Assessment of Coral Reefs in India

Background:

It is an ongoing project sanctioned by the Ministry of Environment & Forests, Government of India in February 2003 with a budget outlay of Rs 42, 83,000/-. The project envisaged remote sensing data based mapping of coral reefs of the four major coral reef sites in India viz., Gulf of Mannar, Gulf of Kutchh, Lakhsadweep and Andaman & Nicobar Islands. The approved work programme includes:

1) Assessment of Coral Reef cover of the following identified Coral Reef areas in the country using remote sensing and preparation of digital maps of all these areas on 1:50,000 scale and preparation of the Coral Reef Atlas:
   i) Andaman & Nicobar Islands
   ii) Lakshadweep Islands
   iii) Gulf of Mannar (Tamil Nadu)
   iv) Gulf of Kutchh (Gujarat)
2) A GIS study for Coral Reefs in Andaman & Nicobar Islands and device monitoring mechanism and tools covering extent of dead and live Coral as well as status of recovery.

Data Input and Methodolgy:

Initial efforts had been directed towards finding suitable satellite data and develop appropriate methodology for coral reef mapping. Satellite data of different sensors were tried for different sites. These included OCM (Ocean Colour Monitor of IRS-P4) data of March, 2003 with a spatial resolution of 360 meter, WiFS (Wide Field Sensor) of IRS-1C of February, 2000 with a spatial resolution of 188 meter, LISS-III data of IRS-1D of January, 2003 with a spatial resolution of 23.5 m meter, merged data of LISS-III and OCM and Landsat (ETM+) data of 2000 with a spatial resolution of 30 meter. High-resolution multispectral data of Quickbird and IKONOS (with spatial resolution of 2.44 meter and 4 meter) are also being procured for parts of Andaman & Nicobar Islands. WiFS and OCM data are not found suitable for coral mapping because of the coarse resolution of these sensors. As corals occur mostly up to 200-300 meters from shore, these data products can not differentiate and map corals properly. While LISS III data was found reasonably good for assessing and mapping barrier and atoll type coral reefs (like in Lakhsadweep), it is not very useful in mapping fringing reefs like those found in A& N Islands because of suppression of the signatures (tone) of corals by sand as coral reefs are very close to shore. Therefore, despite spatial resolution of 23.5 meter of the sensor, it is extremely difficult to delineate fringing reefs correctly using LISS-III data. The merged data of OCM and LISS-III was also not found suitable for coral reef mapping of A&N Islands. They are not separable and mapable accurately on the FCC. Landsat

(ETM+) data was found more suitable for delineation of fringing coral reefs because of presence of blue band in this sensor as the useful signal that is used for remote sensing of coral environment is between 400 nm and 600 nm. Therefore, Landsat (ETM+) data was used to delineate coral reefs of A&N Islands, Gulf of Mannar and Gulf of Kutchh.

The methodology involves downloading of satellite data in digital form to computer followed by geo-rectification. Digital image processing was done using *ERDAS IMAGINE* (version 8.7) software on ***Windows XP platform*** with the ISODATA (Iterative Self-Organizing Data Analysis Technique) algorithm to perform an unsupervised classification which is generally used for classification of corals. This was followed by Ground verification and on screen visual editing was done based on ground information.

Progress:

Delineation of coral reefs has been completed for all the four sites and final maps are under preparation. Maps of A&N Islands will further be refined after the high resolution Quickbird data is procured. Works related to the GIS study on Mahatma Gandhi Marine National Park has also been started. Fig 29 and 30 are examples of coral reef maps.

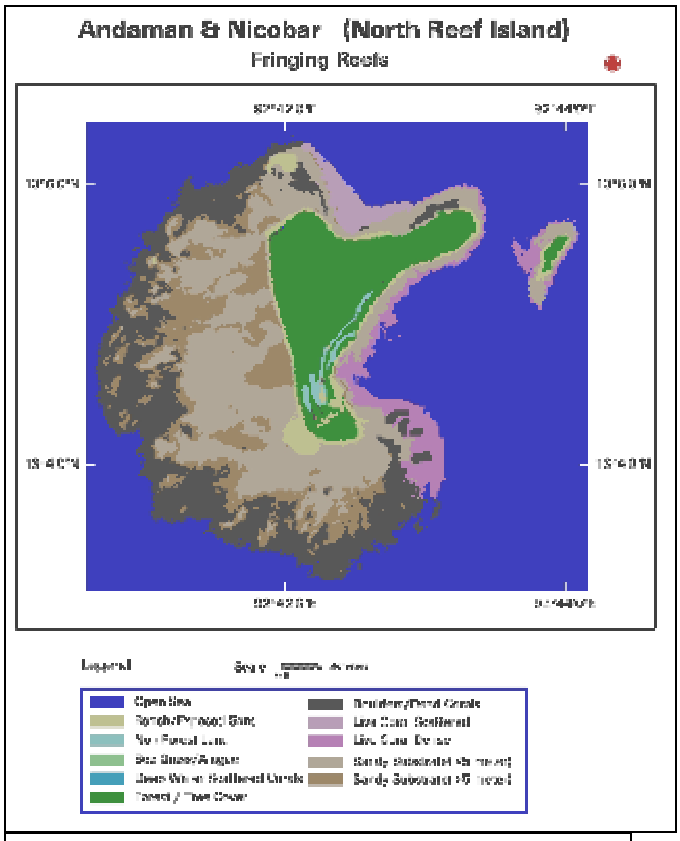

Fig 29 : Coral Reef maps (Fringing Reefs).

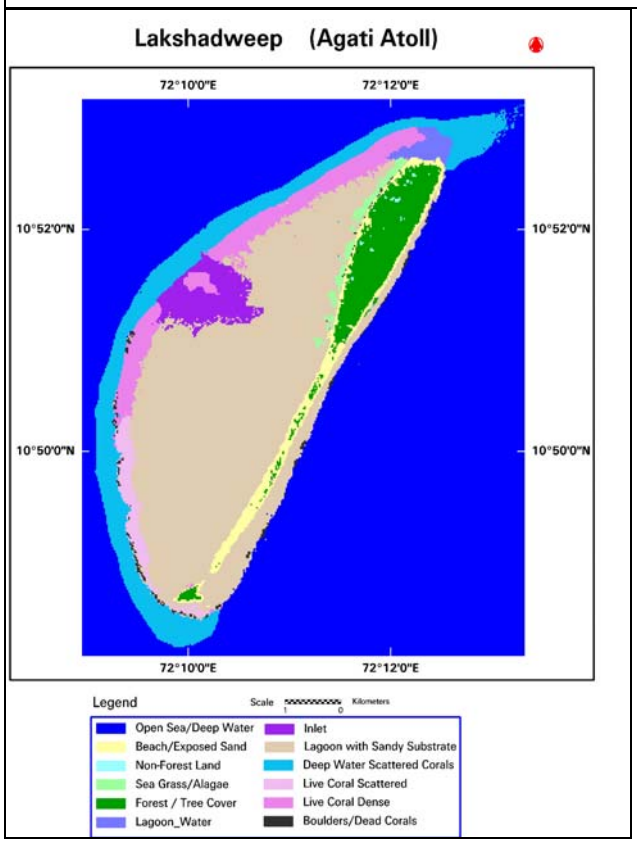

Fig 30: Coral Reef maps.