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Farmers' and academia's views"

Socio-ecological transformation of a traditional Moroccan mountain oasis

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Abstract

Oasis systems in the Atlas Mountains of Morocco are ancient social-ecological systems, which have effectively coped with fragile, arid environments over thousands of years through agricultural practices that have stood the test of time. A central challenge for today's goals of sustainable development is to efficiently manage global modernisation processes while maintaining or even enhancing sustainable agricultural practices and livelihood strategies of rural populations. This study aims at analysing socio-ecological and economic changes affecting traditional oasis agriculture in Tizi N'Oucheg, 50 km south-east of Marrakech in the High Atlas Mountains of Morocco. Land use changes (LUCs) quantified by analysing Google Earth Images of 2003 and 2021 as well as drone images taken in 2022 show an increase of abandoned agricultural land and a decrease of cropland. This was particularly the case for fields of rainfed barley (*Hordeum vulgare* L.) on remote terraces. Ground truthing and the conduction of semi-structured questionnaires with 25 farmers in March and April 2022 revealed irrigation water availability, other job opportunities in urban regions and health problems of the ageing farmer population as main reasons for abandonment of agricultural land. 60 % of the surveyed households permanently living in the oasis stated non-agricultural activities to contribute > 50 % of their income. While crop production in the past was based on subsistence farming, nowadays barley and maize (*Zea mays* L.) are primarily only grown for livestock feeding. Average barley grain yields amount to 430 g/m^2. Cereal yields were reported to decrease over the past 20 years. Vegetables, planted in areas where water availability is high enough, such as potato (*Solanum tuberosum* L.), bean (*Vicia faba* L.) and onion (*Allium cepa* L.) are sold to local markets, in addition to the sale of livestock. Apart from climate change, traditional crop-livestock systems suffer from out-migration, marginalisation, losses in traditional knowledge and biodiversity, while the rapidly growing lowland cities, such as Marrakech, increasingly occupy the old agricultural land with tourist infrastructure and hotels.

Keywords: Crop-livestock system, land use, oasis agriculture, rural-to-urban, traditional knowledge

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