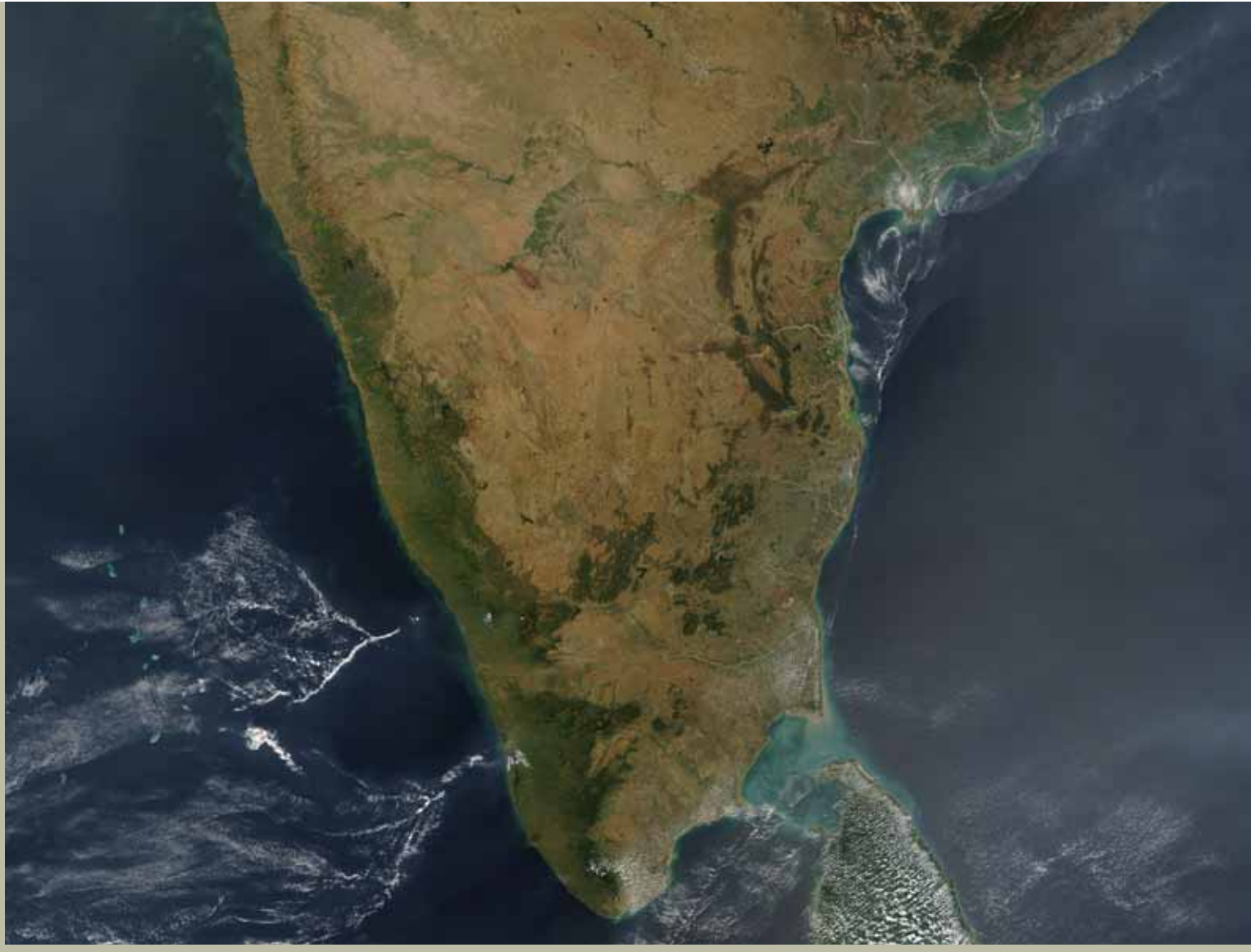

# AIDING CHANGE

## JULIAN SWINDELL EXPLAINS HOW GIS AND REMOTE SENSING ARE AIDING DEVELOPMENT IN SOUTH INDIA

The Indian State of Tamil Nadu entered the international conscience with a roar when it was hit by the Indian Ocean tsunami on Dec 26, 2004. It was a straight assault on a heavily populated coastline which had little if any warning of the approaching wave. Some villages were completely destroyed and all that now remains are new inlets of the sea. Others, seemingly at random, experienced little more than an unusually high tide. A lucky few were protected by a largely neglected natural resource, a fringe of coastal mangrove wetlands. These fragile forests, under threat from development, tourism and agriculture, proved remarkably resistant to the wave's power. It simply petered out amongst the trunks and roots and swamps.

### Value of Biodiversity

The value of mangroves as biodiversity hotspots has long been known but this had done little to encourage their protection by the local populations, who had pressing need for timber, for land and for the fresh water of the rivers which protect the mangroves from the ocean's salt. The clear evidence of the protection provided by the mangroves from the tsunami has brought their preservation and restitution to the forefront of research, now with the strong support of the local populations. The Indian government is planning significant changes to the delineations and management of sensitive coastal zone regions as a direct consequence.

### The Institute

The M. S. Swaminathan Research Foundation (MSSRF) in Chennai, the

**MAIN IMAGE:** Southern India (Image: NASA MODIS - February 2, 2006)
**TOP RIGHT:** New fishing boats by the Mahabalipuram Shore Temple, provided by international donors to replace those lost to the tsunami
**BOTTOM RIGHT:** The Village Knowledge Centre at Veerampatinam, a fishing village which was severely damaged by the tsunami but the population was saved by a warning broadcast from the knowledge centre public address system

capital of Tamil Nadu, has long campaigned for the protection of the mangrove wetlands and in 1996 its GIS laboratory began work on their monitoring and mapping, using satellite remote sensing data provide by the Indian Space Research Organisation (ISRO). This had resulted in the publication in 2001 and 2002, long before the tsunami, of three definitive atlases of mangrove wetlands in Tamil Nadu, Andhra Pradesh and Orissa, covering nearly all of the Indian eastern coastline from Cape Cormorin in the south to the border of West Bengal in the north.

## Remote Sensing and GIS

There are a total of 20,000 ha of mangroves and associated wetlands in the south of Tamil Nadu, with the most important concentrated around the delta of the Cauvery, one of the great sacred rivers of India. Analysis of satellite images over a ten year period showed significant degradation of these wetlands and forests, partly from human clearance, but also from the reduction in fresh water flow from the river, as more and more of its water is used for human activities. The mangrove atlases have now proved an invaluable resource in the preparation of restitution plans. The GIS lab at MSSRF are using ERDAS Imagine software to process the data provided by ISRO to create more detailed land use maps of the mangrove regions and ESRI ArcGIS 9 to map out potential areas for reforestation and restitution, based on ground surveys of soil and water qualities and modelling of the fresh water flows of the rivers. This work is ongoing and is the current major GIS project at MSSRF.

Another important centre for GIS research in Tamil Nadu is at the Institute for Remote Sensing (IRS) in Anna University, the premier engineering university in Tamil Nadu. Again, remote sensing and GIS are seen as two very closely allied technologies and form the core of the Natural Resources Information System (NRIS) for Tamil Nadu State. This will form part of a national spatially referenced database of natural resources, the National Natural Resources Management System (NNRMS).

This is based on 24 thematic layers which are common across the whole of the country. The intention is that all States will create comparable and compatible local databases which can be linked to give a seamless coverage for the whole of India. Data in the NRIS comes from a wide range of sources in addition to satellite remote sensing. These include bore hole reports from geological surveys, well location records with depth and water quality data, hydrology data including location of check damns and percolation ponds which encourage the recharging of aquifers, state cartography for boundaries and the ten yearly national census data for social and demographic information.

## End Product

This spatially referenced database will become accessible for local government use in Tamil Nadu during 2006 and will be used as the basis for developing land and water resource action plans. Initially it will provide information at the equivalent of 1:50,000 mapping at block level, a base areal unit of local government, but it is hoped to increase the resolution down to at least village level if not to individual households. At these levels it is working closely with MSSRF in its Village Knowledge Centre project. In this project, IT equipped Knowledge Centres have been established in about 40 rural villages, linked via hub centres back to MSSRF and the internet.

## Conclusion

These centres provide locally important information to some of the poorest and most disadvantaged members of Indian society. The NRIS will provide them with information about their own land and resources, interpreted into a format most comprehensible to them by MSSRF staff at the local hub centres which support the Village Knowledge Centres. The Village Knowledge Centre project has been running for nearly ten years and the intention is to expand and integrate it with other similar projects to establish ICT based Knowledge Centres in every Indian village by August 2007, the 60th anniversary of Indian independence.

More information:
Anna University, Chennai: www.annaunv.edu
Indian Space Research Organisation: www.isro.org
M. S. Swaminathan Research Foundation, Chennai: www.mssrf.org
National Natural Resources Management System: www.nnrms.gov.in

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