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Assessment of Landcover Dynamics and shoreline changes of Gulf of Mannar Islands through Remote Sensing

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Introduction

Landuse / Landcover change and Shoreline movement caused by erosion and deposition is a major concern for managing the islands and Marine Biodiversity of Gulf of Mannar National Park. Dynamic changes in shoreline location, such as those identified along the Gulf of Mannar National park , poses considerable vulnerability for Marine Biodiversity. Rapid assessment techniques are required to update the shoreline maps of affected islands and monitor rates of change. The study has been carried out to assess the Landuse / Landcover Dynamics and shoreline changes of Gulf of Mannar Islands through Remote Sensing and Toposheet from 1920 to 2014.

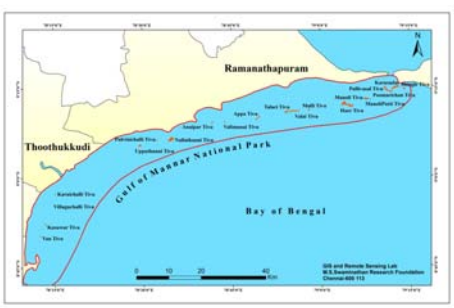
Objectives

- Create Natural Resources (Land cover, Surface water, ground water, soil, slope etc.,) using latest RS images with a focus on preparing Landcover maps.
- Study the temporal changes in land cover dynamics (at 10 year interval. starting from 1990 or date of notification).
- Make recommendations, based on outcomes of objective 1 & 2, for effective management of National Park focusing on redefining zones / boundaries.

Methodology & Study Area

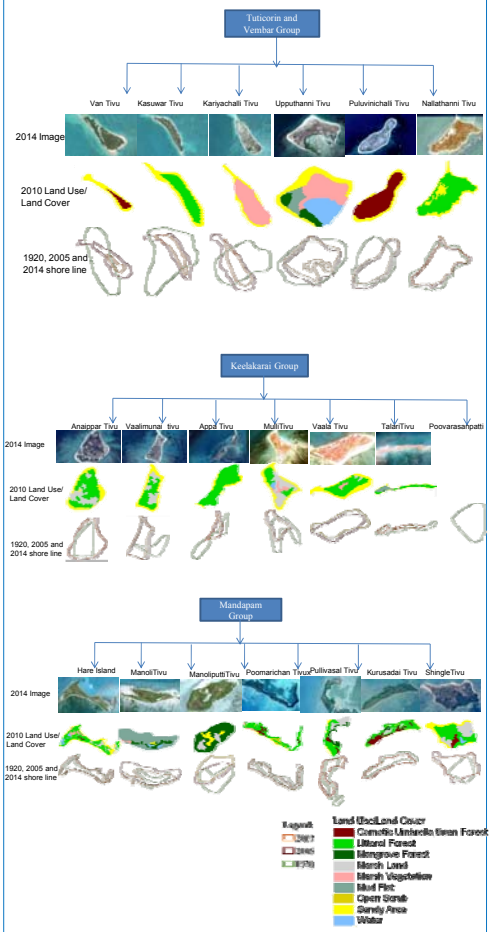
Landcover dynamics and shoreline changes have been studied for the year 1920, 1986, 2005 and 2014. LISS III and LISS IV satellite images were used for the year 2005 and 2014 where as SOI Toposheet was used for the year 1920. Information given in G.O. Ms.No.962, Forest and Fisheries, 10th September 1986 was used to analyze the changes for the year 1986. Extensive reconnaissance survey was carried out in all the 21 islands during the year 2013 with the support of Tamil Nadu Forest Department.

Gulf of Mannar Marine National Park (GOMNP) forms the core area of the Gulf of Mannar Biosphere (GOMBR) and is located between latitude 08°47' to 09°15'N and longitude 78°12' to 79°14'E, i.e. the area from Rameswarm to Tuticorin and covers a total area of 560 sq. km. It is declared as National park in 1986 by the Government of India. The National park comprises of 21 islands from Rameswarm to Tutcorin. It is grouped into Tuticorin group, Vembar group, Keelakarai group and Mandapam group



Results

The Study reveals that two islands near Tutcorin harbor namely, Punnaiyadi islands (62.2 ha) and Pandyan Island (51.50ha) has been given to Tuticorin Power plant. It is observed that the Islands in the Tutcorin group are fast shrinking. The Van Island has shrunken from 34.12 ha to 2.8 ha. Whereas Kasuwar Island has shrunken from 58.40 ha to 8.9ha, Kariachalli Island is reduced from 23.49ha to 7.03ha. Villanguchalli Island which was 17.9ha in area in 1920, has now totally disappeared. It is observed that the other groups of islands are also facing same threat; area is slowly decreasing from 1920 to 2014.



Area of Islands and its changes between 1920 and 2014

S.No	Group	Name of the Island	Area in ha. 1920	Area in ha.1986	Area in ha.2005	Area in ha.2014	Variation 1920 and 2014
1	Tutcorin	Van Tivu	34.12	16	9.56	2.8	*-31.32*
2		Kasuwar Island	58.40	19.5	14.61	8.9	*-49.5*
3		Karaichalli Island	23.49	16.46	10.12	7.03	*-16.46*
4		Villaguchalli Island	17.90	0.95	0.06	0.05	*-17.85*
5	Vembar	Upputhanni Island	42.40	29.94	28.08	23.1	*-19.3*
6		Pulvinichalli Island	14.11	6.2	8.3	8.63	*-5.48*
7		Nallathanni Island	140.67	110	109.5	108.8	*-31.87*
8	Keelakarai	Anaipar Island	7.65	11	12	13.5	*+5.85*
9		Valimunai Island	-	6.72	8.95	8.11	*+8.11*
10		Appa Island	38.54	28.63	16.96	16.43	*-22.11*
11		Poovarasanpatti Island (Killinian Par)		100 mX 25 m	-	-	
12		Talari Island		75.15	84.49	87.07	
13		Valai Island	159.33	10.15	8.71	7.85	*-64.41*
14		Mulli Island	20.71	10.2	13.45	13.68	*-7.03*
15	Mandapam	Hare Island(Musal Island)	137.86	129.04	158.75	161.38	*+23.52*
16		Manoli Island		25.9	33.37	35.14	
17		Manoli Putti Island	15.02	2.34	3.96	3.88	*+24*
18		Poomarichan Island	75.59	16.58	46.75	47.84	*-27.75*
19		Pullivasal Island	-	29.95	16.0	19.95	*+19.95*
20		Kurusadai Island	68.09	65.8	69.0	73.5	*+5.41*
21		Shingle Island	9.21	12.69	15.2	17.47	*+8.26*
		Balayamunai Island	4.94				
		Puvarasanshalli Tivu	5.65				

Conclusion

The shoreline and Landcover of the islands are drastically changing because of over harvesting of resources, drudging operations, improper trawling practices, global warming etc. which hampered algal beds, sea grass beds and coral communities. The coral reefs of reserve are fast deteriorating because of erosion and greater silt inflow from mainland, human activities such a lime stone quarrying, coral collections, industrialization, urbanization, pollution, etc. The present rate of degradation, if allowed to continue will result in the total disruption of the sensitive eco system and consequent drastic depletion of the marine wealth and its biodiversity its caution for the community to take necessary research, policy and action or a similar fate may happen to all the islands in the long run.


Sand dunes with carnatic Umbrella thron forest - Anaippar Island


Carnatic Umbrella thron Forest – Nallathanni Tivu


Open Scrub - Puluvinichalli


Mangrove Forest – Poomarichan land


Wild Lemon– Upputhanni Island


Littoral Forest – Shingle Island


Halophytes– Upputhanni island

Acknowledgements & References

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