Luigi Ranghetti, 2014
Using remotely sensed estimators to detect temporal trends of ecological predictors: the cases of nutritional content of alpine grasslands and water management in ricefields.
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Abstract

The ability to detect quantitative information about ecosystem variables is one of the most important critical points in conservation ecology; satellite remotely sensed data can be very useful to achieve this purpose, thanks to their peculiar advantage to be spatially homogeneous and temporally available also for the past. In this work satellite data have been used to predict two environmental groups of variables: nutritional information of alpine grasslands in Gran Paradiso National Park and water surface within ricefields of the Nothern Italy district. Despite the dissimilarity of the two, both are of primary importance in the study of population dynamics respectively of Alpine ibex (Capra ibex) and species of herons nesting in rice fields. The accuracy of the predictions has been tested using field surveyed data, showing a general predictability from MODIS data of some of the considered nutritional variables of grasslands (biomass, crude protein, neutral detergent fiber and digestibility at 24 hours) and of water fraction among rice fields. Analyses on temporal trend of nutritional quality of grasslands in the period 1982-2013 (done using also AVHRR GIMMS data) revealed a considerable advance in the date of beginning of growing season (?0.45 ± 0,18 days per year), which did not result uniform in the surveyed period but concentrated in the decade 1990-1999. Trends of nutritional variables reflect this tendency, with a decrease in mean protein content and digestibility and an increase in biomass and fiber content. The correlation of these trends with the ibex survival rate in the period 1982-2011 resulted statistically significant. In the case of flooding within rice paddies, a general reduction has been evidenced in the period 2000-2014, averaging ?1.95 ± 0,61% per year; this reduction was recorded throughout the whole rice district, despite the differences between the north-western and the south-eastern portions of the district in terms of paddy fields heterogeneity and water management. Overall, the loss in submerged surface area was estimated for 2014 at 42% of original extension, with a peak of 86 % in the southeastern sub-area.