Coastal Wetland Resources of Central TamilNadu, using India, Remote sensing and GIS

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Abstract:Coastal Zone is most sensitive areas under pressure of modern society being subjected heavily to multiple and often, conflicting activities, impact condition relevant of beaches made up of various internal and external activities happen with three more causes. The Environmental impact activities via natural hazards like erosion, high wave action, unbalance of the ecosystem of mangrove plants with forest, the resources are threatened by human activities and also greatly affects ecological balances. A study of coastal wetland of Vedaranniyam coastal sector, through remote sensing and GIS was made in mangroves resources using IRS IC LISS III data 1997 and 1998 with scale of 1:50,000. From the study an attempt has been decipher the causes of qualitative and quantitative made to degradation of mangroves of central TamilNadu coastal sector.

*Keywords***:** Mangrove forest and plants, environmental impact assessment, risk zone models, Remote sensing high resolution data, socio-economic factors and Integration of GIS.

INTRODUCTION

Coastal zone resources are important for the development of any country. Wetlands are defined as those areas where uplands and water areas overlap to create unique Environment. These are generally concentred in some coastal areas. These are a specific type of ecosystems ecosystems and transitional between terrestrial and aquatic systems. Coastal wetlands are tidally flooded and drained by ocean water. These have three characteristic namely 1) hydrological conditions 2) Hydrologic soil and 3) hydro physics and 4) vegetation. The mangrove habitat map has been used for three general management applications; resources inventory of aquaculture sites. By the Remote sensing data processing techniques that have been used are reviewed in light of the descriptive resolution and accuracy achieved. The paper provides an overview of the use of the remote sensing in coastal wetlands resources included mangrove resources and management. The techniques that have been used for the mapping of change diction of coastal wetland of vedaranniyam coastal sector, southern coast of TamilNadu.

Study area

The study area is located in the central part of the coast of TamilNadu and it covers an area of 680 sq km comprising part of Nagaipattinam, Thiruvaur and Thanjauvr District, The area lie between 10˚ 20' N to 10˚25N latitudes and 79˚ 25' E to 79˚55'E longitudes.It between the palk strait in the east, the land area in the north and west, the Bay of Bengal in the east and Indian ocean in the south. The physiographic area from river Cauvery, its distributes drain the area forming the deltaic region. The Vedaranniyam salt swamp forms next important natural division. Alluvium and Sedimentary rocks cover the most part of the study area. The alluvium formations occupy much of the coastal belt and the Tertiary directly rests on upper. Gondwana formation and landforms of the coast in three categories 1) Uplands/high lands 2)shallow pediments and buried sediments in cuddalore sandstone terrain. The soil of the region is 1) alluvial soil 2) red ferruginous soil or 3)block soil 4) arenaceous soil and kallar soil. The total annual rainfall varies from 1000mm to 1500mm and average temperature above 27 degree. The major population is involved with fishing and other activities.

Objectives

The present studies aim to analysis the coastal resources through inventory and mapping with following objectives:

To evaluate and demarcate the wetland resources of Vedaranniyam coastal Sector using appropriate methods of assessment.

To assesses changes detection of costal wetland of the region through IRC 1C LISS III, in 1970, 1997 & 1998 with scale of 1:50,000 for assessment in environmental degradation of mangroves from the sector.

Integrated all resources theme layer, model through Geographical information System (GIS).

Research Methodology

The arrays of techniques employed to fulfill the above objectives are follows,

A base map with all physical and cultural details has been prepared from the topographical sheets published by the survey of India (SOI) on 1: 50,000 scale. After having set up the objectives of the study primary and secondary base line data have been collected and analyzed in order to understand the existing condition of the study area (profile) in detail as various physical, economic and social attribute as it revels the human relationship between man and resources of the study area. An understanding of such relationship is a path finder to any evaluation for an area to how present status could be preserved, changed or improved 60 village's papers have been referred for bringing socio-economic profile of the study area, apart from the published and unpublished report of different departments. This particular region are dominated the coastal wetland, could be demarcated the mangrove environment, part of Adirampattinam, Muthupettai and kodiakkarai with identifying through toposheets and satellite imagery both IRS IC LSS 111, 1997,1998 and

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1971 SOI for the change variation of coastal wetland. The preliminary and secondary data were collected from the department of forest, Thanjauvar and other data collected from the Muthupet region. Data entry, calculating and analysis.By the preparation different visual and thematic maps integrated though GIS and delineated all point for management of coastal wetland resources of the study area. Recommendation and suggestion for planning and management of the study.

RESULT AND DISCUSSION
Introduction

Weltands are defined as those areas where uplands and water areas overlap to create unique environment. There are generally concerted in some coastal areas. The community based marine resources know as management of particular marine biosphere reserve, including in the living and non-living marine recourses were delimited by Jagannathan et al (1998) and Ramachandran were organized and studied in mangrove environments by using remote sensing and it is high highlighted anothdgy of mangroves. These are a specific type of ecosystems and transitional between terrestrial and aquatic systems. The coastal wetlands are tidally flooded and drained by ocean water. Wetlands contribute to the social, economical and environmental hearth of our community in May ways. Coastal wetlands provide if following. 1) Habitats for aquatic birds and animals 2) Habitats for rare endangered spices 3) Production of fish and shell fish 4) Act as shoreline buffer 5) Provide support for diversity of plants species and Recreation

Coastal wetland of the study area is identified through field investigation and interpretation by survey of India toposheets and satellite imagery with scale of 1:50,000.

The following wetland are identified and analyzed as following
Crop land/cultivation land

Crop land is also known as cultivated land. The crop lands have larger area as western portions, and lesser area in the northern part of the study area. Cultivation areas of 1970 (232.20), 1997 (122.560sqkm) and 1998 (207.500 skim) respectively. Through the time there is an increasing in the crop land. The increase in the crop land in terms of percentage as 16.684, 20.341 and 34.712 respectively. (Table 1,2,3 &4).

Mudflat:

These are low simple landforms represented by gentle gradient with fine sediments in the from of mud.

Its total area during 1970,1997 and 1998 are 85.95 sqkm,306.64, 245.9 respectively. These are simple landforms represented by gentle gradient with fin sediments in the form of mud. It terms of aerial extent in percentage it is calculated as 18.91 percentages, 50.89 and 41.136 percentages respectively. The areal extent increase from 32.765 percent in 1970 and got reduced in 1997_98,to 9.79 percent. There is a substantial increase from 1970-97 through periods of 23 years. The decrease in areal extent from 1970-98 is due to conversion of mudflat area into saltpan and cultivation land. In same place mudflats are converted into sand suns and marsh areas

Table 1 Wetland Type (Survey of India Toposheets 1974)

Year/Wetland	Area (Km 2)	% of area
Cultivation	232.20	32.747
Mudflat	232.20	36.393
Lagoon	59.50	9.393
Mangroves	49.58	7.770
Sand & Vegetation	3.63	0.568
Scrub forest	62.60	9.811
Salt pan	11.800	1.849
Rivers	**9.800**	**1.536**

Table 2 Wetland Type (Satellite Imagery 1997)

Year/Wetland	Area (Km 2)	% of area
Cultivation	122.560	20.341
Mudflat	306.640	50.891
Lagoon	58.400	9.692
Mangroves	26.450	4.390
Sand & Vegetation	28.800	4.780
Scrub forest	17.950	2.979
Salt pan	27.608	4.44
Rivers	34.131	5.665

Table 3 Wetland Type (Satellite Imagery 1998)

Year/Wetland	Area (Km 2)	% of area
Cultivation	207.500	34.712
Mudflat	245.900	41.136
Lagoon	52.400	8.766
Mangroves	14.910	2.494
Sand & Vegetation	18.040	3.018
Scrub forest	28.600	2.610
Salt pan	32.110	5.372
Rivers	11.310	1.892

Lagoon:

There is no drastic change in the lagoon areas and small variation is possible under normal conditions prevailed.

Mangrove wetland resources:

INTRODUCTION

Mangrove denotes any salt tolerant intertidal tree species. The world is estimated to have about 24 million ha mangrove area spread over 30 countries including island nations. In general, mangrove forest also known as coastal wetland and tidal forest has used great curiosity among scientific community and received greatest amount of attention.Dager (1987) studied overall view of mangrove environments including, plants, its structure, Ecology, and management. He had viewed and delineated the particular mangrove environment. Rao (1990) has Studied Ecology of mangroves and this conservation in certain regional concept. The study given ideal view of Ecological setup the certain region. In 1994, Shaolck Nayak were brought studied the application of remote sensing techniques with mangrove environment with this ecological setup. It is delineated in the genetic plant resources.

Mangrove is defined as characteristic littoral plant formation of tropical and subtropical sheltered countries. Mangroves of madras and Karla states represent only a feeble fraction of Indian Mangroves (less than 0.5 percent) and till now have not evoked much interest among botanist and foresters.

Ecology of mangroves

Mangrove is well established in the tropical coast (marginal ecosystem) that the open sea (or) back water guarding the coast. This is littoral plant formations and represents both fresh water bodies as well as marine bodies. The favorable ecological condition for mangrove. Mangrove grows in tropical and subtropical regions of 38-40 n-s latitude. The most favorable habitat is sheltered coastline. It refers to a coastline protected against wave action with were rise and fall of tidal water. This requirement is provided by 8-30 percent of coastline.

Climate It develops luxuriantly in tropical climate between 25N-25S provided other favorable condition like good rainfall. Moat favorable mean annual temperature is 28 C and it also grows in saline water.

Mangrove Environmental status

In India mangrove are distributed in about 6,740sq.km which constituted 7 percent of the world mangrove and 8 percent of the total costline. Desh much (1991) given description of the site sheeted for the mangrove genetic resource center and Ramachandran (1998), studied application of remote sensing techniques for mangrove is distributed in the Muthupettai estuary. Estuary is a semi coastal body of water. Muthupet estuary is located between 10 20' N-79 30' E. It is about 70km away from Tanjauvar. During Monsoon times its area is 20,000 ha and during summer, its areal extent is 16,000ha. The total area of Muthupet mangrove is 12,080ha, grouped into reserved forest. In this healthy mangrove forest does only 1,885ha comprise 15percent. The degraded Mangrove covers an area of 7180.62ha. At point calimere these form luxuriant forest with huge tress extending over 100,000ha.

Identification of Mangrove

Through the field investigation to identified through thematical constant from survey of India toposheets(SOI) 1970 and satellite imagery 1997 and 1998 with scale of 1:50,000. Community based marine resource management in gust of manner Biosphere reserve studied by Jagannathan(1998). It is observed that the mangrove area during 1970, 1997 and 1998 are 40.7, 27.4 and 14.919 respectively. The represent 10 percent and 25 percent of the area. In muthupettai area along the northern side, mangrove is changed to saline areas and sandy areas. In the eastern side, near Kodiyakkari, these are changed to scrub forest by human activities.

Sand and Vegetation

It includes the areas if spit, beach and sand that are occupied by vegetation. These features are generally noticed along the coastline mainly in part of adirampattinam and kodiyakkari. Through the survey of India toposheets, its extent is 161.510 which include the marshy and sandy areas. Through the satellite imageries (IRS 1C LISS III) is clearly recognized. The extents 28.800 and 18.040 sqkm for 1997-98 respectively. The areal extent had been reduced by 9.76 sqkm and 2.150 percent of the area. It is attributed towards marine action.

Scrub forest

The scrub areas delineated and its aerial extent is 62.06 sqkm, 17.950 sqkm and 28.600 sqkm during 1970-1997 and 1998 respectively. During(1974-98) rapid changes in the scrub forest has observed which has following.

1970-97 there is reduction substantially in the scrub forest area, near adirampatinam; scrub forest area converted into cultivated land Owing to the availability of irrigation facilities. In the 1998 Scrub forest area is scattered in the area of cultivated land. Along the coast near Adirampatinam, in the scrub areas, sand and vegetation are developed. Part of Vedaranniyam, scrub forest areas are reduced and used for saltpan development. These are known as Kodiakadu reserved forest. These are preserved and atlas Game sanctuary.

Saltpan

The next important type of wasteland is saltpan. These are developed near Adiramptinam in the west and Vedaranniyam in the east. In the year 1998, its areal extent is 32.11 sqkm and observed in the Vedaranniyam sector chiefly and also near Adirampattinam. Mudflat area has been converted into saltpan. It is explained towards Urbanization and demant for salt, in the adjoining area, due to increasing Population.

River/lakes/Tanks

The area of river has increased from 1974-97, an account of increased irrigational activity in the form laying canals. In the present condition the river area reduction adversely affected the agricultural area.

Conclusion

Tables 4 have briefly given the overall wetland change Analysis. Wetland is important aspect in the study area. Through the NRSA classification analyzed. Cultivated land and saltpan have shown great changes and mangrove forest was greatly educed Owing to human activities. It is to be stated, that special attention is urgently required towards mangrove category as the

present trend may destroy this valuable resources. This can only protect the coastal wetland and it improves resources in the long run. On other hand, there are negative factors namely increased wasteland and reduction in mangrove forest. These urgently deserved special attention particularly towards mangrove forest. The local people, government and other agencies must work together with good aesthetic sense and protect forest and mangrove areas.

The percent studied after taking into identification of various teeters prefers to give the following recommendation for its developed in future.

Mangrove forest are depleting rapidly by which coastal area wise be having hazards by cyclone and marine action the reform mangrove forest development must be taken seriously and immediately to protect the same. The expansion of wasteland must be reduce on war fooding so that land resources can the develop the people. By the coastal wetland Analysis in the year 1997-98, cultivation (14), mudflat (9.75), Rivers (3.77), Over changed and in the year 1970-98 between changed mangrove (5.28), Scrubforest (7.20), mudlflat (4.74) and saltpan (3.52). The changes constantly in the study area.

Table.4 coastal wetland Resources

S. No	Wetland	1970	1997	1998	%70	%97	%98	%74	%97-98	%70-98
1.	Cultivation	232.20	122.560	207.500	32.747	20.341	34.912	12.406	14.371	1.96
2.	Mudflat	232.20	306.540	245.900	36.40	50.891	41.136	14.49	9.75	4.74
3.	Lagoon	59.50	58.400	52.400	9.40	9.692	8.766	0.29	0.93	0.64
4.	Mangroves	49.58	26.450	14.910	7.770	4.390	2.494	3.38	1.9	5.28
5.	Sand & Vegetation	3.63	28.800	18.040	0.568	4.780	3.018	4.21	1.76	2.46
6.	Scrub forest	62.60	17.950	28.600	9.811	2.979	2.610	6.83	0.37	7.20
7.	Salt pan	11.800	27.608	32.110	1.849	4.44	5.372	2.60	0.93	3.52
8.	Rivers	9.800	34.131	11.310	1.536	5.665	1.892	4.13	3.77	0.35

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Maps