

THESIS

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Summary

Rangelands are important systems for understanding global ecosystems functioning and play a major role in supporting local inhabitants. The success of rangelands is often associated with other factors such as climatic factors, mainly precipitation and management strategies like water harvesting techniques. However, the role of soils and topography in these ecosystems is still understudied. There is little information on how rangeland management and restoration efforts interact with local soil geochemical characteristics to influence plant survival rates. This study combined field observation and remote sensing data to understand the interaction of rangeland restoration practices, local soil characteristics and terrain features and their influence on vegetation dynamics. Furthermore, the study investigated the socioeconomic aspect of rangeland restoration activities. The data revealed that largescale survival rates of plants are mainly constrained by soil fertility driven by local soil geochemical processes and water management practices. Overall, soils located on slopes between trenches showed higher nutrients (NPK, base cations, and micronutrients) compared to soils within trenches. Furthermore, sites in AlQatrana (rich in total and available nutrients) showed higher plant survival rates compared to sites located in AlHusseiniya and AlHashemieh (low total and available nutrients). These results suggest that due to flash floods on eroding slopes positions between trenches had higher total and available nutrients compared to their counterparts' trenches. This stresses the role of topography and erosion as a mediator of nutrient dynamics in these arid regions. Altogether the findings of this study revealed the important but often ignored role of soil geochemistry and topography to understand the productivity, success and functioning of rangelands ecosystems. Therefore, soil geochemical properties and topographic features of the landscape should be taken into account while developing a rangeland restoration plan. In addition, for sustainable management of rangelands, the role of local cooperatives should be taken into account when planning and implementing restoration activities of rangeland reserves in Badia.