

Social – ecological resilience of the shea butter value chain upstream end: the case of Beninese shea agroforestry parklands



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Abstract

Shea is a wild African tree species providing 80 million people with a resource base for nutritional health and livelihood. Shea butter production has a gendered dimension as rural women are traditionally in charge of collecting nuts in shea agroforestry parklands, manufacturing and selling the butter. This study focuses on the upstream end of the shea butter value chain, which forms a social-ecological system (SES) comprising women shea producers who depend on shea resources for income and livelihood provision and parklands that rely on sustainable use and management to thrive. The rising land-use change-driven reduction in bush and fallow areas has led to aging stand populations and jeopardizes the species' survival. The *Vitellaria paradoxa* species is classified as vulnerable by the IUCN. The resilience of a shea SES is here defined by its ability to maintain a state in which producers can support their shea-based livelihoods in the context of declining access to shea resources, and in which shea stands can adequately regenerate and maintain stable stocking levels while coping with unsuitable conditions for growth. To better understand the association between social and ecological resilience of shea SESs and speculate on whether shea stands decline affects women shea producers' resilience, this study conducted a case study on 10 Beninese villages. A mixed methodology was used with a dataset of 187 participants (177 shea producers and 10 key informants) and 84 plot measurements in shea agroforestry landscapes. First, the extent to which Beninese SESs are resilient to external pressures was analyzed, showing that northern communities, known to be more dependent on shea for their livelihoods and nutrition, tend to be less resilient while the shea resources they rely on are characterized by poorly regenerated, and densely populated shea stands. Vulnerability hotspots, which resulted in shea SESs with low livelihood transformability combined with high parkland degradation, cluster in the northernmost region. Second, the links between social and ecological resilience were appraised through correlation analysis, showing that there is a weak correlation between social and ecological resilience at $R^2(0.18)$, $p < 0.05$, and then through a regression analysis revealing a fluctuating trend between social resilience and shea seedling recruitment in fields at different levels of regeneration decline ($R^2(0.57)$, $p < 0.000$, 16% error rate). No linear association was found between social and ecological resilience in shea producing systems, and resilience trends unfolding at different degradation scales were interpreted. Firstly, as shea-based livelihood resilience is contingent upon stand populations' resilience in fields rather than fallow areas, a trend concerning women's growing disadvantage in accessing shea was confirmed. Secondly, at low levels of parkland degradation, since shea-based livelihood resilience tends to increase as shea regeneration declines, a perseverance and adaptability trend to maintain production systems was revealed. Thirdly, at high levels of parkland degradation, since shea-based livelihood resilience tends to increase as shea regeneration declines, a transformability trend towards other subsistence pathways was revealed. Fourthly, at severe parkland degradation levels, since shea-based livelihood resilience decreases as shea regeneration declines, a vulnerability trend in poorly transformable communities relying on a dwindling resource for subsistence was revealed. Local perceptions of climate change effects on shea butter production were also assessed, indicating that shifts in wind and seasonal patterns negatively affect the quantity and quality of shea nut production.

Keywords: shea, women shea producers, social- ecological systems, resilience, rural livelihoods