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Resilient landscapes in Mediterranean urban areas: Understanding factors influencing forest trends

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ABSTRACT

Urban and peri-urban forests are recognized as basic elements for Nature-Based Solutions (NBS), as they preserve and may increase environmental quality in urbanized contexts. For this reason, the amount of forest land per inhabitant is a pivotal efficiency indicator to be considered in the sustainable governance, land management, planning and design of metropolitan areas. The present study illustrates a multivariate analysis of per-capita forest area (PFA) in mainland Attica, the urban region surrounding Athens, Greece. Attica is considered a typical case of Mediterranean urbanization where planning has not regulated urban expansion and successive waves of spontaneous growth have occurred over time. In such a context, an analysis of factors that can affect landscape changes in terms of PFA may inform effective strategies for the sustainable management of socio-ecological local systems in light of the NBS perspective. A total of 26 indicators were collected per decade at the municipal scale in the study area with the aim to identify the factors most closely associated to the amount of PFA. Indicators of urban morphology and functions have been considered together with environmental and topographical variables. In Attica, PFA showed a progressive decrease between 1960 and 2010. In particular, PFA progressively declined (1980, 1990) along fringe areas surrounding Athens and in peri-urban districts experiencing dispersed expansion of residential settlements. Distance from core cities and from the seacoast, typical urban functions (e.g., multiple use of buildings and per capita built-up area) and percentage of agricultural land-use in each municipality are the variables most associated with high PFA. In recent years, some municipalities have shown an expansion of forest cover, mainly due to land abandonment and forest recolonization. Findings from this case study have allowed us to identify priorities for NBS at metropolitan level aimed at promoting more sustainable urbanization. Distinctively, proposed NBS basically focus on (i) the effective protection of crop mosaics with relict woodlots; (ii) the improvement of functionality, quality and accessibility of new forests; and (iii) the establishment of new forests in rural municipalities.

1. Introduction

Urban and peri-urban forests are widely recognized as basic elements for Nature-Based Solutions (NBS) due to their leading role in increasing the environmental quality in urban and peri-urban contexts. Multifunctionality is one of the main characteristics of urban forests (Konijnendijk et al., 2006), which provide ecosystem services including the regulation of infiltration and storm water runoff, mitigation of the microclimate, reduction of the heat island effect and air pollution (De Groot et al., 2010; Dobbs et al., 2014; Mariani et al., 2016). Urban and peri-urban forests also contribute to improve well-being perception by urban dwellers or tourists and restore cognitive resources (e.g., Lafortezza et al., 2009; Salvati et al., 2014; Carrus et al., 2015; Tomao et al., 2016). For these reasons, the amount of forest land per inhabitant is a pivotal efficiency indicator to be considered in the sustainable governance, land management, planning and design of metropolitan areas.

Despite the recognized positive role of forests in metropolitan

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