Mapping land cover changes associated with restoration actions to combat desertification in a Mediterranean sylvopastoral landscape

Giuseppe Pulighe (1), Francesco Fava (2), Claudio Zucca (1,2), Salvatore Madrau (1), Massimo D'Angelo (3), and Roberto Scotti (4)

(1) Department of Territorial Engineering, Università degli Studi di Sassari, Italy (gpulighe@uniss.it), (2) NRD, Desertification Research Group, Università degli Studi di Sassari, Italy , (3) Ente Foreste Sardegna, Italy , (4) FS, Nuoro Forestry School, Università degli Studi di Sassari, Italy

The aim of the present study is to assess remote sensing based approaches to observe and quantify the land use/cover changes that occurred, in the last decades, in a sylvopastoral area located in southern Sardinia (Italy), where different restoration actions have been implemented. Specific research questions are: can simple and cost-effective remote sensing technologies be useful for assessing and monitoring different long term restoration actions in this geographic context? Can specific land use/cover transitions and associated spatial indicators provide relevant information to evaluate the success of these actions?

The study area is located in Pula-Pixinamanna (38° 59' N, 8° 54' W). The main ecosystem types are Mediterranean maquis/garrigue, mixed evergreen/Mediterranean woodland, pine forest and recently burned area. This area was strongly affected by land degradation problems mainly associated with overgrazing by domestic animals (until '60s), overexploitation of fuel wood (until '50s) and forest fires. Starting from the late 50s, the area was managed from the regional forest service and most anthropic pressure factors were removed. Moreover, different restoration actions were undertaken, such as cluster and uniform reforestation or "no intervention" as a management choice. The results is a complex landscape mosaic with areas of still high anthropic pressure and areas subjected to different management actions.

To address the research questions and compare the different actions, a set of aerial photographs (1954, 1977, 1995, 2006) and Landsat satellite images have been acquired, orthorectified, and mosaicked. Moreover, a Digital Surface Model (DSM) was obtained from photographs stereo-pairs. Both visual interpretation and object-oriented approaches were performed to classify the images with respect to the land use/cover classes and related spatial indicators assumed to be relevant for the evaluation of the different actions. Automatic change detection techniques were applied to detect changes occurred during the period of analysis. The integration of the information provided by different methods of analysis and data sources is expected to unveil the temporal dynamics of the spatial patterns of the land use/cover, and to produce a set of reliable indicators for the a posteriori evaluation of the management actions.

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