peat); and safeguarding the rights of different interest groups (e.g. traditional and indigenous people, women). Coastal area management is too complex to be handled by traditional sectoral planning and management.

Coastal resources and coastal ecosystems are vital to the health and well-being of the Nagapattinam people. Fisheries, coral reef, sea grasses and mangroves, provide both direct and indirect benefits in coastal communities in the Nagapattinam and their proper management brings benefits to the entire state. Unfortunately, poor planning coupled with uncontrolled use of coastal resources has resulted in significant degradation of the health and integrity of the coastal environment as well as the benefits derived by humans. With the primary mandate for coastal resource management (CRM) devolved to local government, coastal municipalities, cities, and provinces must take immediate and decisive action to stop the degradation of these life-giving resources and invest in their rehabilitation for food security, economic development, and the overall well-being of the Tamilnadu state people.

The total geographical area of the Nagapattinam district is 2212.87 square kilometers and the headquarters of this district is Nagapattinam. Which is divided into two division,namely,Nagapattinam division, Mayiladuthurai divison.and eight taluks namely, Nagapattinam, Kilvelur, Thirukkuvalai, Vedaranyam, Mayiladuthurai, Tharangambadi, Kuttalam, Sirkazhi administratively Nagapattinam district has 11 block and revenue villages 523.the district area represent just 2.09 % of the area of the Tamilnadu state. The district experiences subtropical climate with moderate temperature. Respondents in percentages the udomthenticchromusterts soil (10.72%), mixed typicustipsammants soil (39.72%), mixedtypicustipsammantssoil-1 (9.22%), water body (6.80%) the important soil types of the district. Drainage is an important aspect for regional development. The Nagapattinam district study area is drained by Kollidam and Cauvery in the north, virasolanar, uppanar in the central part. The total population of Nagapattinam district as per 2011 is 16, 16,450. The population density/km² of Nagapattinam district for 2011 is 629 people per sq. Km. Average literacy rate are 74.43 per cent.

Objective of the study

The study aims to drawing up an Integrated Coastal resource Management (CRM) For Nagapattinam coast so as to be able to manage and develop its coastal resource in a Sustainable manner by having the following objectives:

- To examine the spatial distribution of Coastal resource in Nagapattinam District.
- To assess the deviations in coastline along the Nagapattinam District from the year (1971, 1990.2000, 2010, 2017) using the Landsat Imagery.
- To examine the spatial variation of groundwater quality during the Pre monsoon and Post monsoon period of analysis in water quality index.
- To analyze the socio-economic status of the marine fisherfolk of Nagapattinam coast.
- The classify Nagapattinam coast fish production.
- A coastal landuse & land cover recourses in Nagapattinam district.
- To analyse the various problems involved in Coastal Management.

Source of Information and Data Base

The main sources of data were based on secondary data available at Tamilnadu Government marine Fisherfolk located at Chennai city. (I) District Census Handbook of Nagapattinam districts. (ii) Socio-Economic Review and District Statistical Abstract of Nagapattinam districts. The data collection is attempted at various levels. (iii) To analysis and interpretation of optical remote sensing data (Landsat) for shoreline change mapping and statistical techniques for shoreline change rate over. (iv) To trace out is there any the interactive relationship between sea level changes and shoreline change.

Primary Data

The collection of primary data includes the particulars related to sex, age, income, family size, marital status, education, occupation, awareness and prevention of fisherman life style, Socio-Economic, Fishing activities, Awareness about women salt help group. The data collection is based on stratified random sampling. The primary data collection was collected with the help of a 208 questionnaires directly from the respondents comprising both in-fisherman and woman sales fishers who reported at the coastal area during the period of data collection. The method of direct observation was also used as a tool for data collection.

Secondary Data

The secondary data is collected from the following sources

- I). District Census Handbook of Nagapattinam districts (2010).
- II).Groundwater quality different year (2005 and 2015). During State ground and surface water resources data centre, Tharamani, Chennai.
- Iii). The present study emphases on assessing the deviations in coastline along the Nagapattinam District from the year 1971 to 2017.using the (Landsat Imagery).
- Iv). Socio-Economic Review and District Statistical Abstract of Nagappattinam districts.
- V).Department of Fisheries, Government of Nagapattinam, Tamilnadu. Besides these, information regarding the proposed study is taken from various reports and journals.

Techniques used

Shoreline change and environmental conditions of an area have a direct impact on the existing spatial pattern of Digital Shoreline Analysis System conditions. (1).The present study emphases on assessing the deviations in coastline along the Nagapattinam District from the year 1971 to 2017. (2).Delineation of shoreline for the year 1971, 1981, 1991, 2001 and 2017 using the Landsat Imagery.(3).Analysis and Estimating the erosion and accretion along the study area with various parameters like EPR, NSM and WLR.Plotting the study area which is undergoing the maximum accretion and erosion.

Socio- economic and cultural living factor of fisher folk in Nagapattinam district .Socio cultural life understanding with reference to spatial distribution, age and sex-wise, education, the study analyse the ecological structure of Socio- economic with help of the

application of multivariate statistical technique known as „factor analysis“ at different levels.

The factor analysis is also performed subsequently to measure and analyse the impact of Socio cultural. Factor analysis was also employed for the following multivariate tables of different nature generated from the primary data survey.

The cluster analysis, a grouping procedure is performed for the above analysis to identify the respective clusters. Cluster analysis is the most appropriate procedure used to determine the different classification of Socio- economic unit in relation to the selected variables pertaining to the disease ecological structure, types and socio-economic determinants.

The inter relationship between Coastal Resources parameters and variables such as frequency, nature of fisherman life and health man power were also studied. Major dimensions are fisherman life extracted and cultural life is explained with the help of cartographic tool by way of application of factor scores. Finally a conceptual frame work is derived based on the disease ecological structure, socio-economic and socio cultural determinants of Coastal Resources and social aspects. Deriving such a conceptual frame work suggested a Coastal Resources Management planning to improve the spatio functional organization Coastal Management in Tamil Nadu.

Cartographic tool and computer aided tests using statistical packages were used to analyze the data collected. A multivariate statistical technique-factor analysis was used to identify the major dimensions and to explain the causative association and explanation. The diagrammatic representation and statistical are analysed from Microsoft Excel and SPSS package. The Maps were drawn with the help of ARC GIS – 10.1, ERDAS 9.1, Soft ware.

Scope of the Study

The identification of coastal resource factors of the study area in relation to the coastal highlights the association below socio economic and cultural environment condition. Coastal resource changes stress and their particular characteristics and requirements should be planned and managed in combination.

In addition it also helps to provide the coastal Management Shoreline change and groundwater quality based on various parameters and to identify facing quality degradation

and its reasons. An economic and social benefit evaluation and public participation form important component of coastal area management. Conservation is an important goal in sustainable coastal development. Multi-sect oral approaches are essential to the sustainable use of resources as they involve multi-sect oral interactions.

A coastal programme includes several types of resources and environments as well as the interests of the various economic sectors that are stakeholders in coastal resources. More over the observation and recommendations of this study will be useful for the purpose of planning in the field of Coastal Resource Management and for implementation in a successful manner.

Analysis and Result

The foregoing in fronting there higher on the varied dimensions of physical, demographic and infrastructural profile of the study area. It has also been noticed that the study area depends more upon coastal resource management, Fishermen's socio- economic and cultural living and agricultural activities. However, nearly half of the total population concentrated in various urban growths and the functional character of urban centers is Nagapattinam district.

The result from the analysis suggests that North, Central part of the shoreline is undergoing erosion and Southern part coast shows stable and accreting feedback. The study based on during periods decades (1971-1990, 1990-2000, 2000-2010 & 2010-2017) highlights the shoreline is very dynamic and movement of the erosion and accretion is varied based on natural pattern. The result (Tab. 3.2) shown there is from 1971 to 1990 shoreline is accreting at 14 m, 1990 to 2000 shoreline is erosion at 9m, 2000 – 2010 shoreline is stable (-0.082m) and finally the present period recession rate is 2.48 m. The Nagapattinam shoreline is modified based on the natural forces acting on the coast and increased cyclonic frequency.

The ground water is exists in the pore spaces and fractures in rock and sediment beneath the earth's surface. It originates as rainfall or snow, and then moves through the soil into the groundwater system, where it eventually makes its way back to surface stream, lakes, or oceans. It is naturally replenished from above, as surface water from precipitation, streams and rivers infiltrates into the ground. Some water underlies the earth's surface

everywhere, beneath hills, mountains, plains and deserts. It is not always accessible or fresh enough for use without treatment and it is sometimes difficult to locate or to measure and describe. This water may occur close to the land surface, as in a marsh, or it may lay many hundreds of feet below the surface, as in some arid areas. Water at very shallow depths might be just a few hours old: at moderate depth, it may be 100 years old: at great depth or after having flowed long distances from places of entry, water may be several thousands of years old. Groundwater is stored in and moves slowly through moderately to highly permeable rocks called aquifers. The word aquifer comes from the two Latin words, aqua for water and ferry to bear or carry. Aquifers literally carry water underground. An aquifer may be allayer of gravel or sand, layer of sandstone or cavernous limestone, the base of lava flows or even large body of massive rock, such as fractured granite that the sizable openings. In terms of storage at any one instant in time, groundwater is the largest single supply of fresh water available for use by humans.

Coastal Land use change has become an important component in current strategies for managing coastal resources and monitoring its environmental changes. Coastal zones are subjected to dynamic environment or account of the alteration process injected by the human development and natural disaster, it is essential to assess land use / Land cover changes to improve management strategies. An attempt is made to study the changes in land use occurred along the Nagapattinam coast. Remotely Sensed products have advanced technology to detect various products at wide band of spectrum, from multi-spectral to hyper spectral. IRS, Resource Sat-1 and Landsat – (8 OLI) satellite imageries in the scale of 1:50000 were available, respectively for the years 2011 and 2019 and were interpreted visually for land use and were categorized according to NRSA land use classification. Ground truth observations were also made to ascertain the accuracy of the classification.

Agricultural lands were mostly located in the region with 0-7 m of altitude. But many people preferred residing in coastal area. The lands converted to built-up area agricultural, forest, barren land especially densely populated coastal regions. This conversion especially occurred in built-up in rural areas because of mass migration to the cities. These lands are usually filled with alluvial plains by coastal floods, and sand in the bank of streams. The beach in barren land classes is expanded by filling materials; these regions increase 3.55 per cent deposit in different places in 2011 and 2019. Are conversions

to build up land class from all kinds of lands, the conversion from barren land is relatively less. A with the increase in population, Nagapattinam, Vellankanni and Vedaraniyam town are enlarged by the conversion of neighbouring agriculture areas to in residential areas. Similarly, because of the structuring pressure on river bank regions and coastal areas, small amount of barren land in those areas are converted in to residential areas. The mudflat areas conversion in to aquaculture ponds is originated from filling the coastal areas. The Built-up area has increased 3.72% to 7.41% due to increase in developmental activity along the coastal region. The forest decreases from 13.38% to 12.22% in short-span became of government policies. The fallow land had decreased sharply from 30.38% to 25.33% and water bodies in craned reduced from 9.58% to 14.48%. The analysis of the Landuse and Land cover maps of the year 2011 & 2019 reveals that built-up area has nearly doubled from 39.6 to 78.9 sq.km. Water bodies in the Nagapattinam show the highest increase, area-wise up to 52 sq.km in short – span. The reduction of the features is found in agriculture, forest and Wasteland, with highest is noted in fallow land with 60 sq.km, agriculture land with 20 sq.km and forest with 12 sq.km. The land use changes were derived using intersection analysis. The reasons for these changes were identified and discussed.

Fisheries play a role of great significance, as fishes are deeply rooted in history, literature, culture and socio-economic aspects in Tamilnadu. Tamilnadu develop a natural affinity for fish an affinity they proudly and justifiably relish and cherish. Fishes are an integral part of our folklore, apart from providing an easily digestible source of the most nutritionally rich animal protein. As a result, the aim of the fishery department is not only to increase production of fish but also to provide rural employment for eradication of poverty and improvement of socio-economic condition of the poor fishermen. The total Nagapattinam fish production of around 1 lakhs tonnes in 2015-16 is estimated to contribute 60 crores to the State. The per capita productivity of a fisherman works out to 9000 to 80000. The per capita consumption of fish improved from 8900 kgs in 2009-10 to 8.9 kgs in 2015-16, the demand for fish increased due to a change in the consumption pattern of the growing population in the State. Of the total fish production, the marine fish production shared 71 per cent and local 29 per cent during 2013-14. The total fish production marginally went up from 5.71 tonnes in 2013-14 to 5.97 tonnes in 2015-16. Of this, marine fish production rose from 4.01 tonnes to 4.25 tonnes, the increase being 5.98 per cent. Likewise, the inland fish

production also marginally improved from 1.70 tonnes to 1.72 tonnes in the respective years. The fisheries sector has been recognized as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food, at the same time it is an instrument of livelihood for a large section of economically backward population of the country. The employment trend in fishery sector.

The factor analysis has come out with 9 major dimensions and these were identified with a total variance of 73.64 percent. They are Socio-Cultural economic Life and Cultural and Fishing Drinking Water, Drinking Type and Cultural Status, Fisher in Health Status, Fishers Environmental Based on Health Status, Fishers Family Type, Social and Health Status, Fishermen Professional and Status, and cultural and economic activities. The variables loaded in each dimension determined the significance of the characteristics of these variables.

The result observed from this study may be useful for identifying the causal relationship with the application of a suitable multivariate statically technique, the factor analysis which not only identified the but also identified the most important variable that explained particular dimensions and their significance.

Identification of major dimensions and 4 importance of spatial distribution of socio-economic and cultural life of fisherfolk in Nagapattinam district. forms the vital part of the thesis to explain the importance of the each distribution with reference to selected variables on distribution and also identification of the major dimensions and these are considered to be the need of the hour for improving the socio economic and cultural life of fisherfolk aspects of complete the study.