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LANDSCAPE SPATIAL MODELLING AND SCENARIO ANALYSIS OF MEDITERRANEAN FOREST DYNAMICS UNDER CLIMATE CHANGE AND ANTHROPOGENIC DISTURBANCE CONDITIONS FOR ADAPTIVE MANAGEMENT IN PROTECTED AREAS

Spatial simulation models can be effectively used to build forest landscape modification scenarios that provide inferences on the coupled effects of climate change and anthropogenic disturbance regimes on tree species distribution and productivity. This kind of inferences are of utmost importance for adaptive sustainable forest planning and are required for biodiversity conservation. We illustrate this through a case study in a protected area in a Mediterranean environment (southern Italy) where semi- and sub-natural vegetation types, comprised of forests and grasslands, are cast within an agricultural matrix. The parallel dynamics of these two broad categories of semi- and sub-natural vegetation were modelled over the next 150 years using a forest landscape dynamics simulator (LANDIS-II) under conditions of climate change, two alternative fire regimes (current, *i.e.*, severe, and target, *i.e.*, attenuated) and current forest management. Quantitative scenario analysis was carried out to assess forest and grasslands modifications in terms of spatial configuration and vegetation characteristics (biomass density and relative woody species composition). Results indicate that a similar pattern of spatial changes in both categories is predicted to occur, whereas the attenuated fire regimes somewhat tempers the qualitative vegetation changes. This seems to depend on the relatively stronger role of severe fire regime than that of forest management in shaping vegetation dynamics. The future site-scale management will most likely be based on the fixed-boundary protected area approach coupled with a resistance strategy to vegetation changes aiming at the conservation of the ecosystem services now provided and valued for by the categories of semi- and sub-natural vegetation. Our results indicate that current forest management regime will be not appropriate to such a perspective unless a concurrent fire mitigation policy is not carried out. In order to enhance current spatially explicit modelling potentials of LANDIS-II, besides developments aimed at the incorporation of other vegetation types dynamic models (*e.g.*, grasslands), the integration of modeling and monitoring by means of remote sensing technologies is advocated. This can be critical for protected areas adaptive management, providing early signals of environmental shifts within and outside protected areas. climate change and anthropogenic disturbances, coupled effects, protected areas, adaptive management, Mediterranean forest.

Parole Chiave: Spatial Simulation Models and Scenario, Climate Change and Anthropogenic Disturbances, Coupled Effects, Adaptive Forest Management, Protected Areas, Mediterranean Forest and Landscape

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