Paper ID: 10653
oral

EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Applications and Economic Benefits (5)

Author: Ms. Lisa Kuchy
United States, kuchylm@gmail.com

Prof. Santhosh K. Seelan
Department of Space Studies, University of North Dakota, United States, seelan@space.edu

REMOTE SENSING BASED STUDY OF MINING IMPACTED CHANGES IN GOA, INDIA, OVER THREE DECADES

Abstract

Goa, a state on the west coast of India, is known for its mineral wealth, particularly iron ore and manganese, mined through open pits. While the mining industry is a key contributor to the local economy, lack of good management of mining areas with respect to waste accumulated through the mining process has caused problems to the surrounding areas and water ways. As Goa experiences heavy monsoon rains, the excess amount of sediments resulting from mine run off are carried downstream to the estuaries, impacting the marine fauna such as the foraminifers. The land cover too has changed drastically. Only recently measures have been taken to reduce the sediments leaving the mined areas and also reclaim and revitalize the mined land after mining has ceased. In this study, imagery from Landsat and Indian Remote Sensing Satellites for the period 1973 to 2006 were used to study the land cover changes in the mining areas and to understand the impact of the changing land cover on the foraminifers. Classification of land cover categories was done using both maximum likelihood classifier on ERDAS Imagine software, and using object based classification on eCognition software. Change detection was done using the time series data and accuracy assessment was carried out to determine the classification accuracy of both methods of classification. The land cover classification showed that mining trends have moved from South Goa and concentrated in North Goa. Over time, it can be seen that the Mandovi River in the North has the lowest foraminifer numbers because of the excess turbidity from the mine runoff. This is where the mining activities are most concentrated and with the lowest reclamation activities. While South Goa still has mining near the Zuari river many of the mines have been reclaimed and the mining is not as intensive as in the North. The improvement can be seen not only on the land cover maps, but also in the foraminifer counts, which have not decreased as much as the Mandovi catchment basin in the North. There seems to be a correlation between the foraminifer counts and the amount of mining in an area.