Chandra Giri
SAIC/USGS Earth Resources Observation and Science (EROS) Center

Tropical Mangrove Forests: Global Distributions And Dynamics (1990-2005)

Mangrove forests are declining at an alarming rate--perhaps even more rapidly than inland tropical forests (Aizpuru, 2000; Duke et al., 2007). This decline is occurring even though mangroves provide valuable ecosystem goods and services to ecosystem and society. Our current understanding of the spatial distribution, and rates, patterns, causes and consequences of global mangrove forest cover change is limited (Barbier & Cox, 2003; Macintosh & Ashton, 2002; Wilkie & Fortuna, 2003; MEA, 2006). Previous global land cover initiatives (Loveland et al. 2000, Friedl et al. 2002; Bartholome & Belward, 2005) either did not map or failed to map mangrove forests with sufficient detail. The estimates of Food and Agriculture Organization (FAO) (Wilkie & Fortuna, 2003) and The World Mangrove Atlas (Spalding et al. 1997) are inconsistent across space and time because they rely on a compilation of disparate and often incompatible data sources.

Our proposed research will build on our current NSF-sponsored research on "modeling tsunami effects on mangrove ecosystems and the role they play in saving lives and properties", and USGS Venture Capital Fund research. We will:

1) assess the current and historical distributions of mangrove forests;
2) quantify the rates and patterns of mangrove forest cover change (i.e. deforestation and reforestation) spatially, temporally, and sectorally;
3) identify deforestation "hot spots"; and
4) identify the proximate and underlying causes and consequences of mangrove deforestation; and
5) create a historical change database suitable for projecting future mangrove forest cover change.

Our proposed research directly addresses NASA's Land Cover Land Use Change (LCLUC) key science research focus such as monitoring LCLUC over space and time, identifying causes and consequences of change, and developing the capacity to perform repeated global inventories of land use and land cover from space. The proposal is in response to the second component of the current solicitation that uses Mid-Decadal Global Land Survey (MDGLS), and Geocover data to monitor mangrove forests cover change that has occurred from 1990 to 2005. It also addresses several key research questions outlined in the U. S. Climate Change Science Program, GOFC-GOLD, and the Land Project. The project will deliver:(i) comprehensive methodology to assess and monitor global mangrove forest cover using multi-temporal Landsat satellite data and in-situ measurements; (ii)global mangrove forest cover database for the years 1990, 2000, and 2005; (iii) historical mangrove forest cover change database (1990-2005), (iv) identification of deforestation hot spots, and rates and patterns of change that can be used to project future mangrove forest cover change; (v) identification of the causes and consequences of mangrove forests cover change; and (vi) establishment of distributed information systems for regional access and use by policy makers and coastal managers