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Sommario	In the realm of the doctoral program in technologies for sustainability and land restoration, this thesis deepens sustainable and ecological solutions for Mediterranean environment after the German tradition and the Swiss school of green roofs for biodiversity. Specific aims were to: (1) assess the effectiveness of the existing green roofs norms in supporting biodiversity; (2) review methodologies and approaches for the implementation of biodiverse green roofs but also their application for ecological design; (3) identify habitat templates in the Mediterranean ecoregion replicable on green roofs; and (4) investigate the long term vegetation development of unmanaged green roofs in order to give ecological design guidance. As regards the green roof norms assessment, the German guidelines were chosen for its traditional referential role, the Swiss norm for its peculiar biodiversity approach, the Italian one for affecting a territory with remarkably heterogeneous environmental conditions, stretching from Alpine to Mediterranean ecosystems. Even if the three regulations at comparison addressed to some extent biodiversity related matters, none of them focused on the peculiarities of different ecoregions in term of plant species selection and assemblage, growing medium composition (materials and granular size) and system build-ups (multi-layers and single-layer

	construction). It was concluded that at the current knowledge, an official and effective regulation for green roof design in Mediterranean ecoregion is still missing. Biodiverse green roofs, being characterised by different and contiguous microhabitats (habitat mosaics or patches) can host several species with different morphological and functional traits (Brenneisen, 2003). As regards their implementation methods and approaches, the habitat template consists in choosing suitable plant species among the one living in nature under similar conditions e.g. shallow and nutrient poor substrate and drought, while the phytosociological approach applied to green roofs considers habitat analogues not only as species pools, but also as models to group plants in specific associations. It was concluded that nature conservation approaches on green roofs offer new perspectives for urban sustainability and for ecological design. However, in order to give the “naturalistic” approach a chance to develop extensively, it is necessary to act into the education and technical spheres: sensitizing the public opinion starting from the new generations (eco-litteracy) and training professionals able to conjugate scientific knowledge (analytic phase) and design (creative phase). An Eco-designer should operate considering the local climatic conditions, the potential vegetation and the interactions with neighbouring biocenosis: he/she has to be also an ecologist in order to combine the ways of nature to the ways of man. As regards replicable habitat on green roofs in Mediterranean areas, the proposed methodology approach was based on a practical plant sociology understanding of EU Directive 92/43: a recognition of Natura 2000 habitat that could be imitated on roofs in terms of characteristic species and substrates. The results lead to three groups: those linked to sandy substrates (psammophilous vegetation), to gravely-pebbly substrates (glareicolous vegetation) and to xeromorfic soils (garrigues and dry grasslands). Desirable plants establishment methods on green roofs should be based on diaspore hay- transfer and threshing from selected donor meadows, as it happens for grasslands restoration. Finally, as regards the long term vegetation development over a thirty year period, results demonstrated that the main driver of the observed functional changes on undisturbed simple-intensive green roofs in temperate climate, was a shift towards relatively more thermo-xeric conditions. In terms of plant life strategies, the competitive species sown on the roof gradually gave way to stress-tolerant and ruderal species, along with a progressive increase in species with short-distance seed dispersal strategies. It is concluded that: (a) to create resilient green roofs, spontaneous colonisation should be accepted and considered as a design factor; and (b) regional plant communities could serve as a model for seed recruitment and design.
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