



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems
promoting climate resilient futures”

Market access shapes social-ecological transformation in mountain oases of Gilgit-Baltistan, Pakistan

ALEEZA ALEEZA, KIRA FASTNER, ANDREAS BUERKERT

University of Kassel, Organic Plant Production and Agroecosyst. Res. in the Tropics and Subtropics, Germany

Abstract

Land use transformation in mountain regions is strongly influenced by infrastructure development, which improves access to distant markets and promotes tourism. However, little is known about the social and ecological implications of transformation processes in remote high-mountain oasis systems such as in Gilgit-Baltistan, Pakistan. This study focuses on two valleys with contrasting levels of connectivity: Karimabad in Hunza Valley and Shimshal. While Karimabad is well-connected to regional markets and tourism flows, Shimshal remains comparatively isolated. Through the analysis of time-series satellite imagery (Corona, Landsat, and high-resolution reference data from Google Earth) and semi-structured household surveys in both valleys ($n = 200$) this study aims to assess how connectivity affected agricultural land use changes and social-ecological transformation processes over the past 5 decades. Preliminary findings reveal marked differences between the two valleys. In Karimabad, Normalized Difference Vegetation Index (NDVI) analysis for the 427 ha study area showed that dense vegetation (NDVI 0.37) increased from 30 ha in 1993 to 136 ha in 2016, reflecting an expansion of cultivated land, before declining to 92 ha in 2025 due to infrastructure development and related decrease in cropland and tree cultivation. Survey results confirm widespread agricultural land use changes after the opening of the China-Pakistan Economic Corridor (CPEC) in 2015, as stated by 83 % of the surveyed households. The reported changes include a decline in agricultural land area driven by infrastructure development (48 %) and population growth (35 %). In addition, there has been a transition from subsistence-oriented staple-crop cultivation to market-oriented horticultural crops. In the past, 74 % of households cultivated staple crops, whereas at present, 99 % of households cultivate marketable horticultural crops. In Shimshal, preliminary NDVI analysis indicates no substantial change in dense vegetation, and survey results show greater land use stability, with 71 % of the households reporting no major changes and a continued reliance on subsistence-oriented production. These findings suggest that infrastructure development is a key driver of transformation processes in Gilgit-Baltistan, accelerating the shift from subsistence farming to market-oriented production. While these changes create new economic opportunities, they may also increase pressure on land resources and lead to increased dependence on market demands.

Keywords: Land use changes, oasis agriculture, rural-urban transformation, time-series analysis