

SCIENTIFIC REPORT

on the doctoral thesis

Tools for livelihood improvement in tropical rain forest. Case study of Kakamega forest in Kenya

prepared by Ibrahim Odinga OSEWE

As scientific supervisor, I present the following assessment of the doctoral thesis prepared by Ibrahim Odinga Osewe in the doctoral field of Forestry at Transilvania University of Braşov. The thesis examines how forest ecosystem services, socio-economic characteristics and institutional arrangements shape livelihoods and household resilience in communities surrounding Kakamega Forest, Kenya.

The topic addresses an important challenge in tropical forest management: reconciling biodiversity conservation with the livelihood needs of forest-dependent communities. Kakamega Forest provides a relevant setting because of its ecological importance, the diversity of community uses of forest resources and the difficulties of ensuring equitable access under participatory forest management. The research connects these local concerns with a regional assessment of payments for ecosystem services (PES) in East Africa.

The thesis is organised into eight chapters, progressing from the conceptual framework and literature review to five research studies and an integrated synthesis. Its mixed-methods approach combines a comparative assessment of 25 PES schemes in Kenya, Uganda and Tanzania with field research in Kakamega. Household-level analyses draw on a survey of 453 households, supported by focus group discussions, key informant interviews and participatory wealth ranking. Statistical comparisons and regression models examine differences between socio-economic groups and associations with ecosystem service recognition and coping strategies.

The principal results and contributions can be summarised as follows:

1. PES design and performance. The regional comparison identifies conditions associated with greater PES success, including bundled ecosystem services, medium- to long-term financing, regional implementation and combined cash and in-kind payments. These findings provide an empirical basis for adapting conservation financing to regional institutional and livelihood conditions.

2. Ecosystem services and social differentiation. The research identifies 20 ecosystem services recognised by local communities and demonstrates differences in their perceived importance, use and supporting land uses across wealth, age and gender groups. Firewood is acknowledged by 86% of respondents. Education, land ownership and Community Forest Association membership are among the factors associated with service recognition. The results show why management decisions need to account for differences within communities.

3. Conservation pressures and access to benefits. The thesis examines perceived changes in forest condition and service provision alongside threats and community challenges. Illegal logging emerges as a major perceived threat, while the allocation of harvesting rights to non-local actors is a prominent concern. The finding that poorer households may perceive improved forest condition alongside declining service provision highlights the importance of access and benefit distribution in evaluating conservation outcomes.

4. Household resilience and coping strategies. The analysis establishes the importance of forest resources as a safety net during livelihood shocks. Coping choices vary with household wealth, gender, household size and institutional membership, including interactions between these characteristics. The findings support targeted livelihood diversification and social protection measures to reduce vulnerability and pressures on forest resources.

The originality of the thesis lies in integrating ecosystem service perceptions, institutional access, conservation pressures and household responses to shocks within a common socio-ecological framework. Its differentiated analysis provides evidence relevant to participatory forest management, equitable benefit sharing and PES design. The thesis also acknowledges the limitations of cross-sectional, perception-based data and identifies appropriate directions for further research.

The results have been disseminated through five ISI-indexed articles, one further article in an internationally indexed journal, and presentations at national and international conferences. These outputs demonstrate sustained research activity and the dissemination of the principal findings.

On the basis of the research undertaken, the results obtained and the original contributions presented, I consider that the thesis has scientific and practical merit and meets the requirements of a doctoral thesis in Forestry. I therefore support its public defence for the award of the doctoral degree.

Scientific supervisor

Prof. Dr. Eng. Bogdan POPA

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