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Typological characterisation of smallholder silvopastoral farms in the walnut-fruit forests in Kyrgyzstan

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Abstract

Walnut-fruit forests of Kyrgyzstan are a unique forest ecosystem harboring more than 130 food and medicinal plant species, many of which are endemic. This makes this forest a global conservation hotspot. More than 1 million people in this region depend on these forests for their livelihoods. However, illegal logging, overharvesting of non-timber forest products (NTFP) and overgrazing of the forest pasture negatively affect regeneration and biodiversity. To address problems of forest degradation, several protected areas (PAs) were established covering walnut-fruit forests. However, despite their protected status, these areas are still under immense anthropogenic pressure. Protected area measures that were introduced were entirely aimed on prohibiting human activities in these areas, and completely overlooked the traditional socio-ecological system based on sustainable use of walnut forests ecosystems by local households dependent on forest resources for their livelihoods.

This study aims to develop an appropriate and robust classification methodology to identify and characterise silvopastoral farming systems in walnut-fruit forests to assess sustainable development pathways. Data were collected from 220 farm-households in three villages located within or in the buffer zone of the protected areas where inhabitants directly impact forests. Principal component analysis and cluster analysis were used to analyse quantitative data and aggregate farms into clusters according to forest resource availability and use, production means and socioeconomics. Three distinct silvopastoral farming systems were identified, all of which collect and sell NTFP, but also have (i) higher NTFP income, medium-sized livestock herds, and low off-farm income; (ii) moderate NTFP income, large livestock herds, and high off-farm income; and (iii) low NTFP income, small herds, and moderate off-farm income. Failure to harvest walnuts and other forest products was identified as a major problem. Overall, farms exhibited different livelihood strategies and no NTFP processing was observed in any cluster. Thus, improving forage base for livestock as well as sustainable forest grazing along with introducing new processing technologies is imperative. Use of multivariate methods identified important variables for delineating farms and subsequent clustering of farms, providing basis for further exploration of variability among farm types to target management measures for sustainable livelihoods to distinct farmer categories.

Keywords: Cluster analysis, farming-systems, non-timber forest products, off-farm income , resource degradation, silvopastoral production