Long-term change monitoring of natural grasslands ecosystem in support of SDG 15.3.1

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Assessing and maintaining the conservation of natural and semi-natural grassland ecosystems is one of the most important actions of the Biodiversity Strategy by the European Commission.

The present study focuses on the detection of long-term changes, from 1990 to 2018, of natural grasslands ecosystem, at local scale, in the “Murgia Alta”, a National Park as well as a Natura 2000 protected area, Southern Italy. The study site represents one of the largest areas for the conservation of such ecosystem in Italy. It is under pressure and in danger of destruction due to soil graining for agricultural intensification, illegal expansion of extraction sites, fires and land abandonment with consequent biodiversity loss.

Land Cover (LC) changes and class trends are one of the measures (sub-indicator) required for the implementation of the Sustainable Development Goals (SDG) 15.3.1 Indicator (“Proportion of land that is degraded over total land area”) of the Agenda 2030 by United Nations.

Multisource/multiresolution free available satellite data (visible, near infrared and short wave infrared spectral bands) were considered. Historical images from Landsat (4 images per year, one per season) were analyzed to produce different LC multiclass maps for 1990, 2001, 2004, 2011 and 2018 at 30 m spatial resolution, with an automatic data-driven classifier (Support Vector Machine). For 2018 Sentinel-2 data, 10 m spatial resolution, were also considered.

The mean value of the Overall Accuracies obtained for the LC maps from Landsat was 95%. Similar value was obtained in the last year from Sentinel-2.

Then natural grassland layer was extracted from those maps to analyze the trend of the grasslands ecosystem over time. The findings obtained indicate a total loss in the extension of the ecosystem of about 18% from 1990 to 2018. The major decrease (26%) occurred in 1990-2001. Then a modest decrease followed up to 2004 (year of institution of the National Park). Finally a slight increase probably due to land abandonment followed to fire events was quantified after 2004.

From the comparison of the different LC maps obtained, the decrease of natural grasslands resulted mainly due to transformation into agricultural areas.
In addition, these results are consistent with those obtained using Corine Land Cover maps available for the same period although at a coarser scale.

The SDG sub-indicator was evaluated inside the protected area and in a buffer, 10 km, area around. This sub-measure, which can be evaluated from time-series of satellite free data, can support long-term monitoring of protected area and can be used not only for the resilience evaluation of the study site to climate changes but also for the evaluation of conservation policies and as input to scenario modelling.