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Training on lobster and mud crab fattening in Pulicat

NIOT has deployed the first lobster cage unit (with 4 cages) at Pulicat on 14 October, 2005, to study the performance of the newly designed cages, under the project on lobster and mud crab fattening in Pulicat Lake funded by the Department of fisheries, Government of Tamil Nadu. The deployment site was selected after conducting scientific surveys. A team of scientists from NIOT visited Thirumullai Nagar, a fishermen hamlet in Pulicat Lake, to give training in lobster fattening and in deployment of lobster cages to the selected beneficiaries of Self Help Groups. In an interactive session the village head, the beneficiaries and other fishers were briefed on the prospects of lobster and crab fattening at Pulicat. After the interactive session the cages were taken to the site, assembled and deployed by the beneficiaries themselves under the supervision of the NIOT team. Full deployment of cages and pens and stocking of lobster and mud crab will be taken up in the month of January, 2006.

Also, a survey was conducted in the Nagapattinam district of Tamil Nadu, for initiation of programme on sea cage culture of lobsters .

Training in progress at Pulicat

Survey being done in Nagapattinam for intiation of cage culture of lobster

Lobster cages being installed at Pulicat

Instrument / Technique

Liquid Scintillation Counter

Liquid Scintillation Counter is an instrument used to detect radioisotopes that emit low energy β-particles, which is basically an electron that carries a single electrical charge. Some examples of β-emitters that can be detected by liquid scintillation counter are ^{3}H, ^{14}C, ^{32}P, ^{33}P, ^{35}S, ^{45}Ca, and ^{125}I.

In general, Liquid Scintillation Counter senses light flashes from the radioisotope and converts this energy to voltages that are proportional to the intensity of the light flash. It sorts through these voltages and puts them into energy ranges and counts the number of voltages in each energy category.

Commercial liquid scintillation counter contains the following components such as (1) a Sample Chamber, where the sample vial is placed in a chamber that is completely closed off to outside light so that flashes of light from the sample can be detected, (2) Light Detector System that senses the light flashes, converts them to voltage, and amplifies them, (3) Amplification System that intensifies the detection, (4) Analyzing System that determines the pulse intensity/height and (5) a Scalar System that counts the electrical impulses over a certain time interval.

Liquid Scintillation Counter

Liquid scintillation counter can be used to detect radioisotopes in any liquid sample and is extremely sensitive, and can detect radioactivity below the detection limits of traditional Geiger Counters. NIOT has installed the equipment and has been utilizing for studies related to lobster and mudcrab research programmes.

Popular Article

GIS based mapping of Tsunami induced Land Use / Cover change in Nancowry group of Islands, Andaman and Nicobar Islands

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26th December 2004 became an unforgettable day for the people of Indian Ocean bordering countries when a tsunami of devastating scale ambushed the coastal people of almost 11 countries leaving more than 200,000 human beings dead and millions of people homeless. The tsunami, which is very uncommon in the Indian Ocean region, was actually triggered by a mega earthquake of 9.0 magnitude off the northwest coast of Sumatra in Indonesia with its epicenter at 3.32°N, 95.85°E. According to USGS, the earthquake occurred along the plate boundary marked by subduction zone between the Indian plate and the Burmese micro-plate when the former subducted beneath the later along a mega thrust about 1000 km long from NW Sumatra to Andaman causing sudden uplift of the Southeast Asian block by 10-12m. This raised the overlying ocean, so that there was briefly a hill of water overlying the rupture of about 1000km x 50km. The flow of water downward from this hill triggered a series of very long wavelength ocean waves that were capable of traversing the entire Indian Ocean.

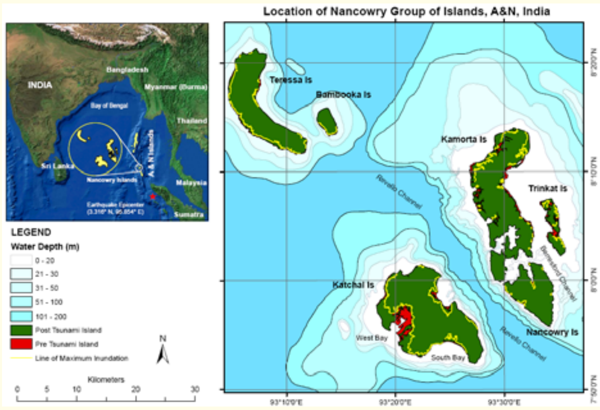

Fig.-1 Location map of Nancowry group of Islands showing Pre- and post-tsunami island area, line of maximum inundation and their coastal bathymetry.

In the Indian region, Andaman and Nicobar group of islands due to is close proximity to the epicenter of the earthquake, suffered maximum damage in terms of loss of human life and livelihood as well as loss of coastal vegetation and animal habitats. Again, among the A&N islands the islands of Nancowry group and Car Nicobar suffered maximum loss owing to their low relief and low-lying coastal areas. The Nancowry group of islands constitutes the inhabited islands of Teressa, Chowra, Bambooka, Katchal, Kamorta, Trinket and Nancowry which lie between Little Nicobar and Car Nicobar islands (Fig-1).

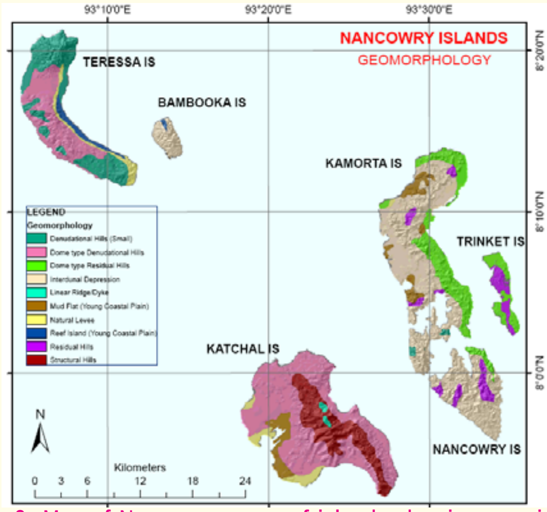

Fig.-2 Map of Nancowry group of islands showing prominent Geomorphological features (Source: Geological Survey of India)

These islands are characterized by extensive grass lands with coco palms and pandani growing in the interior except Katchal island, which is mostly covered with Andaman evergreen forests. Denudational hills, interdunal depressions with occasional residual hills made up of serpentine form the governing of this island group except Katchal island which has a prominent structural hill at its interior (Fig-2). The bed rock of these islands is covered by plastic white or yellowish clay and clay marl with intervening bed of quartz sandstone formed by disintegration of the Plutonic rocks, whose upheaval in two successive stages brought the Nicobar into existence. The western parts of these islands are low in relief as compared to the eastern parts and are having extensive mud flats covered with high density mangroves, mainly *Rhizophora* species. The coastal areas of these islands are classified under CRZ (Coastal Regulation Zone) IV category.

These islands suffered maximum loss in terms of their land and vegetation loss due to 26th December tsunami. Table-1 summarizes the lives and land loss in the Nancowry group of islands. In this article an attempt has been made to assess the vegetation loss due to tsunami in these islands using satellite remote sensing and GIS techniques. IRS P6 LISS 3 multi-spectral digital data (images) with spatial resolution of 23.5m covering Nancowry group of islands were

Table -1. Summary of lives and land loss in the Nancowry group of islands (A&N)

Islands	Population (2001 Census)	Pre-tsunami Area# (Sq. Km)	Post-tsunami Area# (Sq. Km)	% Loss in Area	Lives Lost: Human	Lives Lost: Dead Identified	No. of Injured	No. of Missing
Teressa	2026	101.26	97.64	3.6	45	45	0	6
Bambooka	55	13.46	12.82	4.8	10	10	38	0
Katchal	5312	174.30	160.73	7.8	354	1	1	4310
Kamorta	3412	188.03	176.38	6.2	50	1	144	285
Trinket	432	36.26	29.25	19.4	1	1	192	90
Nancowry	927	66.82	65.60	1.8	0	0	24	2

Note: # -The pre-tsunami and post-tsunami areas have been calculated based on GIS mapping of LISS 3 satellite data of 27th Feb 2004, 4th Jan 2005 and 15th March 2005. (Source: A & N Administration Daily Report dated 9th March 2005) acquired for pre-tsunami (27th February 2004) as well as post-tsunami (4th January and 15th March 2005) dates. The images

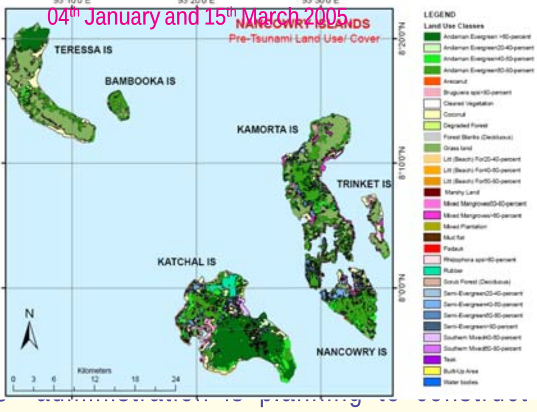

Fig.-3 Pre-Tsunami land use/ cover map of Nancowry group of Islands, as derived from IRS P6 LISS 3 satellite data acquired on 27th February 2004.

were then analyzed and processed using ERDAS-Imagine (ver. 8.5) following standard image processing procedures. The pre-tsunami image was geo-referenced with respect to Survey of India toposheets of 1:25,000 scales and subsequently, precise image-to-image registration was achieved between pre- and post-tsunami images by way of selecting about 30 ground control points (GCPs) in a second order polynomial equation with the RMS error below 0.1. After proper normalization procedures, the images were classified for various land use/ cover classes as per the standard NRIS (Natural Resource Information System) Level-4 classificatior scheme using methods like Principal component analysis supervised classification and NDVI (Normalized Difference Vegetation Index) ratios. Finally, the classified images were brought to ArcGIS 9.0 as layers and subsequent analysis tool place. The raster classes were transformed into vector classes and the required area statistics were calculated through suitable methods. **Fig.-3 and Fig.-4** shows the pre- and post tsunami land use/ cover of these islands and **Table-2** summarizes the changes in area as well as percentage changes in broad land use/ cover classes. These figures clearly show that the coastal vegetation like mangroves, littoral forests and coconut plantations are highly damaged due to their physical removal by the strong tsunami waves. The figures also show that more than 4000 Ha of coastal land has been cleared of any vegetation indicating the wrath of the tsunami. It is believed that mangroves create favorable environment for coral reefs to grow by filtering out terrestrial sediments from the surface runoff through their stilt roots. With almost 64% of mangrove vegetation being cleared due to tsunami, it can now pose a threat to the coral reef ecosystems in these islands. Though there is a fair possibility that the lost mangroves will regenerate in due course as these islands are less disturbed by anthropogenic activities, it is highly essential to ensure that the process is faster and this can be achieved through proper management practices like mangrove plantation and covering the bare soil with vegetation.

A&N Centre for Ocean Science and Technology (ANCOST), a field unit of NIOT at Port Blair, is engaged in assessing post-tsunami changes in the A&N group of islands through extensive field surveys and measurements. Though the Nancowry group of islands was almost inaccessible for months together after the devastating tsunami, a group of scientists and technicians could visit the islands in the month of April 2005 and they assessed the damage to the vegetation as well as the extent of inundation in the islands. A few DGPS readings were recorded at selected locations to mark the line of inundation and to cross-check the land use/ cover classifications. The information given in this article are

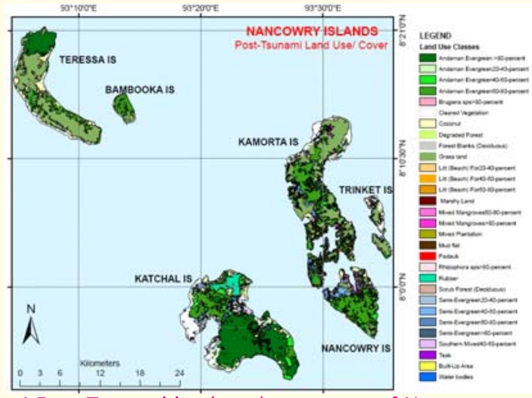

Fig.-4 Post-Tsunami land use/ cover map of Nancowry group of Islands, as derived from IRS P6 LISS 3 satellite data acquired on 04th January and 15th March 2005.

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permanent settlements in these islands. In this regard, it was felt that the locations for the new settlements must be scientifically selected in order to have a safe and secure place for the people to live in. Thus, GIS model was developed using ArcGIS 3D Analyst and Spatial Analyst extensions for site suitability for post-tsunami settlements. It was observed that the island is subsided by at least 2 – 2.5 meters due to the

Table -2. Tsunami induced land use/ cover changes in the Nancowry group of Islands

Land Use/ Cover Classes	Pre Tsunami Area (Ha)	Post Tsunami Area (Ha)	Change in Area (Ha)	% Change In Area
Andaman Evergreen Forest	25570.5	23908.0	1662.5	6.50
Semi Evergreen Forest	3594.3	3023.5	570.8	15.88
Scrub Forest (Deciduous)	928.0	758.0	170.1	18.33
Littoral (Beach) Forest	287.0	56.3	230.7	80.39
Mangroves	3853.2	1694.8	2468.7	64.07
Plantations (Coconut, Arecanut etc.)	7865.1	5750.4	3784.6	48.12
Built-Up Area	245.8	211.5	34.3	13.95
Cleared Vegetation	0.0	4305.5	(-)4305.5	-

subduction and subsequent tilting of the south Asian plate under the Burmese plate (as cited in many research papers) and maximum RunUp height in these islands exceeds 8 meters. Thus it is highly recommended that the areas lying below 15m from the MSL are not safe for any settlement.

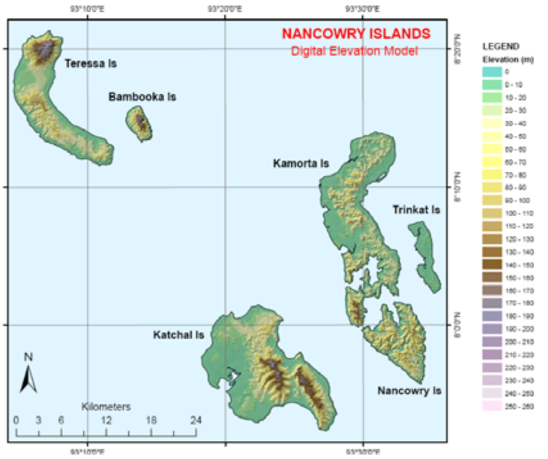

Fig.-5 Digital Elevation Map of Nancowry group of Islands derived from SoI toposheets of 1:25,000 scales with 10m contour interval.

The factors considered for selecting an area for safe settlement include:

1. Elevation of the land should be greater than 15m and less than 200m as the areas beyond 200m height are very steep and inaccessible.
2. Slope of the land should be less than 15 degrees in order to facilitate construction of buildings.
3. The land should be at least 200m away from the High Tide Line (HTL) as per the CRZ-IV regulations and areas between 200m and 500m from the HTL will have restricted activities as per the CRZ regulations.
4. The land should not fall under reserved or protected forests, other dense forests of economic importance and critical habitats like mangroves and beach forests.
5. The land should fall within 1000m from any existing roads or settlements.
6. The area of the land should be at least 2 Ha.

The slope and elevation layers were derived from the Digital Elevation Model (DEM) of these islands prepared using 1:25,000 scale toposheets having 10m contour interval (Fig.-5). Then the areas with elevation value more than 15m but less than 200m and slope value less than 15 degree were selected. Again, the selected areas falling with 200m from the HTL were eliminated using a 200m buffer from the HTL. Again, the selected areas falling within reserved/protected forests, other dense forests and critical habitats were masked. Out of these only those areas were retained for further considerations which fall within 1000m from any existing roads or settlements. Finally, the areas less than 2 Ha were removed from the selection and the final settlement map was prepared. The regions between 200m and 500m from HTL were demarcated as per the CRZ norms for islands which says, "the buildings between 200 and 500 meters from the High Tide Line shall not have more than 2 floors (ground floor and first floor), the total covered area on all floors shall not be more than 50 per cent of the plot size and the total height of construction shall not exceed 9 meters". Fig.-6 shows the location suitability map for post-tsunani settlements in Nancowry group of islands. From this figure it is prominent that Trinket island is no more suitable for any settlement.

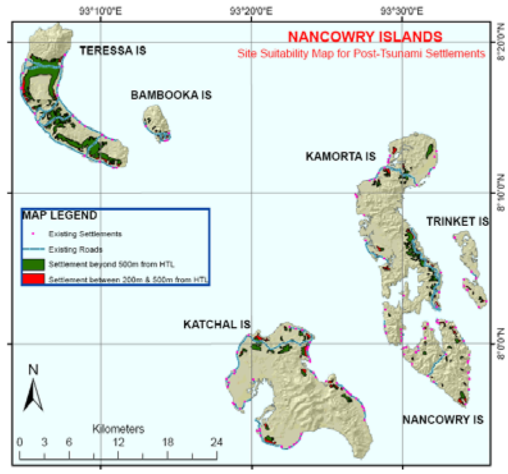

Fig.-6 Location suitability map for Post-tsunami settlements of tsunami affected population in Nancowry group of islands derived through GIS model.

NOTE: (Regions shown in Dark Green colour are suitable for all type of constructions permitted in A&N islands and the regions shown in Red colour are suitable for settlements with CRZ-IV regulations as applicable in A&N islands).

An International conference on

"Recent Advances in Marine Antifouling Technology (RAMAT 2006)"

to be organized by National Institute of Ocean Technology, Chennai, in November 2006

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