

Level of Community Participation in Participatory Forest Management in Muguga Forest, Kiambu, Kenya

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Abstract—Participatory Forest Management emerged as a response to centralized forest governance systems that excluded local communities, often resulting in forest degradation and weakened local stewardship. This study assessed the role of communities in PFM in Muguga Forest, Kiambu County, Kenya. Specifically, it examined how local communities participate in forest governance and conservation activities. Descriptive survey approaches were adopted. Sampling was done using census approach where the target group, N=150 was surveyed, primary data were collected from 102 registered MERCFA members (68% response rate out of 150 active members) through questionnaires, interviews, focus group discussions, and observation. Secondary data were obtained from institutional reports. Findings indicate that communities play central roles in tree planting, nursery establishment, forest patrols, environmental awareness creation, and regulated cut-and-carry grazing. They also engage in forest-based enterprises such as beekeeping and ecotourism. Although community participation has strengthened local stewardship and improved conservation awareness, forest recovery remains unstable due to financial constraints, weak enforcement, limited market access, and low youth engagement. The study concludes that sustainable PFM depends on empowered community roles, equitable benefit-sharing, and strong institutional support under the Forest Conservation and Management Act (2016).

Keywords — Participatory Forest Management, Community Participation, Community Forest Association (CFA), Muguga Environmental Research Community Forest Association (MERCFA), Participatory Forest Management Plans

I. INTRODUCTION

Forests are a vital ecosystem that sustain lives in countless ways, offering environmental, economic, and social benefits. They act as carbon sinks, support biodiversity, and provide livelihoods for millions worldwide (FAO, 2020). But land encroachment, agricultural growth, and illicit logging all contribute to deforestation and forest degradation, which remain major global issues. Agricultural practices and encroachment have caused an estimated 420 million

hectares of forest area to disappear since 1990. According to Matiku et al., (2013), PFM was adopted to address widespread forest degradation by integrating communities into management systems, with the dual goal of improving forest conditions and enhancing rural livelihoods. They argue that the shift was driven by the realization that without community buy-in, conservation policies were unlikely to succeed. PFM thus represents both a conservation strategy and a tool for socio-economic empowerment.

Forests are also vital for ecological balance, biodiversity, and livelihoods in Africa. However, deforestation, land degradation, and unsustainable exploitation pose significant challenges to environmental sustainability and rural development (Blomley & Ramadhani, 2006). A strategic approach to forest governance and resource management, PFM involves governments, local people, and other stakeholders. The foundation of PFM is decentralization and community-based natural resource management principles, aiming to enhance local ownership, improve livelihoods, and ensure long-term forest ecosystem sustainability (FAO, 2020). Forests that are managed by communities and Indigenous peoples, like those in Ixtlán de Juárez in Mexico, greatly reduce the frequency of wildfires and enhance biodiversity. After taking over from private concessions in 1982, these communities have embraced sustainable logging methods and have shown success in reducing poverty, creating jobs, and diversifying their economies through businesses like ecotourism and furniture manufacturing (Farthing, 2024). Better forest conditions and livelihoods have resulted from the involvement of local communities in forest governance in Nepal by community forestry programs and in India by Joint Forest Management (JFM). Saigal (2003).

The Collective Forest Tenure Reform, which was started in the late 1970s and reinforced in the early 2000s, has been a major factor in the significant

evolution of participatory approaches to forest management in China over the past few decades. This reform allowed more than 100 million rural households to directly manage about 60% of the nation's forest area by transferring forest use rights from collective entities to individual households or communities (Xu et al., 2010). In many African countries, studies show that PFM can improve forest conservation, increase household incomes, and strengthen social cohesion among rural populations. However, challenges such as inadequate policy support, conflicting land tenure systems, and limited technical capacity often hinder the successful implementation of PFM in Africa.

The PFM approach was first tested in Kenya's Arabuko-Sokoke Forest in 1997. Its success led to broader government adoption and implementation in various forest reserves across the country (Tito et al., 2023). In response to the need to involve communities in conservation and the degradation of the forest. Since then, a large number of studies have evaluated PFM's application, the development of policies, and its effects on community livelihoods and forest conservation (Tenge & Morara, 2020). Research in the Mau Forest Complex, for example, has assessed how well community involvement can stop deforestation, and studies in the Gathiuru and Karima forests have examined governance and power relations both before and after PFM adoption. Researchers observed that PFM improved environmental stewardship and community income in Eburu Forest.

II. LITERATURE REVIEW

Historically, natural resource conservation suffered due to exclusionary management policies that marginalized local communities and overlooked their potential contribution. Such approaches weakened accountability and sustainability. In contrast, inclusive governance models have demonstrated that decentralization, cultural autonomy, and meaningful participation enhance long-term conservation outcomes. PFM is grounded in the recognition that local communities are central to sustainable forest management. Involving them not only strengthens environmental protection but also promotes social equity (Agrawal & Gibson, 2019).

Recent empirical studies reinforce this position. Kimiri et al. (2023) found that integrating traditional

governance systems, such as the Maasai council of elders in Loita Forest, improves forest management effectiveness. Chisika and Yeom (2024) demonstrated that artificial intelligence can enhance community engagement and efficiency in forest governance in Nairobi City Park. Similarly, Kimiri (2023) showed that community participation in Tanzania's Nsieni Forest improves both livelihoods and sustainable practices. A 2023 study in Global Environmental Change further revealed that collaborative governance networks strengthen community-based forest management in Southeast Tanzania, slowing forest loss through strong inter-organizational ties.

In Kenya, the Forest Conservation and Management Act (2016) institutionalized Community Forest Associations as vehicles for community participation in forest governance. CFAs collaborate with the Kenya Forest Service in developing Participatory Forest Management Plans regulating forest use, and representing community interests in decision-making (Mutune et al., 2022). Mwangi et al. (2021) note that CFAs enhance transparency, equitable benefit-sharing, and local ownership, though effective participation depends on capacity building, supportive policies, and financial incentives.

Mbeche et al. (2021), in a survey of 924 forest-dependent households in Western Kenya, found that 52% participated in PFM activities. Participation levels were moderate across planning (41%), implementation (49%), and monitoring and evaluation (42%). Positive determinants included male gender, household expenditure, anticipated forest benefits, and market access, while food insecurity, credit constraints, distance to forest, and off-farm employment reduced participation.

III. METHODOLOGY

This research applied a descriptive survey design was used for the quantitative component, involving the systematic collection of data from a target population to assess respondents' attributes, practices, and viewpoints. As defined by Siedlecki (2020).

The target population comprised 150 active members of the Muguga Environmental Research Community Forest Association (MERCFA) who had renewed their membership out of approximately 400 registered members. A census sampling approach

(Mugenda & Mugenda, 2003) was adopted to enhance representativeness and minimize sampling bias by targeting all 150 registered members. Out of these, 102 valid responses were obtained, representing a 68% response rate.

Data were collected using a structured household questionnaire administered through face-to-face interviews at respondents' homes or workplaces. The questionnaire captured information on demographic characteristics, level of participation in PFM activities, perceptions of forest conservation outcomes, and challenges experienced in implementation. Prior to the main survey, a pilot test of 20 questionnaires was conducted, with 15 successfully completed. Feedback from the pilot informed refinement of the tool to improve clarity, relevance, and reliability. According to the Central Limit Theorem, a sample size above 30 supports reliable statistical inference (Gravetter & Wallnau, 2017). The achieved sample size of 102 was therefore considered adequate for meaningful analysis.

Quantitative data were coded, cleaned, and entered into the Statistical Package for the Social Sciences (SPSS) for analysis. Descriptive statistics, including frequencies, percentages, and measures of central tendency, were generated to summarize participation patterns and respondent characteristics.

IV. RESULTS AND DISCUSSION

The findings demonstrate that MERCFA members play multiple and interconnected roles in Participatory Forest Management, combining conservation functions with livelihood-oriented activities. Participation rates show that 83% of respondents engage in tree planting, 22% in cut-and-carry pasture, 15% in nursery establishment, 11% in beekeeping, 9% in patrols and monitoring, and 7% in ecotourism activities.

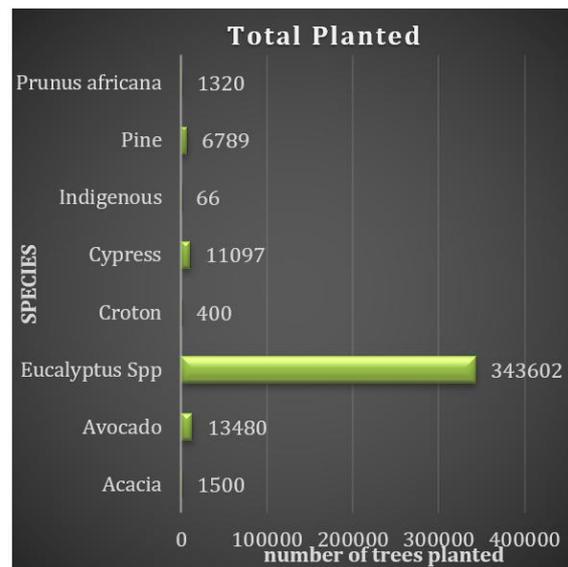
Table 4.1: Participation rate in PFM activities

Activity	Participation rate (%)
Tree planting	83
Cut-and- carry pasture	22
Tree nursery establishment	15
Beekeeping	11
Patrols & Monitoring	9
Ecotourism	7

(n=99)

Source: Field survey, 2025

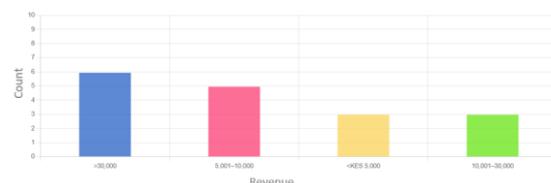
Tree planting emerges as the most dominant conservation role. On average, members planted 335 trees in the last year, with over 300,000 eucalyptus and more than 10,000 cypress trees planted collectively, alongside pine, bamboo, croton, acacia, and fruit trees. Despite this strong engagement, only 8 members reported selling timber, with most earning less than Ksh.5,000, indicating that tree growing remains largely a long-term conservation investment rather than an immediate income source. The survival mean of 387 trees further reflects sustained ecological impact.



Source: Field survey, 2025

Figure 4.1: Species of trees planted (n=78)

Nursery establishment (15%) strengthens restoration efforts by supplying seedlings for both forest and farm planting. Although only 17 respondents reported seedling sales, average sales reached 6,394 seedlings, with 6 respondents earning above Ksh.30,000. Additionally, 14 respondents donated seedlings, averaging 1,004 seedlings each, reflecting community-driven environmental stewardship beyond profit motives.



Source: Field survey, 2025

Figure 4.2: Earnings for seedling sell (n=17)

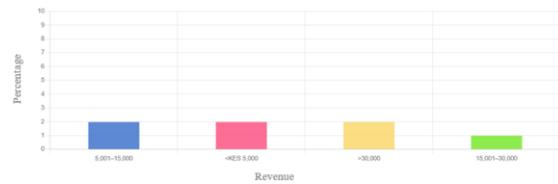
Livelihood-support roles such as cut-and-carry pasture (22%) primarily contribute to household

livestock sustenance rather than commercial income. Out of 101 respondents, 33 provided data on fodder harvesting, with 31.68% indicating that grass is the main fodder collected and only 0.99% harvesting both grass and maize stalks. Collection frequency varies, with 21.78% harvesting daily and 11.88% harvesting weekly or twice weekly, though this declines during dry seasons. On average, respondents harvest 2.41 bundles per visit. Most participants (31.68%) use the fodder exclusively for home consumption, while only 0.99% both consume and sell. Income remains minimal, with 3.96% earning less than Ksh.2,000 and 1.98% earning between Ksh.2,001–5,000 annually. Key challenges include insecurity (theft and risk of sexual assault), unreliable weather patterns affecting pasture growth, and inadequate coordination of livelihood activities. Respondents recommended improved forest access regulation, expanded PELIS programs, better security measures, and stronger oversight to ensure equitable and sustainable fodder access.



Source: Field survey, 2025
 Figure 4.3: Challenges faced in nursery establishment (n=22)

Beekeeping (11%) remains a minor but potentially valuable activity. Only three respondents actively owned beehives, with 0.99% owning two hives and 0.99% owning three. About 6.39% of hives were relocated to farms, while 3.96% remained within forest boundaries. Honey is harvested twice annually; 5.94% harvested less than 10 liters per season, and 0.99% harvested between 31–50 liters. Income distribution shows 1.98% earning below Ksh.5,000, 1.98% earning Ksh.5,001–15,000, 0.99% earning Ksh.15,001–30,000, and 1.98% earning above Ksh.30,000. Constraints include limited processing skills (honey sold raw), poor market access (4.95%), low flowering seasons (4.95%), hive theft (3.96%), weather variability, hive placement issues (2.97%), and pests (0.99%). Proposed solutions included training on honey refinement, provision of equipment, improved security fencing, additional hives, and expanded market networks.



Source: Field survey, 2025
 Figure 4.4: Income from the sale of honey (n=7)

Forest governance roles are reflected in patrols and monitoring (9%), largely conducted in groups (13.86%) for safety, with only 1.98% patrolling individually. Patrol frequency is mainly weekly (10.89%), with 4.95% conducting daily patrols and 1.98% monthly. Illegal logging and unauthorized grazing were reported by 11.88% of respondents, encroachment by 3.96%, and charcoal burning by 1.98%, underscoring the community’s frontline surveillance role. Challenges include limited enforcement authority, inadequate financial support, and insufficient equipment. Respondents recommended enhanced security patrols, fencing, strengthened collaboration with KFS, banning grazing near young plantations, empowering community scouts, and promoting farm woodlots.

These findings align with national studies. Matiku et al. (2013) observed strong community engagement in planting and monitoring in Arabuko-Sokoke but noted livelihood constraints. Okumu et al. (2020) similarly found that CFAs are critical conservation actors yet face institutional and inclusivity challenges. Edward et al. (2024) reported comparable trends in Iveti Forest, with high planting participation but limited market access. Koech et al. (2009) also emphasized that while communities are central to surveillance and regeneration, weak institutional support threatens sustainability. Muguga’s PFM model demonstrates that local communities are the backbone of conservation efforts, contributing significantly through restoration, monitoring, resource management, and livelihood activities. However, economic returns remain uneven, and stronger institutional support, market access, and inclusive governance structures are necessary to fully realize the conservation and livelihood potential of community participation.

V. CONCLUSION

The study established that MERCFA members play a central and active role in implementing PFM in Muguga Forest. Their involvement spans

conservation, livelihood, and governance functions that collectively support forest sustainability. A key role is tree planting, where members participate in afforestation and reforestation to restore degraded areas. They also undertake maintenance practices such as pruning and weeding to enhance tree survival and regeneration. Community members engage in regulated firewood collection to ensure sustainable resource use and practice beekeeping, which provides supplementary income while supporting pollination and forest health. The cut-and-carry grazing system further minimizes forest degradation by preventing uncontrolled livestock grazing. In forest governance, members conduct patrols and surveillance in collaboration with KFS to curb illegal logging and encroachment. They also establish and manage tree nurseries that supply seedlings for reforestation and local sale, contributing to both increased forest cover and household income. Beyond field activities, MERCFA members promote environmental awareness and participate in decision-making forums with KFS and KEFRI, ensuring community perspectives inform forest management plans. They also assist in resolving conflicts related to forest resource use. Overall, the findings show that the community functions not merely as beneficiaries but as active partners in forest conservation and sustainable management.

REFERENCES

- [1] Blomley, T., & Ramadhani, H. (2006). Going to scale with Participatory Forest Management: early lessons from Tanzania. *International Forestry Review*, 8(1), 93–100. <https://doi.org/10.1505/ifor.8.1.93>. Accessed on 20th November 2025
- [2] Chisika, S., & Yeom, C. (2024a). The Implication of the Changing Forest Management Paradigms in Formulating Forestry Policies in Kenya. *FORESTIST*. <https://doi.org/10.5152/forestist.2024.23040>. Accessed on 15th March 2025.
- [3] Edward, J. N., Mwendwa, P. K., & Kimeu, R. M. (2024). *Dynamics of Participatory Forest Management (PFM) activities by Community Forest Association (CFA) and Implications on Conservation of Iveti Forest in Machakos County, Kenya*. Cedred.org. <http://cedred.org/jais/index.php/issues>. Accessed on 9th August 2025.
- [4] FAO. (2020a). *Global Forest Resources Assessment 2020*. FAO. <https://doi.org/10.4060/ca8753en>. Accessed on 5th February 2025
- [5] FAO. (2020b). *The State of the World's Forests 2020*. FAO and UNEP. <https://doi.org/10.4060/ca8642en>. Accessed on 5th February 2025
- [6] Farthing, L. (2024, May). *Fewer wildfires, great biodiversity: what is the secret to the success of Mexico's forests?* The Guardian; The Guardian. <https://www.theguardian.com/global-development/2024/may/01/fewer-wildfires-great-biodiversity-what-is-the-secret-to-the-success-of-mexicos-forests?> Accessed on 13th February 2025
- [7] Gravetter, F., & Wallnau, L. (2017). *Statistics for the Behavioral Sciences*. https://www.ndl.ethernet.edu.et/bitstream/123456789/29095/1/Frederick%20J%20Gravetter_2017.pdf. Accessed on 15th August 2025
- [8] Kimiri, K. L., Ming'ate, F. L. M., & Kioko, E. M. (2023). Community Forest Associations Boundaries and Sustainable Forest Management in Loita Forest, Narok County, Kenya. *Asian Journal of Geographical Research*, 6(4), 17–31. <https://doi.org/10.9734/ajgr/2023/v6i4200>. Accessed on 30th September 2025.
- [9] Koech, C. K., Ongugo, P. O., M T E Mbuvi, & Maua, J. O. (2009). Community Forest Associations in Kenya: challenges and opportunities. *Kenya Forestry Research Institute*. https://www.researchgate.net/publication/362619710_Community_Forest_Associations_in_Kenya_challenges_and_opportunities. Accessed on 24th October 2025.
- [10] Matiku, P., Caleb, M., & Callistus, O. (2013). The Impact of Participatory Forest Management on Local Community Livelihoods in the Arabuko-Sokoke Forest, Kenya. *Conservation and Society*, 11(2), 112–129. <https://www.jstor.org/stable/26393104>. Accessed on 10th December 2025.
- [11] Mbeche, R., Ateka, J., Herrmann, R., & Grote, U. (2021). Understanding forest users' participation in participatory forest management (PFM): Insights from Mt. Elgon Forest ecosystem, Kenya. *Forest Policy and Economics*, 129, 102507.

- <https://doi.org/10.1016/j.forpol.2021.102507>. Accessed on 20th December 2025.
- [12] Mutune, J. M., & Lund, J. F. (2016). Unpacking the impacts of “participatory” forestry policies: Evidence from Kenya. *Forest Policy and Economics*, 69, 45–52. <https://doi.org/10.1016/j.forpol.2016.03.004>. Accessed on 9th May 2025.
- [13] Mwangi, E., Mogoi, J., Ongugo, P., Obonyo, E., & Oeba, V. (2021). Communities, property rights and forest decentralisation in Kenya: Early lessons from participatory forestry management. *Conservation and Society*, 10(2), 182. <https://doi.org/10.4103/0972-4923.97490>. Accessed on 15th May 2025.
- [14] Okumu, B., & Muchapondwa, E. (2020). Determinants of successful collective management of forest resources: Evidence from Kenyan Community Forest Associations. *Forest Policy and Economics*, 113(102122), 102122. <https://doi.org/10.1016/j.forpol.2020.102122>. Accessed on 15th October 2025.
- [15] Saigal, S. (2003). Improving forest governance: Experience of Joint Forest Management in India. *Social Change*, 33(2-3), 29–40. <https://doi.org/10.1177/004908570303300303>. Accessed on 22nd May 2025.
- [16] Siedlecki, S. (2020, January). *Understanding Descriptive Research Designs and Methods | Request PDF*. ResearchGate; www.researchgate.net. https://www.researchgate.net/publication/338300876_Understanding_Descriptive_Research_Designs_and_Methods. Accessed on 22nd May 2025.
- [17] Tenge, F. M., & Morara, J. (2020). *Impact of participatory forest management on rural livelihoods and forest conservation in Kenya: A case of Upper Imenti Forest*. Juniperpublishers.com. <https://juniperpublishers.com/ijesnr/IJESNR.MS.ID.556119.php>. Accessed on 3rd December 2025.
- [18] Tito, M., Ndalilo, L. A., Matiku, P., & Gacheru, P. (2023, December 14). *participatory forest management in kenya lessons learned after twenty years of implementation (1997 to 2018)*. Research Gate. https://www.researchgate.net/publication/376516201_participatory_forest_management_in_kenya_lessons_learned_after_twenty_years_of_implementation_1997_to_2018. Accessed on 10th December 2025.
- [19] Xu, J., White, A., & Lele, U. (2010). *China’s Forest Tenure Reforms Impacts and implications for choice, conservation, and climate change*. <https://rightsandresources.org/wp-content/uploads/China-long-report-final-LP-edit-Jan20.pdf>. Accessed on 10th May 2025.