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Land use/cover change in the Tam Giang - Cau Hai Lagoon (Central Vietnam) by means of SPOT 5, Aster and Landsat images

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The aim of this work was to quantify the development of aquaculture activities in the Tam Giang - Cau Hai Lagoon (Thua Thien Huè Province TTH, central Vietnam) for the period 1989-2006.

We present and discuss the results of the multitemporal analysis of land use/cover changes occurred in the area and focus on those type of conversions that lead to a loss of agricultural areas and lagoon surface as well. This research was lead in the framework of research project cooperation between the Centre of GeoTechnologies CGT of the University of Siena and the FAO IMOLA (Integrated Management of Lagoon) Huè Project.

The methodology used to accomplish this research was developed in several steps:

- purchasing and georeferencing of 8 sections of the official Vietnamese topographic maps at 1:25,000 scale;
- downloading of Landsat TM and ETM+ multispectral orthorectified images, path/row 125/48-49, acquired on 17/02/1989 and 02/06/2001, from the ESDI Global Land Cover Facility website;
- purchasing of ASTER L1B multispectral images, acquired on 10/05/2000 and 18/08/2000, rectified by using ground control point GCP through polynomial model; - purchasing of SPOT 5 1A multispectral and panchromatic images, K/J 275/317, acquired on 06/05/2006, 08/23/2005 and 09/23/2005, orthorectified using a rigorous model, DTM and GCPs collected by GPS survey.

The second step was the nomenclature characteristics definition and land use/cover map realization by visual interpretation on screen for the period 1989, 2000 and 2006. The extension of the study area is 125,000 hectares and includes all the 34 communes of IMOLA Project interest. The working scale is set at 1:25,000 and the area of the smallest mapping unit defined in 1.56 hectares. The land use/cover hierarchical nomenclature includes four levels made by 5 headings for first level, 11 for the second, 23 for the third and 8 for the fourth. The reference system is the UTM WGS84 zone 48 The database was validated by collecting several check points in two different campaigns. The first was conducted in August 2006 collecting almost 340 check points that were used to help the interpretation of the images. The second was held in July 2007 (71 check points) to validate the results of the visual interpretation.

Results. A recent study carried out by IMOLA demonstrated that the lagoon experienced environment has changed dynamically and the lagoon area has been narrowed by expansion of dense fishing structures (fish corral, fishnet, bottom net, etc.) which causes the decline of aquatic population and productivity as well. By using remote sensing techniques we demonstrate how the lagoon underwent increasing human pressure between 1989 and 2006. Particularly between 2000 and 2006 the lagoon allocated aquaculture area has dramatically increased from 2200 to 4650 hectares, at the same time the lagoon area has been narrowed and rice fields areas has decreased about 3700 hectares.

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