

Comparative Analysis of Participatory Forest Management in Kenya: Embaringo and Gathiuru Community Forest Associations

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Abstract: As forest ecosystem services continue to decline, participatory forest management (PFM), a collective approach to forest management, is gaining traction as a means to promote livelihoods and conservation. As such, a number of analytical tools have been deployed in order to explore ways of enhancing PFM. Sequential Power Analysis (SPA) is rapidly becoming a robust approach for evaluating many natural resource sustainability outcomes in both developed and developing countries around the world. However, information on applying SPA to enhance participatory forest management is scarce. This study aimed to apply SPA to two community forest associations (CFAs) in Kenya in order to contribute to an improved understanding of the strategies for enhancing community involvement in forestry. A case study approach and literature review using document content analysis were used to evaluate secondary data from internet sources and office records at Kenya Forest Service. Key documents reviewed include policy papers and other documents. Through document content analysis, for the first time, the evaluation focused on the implications of SPA application in selected PFM scenarios by categorizing findings into three main themes: power delivery, power adjustment and power background and the policy implications on forest management in Kenya. The study found that achieving responsible forest management in Kenya depends on a delicate balance of ecological, social, and economic factors. PFM is a promising approach; however, evaluating its implementation in the Embaringo and Gathiuru CFAs using SPA reveals complex power dynamics. In Embaringo, historical and sociocultural factors have affected local communities. In Gathiuru, similar power imbalances exist, but the CFA is engaged in income-generating projects with the Kenya Forest Service (KFS), showing progress. However, to fully realize PFM's potential, Kenya should enact a national benefit-sharing policy to ensure fair resource benefit distribution. This study calls upon policymakers and key PFM stakeholders to embrace SPA as a crucial analytical tool for evaluating PFM decisions.

Keywords: Sustainable Forest Management, Sequential Power Analysis, Community Forest Associations, Sustainability, Benefit-sharing

1. Introduction

Forest ecosystems, upon which 1.6 billion people depend for various goods and services, are facing a decline worldwide. However, with the growing human population, forest resources continue to decline

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across the globe. As a consequence, forest policymakers and key stakeholders are grappling with the choice of policy options for achieving responsible forest management. Participatory Forest Management (PFM), which involves local communities and provides a holistic approach to the sustainable management of forests around the globe is increasingly gaining prominence as a viable policy option for achieving perpetual forest management[1]. Participatory forest management represents a shift from traditional top-down forest management approaches, characterized by most state-led forest management approaches, to more inclusive and community-oriented strategies[1]. This approach prioritizes community engagement, sustainability, equitable benefit-sharing, and the incorporation of local information. It plays a crucial role in promoting responsible forestry practices while contributing to broader global sustainability objectives[1]. However, evaluating the effects of participatory forest management initiatives, especially power-related outcomes such as increased decision-making power, equity, ownership and control of forest resources, increased gender inclusivity, and enhanced inclusive participation, presents several methodological challenges owing to their complex and context-specific nature[2]. Despite the scarcity of literature on the application of Sequential Power Analysis (SPA) in forestry, many PFM evaluators around the world are increasingly exploring the possibility of using Sequential Power Analysis in forest management. Sequential Power Analysis appears superior compared to other analytical methods, such as stakeholder mapping, 4R analysis, and social network analysis, because it considers the context-specific nature of the power relationship and engages stakeholders, thereby improving the effectiveness of the initiatives[2].

In Kenya, PFM has gained prominence as a strategy to address deforestation, promote conservation, and enhance community livelihoods[3]. Community forestry initiatives in Kenya are guided by legal frameworks and international principles, aiming to contribute to forest conservation and the improved livelihoods of people who depend on these vital ecosystems. However, with growing human needs, there is a limited understanding of the implications of using innovative diagnostic instruments, such as Sequential Power Analysis, to communities that practice collaborative Forest Management to promote forest management. This research is crucial because the limited understanding of Sequential Power Analysis' potential implications on forestry collaboration predisposes the country to the risk of missing opportunities for improving the power relationships for improved livelihoods and sustainable forest conservation and management. Existing literature speculates that Sequential Power Analysis helps uncover the power dynamics and opportunities in forest-based collaboration by defining who has influence, authority, or control over decision-making, resource allocation, and other key aspects of the situation.

This study applies SPA to analyze the implementation of PFM initiatives in two Kenyan case studies in order to highlight the implications for forest management. To achieve this aim, this study uses a case study design and literature review using document content analysis to respond to the following research question: What are the implications of applying Sequential Power Analysis on Participatory Forest Management practices in the Embaringo and Gathiuru forests in Kenya? To effectively answer the research question, global literature on Participatory Forest Management and Sequential Power Analysis will be explored first. Then unlike other studies, this paper will apply the lessons learned in Kenya's context to generate the policy implications of this study. Two case studies from Kenya. These are appropriate for this study due to their unique environmental, social and economic contexts. Understanding the implications of Sequential Power Analysis on Participatory Forest Management by policymakers and key stakeholders can inform tailored strategies for effective community engagement in Kenya.

2. Literature Review

2.1 Participatory Forest Management: A Theoretical Analysis and Implications

Sustainable forest management involves strategies that maintain a healthy balance between environmental, social, and economic factors. One approach to achieving perpetual forestry is Participatory Forest Management, which ensures the involvement of local communities and stakeholders in decision-making, resource utilization, and conservation efforts. Participatory Forest Management encompasses various approaches and types tailored to specific contexts, goals, and levels of community involvement[4]. These approaches include Community-Based Forest Management (CBFM), which recognizes local communities by granting them legal rights and responsibilities for nearby forests and facilitating resource management decisions, conservation efforts, and revenue-sharing through forest user groups[4]. Joint Forest Management (JFM) involves collaborative efforts through formal agreements, allowing communities to play part in decision-making and benefit-sharing. In contrast, the government retains overall control[5]. Co-management involves partnerships among government agencies, local communities, and stakeholders to combine resources for forest management, focusing on shared decision-making and equitable cost and benefit distribution[5]. Community forestry programs enable local communities to sustainably manage designated forest areas and promote income generation, non-timber forest product collection, and the conservation of improved livelihoods. Collaborative Forest Management fosters cooperation among diverse stakeholders emphasizing shared decision-making and conflict resolution. Community Conservation Reserves are established to protect specific ecosystems, wildlife habitats, and culturally significant sites, thereby contributing to biodiversity conservation[6]. Community-managed logging allows communities to engage in sustainable timber harvesting, with revenue-sharing among members. Indigenous Forest Management leverages traditional knowledge and practices for sustainable resource use and biodiversity conservation[6]. Finally, multi-stakeholder platforms bring together various groups to address forest management challenges jointly through dialogue and coordination[6].

Historically, Participatory Forest Management emerged in response to the shortcomings of traditional state-owned forestry management approaches, which often lead to deforestation, degradation, and conflict with local communities. The origins of Participatory Forest Management can be traced back to the late 20th century, when conservationists, policymakers, and researchers began to recognize the importance of involving local communities and stakeholders in forest management decisions[7]. The 1992 Earth Summit and the adoption of Agenda 21 played pivotal roles in promoting community-based approaches to natural resource management, including forests[7]. As a result, Participatory Forest Management has gained prominence as a more inclusive and sustainable approach to forest management, emphasizing community engagement, equitable benefit-sharing, and the integration of local knowledge. Participatory Forest Management has evolved and has been embraced by many countries and regions worldwide as a means of balancing conservation goals with community needs and rights in forested areas.

2.2 Empirical Literature on PFM: Global Perspective

Empirical findings on the positive impacts of Participatory Forest Management highlight several benefits. Participatory Forest Management has been associated with reduced deforestation and forest degradation in many regions, as local communities are actively engaged in sustainable resource management and conservation[8]. Moreover, Participatory Forest Management often leads to improved livelihoods for these communities because they gain access to forest resources for income generation, non-timber forest products, and improved agricultural practices[8]. Furthermore, Participatory Forest Management can contribute to social cohesion within communities as they collectively make decisions related to forest management, and it has the potential to reduce conflicts related to land and resource use[9][10].

However, as human needs grow and new forest management challenges arise, there are emerging

criticisms of the Participatory Forest Management approach. Some scholars argue that Participatory Forest Management implementation can be challenging owing to issues such as insufficient resources, inadequate capacity, and a lack of government support. Other critics also point out that not all Participatory Forest Management initiatives achieve equitable benefit-sharing, as power dynamics within communities may lead to an unequal distribution of benefits[11]. In addition, striking the right balance between conservation and development objectives can be complex, leading to potential conflicts between these goals. Furthermore, Participatory Forest Management outcomes can vary widely depending on the local context, making it challenging to generalize their success. Finally, some skeptics argue that Participatory Forest Management may be susceptible to co-optation by external interests or may not fully address the needs and rights of marginalized groups[12]. In this paper, the authors argue that these criticisms could arise from the methodological approaches and differences used in various studies that generated these negative outcomes; thus, there is a need to test the application of other analytical tools, hence the need for this study. Moreover, Participatory Forest Management is influenced by a multitude of key factors that play pivotal roles in its success or failure. First, community engagement and empowerment are critical[13]. Second, effective governance and institutional frameworks are essential to ensuring transparent and accountable management practices. Additionally, the ecological context, including the type and health of the forest ecosystem, significantly affects participatory efforts. Adequate financial resources and technical support are vital to building capacity and sustaining community-led initiatives. Moreover, socioeconomic factors, such as land tenure, livelihood opportunities, and cultural traditions, significantly influence the willingness and ability of communities to engage in responsible forest management. Finally, external pressures, such as illegal logging, climate change, and market dynamics, can challenge and motivate participatory forest management efforts, making adaptability and resilience key factors in achieving long-term success[13]. From this review, it is important to understand how to balance critical success factors in PFM in a manner that fosters sustainable and inclusive forest management practices hence the need for this study.

2.3 The role of Power in Participatory Forest Management

In collaborative forestry, power refers to the ability of different stakeholders to influence and make decisions regarding the use and conservation of forest resources. It involves the distribution and exercise of authority, control, and influence among these stakeholders[13]. Effective participatory forest management requires a balance of power among the various actors involved. Local communities should have a meaningful say in decisions, ensuring that their local wisdom, needs, and perspectives are recognized. This approach aims to avoid the usurpation of power by a few entities and promotes more inclusive and sustainable management of forest resources[13]. As such, power balance has emerged as the most crucial factor affecting participatory forest management. First, power determines the degree of equity and inclusivity in decision-making processes related to forest management[13]. When power is imbalanced, certain groups or stakeholders may dominate discussions and decision-making, leading to the marginalization of others. By contrast, a balanced distribution of power ensures that all relevant parties have a voice and can contribute to their perspectives, leading to more informed and fair decisions. Second, a power balance is vital for the sustainability of participatory forest management initiatives. When local communities and Indigenous groups are empowered by decision-making authorities, they are more likely to take ownership of conservation efforts and have a vested interest in protecting forest resources. This sense of ownership can lead to effective management practices. Furthermore, power imbalances can hinder the implementation of Participatory Forest Management plans[13]. Communities or stakeholders who feel marginalized or disempowered may resist or undermine conservation efforts, leading to conflicts and obstacles to achieving forest management goals. However, a fair power balance fosters cooperation, collaboration, and trust among all parties involved, making it easier to implement

and enforce sustainable management practices[13]. However, studies and methodologies on the influence of power on Participatory Forest Management are limited and, hence the need for this study.

2.4 Power, SPA and PFM

Various methodologies exist for power analysis in participatory forest management, including qualitative assessments, social network analysis, and quantitative metrics. However, sequential power analysis stands out as a superior method. Unlike static approaches, sequential power analysis dynamically assesses power shifts over time, acknowledging the evolving nature of Participatory Forest Management. It allows researchers to track changes in influence and decision-making authority, capturing the nuances of community dynamics and stakeholder interactions. This method accommodates the fluidity inherent in Participatory Forest Management initiatives, providing a more realistic representation of power distribution and facilitating timely interventions to address imbalances. Additionally, sequential power analysis offers a nuanced understanding of the factors influencing power relations, enabling more targeted and effective strategies for enhancing community engagement and achieving responsible forest management goals. Sequential Power Analysis analysis is conducted sequentially or step-by-step to understand how power is distributed, exercised, and evolved over time through a particular process or initiative. Sequential Power Analysis helps identify who holds influence, authority, or control over decision-making, resource allocation, and other key aspects of a situation[14-16]. This method is particularly valuable for uncovering how power relationships change and affect outcomes at different stages of a process. By sequentially examining power dynamics, this study provides insights into the evolution of power structures and can inform strategies for addressing power imbalances and enhancing the effectiveness of initiatives. Sequential Power Analysis is frequently used in fields such as participatory development, policy analysis, conflict resolution, and organizational management[17-19]. In the context of participatory forest management, Sequential Power Analysis is a valuable tool for understanding the nuances of power relationships and their evolution over time. This understanding can inform strategies for enhancing the effectiveness, equity, and sustainability of PFM initiatives. While the cited studies employ a sequential power analysis to assess social outcomes from forestry in various contexts, certain weaknesses warrant consideration. The studies predominantly focus on specific regions, such as Indonesia and Bangladesh, potentially limiting the generalizability of their findings to diverse sociocultural settings. Additionally, the temporal scope of the analyses may not capture long-term power dynamics adequately. Furthermore, the studies lack a comprehensive examination of the intersectionality of power relations within polycentric and multi-level forest governance. Therefore, more context specific studies are required and it will be interesting to examine Kenya's case.

2.5 The Context for Participatory forest management and Sequential Power Analysis in Kenya

Trees and forests hold significant importance as key national assets in Kenya, given their ecological and socioeconomic value. The forest sector in Kenya plays a crucial role in supporting the livelihoods of more than 82% of households, providing direct employment to over 750,000 Kenyans. Additionally, it offers indirect benefits to over four million citizens, contributing approximately USD 365 million, equivalent to 3.5% of the GDP[20]. However, Kenya has a low forest cover compared with the recommended minimum global standard of 10%[20]. Deficient governance, unsustainable resource exploitation, excessive dependence on forest products, wildfires, and the escalating impacts of climate change have intensified the issues of deforestation and forest degradation in Kenya[20]. With a population growth rate of 2.7%, Kenya anticipates reaching 66.3 million people by 2030. This demographic increase poses challenges to the sustainable use of forest resources and the potential

expansion of farm forests. In 2014, a study by the GATSBY Charitable Fund indicated that Kenya faced a national wood deficit of 12 million cubic meters, a figure projected to escalate to 34.4 million cubic meters by 2030. In response, the Kenya Kwanza administration's bottom-up economic model prioritizes achieving a 30% national tree cover by 2032. This initiative aims to create more job opportunities, enhance livelihoods, build resilience to climate change, and foster economic growth, aligning with the Vision 2030 framework[20]. Socio-culturally, Kenya has various ethnic groups, each contributing distinct perspectives, traditional knowledge, and customary practices related to forest interaction. The diverse cultural fabric influences community dynamics, governance structures, and decision-making processes regarding forest resources. The 2021 National Forest Resource Assessment determined that Kenya's national tree cover stands at 12.13%, while the forest cover is recorded at 8.83%[21]. Kenya's president introduced a new national aspiration to reach a 30% tree cover by 2050. However, on October 20, 2022, the president issued a directive to expedite the achievement of the 30% tree cover target by 2032. The strategy involves the production of 15.9 billion high-quality seedlings in both public and private tree nurseries by 2032. This will be realized through increased high-quality seed production facilitated by entities such as KEFRI, the Kenya Forest Service (KFS), other government departments, and the private sector. Additionally, the strategy aims to elevate the national tree cover by 17.8% (10,579,062.51 hectares) by 2032, with a specific focus on safeguarding, preserving, and rehabilitating public natural forest reserves[21]. The initiative aims to increase forest cover in non-reserve natural forests and commercial plantations, as well as encourage tree planting on farmlands (agroforestry), arid and semi-arid lands (ASALs), schools, institutions, urban areas, green spaces, roads, highways, and infrastructure projects. Public education and awareness campaigns have been heightened. Furthermore, there will be a focus on advancing technologies for wood utilization, forest management, and strengthening forest governance. This involves enhancing the institutional capacities of the Ministry of Environment and Forestry (MEF), Kenya Forest Service (KFS), Kenya Wildlife Trust Authority (KWTA), and the Council of Governors (CoG) to ensure effective coordination and project implementation[21]. In an effort to reduce its dependence on domestic forest products within crucial economic sectors, Kenya has positioned itself as a global and regional trader in forest products. The country is dedicated to playing a role in climate change mitigation and adaptation, aligning with the requirements of the Paris Climate Change Agreement and the United Nations Framework Convention on Climate Change (UNFCCC). Kenya's commitment involves a 30% reduction in greenhouse gas (GHG) emissions by 2030, as outlined in its Nationally Determined Contributions (NDCs). The 2010 Kenyan Constitution acknowledges the imperative to attain and sustain a national tree cover of at least 10%. This goal also aligns with Kenya's commitment to restoring 5.1 million hectares of forest and degraded landscapes, contributing to the African Forest Landscape Restoration Initiative (AFRI 100) target and the NDC objective of a 32% reduction in greenhouse gas emissions by 2030, compared to a business-as-usual scenario[22].

2.6 The Evolution of PFM and Empirical Findings in Kenya

Kenya established a policy framework for promoting collaborative forestry through the Forest Conservation and Management Act of 2016, which provided a legal foundation for community engagement in forest management. Various community forestry groups actively participate in managing and conserving forest resources, contributing significantly to improved livelihoods, decision participation, and the implementation of forest management actions[23]. Moreover, Kenya's devolution process, initiated in 2013, decentralized some forest management functions to county governments, aiming to enhance local involvement and decision-making, resulting in each county adopting a unique approach to Participatory Forest Management[23]. However, persistent challenges include inadequate funding for community-led initiatives, conflicts between adjacent forest communities and conservation

agencies, illegal logging, and limited capacity and technical expertise within community groups. Nonetheless, the primary objectives of Participatory Forest Management in Kenya revolve around biodiversity conservation, sustainable resource utilization, and poverty reduction among forest-dependent communities, aligned with broader conservation and sustainable development goals[23]. Thygesen et al.[24] conducted 34 semi-structured interviews to establish a power imbalance between a community forestry and the Nyeri County government. The CFA lacked substantial authority, as all significant powers and advantages remain vested in the local government (county government). Furthermore, the research highlighted that the community forestry group inadequately represented the community forestry groups and had limited accountability relationships with group members. Additionally, there are shortcomings in the planning process, particularly in terms of participation and inclusivity. The study recommends redefining the role and authority of CFAs, revising the framework for benefit distribution, and enhancing the inclusiveness and participatory nature of the PFM process. Chomba et al.[25] used the unified theory of empowerment and found that national forest policies and stakeholders delegated limited authority to local communities to carry out forest protection and conservation responsibilities while retaining legislative control and economic benefits at the central level. Additionally, at Ngare Ndare, there was a significant bias in the CFA representation, favoring small, already influential local elites. This study called for the empowerment of local communities through adequately representative institutions. From the foregoing review, despite the positive impacts of PFM, the reviewed literature shows that with the changing socioeconomic matrices in the country, there are no studies that have explored the power dynamics of PFM using SPA. Such studies will be crucial to ensuring equitable, effective, and sustainable outcomes by addressing power imbalances and fostering inclusive decision-making processes, hence the need for this study.

3. Research Methodology

3.1 Research Design

This study uses a case study research design to evaluate the implications of using Sequential Power Analysis to analyze power relations in the two case studies. This choice was informed by the fact that Participatory Forest Management involves complex and context-specific challenges that often require an in-depth understanding of the unique factors at play. A case study design allows for an in-depth examination of a specific case. It provides a comprehensive understanding of the complexities and contextual factors, including those involved in participatory Forest Management. The design focuses on understanding the specific contexts, processes, and outcomes in participatory forest management.

3.2 Research Locale

3.2.1 Case Study No. 1: Embaringo Forest Block in Muringato Forest Station

Embaringo Forest covers 11,225 ha and is a state forest managed by the KFS. The Embaringo Forest Reserve is rich in biodiversity and has potential for ecotourism and recreational development. However, owing to their unsustainable use, forests are under constant threat of degradation. To reverse degradation, communities living adjacent to the forest have established the Embaringo CFA as an avenue for restoration efforts under the PFM approach. In the current CFA management structure for blocks under the Muringato Forest Station, there are three forest blocks: Embaringo, South Laikipia/Tanyai, and Muringato Nursery/Nyeri forests. However, the last CFA election took place in 2012. Elections were conducted at two levels. First, there were primaries to elect representatives at the forest beat level, and five members were elected. The second level elects the overall CFA leadership, known as the Executive Committee. The executive comprises eleven (11) members and is elected from the forest beat

representatives. At the forest block level, there is a subcommittee with three (3) members, consisting of the chairperson, secretary, and treasurer. This subcommittee links each forest block with the umbrella CFA for the Muringato Forest Station[26].

Unfortunately, no CFA elections have been held in the Embaringo Forest Block since 2012. This is despite the stipulation that CFA elections take place every three years in accordance with the PFM guidelines of the country. Interestingly, CFA members at the forest block level meet quarterly to discuss emerging issues affecting the sustainable management of their forest blocks. A quick analysis of the achievements of the 2014–2018 participatory plan revealed that 71% of the planned activities were not implemented. However, the recent institutionalization of the Forest Level Management Committee (FLMC) is expected to ensure that the 2023–2027 participatory plan will be implemented for sustainable livelihoods[26].

The three forest blocks under the Muringato Forest Station cover diverse ecological zones and vast geographic areas. Managing these vast and diverse areas under one umbrella body poses challenges such as weak coordination and weak follow-up of planned activities. The blocks submitted a proposal to the KFS for each of the blocks to become a standalone forest block with a forest station and a CFA. The Embaringo CFA has 10 forest user groups and collects revenue for its operations, but this occurs in an ad hoc manner. However, recently, a decision was reached where CFA user groups would create bylaws to inform the implementation of the group's activities, including revenue collection and generation. Additionally, each user group reviews and revises the user group bylaws and writes them where they do not exist. Most CFA members participate in forest preservation activities, including fire control, management decision-making, and forest tree planting. This indicates the presence of goodwill among adjacent forest communities to promote forest conservation and management[26].

According to the current participatory plan, communities around Embaringo Forest are willing to contribute a portion of their income toward the conservation of the forest. Up to 71% of residents were willing to contribute to Kes. 500 for forest conservation. The community's willingness to contribute to forest conservation measures meant that they were aware of the tangible and intangible benefits of the forest. Various stakeholders are involved in the implementation, financial management, monitoring, and evaluation of Embaringo Forest. KFS wields authority to control the access and use of forest resources from the Embaringo forest block[26].

3.2.2 Case Study Area No. 2: Gathiuru Forest Station

Gathiuru Forest was gazetted in 1943 as a state forest under the Mount Kenya Forest Reserve and covers an area of 14,985 ha. It is managed by the KFS. The Gathiuru Forest is critical in sustaining the livelihoods of the community living adjacent to this forest, as it provides water for domestic, livestock, and agriculture; grazing resources; fuelwood; food security through the Plantations Establishment and Livelihoods Improvement Scheme (PELIS) program; and income-generating nature-based enterprises such as beekeeping. The Gathiuru Forest Adjacent Community, through the Gathiuru CFA, has played a key role in the conservation of Gathiuru Forest and has been actively involved in its management since the inception of PFM[27].

The CFA was formed in 2007 and registered with the Registrar of Societies in 2008. Membership was initially 4,000, but by 2020 it had decreased to 1,367. The CFA has two community-based organizations (CBOs): Gathiuru North CBO and Gathiuru South CBO. In addition, the CFA had 104 scouts, of which 27 were trained by the KFS and the Laikipia Wildlife Forum. Its constitution guides its operations and governance. The first PFM plan was written and launched in 2010 and endorsed by the KFS in 2011. Subsequently, the plan was reviewed in 2016 and 2022. Mount Kenya Gathiuru CFA has several user rights, including fuelwood, PELIS, fishing, herbs, grazing, nurseries, and ecotourism. There were 57 user groups used to facilitate governance at the grassroots level. Normally, the CFA receives revenue by charging fees for activities such as grazing, PELIS, and membership registration, as per the subsidiary

rule in its constitution. Some of the benefits that the CFA used to get from the forest were used to build a CFA office and to give scholarships to the members' students who had performed well but were not able to pay school fees. The CFA also has income-generating activities funded by the Green Zone Development Support Project, such as rabbit keeping, beekeeping, and soap production[27].

Despite the aforementioned benefits, CFA members continue to experience challenges such as delays in signing forest management agreements with the government, frequent forest fires, livestock destruction in young forest plantations, leadership wrangles and political influence, poor tree nursery infrastructure, and the exploitation of PELIS by middlemen. Interestingly, most adjacent forest communities are willing to pay between Ksh.1- 499 for conservation activities. This state of affairs indicates a huge opportunity for the conservation and restoration of the Gathiuru Forest. The Gathiuru Forest Station has several stakeholders who participate in its management and conservation in different ways. Some stakeholders are directly involved in management, such as the KFS, CFA, and Nature Kenya[27].

3.3 Data Sources and Collection Process

This study used secondary qualitative data to evaluate the implications of applying SPA to PFM in Kenya using document content analysis. The secondary data examined in this study included the key policy documents reviewed and other documents retrieved from official websites. The data were analyzed qualitatively to determine the implications of this study. Document content analysis was a systematic process that included identifying pertinent documents, choosing a sample for examination, creating coding schemes or categories to structure the data, and methodically scrutinizing the content to derive conclusions related to the research question. The data collection processes, including document review, research location, and administration, This research was executed between May and September 2023 for strategic reasons aligned convenience on the part of the researchers.

3.4 Research Instrument

A textual analysis procedure was developed to comprehend Participatory Forest Management Initiatives in Kenya, following a systematic process to extract and analyze relevant documents. In the document selection criteria phase, researchers identified pertinent documents such as police reports, project reports, and meeting minutes, ensuring a comprehensive coverage of Participatory Forest Management initiatives in Kenya. The subsequent data extraction step involved isolating pertinent sections related to implementation cases and incorporating details on methodologies, strategies, and key actors. The coding scheme is designed to categorize textual data into themes like "Community Involvement," "Policy Framework," and "Environmental Impact." The power analysis indicators integrate measures of power dynamics, tracking shifts, decision-making authority, and stakeholder influence. The Sequential Analysis approach identified the evolving patterns and improvements over time, while sustainability implications scrutinized sections pertaining to the impact on forest management. The contextual analysis considered broader social, economic, and environmental factors influencing implementation outcomes. The interpretation and synthesis phase analyzed coded data, drawing meaningful conclusions and showcasing implications for forestry. The validity and reliability checks ensured accurate representation through independent coding and cross-verification. Ultimately, the reporting phase presented a comprehensive report, elucidating key findings and emphasizing how Sequential Power Analysis contributes to understanding forestry in the Kenyan context.

3.5 Data Gathering Procedures

Information on PFM and SPA was gathered from existing literature through desktop search engines, particularly Google, and official records. In the desktop search, relevant keywords such as "PFM," "sustainable forest management," "SPA," "equity," and other pertinent terms were used. Advanced search techniques, including quotation marks (") for exact phrases and the minus sign (-) to exclude specific keywords, were employed when necessary. Notes were taken to document the reference sources. Subsequently, the collected information was synthesized and utilized to formulate insights and support the arguments presented in this study. Progress data on PFM implementation in the two cases were acquired from records at the Kenya Forest Service (KFS) Office. Additional secondary data were obtained by reviewing key policy documents outlined in [Table 1], providing further context for this study. The selection of key policy documents and secondary data sources in this research involved a systematic review of relevant literature, consultation with experts, and prioritizing sources with comprehensive insights and empirical relevance. In selecting key policy documents and secondary data, the inclusion criteria focused on relevance, recency, and empirical depth, whereas exclusion criteria considered outdated or non-peer-reviewed sources. The documents in [Table 1] offer a contextual overview of the application of Participatory Forest Management (PFM) in Kenyan forest management. Extracted from KFS Office Records, they form a critical foundation for a sequential power analysis. Notably, the National Forest Programme 2016-2020 emphasizes the need for specific PFM-related information, while the Forest Conservation and Management Act 2016, underscores the institutions responsible for PFM. The Draft National Strategy for Achieving and Maintaining 30% Tree Cover by 2032 evaluates the integration of PFM into long-term visions. The Draft Participatory Forest Management Plans provide nuanced, context-specific insights. Relying on document reviews, this study finds documents indispensable for efficiently analyzing historical, scientific, and social aspects of PFM.

[Table 1] Key Policy Documents

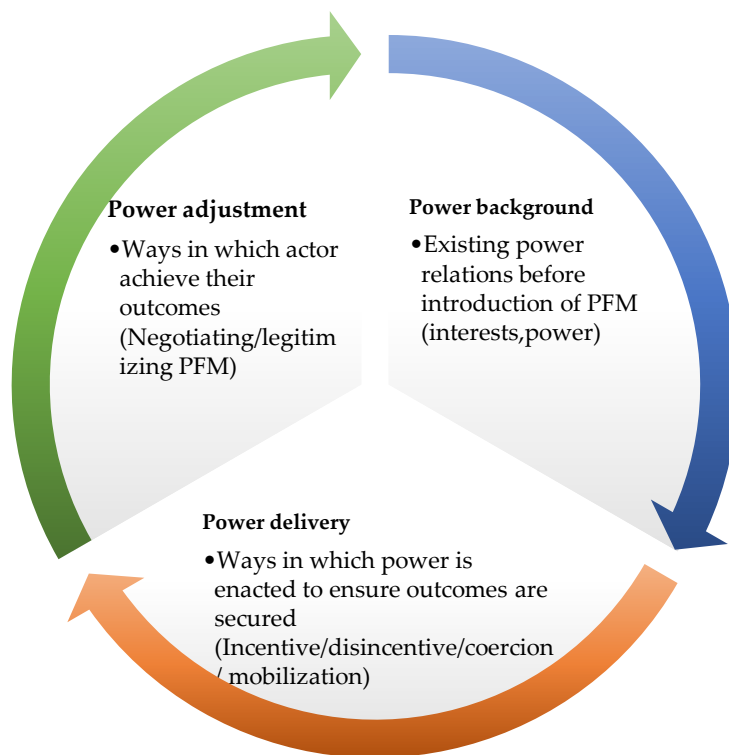
No.	Name of document	Information sought	Source
1.	Draft Participatory forest management plan 2023-2027 for Embaringo forest block [26]	Information on PFM	KFS Office Records
2.	Draft Participatory Forest Management Plan 2023-2027 for Gathiuru Forest Station [27]	Information on PFM	KFS Office Records
3.	Draft National Strategy for Achieving and Maintaining 30% Tree cover by 2032 (28)	Whether PFM is enshrined in long-term visions	KFS Office Records
4.	National Forest Programme 2016-2020 [29]	Information on PFM	KFS Office Records
5.	Forest Conservation and Management Act, 2016 [30]	The institutions responsible for developing and applying PFM	KFS Office Records

3.6 Data Analysis

The data obtained through document content or textual analysis encompassed different aspects of SPA within PFM, including power background, power delivery, power adjustment, and influential power patterns. [Fig. 1] outlines the analytical framework that emerged from themes identified in a literature review examining how SPA assesses PFM outcomes. This framework was then applied to Kenya to derive the policy implications presented in this study. As depicted in [Fig. 1], SPA deconstructs the power structure of PFM, contributing to a deeper comprehension of PFM outcomes.

Document content analysis was chosen as the research method due to its cost-effectiveness compared to alternatives such as surveys or experiments. This approach utilizes existing data, eliminating the need for researchers to gather new information. Unlike surveys or experiments, document analysis doesn't

necessitate direct interaction with participants, making it valuable for studying sensitive topics or when researchers aim to avoid influencing participant behavior. The objectivity of document content analysis stands out compared to other research methods, as it relies on the content of documents rather than the researcher's interpretation of the data. While the methodology centered on document content analysis, it acknowledges the absence of quantitative data. Although quantitative data could provide valuable statistical insights, limitations in the availability of documents led to their exclusion. This absence constrains statistical analyses, impacting the study's depth.



[Fig. 1] SPA Analytical Framework for PFM Outcomes at Gathiuru and Embaringo Forests in Kenya

4. Results

[Table 2] and [Table 3] outline the broad phases of SPA, key indicators, and findings in each case when the analytical framework for SPA was applied to the two Kenyan PFM case studies. [Table 1] lists the power community structures in the Embaringo Forest Block. From [Table 2] shows the power analysis in Participatory Forest Management unveils complexities characterized by historical disempowerment, regulatory imbalances with Kenya Forest Service, market-driven pressures on charcoal production, and the pivotal role of Community Forest Association. Despite capacity gaps, the CFA engages in participatory negotiations, yielding socioeconomic benefits, yet hindered by the absence of a national benefit-sharing policy.

[Table 2] The Status of PFM and SPA at Embaringo Forest Block in Muringato Forest Station

Power phase	Key indicators	Findings
Power background	Historical and sociocultural factors	<ul style="list-style-type: none"> Historical disempowerment and lack of involvement in forest management decisions There are no formal conflict resolution mechanisms.

	Existing powerful actors and institutions	<ul style="list-style-type: none"> • Historical disempowerment and lack of involvement in forest management decisions • There are no formal conflict resolution mechanisms.
	Regulatory power	<ul style="list-style-type: none"> • KFS is the regulator of forest resource use and develops guidelines for PFM. • Lack of national benefit-sharing policy perpetuating power imbalances
	Market-driven power	<ul style="list-style-type: none"> • Local demand for charcoal sometimes increases rates of illegal charcoal production.
Power delivery	Actors who maintain a powerful influence	<ul style="list-style-type: none"> • CFA has decision-making authority on forest resource access and use. • CFA has a financial dependency on donor funding. • CFA has capacity gaps, including a lack of technical skills in forest management, finance management, and mobilization.
	Delivery actions (initiatives, programs)	<ul style="list-style-type: none"> • CFA has not had elections to choose new executive officials. • There is limited evidence of joint implementation of projects with KFS.
	Coalitions and oppositions	<ul style="list-style-type: none"> • For instance, there are records of joint project implementation in seedling production. • There are joint forest patrols to deter illegal activities.
	Agreements	<ul style="list-style-type: none"> • A forest management Agreement (FMA) is a formal collaborative agreement document that outlines the rights, roles, and responsibilities of parties to the agreement.
	Negotiation process and mechanisms	<ul style="list-style-type: none"> • The FMA negotiation process is participatory. A local planning team (LPT) is formed to negotiate on behalf of the community.
Power adjustment	Actions for legitimizing PFM	<ul style="list-style-type: none"> • The CFA conducts capacity building of its members • Conflict resolution committees exist in the CFA ranks.
	Practical outcomes from negotiation (benefit and cost-sharing)	<ul style="list-style-type: none"> • Substantial socioeconomic and environmental benefits, but sharing is affected by lack of a national policy for benefit and cost-sharing.

4.1 The Status of PFM and SPA at Gathiuru Forest Station

From a SPA perspective, the findings reveal a complex power dynamic within PFM at the Gathiuru Forest Station, as shown in [Table 3]. Critical power dynamics emerge. Historical disempowerment persists, exacerbated by the absence of conflict resolution mechanisms. Powerful actors, such as the Kenya Forest Service (KFS), and support from NGOs shape the landscape. While KFS holds regulatory power, the lack of a national benefit-sharing policy sustains imbalances. The Community Forest Association (CFA) has decision-making authority in the power delivery phase but faces capacity gaps and financial dependency. Despite initiatives, the absence of a national policy hinders effective benefit-sharing from participatory negotiations, revealing challenges in PFM dynamics.

[Table 3] The Status of PFM and SPA at Gathiuru Forest Station

Power phase	Key indicators	Findings
Power background	Historical and sociocultural factors	<ul style="list-style-type: none"> Historical disenfranchisement and lack of involvement in forest management decisions There are no formal conflict resolution mechanisms.
	Existing powerful actors and institutions	<ul style="list-style-type: none"> KFS has the authority to grant access and use of forest resources. NGOs and International Organizations provide funding, technical expertise, and capacity building to the CFA.
	Regulatory power	<ul style="list-style-type: none"> KFS is the regulator of forest restriction use and develops guidelines for PFM. Lack of national benefit-sharing policy perpetuating power imbalances
	Market-driven power	<ul style="list-style-type: none"> Brokers and traders in PELIS produce have emerged as intermediaries.
Power delivery	Actors who maintain a positive influence	<ul style="list-style-type: none"> CFA has decision-making authority on forest resource access and use. CFA is not authorized to extract timber resources. CFA has a financial dependency on donor funding. CFA has capacity gaps, including a lack of technical skills in forest management, finance management, and mobilization.
	Delivery actions (initiatives, programs)	<ul style="list-style-type: none"> The CFA has implemented a number of capacity-building projects to improve knowledge of forest management. The CFA has established a governance structure. CFA members are represented in the forest conservancy meetings and the KFS board of management. The CFA has several income-generating projects, e.g., rabbit keeping, beekeeping, and soap production.
	Coalitions and oppositions	<ul style="list-style-type: none"> For instance, there are records of joint project implementation in seedling production. There are joint forest patrols to deter illegal activities.
	Agreements	<ul style="list-style-type: none"> A forest management Agreement (FMA) is a formal collaborative agreement document that outlines the rights, roles, and responsibilities of parties to the agreement.
Power adjustment	Negotiation process and mechanisms	<ul style="list-style-type: none"> The FMA negotiation process is participatory. A local planning team (LPT) is formed to negotiate on behalf of the community.
	Actions for legitimizing PFM	<ul style="list-style-type: none"> The CFA conducts capacity building of its members Conflict resolution committees exist in the CFA ranks.
	Practical outcomes from negotiation (benefit and cost-sharing)	<ul style="list-style-type: none"> There are substantial socioeconomic and environmental benefits, but sharing is affected by the lack of a national policy for benefit and cost-sharing.

5. Discussion

PFM offers an avenue for meeting the balance between the ecological, social, and economic factors

of sustainable forest management; however, there is a need to evaluate the practices, key factors, and methods that evaluate the impact of PFM implementation in specific contexts. When the conceptual framework of SPA [Fig. 1] was applied to the two case studies, results from the Embaringo forest block in the Muringato Forest communities [Table 1] showed that in the power background phase, historical and sociocultural factors disempowered local communities, limiting their involvement in forest management and lacking conflict resolution mechanisms. Regulatory power is centered on the KFS, while the absence of a national benefit-sharing policy exacerbates power and resource benefit-sharing imbalances. Market-driven power appears to promote illegal charcoal production owing to local demand for energy resources. The results also show that in the power delivery phase, even though the CFA has decision-making authority, its dependency on donor funding and capacity gaps undermine its authority in decision-making processes. The results also indicate that the CFA has not held elections since the first cycle of the PFM and that joint project implementation with the KFS is limited. The Forest Management Agreement formalized the role of the CFA in PFM. Still, the power-adjustment phase, participatory negotiation, and legitimacy-building actions were affected by limited benefit-sharing due to the absence of a national benefit-sharing policy [Table 1]. These results concur with the findings of Thygesen et al.[24] and Chomba et al.[25], who castigated PFM for transferring limited power to CFAs. Bisui et al.[9] also criticized PFM on this account. Nevertheless, findings from the Embaringo Block at the Muringato Forest Station underscore the need for systemic changes to address historical power imbalances, promote inclusivity, and ensure an equitable distribution of benefits in PFM initiatives. Other studies on PFM have also recommended that policymakers and other stakeholders consider these findings to create a more equitable and effective framework for managing forest resources[9][24][25].

At Gathiuru Forest Station, the results show that in the power background phase, historical and sociocultural factors have marginalized local communities, hindering their involvement in forest management, lacking conflict resolution mechanisms, and deepening power imbalances [Table 2]. An assessment of existing powerful actors and institutions revealed that the KFS wields the authority to grant forest resource access and use. NGOs and international organizations also significantly participate in strengthening the CFA through funding and capacity building. However, the regulatory power of forest use and access rests with the KFS. In the absence of a national benefit-sharing policy, this situation perpetuates unequal resource distribution, thus affecting the CFA power structure. The sale of key products by PELIS involves intermediaries that influence the potato market. In the power delivery phase, the CFA has some decision-making authority but lacks timber extraction rights. Dependency on donor funding and capacity gaps challenge autonomy, although the CFA has implemented capacity-building initiatives and income-generating projects. Coalitions and opposition are evidenced through joint project implementation and forest patrols, in which KFS rangers patrol the forest alongside CFA scouts. Agreements formalize roles through the Forest Management Agreement (FMA) which includes participatory negotiation processes and legitimacy-building actions that address internal imbalances. In general, practical outcomes show some significant socioeconomic and environmental benefits accrued to the community, but the absence of a national benefit-sharing policy hampers equitable distribution and power-sharing. These findings are in line with those of many other studies that have highlighted the positive impacts of PFM[3][20][22][23][28]. However, the findings from Gathiuru Forest Station underscore the importance of addressing historical power imbalances, formalizing agreements, and strengthening community capacity to foster more equitable and effective PFM [20][23-26].

Findings have revealed similarities and differences in power dynamics, outcomes, and recommendations. In the power background phase, both cases showcased historical and sociocultural factors marginalizing local communities, limiting their involvement, and deepening power imbalances. Regulatory power was centered on the Kenya Forest Service (KFS), exacerbating resource distribution inequities. Market-driven power in Embaringo led to illegal charcoal production, influenced by local energy demands. In the power delivery phase, the Community Forest Association (CFA) faced

challenges in decision-making authority and joint project implementation due to donor dependency. Limited benefit-sharing persisted, emphasizing the absence of a national policy. Gathiuru highlighted KFS's regulatory authority, impacting the CFA's power structure.

Practical outcomes demonstrated benefits, but the lack of a national benefit-sharing policy hindered equitable distribution. Comparatively, for both CFAs, the beneficial social, economic, and environmental outcomes from PFM are still dismal. Both cases underscored the need to address historical imbalances, formalize agreements, and enhance community capacity for effective participatory forest management. Whereas there could be other reasons for the revealed power imbalances, in this study, this state of affairs may have been perpetuated by the long-established tradition of community disempowerment perpetuated by the earlier colonial legacies of state-driven forest management. Kenya's colonial legacy has left a lasting imprint on forest management, with many Indigenous communities continuing to face disempowerment, limited participation, and unequal access to forest resources. Addressing these historical injustices and building more inclusive and equitable forest management systems are complex and ongoing challenges. However, in this study, the authors submit that failing to conduct timely elections for an Embaringo CFA presents a constellation of risks that warrant careful SPA. First, delayed elections can lead to a leadership vacuum, impeding effective decision-making and responses to emerging issues within community forests. This, in turn, may escalate into internal conflicts and divisions, eroding trust between CFA members and stakeholders. Legal and regulatory risks also loom large, as non-compliance with election requirements can result in legal challenges or loss of official recognition. Resource mismanagement has become a genuine concern in the absence of elected representatives, jeopardizing sustainable harvesting practices and revenue-sharing mechanisms. Moreover, accountability diminishes, governance becomes inefficient, and community engagement dwindles, all of which can adversely affect a community's economic well-being and conservation efforts. Timely elections are the linchpin of effective CFA governance, ensuring transparency, accountability, and sustainable forest management, whereas failure to conduct them can trigger a cascade of interconnected risks. Although the Embaringo Community Forest Association appears to suffer the most, the Gathiuru Community Forest Association appears to be on the path toward correcting these power imbalances in view of positive PFM outcomes. The CFA has several income-generating projects, including rabbit keeping, beekeeping, and soap production. Moreover, there is joint project implementation with the KFS; for instance, community scouts conduct forest patrols alongside KFS rangers.

To amplify the benefits of PFM for communities in the Gathiuru and Embaringo Forests, there is an urgent need to enact a national benefit-sharing policy. Establishing a national benefit-sharing policy for PFM is of paramount importance for Kenya. This policy serves as a foundational framework to ensure that the benefits derived from forest resources are distributed fairly and equitably among all stakeholders, including local communities. In a country with rich forest ecosystems, this policy not only incentivizes forest management practices but also fosters social and economic development. Providing clear guidelines for benefit allocation helps to reduce conflicts over resource access and encourages the active participation of local communities in conservation efforts. Additionally, a well-designed benefit-sharing policy can contribute to poverty alleviation, empower marginalized groups, and promote the long-term sustainability of Kenya's forests, which are vital for biodiversity conservation and climate change mitigation. Ultimately, this reinforces the principles of fairness, transparency, and inclusivity in the governance of Kenya's forests and aligns them with international best practices for forestry.

Developing a national benefit-sharing policy to facilitate sequential power analysis in participatory forest management in Kenya involves several practical steps. First, stakeholder engagement is crucial, involving local communities, government agencies, NGOs, and other relevant entities to ensure diverse perspectives are considered. Conducting comprehensive consultations and participatory workshops can help identify key issues and priorities. Next, a thorough review of existing policies and legal frameworks

is essential to ensure alignment and avoid contradictions. The policy should clearly outline mechanisms for equitable benefit distribution, specifying the roles and responsibilities of different stakeholders. Additionally, incorporating feedback loops and regular reviews ensures adaptability to changing circumstances. Implementing effective monitoring and evaluation mechanisms helps track the policy's impact on power dynamics and benefit-sharing over time. Lastly, transparency and inclusivity in the policy development process are paramount to building trust among stakeholders, fostering collaboration, and ultimately promoting more sustainable and equitable participatory forest management practices in Kenya. These practical steps are in line with the need for proper institutions that will promote PFM [13] [17] [18] [20] [21].

However, and perhaps most importantly, the results from the Embaringo and Gathiuru CFA show that SPA is a crucial tool for evaluating PFM in Kenya, as it addresses the inherent disparities in decision-making processes and resource allocation within the sector. The SPA shows that Kenya's forests are vital for environmental conservation, livelihood, and biodiversity preservation. However, historically, access to and control over these resources has often been skewed, with powerful stakeholders dominating decision-making and marginalized communities facing limited participation. SPA helps identify these imbalances, shedding light on who holds influence, who is excluded, and how decisions are made. By understanding power dynamics, stakeholders can work toward a more equitable and inclusive approach to forest management, ensuring that the voices and needs of all communities, especially indigenous and local communities, are considered and respected [19]. There is also the need for empowering local communities for a more active role in decision-making in participatory forest management involves several strategies. First, there should be efforts to enhance community capacity through education and training, enabling them to understand their rights, responsibilities, and the intricacies of forest management. Establishing clear and legally recognized rights for local communities over forest resources ensures their meaningful participation. Additionally, fostering inclusive and transparent communication channels between communities and relevant stakeholders promotes informed decision-making. Implementing mechanisms for community engagement in the entire decision-making process, from planning to implementation, is crucial. Sequential power analysis plays a pivotal role in this empowerment by providing a structured framework to assess and understand power dynamics over time. The potential benefits of sequential power analysis include the ability to identify and address imbalances, enhance community involvement, and improve the effectiveness of participatory forest management initiatives. It offers a tool to strategically allocate decision-making authority, promote equitable benefit-sharing, and ultimately contribute to more sustainable and community-driven forest management practices. This will ultimately enhance the sustainability of Kenya's forests, benefiting both the environment and the people.

6. Conclusion

This study used Sequential Power Analysis on two cases of implementing Participatory Forest Management initiatives in Kenya to showcase the implications for sustainable forest management. The results have revealed that the journey toward responsible forestry in Kenya is intricately linked to a delicate balance between ecological, social, and economic factors. PFM has emerged as a promising approach to achieving this balance. However, a comprehensive evaluation of PFM implementation in two distinct case studies—the Embaringo and Gathiuru CFAs using SPA—uncovered a complex web of historical, sociocultural, and regulatory factors that have shaped the power dynamics within the forest management landscape.

In Embaringo, historical factors deepen community disempowerment, worsened by the lack of conflict resolution mechanisms. Regulatory power with the Kenya Forest Service and no national benefit-sharing policy amplify imbalances. In Gathiuru, despite historical imbalances, the community

engages in income-generating projects, but the absence of a national benefit-sharing policy impedes equity. Despite positive outcomes, historical power imbalances persist, hindering community impact. The study advocates for a national benefit-sharing policy aligning with global standards and highlights SPA's role in evaluating and transforming Kenya's forest management. Subsequent research endeavors should undertake a quantitative examination of SPA applications and leverage diverse data sources for a more thorough analysis. One limitation of this study is its exclusive reliance on a bibliographic review, neglecting a direct analysis of public opinion through interviews with stakeholders engaged in Kenya's PFM process. This omission has led to a deficiency in both qualitative and quantitative data, hindering a more nuanced discussion and impeding a direct response to the research objectives. To address this, future studies can benefit from cross-referencing and employing varied data collection methods.

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References

- [1] G. Girma, Melka, Y. Hailelassie, A. Mekuria Participatory forest management for improving livelihood assets and mitigating forest degradation: Lesson drawn from the Central Rift Valley, Ethiopia *Current Research in Environmental Sustainability*, (2023), Vol.5, No.100205.
DOI: 10.1016/j.crsust.2022.100205
- [2] J. Liu, J. L. Innes, Participatory forest management in China: key challenges and ways forward. *International Forestry Review* (2015), Vol.17, No.4, pp.477-484.
DOI: 10.1505/146554815817476512
- [3] B. O. Adwar, M. J. Ogada, C. Masila, Drivers of Community Participation in Participatory Forest Management; An Evidence of Koderia Forest in Kenya. *East African Journal of Forestry and Agroforestry*, (2023), Vol.6, No.1, pp.254-261.
DOI: <https://doi.org/10.37284/eajfa.6.1.1410>
- [4] P. Blaikie, O. Springate-Baginski, Introduction: setting up key policy issues in participatory forest management. In *Forests People and Power*, Routledge, (2013), pp.23-46.
- [5] H. Luswaga, Nuppenau, E. A. Participatory forest management in west Usambara Tanzania: what is the community perception on success? *Sustainability*, (2020), Vol.12, No.3, 921.
DOI: <https://doi.org/10.3390/su12030921>
- [6] A. J. Uisso, P. W. Chirwa, P. A. Ackerman, S. S. Bakengesa, Do Community Perceptions of Forest Management and Conservation Vary Across wealth Groups? The Case of the Kilosa REDD+ Initiative in Tanzania, *Human Ecology*, (2023), Vol.51, No.2, pp.251-263.
DOI: <https://doi.org/10.1007/s10745-022-00385-7>
- [7] T. Cadman, T. Maraseni, U. A. Koju, A. Shrestha, A. Karki, Forest Governance in Nepal concerning Sustainable Community Forest Management and Red Panda Conservation. *Land*, (2023), Vol.12, No.2, pp.493.
DOI: <https://doi.org/10.3390/land12020493>
- [8] A. Ameha, H. Meilby, G. L. Feyisa, Impacts of participatory forest management on species composition and forest structure in Ethiopia, *International Journal of Biodiversity Science, Ecosystem Services & Management*, (2016), Vol.12, No.(1-2), pp.139-153.
DOI: <https://doi.org/10.1080/21513732.2015.1112305>
- [9] S. Bisui, S. Roy, B. Bera, P. P. Adhikary, D. Sengupta, G. S. Bhunia, P. K. Shit Economical and ecological realization of Joint Forest Management (JFM) for sustainable rural livelihood: a case study, *Tropical Ecology*, (2023), Vol.64, No.

- 2, pp.296-306.
DOI: <https://doi.org/10.1007/s42965-022-00275-5>
- [10] B. Gunawan, O. S. Abdoellah, F. Hadi, G. J. Alifi, R. N. Suhendi, I. Y. Aisharya, W. Gunawan From Laborers to Coffee Farmers: Collaborative Forest Management in west Java, Indonesia. *Sustainability*, (2023), Vol.15, No.9, p.7722.
DOI: <https://doi.org/10.3390/su15097722>
- [11] J. M. Nzau, E. Gosling, M. Rieckmann, H. Shauri, J. C. Habel, The illusion of participatory forest management success in nature conservation, *Biodiversity and conservation*, (2020), Vol.29, pp.1923-1936.
DOI: <https://doi.org/10.1007/s10531-020-01954-2>
- [12] A. N. Ayana, N. Vandenabeele, B. Arts, Performance of participatory forest management in Ethiopia: institutional arrangement versus local practices, *Critical Policy Studies*, (2017), Vol.11, No.1, pp.19-38.
DOI: <https://doi.org/10.1080/19460171.2015.1024703>
- [13] J. M. Nzau, W. Ulrich, M. Rieckmann, J. C. Habel, The need for local-adjusted Participatory Forest Management in biodiversity hotspots, *Biodiversity and Conservation*, (2022), Vol.31, No.4, pp.1313-1328.
DOI: <https://doi.org/10.1007/s10531-022-02393-x>
- [14] M. A. K. Sahide, M. R. Fisher, B. Verheijen, A. Maryudi, Y. S. Kim, G. Y. Wong, Sequential power analysis framework in assessing social forestry outcomes, *MethodsX*, (2020b), Vol.7.
DOI: [10.1016/j.mex.2020.100917](https://doi.org/10.1016/j.mex.2020.100917)
- [15] A. Wibowo, L. Giessen, Absolute and relative power gains among state agencies in forest-related land use politics: The Ministry of Forestry and its competitors in the REDD+ Programme and the One Map Policy in Indonesia, *Land use policy*, (2015), Vol.49, pp.131-141.
DOI: <https://doi.org/10.1016/j.landusepol.2015.07.018>
- [16] P. K. Sarker, M. D. Rahman, L. Giessen, Empowering state agencies through national and international community forestry policies in Bangladesh, *International Forestry Review*, (2017), Vol.19, No.1, pp.79-101.
DOI: <https://doi.org/10.1505/146554817820888618>
- [17] A. Maryudi, M. A. Sahide, Research trend: power analyses in polycentric and multi-level forest governance, *Forest Policy and Economics*, (2017), Vol.81, pp.65-68.
DOI: <https://doi.org/10.1016/j.forpol.2017.05.003>
- [18] M. Krott, A. Bader, C. Schusser, R. Devkota, A. Maryudi, L. Giessen, Actor-centred power: The driving force in decentralized community-based forest governance, *Forest policy and economics*, (2014), Vol.49, pp.34-42.
DOI: <https://doi.org/10.1016/j.forpol.2013.04.012>
- [19] M. A. K. Sahide, M. R. Fisher, S. Supratman, Y. Yusran, A. A. Pratama, A. Maryudi, Y. S. Kim, Prophets and profits in Indonesia's social forestry partnership schemes: Introducing a sequential power analysis. *Forest Policy and Economics*, (2020a), Vol.115, pp.102-160.
DOI: <https://doi.org/10.1016/j.forpol.2020.102160>
- [20] Ministry of Environment and Forestry, Taskforce Report on Forest Resources Management and Logging Activities in Kenya, (2018)
Available from: http://www.parliament.go.ke/sites/default/files/2019-09/REPORT%20ON%20LOGGING_compressed.pdf
- [21] KFS: Kenya Forest Service, National Forest Resource Assessment Report, (2022)
Available from: <https://www.kenyanews.go.ke/kenya-surpasses-10-tree-cover-assessment-report-2021-says/>
- [22] R. Mbeche, J. Ateka, R. Herrmann, U. Grote, Understanding forest users' participation in participatory forest management (PFM): Insights from Mt. Elgon forest ecosystem, Kenya, *Forest Policy and Economics*, (2021), Vol.129, pp.102-507.
DOI: <https://doi.org/10.1016/j.forpol.2021.102507>
- [23] J. M. Mutune, C. P. Hansen, R. G. Wahome, D. N. Mungai, What rights and benefits? The implementation of participatory forest management in Kenya: The case of Eastern Mau Forest Reserve, *Journal of sustainable forestry*, (2017), Vol.36, No.3, pp.230-249.

DOI: <https://doi.org/10.1080/10549811.2017.1289105>

- [24] S. H. Thygesen, T. Løber, E. M. Skensved, C. P. Hansen, Implementation of participatory forest management in Kenya: A case study of Karima Forest, *International Forestry Review*, (2016), Vol.18, No.3, pp.357-368.
DOI: <https://doi.org/10.1505/146554816819501673>
- [25] S. W. Chomba, I. Nathan, P. A., Minang, F Sinclair, Illusions of empowerment? Questioning policy and practice of community forestry in Kenya, *Ecology and Society*, (2015), Vol.20, No.3.
- [26] Draft Participatory forest management plan 2023-2027 for Embaringo forest block, Accessed from Kenya Forest Service Office Records.
- [27] Draft Participatory forest management plan 2023-2027 for Gathiuru Forest Station, Accessed from Kenya Forest Service Office Records.
- [28] Draft National Strategy for Achieving and Maintaining 30% Tree cover by 2032, Accessed from Kenya Forest Service Office Records.
- [29] National Forest Programme 2016-2020, Accessed from Kenya Forest Service Office Records.
- [30] Forest Conservation and Management Act, 2016. Accessed from Kenya Forest Service Office Records.