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# Mediterranean agro-ecosystems between tradition, industrialisation, and innovation. How do multifunctional mixed farming systems support agroecology and biodiversity ?

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## Abstract

Agriculture and society have co-evolved in the Mediterranean basin during millennia, shaping a large diversity of land systems that produced food while sustaining a rich agro-biodiversity. Socio-economic changes in the XXth century have resulted in both, abandonment of agriculture in remote regions and intensification in more favorable regions. Intensification can lead to soil erosion or groundwater depletion, decreasing the production ability, especially under climate change. Studies demonstrate the interest of so-called innovative practices (e.g. soil conservation farming, associated cropping, sylvopastoralism and agroforestry), characterizing agroecology, for sustaining production in a drought-prone region. Some of these belong to the traditional Mediterranean mixed and diverse systems, preserved in many places, offering habitat conservation and multiple ecosystem services both of which are increasingly demanded by society.

We present a synthesis of the literature on the quantified impacts of such mixed systems and innovative practices on the agroecological functions that contribute to the resilience of Mediterranean agriculture, and to biodiversity conservation.

We then show the state of the art of the modelling of such systems. This includes: accounting for soil conservation practices within agro-ecosystem models, characterizing the mixed systems and the landscape heterogeneity within land use data sets, representing their multifunctional role (e.g. conserving habitat, sustaining the functional agro-biodiversity required for the viability of agroecological systems, beside providing other services). Modelling such systems requires a coherent accounting of agriculture-biodiversity interactions.

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