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Polarisation in (Post-)Nomadic Resource Use in Eastern Morocco – Insights Using a Multi-Agent Simulation Model

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Abstract

Mobile pastoral resource use is a well-adapted and successful strategy to ensure food security under scarce and highly fluctuating rainfall conditions. It has been the traditional way of life for a considerable number of people in arid regions. However, in the last decades this land use type has been exposed to change, such as technological, climate or social change. This has led to contrasting patterns of mobility and a change in lifestyle which we also observe in a case study in the Eastern High Plateau, Morocco. Here, a polarisation of pastoralists into two groups has occurred: highly mobile ones with large herds, and those with very low livestock numbers who have almost become sedentary. We are interested in understanding the causes for this polarisation among pastoralists.

However, this land use system is shaped by complex interactions between ecological, social and economic components. Therefore, to understand the impact of change at the local level, feedbacks between these components need to be taken into account. Social-ecological modelling, and in particular agent-based modelling, offers an approach that allows to incorporate these aspects and to analyse the behaviour of the land use system in time and space.

We developed a spatially-explicit agent-based model incorporating the interrelations of vegetation dynamics, herd mobility as well as herd sizes and monetary stocks of the pastoral households.

We investigated whether polarisation arises between two groups of pastoralists. Starting with both groups being homogeneous, we stepwise increased heterogeneity in terms of their mobility costs and resource endowments. The agent-based approach allowed us to explicitly incorporate the interaction of households and their competition on grazing land.

Our results indicate that different initial resource endowments and mobility costs for the pastoralists lead to polarisation only under harsh environmental conditions.

Building on these findings, we discuss the potential of policy instruments to counteract polarisation and increase the livelihood security of pastoralists.

Keywords: Livelihood security, Morocco, pastoralism, social change, social-ecological modelling