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Gender Struggles in Commons Governance: Access, Control, and Participation in Informal Charcoal Trade in Malawi

REVIEW ARTICLES

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ABSTRACT

In Malawi, limited access to reliable energy, environmental degradation and climate-related pressures intensify pressure on commons, making its governance a critical concern for energy security, environmental sustainability, and social equity. To understand how researchers have engaged these challenges, this review synthesized multidisciplinary evidence on the governance of the forest commons focusing on informal charcoal trading within Lilongwe River Upper Catchment. Using integrated feminist political ecology, commons governance studies, legal pluralism, and the critical zone perspective, the reviewed literature showed that while both men and women face risks of abuse and confiscation under the Forestry Act, women are disproportionately exposed to harassment by law enforcers. The review identifies a critical policy gap as the current legal frameworks focus on criminalization and enforcement but fail to address the underlying socio-economic situations and power dynamics of informal charcoal trade. This inadvertently perpetuates a cycle of vulnerability, illicit activities, and human rights abuses, thereby undermining both environmental sustainability and social equity as criminalization does not necessarily get rid of the underlying drivers of the trade, instead it reshapes how it is carried out, increasing vulnerability among marginalized populations. The study proposes that the interplay of these gendered struggles is not inseparable from broader critical zone degradation, affecting habitable futures. The paper calls for gender-responsive, participatory, and ecologically informed governance interventions that reconcile livelihood security with long-term environmental sustainability.

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INTRODUCTION

What drives gender struggles in commons governance? This review of existing literature aims to identify the missing link in policy implementation that impedes sustainable and equitable interventions. It aims to identify existing problems and missing links in the literature, particularly within the informal charcoal trade and to understand gender struggles around charcoal trade within LRUC. Drawing on the Critical Zone concept to connect the complex, systemic relationship between urbanization, environmental degradation, and gender inequality, this review addresses both the urgent need for environmental sustainability and the pressing requirement for social equity, thereby creating a policy foundation that avoids merely criminalizing poverty in Malawi.

DEFINING GENDERED ACCESS, CONTROL, AND PARTICIPATION IN COMMONS

Understanding gender struggles in commons governance requires a clear conceptual understanding of the nexus between gender dynamics and natural resource management. Commons governance refers to the ways in which shared resources are organized and managed through a combination of rules, institutions, and social relationships (Serres, 2022). It goes beyond formal government policies to include customary norms, everyday practices, and informal arrangements that influence who can access resources, who has the power to make decisions about them, and who is included or left out of these processes (Partelow & Manlosa, 2023).

To meaningfully understand that nexus in terms of gendered relations, it is valuable to define the key dimensions of access, control, and participation. *Access* refers to the ability of individuals or groups to use natural resources, which is profoundly influenced by social norms, legal frameworks, and physical proximity to the resources (Aguilar et al., 2015; Modern Cooking for Healthy Forests, 2023). According to Kiptot (2015), women's access to firewood is dictated by their traditional roles in household energy provision, and their physical access is increasingly constrained by deforestation. *Control* denotes the power to make decisions over resources, including ownership rights, management practices, and the allocation of benefits (Homung & Hoge, 2021; Ristyawan et al., 2023). Control over resources is heavily skewed by patriarchal norms and customary laws that often grant men principal land and resource ownership, limiting women's autonomy over the very resources they depend on (Sikor & Lund, 2010; García-Morán & Yates, 2022). *Participation* involves active engagement and influence in governance mechanisms, ranging from local community-based natural resource management (CBNRM) initiatives to national policy formulation (Clayton et al., 2017; Clayton, 2024). These three dimensions are complexly shaped by gender roles and relations, which dictate who can access what, who can decide, and whose voice is genuinely heard in resource governance (Markus, 2020).

CHARCOAL IN ENERGY ECONOMIES OF SUB-SAHARAN AFRICA AND MALAWI

Commons governance represents a crucial intersection for sustainable livelihoods and environmental stability across Sub-Saharan Africa (Tucker et al., 2023). Within this region, charcoal maintains a profound and unavoidable importance in household energy economies, acting as the primary cooking fuel for urban populations, including Malawi's capital, Lilongwe, due to the high cost of alternatives and pervasive electricity unreliability (Kamanga, Vedeld, & Sjaastad, 2009). Lilongwe's rapid urbanization, characterized by substantial informal settlements and strained basic services (UN Habitat, 2011), only intensifies this demand, making reliance on charcoal not a choice, but an economic necessity.

This dynamic establishes charcoal as an indispensable, albeit environmentally problematic, source of energy, thereby creating an acute and sustained conflict between human welfare, economic growth, and ecological preservation that sets the stage for governance struggles at the urban-rural interface. Charcoal trading among rural women provides income as a livelihood strategy. Recent studies around Dzalanyama forest have shown that human activities are posing a threat to the forest ecosystem, leading to degradation (Makwinja & Kimengsi, 2025; Makwinja & Mkhwimba, 2025). The policy frameworks about forests management in Malawi restrict access to forest materials. This forces local traders to venture into forests during the night, risking lives. Women who operate in low-capital value chains, face disproportionate impacts of these legal enforcements. These gendered struggles are inseparable from broader Critical Zone degradation, as deforestation and soil erosion, driven by urban energy demand, consequently, undermines hydrological stability and habitability across the Lilongwe River Upper Catchment (LRUC). Existing studies have documented environmental degradation and livelihood dependence on charcoal, but less attention has been paid to how overlapping governance systems, gendered power relations, and ecological change interact to shape access to resources, control over resources, and vulnerability among informal traders in the LRUC. Addressing these gaps requires an analytical framework capable of linking environmental change with institutions, power relations, and gendered experiences of resource governance.

RESEARCH GAPS AND THE NEED FOR AN INTEGRATED APPROACH

Although substantial research has examined charcoal production, forest degradation, and energy poverty in Sub-Saharan Africa, important analytical gaps remain. First, much of the literature treats charcoal trade primarily as an environmental or economic issue, with insufficient attention to the gendered power relations that shape access to resources, decision-making authority, and livelihood opportunities. Second, studies often focus either on formal forest governance institutions or on local livelihood strategies, without adequately examining how overlapping statutory and customary systems produce unequal outcomes for different social groups. Third, while environmental degradation associated with charcoal production is well documented, less attention has been given to how ecological change interacts with social inequalities, particularly gendered vulnerabilities, within interconnected socio-ecological systems.

These gaps are especially relevant in the LRUC, where increasing urban demand for charcoal, environmental degradation, and restrictive forest governance policies intersect with existing gender inequalities. To address these limitations, this review draws on Feminist Political Ecology (FPE), Commons Governance Studies, Legal Pluralism, and the Critical Zone perspective. Together, these approaches provide a framework for understanding how environmental change, governance institutions, and gendered power relations shape access, control, and participation in the informal charcoal trade.

THEORETICAL LINKAGES FOR ANALYZING GENDER STRUGGLES IN THE LRUC

FEMINIST POLITICAL ECOLOGY (FPE): THE LENS OF POWER, LABOR, AND VULNERABILITY FEMINIST

FPE provides a theoretical lens for examining the intersection of gender dynamics and environmental governance. This perspective emphasizes that environmental outcomes are not gender-neutral but are profoundly shaped by patriarchal structures and gendered division of labor (Aguilar et al., 2015; Kum, 2019). FPE's core thesis is that the unequal distribution of power determines who benefits from and who is burdened by environmental change. Rather than viewing gender disparities in commons governance as isolated issues, FPE places them within wider socio-ecological power dynamics. Using this framework enables understanding of how control over resources, distribution of labor, and decision-making authority is constantly shaped and contested in ways that reflect and reinforce gender inequalities in commons governance. This theoretical framework has been used to link the following constructs:

1. Gendered Vulnerability and Labor: The framework highlights that traditional gender roles assign women the primary responsibility for household energy provision, making them highly dependent on resources like firewood and non-timber forest products (Bone, Parks, Hudson, Tsirinzeni, & Willcock, 2017). As environmental change accelerates due to degradation and deforestation, this dependency translates into a disproportionate burden placed on women (Roswaldy, 2024), forcing them to travel greater distances or engage in precarious, illicit activities like the charcoal retail trade for survival.
2. Resource Control and Dispossession: FPE links environmental scarcity to social power dynamics. It argues that control over natural resources is fundamentally about social control, where patriarchal structures (Hussein, 2021) limit women's capacity for self-determination and autonomous decision-making regarding land and resources (García-Morán & Yates, 2022).

INTEGRATING COMMONS GOVERNANCE STUDIES: INSTITUTIONS, RULES, AND RIGHTS

To complement FPE's focus on power and gendered labor, insights from Commons Governance Studies were employed focusing on the institutions, rules, and property rights governing shared resources. The governance of the LRUC's resources is impacted by formal regulatory exclusion. This is the state-level intervention, specifically the criminalizing amendments to the Forestry Act (Malawi Government, 2017), which represents a formal governance structure that severely restricts access and control for all informal traders. Imposing strong penalties overlooks the socio-economic drivers of participation, effectively criminalizing poverty and pushing vulnerable populations into high-risk, illicit nocturnal operations (Zulu, 2013). In addition, studies on commons management emphasize that customary rules, which are frequently gender-biased, limit women's decision-making power (Fredrick, Lucian, & Urassa, 2025). Patriarchal norms often grant men principal land and resource ownership (Sikor & Lund, 2010), thereby undermining women's autonomy and limiting their capacity for meaningful participation in community-based natural resource management (CBNRM) initiatives, even when they possess specialized environmental knowledge.

LEGAL PLURALISM AND GOVERNANCE FRAGMENTATION

The governance of charcoal trading in the LRUC operates under conditions of legal pluralism, where statutory

forest laws coexist with customary authority (Makwinja & Kimengsi, 2025). In most cases, customary leaders often regulate access to forest resources informally, while state agencies enforce national legislation that criminalizes charcoal production in forest reserves. This often creates an overlap that enables selective enforcement of laws and elite capture. The elites and those connected to the authority are able to navigate the systems while women, who often rely on customary access and without legal or financial capital, are excluded. Additionally, confiscations, fines, and arrests disproportionately target small-scale traders, which reinforces gendered dispossession.

This mechanism often functions in a way to exercise power, shaping who bears the costs of conservation and who benefits from resource exploitation.

CRITICAL ZONE PERSPECTIVE

The Critical Zone (CZ) concept is defined as the thin interface extending from the bottom of the underground water, the impermeable bedrock upward through the porous bedrock to the top of the vegetation canopy (Arora, Seybold, & Jin, 2024). The concept of Critical Zone is understood as a complex interaction between the geosphere, biosphere, hydrosphere, and atmosphere, which are essential for the creation of the conditions of habitability (Lee, Shoshitaishvilib, Woods, Bekker, & Abbotta, 2023). It offers a means to understand the nexus among soil, water, vegetation, and human activities that co-determine ecological integrity and landscape sustainability. Human activities at any point on Earth's surface have potential to either improve or degrade the potential for landscapes to reproduce the conditions of habitability, since any change in one aspect has a detrimental impact on others.

In the LRUC, the deforestation process removes forest cover which creates exposed areas that lead to soil erosion and decreased water absorption capacity. The altered evaporation and transpiration patterns create changes in local rainfall while sedimentation levels rise across rivers. These biophysical processes directly affect people's ability to live in particular areas because agricultural productivity declines due to decreasing soil fertility, water shortages create increased domestic work requirements, and deforested areas cause decreased ability to withstand climate disasters. The way that works responsibilities are assigned based on gender results in women experiencing higher financial burdens. The Critical Zone perspective therefore highlights how charcoal-related environmental change is not only an ecological concern but also a social and gendered issue, linking resource governance, ecosystem degradation, and inequalities in access, control, and participation within the LRUC.

METHODOLOGY

This review paper adopts a synthesis of literature to analyze existing knowledge on gender struggles in commons governance, with a specific focus on the informal charcoal trade in Malawi's LRUC. The sources used in this study included peer-reviewed journal articles, books, government policies, and reputable organizational reports which were published since 2000 and focused on Malawi and similar African regions by using a combination of keywords and their synonyms such as; "Lilongwe River Upper Catchment," "commons governance," "natural resource management," "charcoal trade," "Forestry Act," "gender struggles" and "time poverty".

INCLUSION AND EXCLUSION CRITERIA

Documents were selected based on the following criteria. To help with the determination of the relevance and quality of the literature reviewed, this review used meta Prisma analysis for inclusion and exclusion criteria. Figure 1 below is a flow diagram for inclusion and exclusion.

Inclusion Criteria:

- Focus on Malawi, particularly the LRUC, or broader Sub-Saharan Africa with direct relevance to Malawi.
- Literature on gender dynamics in natural resource governance, informal economies, or the charcoal trade.
- Published as peer-reviewed journal articles, books, book chapters, government reports, policy documents, or reputable organizational reports.
- Written in English, published from 2000 onwards to ensure contemporary relevance, with exceptions for foundational or highly cited earlier works.

Exclusion Criteria:

- Studies not directly relevant to gender, commons governance, or the informal charcoal trade in the specified geographical context.
- Opinion pieces, editorials, news articles (unless from a formal news agency report used for specific data points), or non-academic grey literature without clear authorship or institutional backing.
- Studies focusing solely on technical aspects of charcoal production without socio-economic or gender analysis.

This review is limited by its reliance on secondary sources which tend to emphasize production statistics and enforcement results instead of actual human experiences. Existing research fails to represent community perspectives especially those belonging to women who participate in

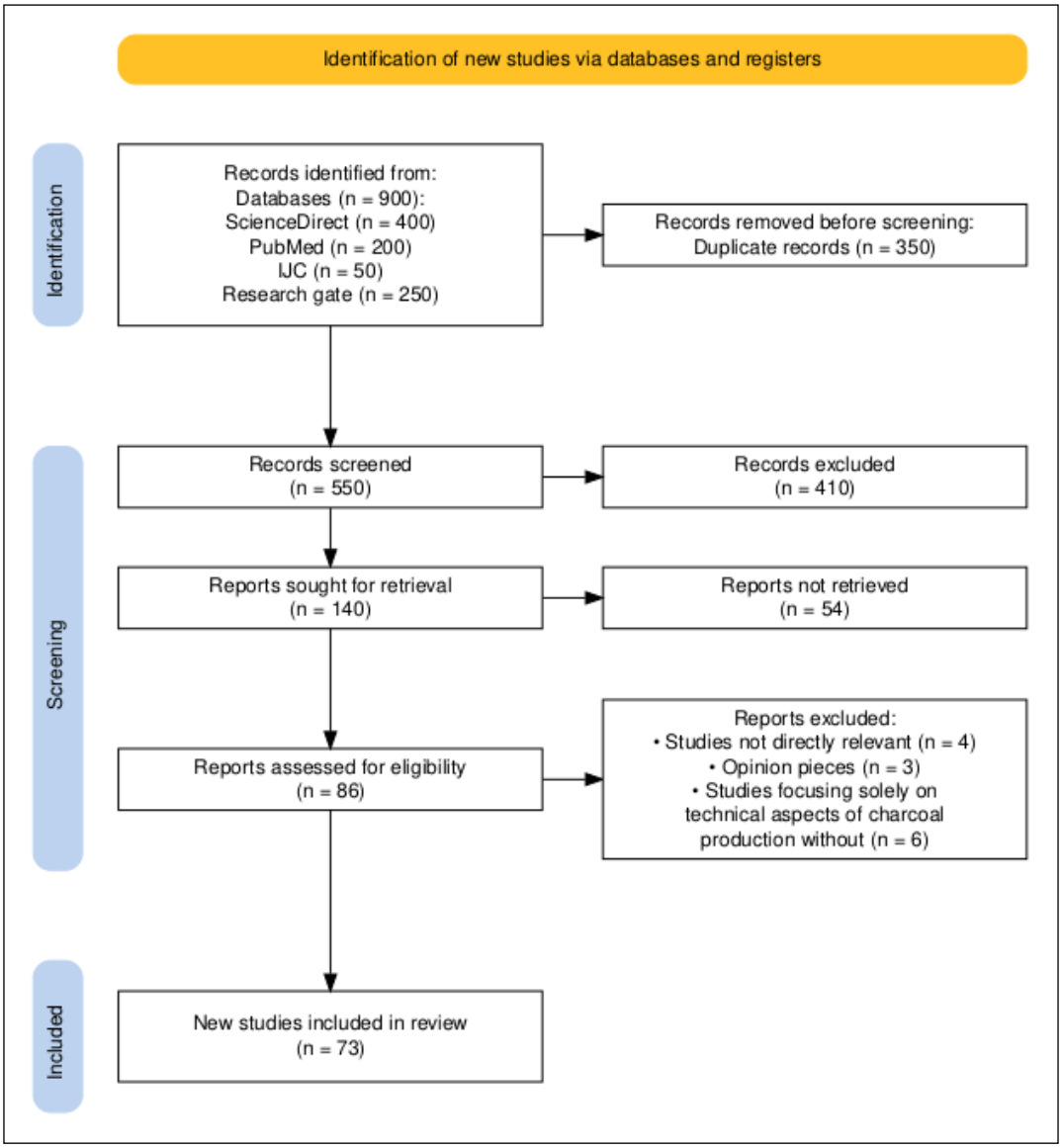

Figure 1 Prisma flow diagram for inclusion and exclusion criteria.

unofficial charcoal businesses. In response to this limitation, the review highlights the need for future research to employ participatory methods that capture the social dimensions of charcoal governance more explicitly.

GENDER STRUGGLES IN THE LILONGWE CHARCOAL TRADE

The review identified several key themes that explain how gender shapes experiences and opportunities within the Lilongwe charcoal trade. These themes reveal differences in access to resources, participation, decision-making, and the distribution of benefits and risks. The findings are presented under the thematic headings discussed below.

THE INFORMAL CHARCOAL TRADE AND GENDERED STRUGGLES IN DZALANYAMA

The literature shows that informal charcoal trade around Dzalanyama Forest Reserve, presents struggles within commons governance, driven by a complex interplay of poverty, energy demand, and inadequate policy enforcement. Dzalanyama Forest Reserve, a critical water catchment area for Lilongwe, faces severe deforestation primarily due to illegal charcoal production and logging, with a large portion of trees cut for this purpose (Kambewa, Mataya, Sichinga, & Johnson, 2007). This illicit business thrives because it provides a vital source of income for thousands of Malawians living in poverty (Kamanga et al., 2009). To some extent, individuals engage in charcoal production and transportation at night in response to the criminalization of

this trade under the Forestry Act (Zulu, 2013). This nocturnal operation is an attempt to evade law enforcement, as producers travel within forest reserves hoping to leave no traces for the police or army. These operations put the lives of poor populations at a greater risk and in constant stress and physical harm in an attempt to make their livelihood.

CHARCOAL TRADE AS BOTH A LIVELIHOOD AND ENVIRONMENTAL GOVERNANCE CHALLENGE

The literature shows that urban demand transforms the informal charcoal trade into a dual-edged phenomenon operating within the LRUC, a critical interface where rural and urban dynamics converge. The reviewed studies report that charcoal trading provides a vital, poverty-alleviating livelihood strategy and source of essential income for many Malawians living in poverty (Zulu, 2018; Zulu & Richardson, 2013). On the other hand, the literature identifies charcoal production as the primary driver of severe deforestation in crucial water catchment areas, such as the Dzalanyama Forest Reserve and Malingunde dam. This deepens the conflict between public policy, economic desperation, and environmental change, as urban growth drives degradation, increasing the burden on vulnerable rural households (Makwinja & Kimengsi, 2025).

URBAN-RURAL FEEDBACK LOOP IN CHARCOAL COMMONS GOVERNANCE

Figure 2 below describes charcoal governance as an urban-rural social-ecological system that operates through social-ecological systems in the Critical Zone.

The Lilongwe energy crisis which results from unstable electricity and high costs of other energy sources leads to constant charcoal demand which forces ongoing charcoal harvesting from forest areas in the Lilongwe River Upper Catchment. The demand results in upstream biomass extraction which transforms Critical Zone operations because it removes plant life and increases soil erosion and disrupts water flow systems. The physical alterations to the environment prevent forests from regrowing while agricultural output decreases and water storage capacity declines, which results in environmental change that harms rural communities.

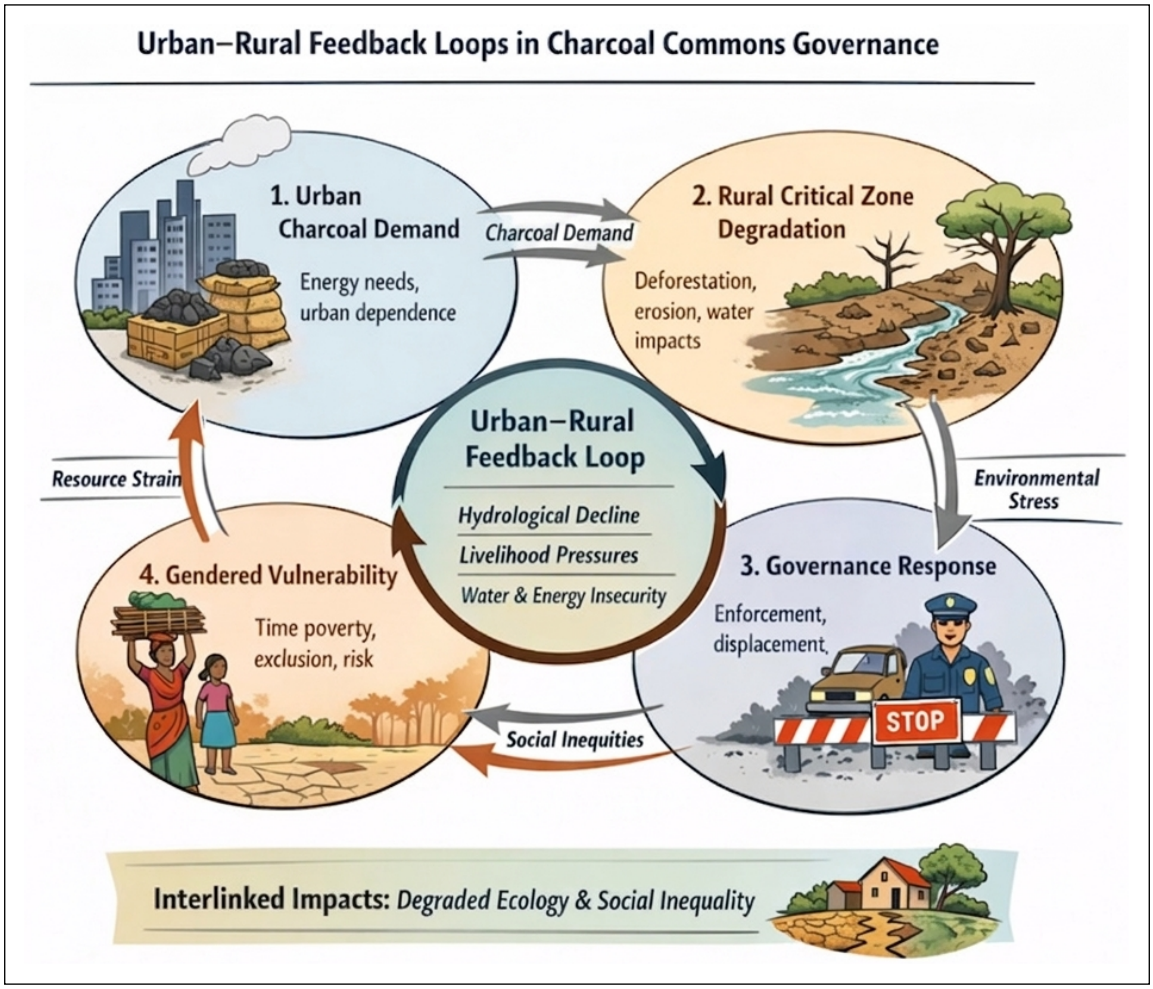

Figure 2 Urban–Rural Feedback Loops.

The governance responses to these environmental changes, in one way or another, tend to intensify the problem. State enforcement agencies, responding to deforestation near urban water supply catchments, adopt punitive measures such as placing roadblocks, confiscations, and arrests. The governance response, embodied by the amended Forestry Act (2019) criminalizing the trade (Zulu, 2013), has pushed this activity into illicit, high-risk nocturnal operations that evade law enforcement (police or army). This deepens the conflict between public policy, economic desperation, and environmental degradation, as urban growth drives degradation, increasing the burden on vulnerable rural households. These enforcement-based policies, which target criminal activities instead of establishing regulations for public participation, result in the geographical shift of charcoal production which does not decrease market demand. The extraction process through this practice enters new territories that hold ecologically important areas while environmental damage, through extraction processes, expands because of longer transport needs and increased area destruction. Women who work in the low-capital charcoal value chain, face increased risks due to law enforcement operations which result in violence that leads to confiscation and dangerous working conditions which create financial instability for them (Makwinja & Kimengsi, 2025).

These degraded Critical Zone conditions feed back into urban systems through hydrological and sedimentary pathways. Increased sediment loads and altered runoff make urban water supplies unreliable and more expensive to maintain while rising charcoal prices and supply instability reinforce continued dependence on biomass energy. These stresses continue to create ongoing demand for charcoal which establishes a feedback loop in which social inequality, governance failure, and biophysical degradation are linked. Rural-urban feedback demonstrates that charcoal commons governance functions as a recursive system in which gendered power relations and Critical Zone dynamics shape habitability of the rural-urban landscape.

THE ROLE OF INFORMAL CHARCOAL TRADE IN MALAWI: LIVELIHOOD STRATEGY VS. ENVIRONMENTAL GOVERNANCE CHALLENGE

Table 1 summarizes the role of the informal charcoal trade as a livelihood strategy and environmental governance challenge.

GENDERED DIMENSIONS: WHY WOMEN'S STRUGGLES MATTER

The governance of shared resources is rarely gender-neutral, yet it often exhibits significant disparities in how men and women access, control, and participate in their management (Périvier, 2024). These gendered struggles are deeply rooted in patriarchal structures (Kum, 2019; Hussein, 2021) that systemically skew the dimensions of governance. Access is constrained by deforestation for women and their traditional roles mandate forest dependency for firewood and non-timber forest products (Kiptot, 2015; Siraw et al., 2023). Control is limited by customary laws that grant men principal resource ownership (Sikor & Lund, 2010; García-Morán & Yates, 2022), restricting women's autonomy. Thus, women's struggles

DIMENSION	LIVELIHOOD STRATEGY	ENVIRONMENTAL GOVERNANCE CHALLENGE
Household Income	Provides vital income for rural producers and urban traders, covering food, school fees, and health needs (Ansah, 2022).	Income gains often short-term and unsustainable due to forest depletion and policy crackdowns (Chanda et al., 2026; Nabukalu & Gieré, 2019).
Employment	Engages thousands of people (especially the youth and women) across production, transport, and retail segments of the value chain (Sola & Awono, 2019).	Predominantly informal jobs lacking security, exposing workers to harassment, fines, and criminalization (Mwampamba, Owen, & Pigaht, 2013).
Energy Security	Supplies 80–90% of urban households with affordable and accessible cooking fuel (Agency International Energy, 2022).	Reinforces dependency on unsustainable energy sources, delaying transition to clean alternatives (Sedano, Mizu-Siampale, Duncanson, & Liang, 2022).
Gender Dynamics	Women dominate retail and small-scale marketing, gaining some financial autonomy (G. Siraw, Zewunde, & Habtegiorgis, 2023)	Women face systemic exclusion from resource access and decision-making, with higher vulnerability to exploitation (Haverhals, Ingram, Elias, Basnett, & Petersen, 2016).
Governance	Functions as a safety net in contexts of weak rural economies and limited alternative livelihoods (Sola & Awono, 2019).	Operates largely outside formal regulation, fueling deforestation, rent-seeking, and weak law enforcement (F Sedano et al., 2020).
Environment	Supports household survival during agricultural stress (e.g., droughts, crop failure) (Luz et al., 2015).	Major driver of forest degradation, biodiversity loss, and greenhouse gas emissions (Chanda et al., 2026).

Table 1 Charcoal trading as a livelihood strategy and environmental governance challenge.

matter urgently in the LRUC because their dependence places a disproportionate burden of environmental degradation on them (Roswaldy, 2024). Furthermore, their involvement in the informal charcoal retail exposes them to acute gendered risks, including harassment, abuse, and even sexual assault by law enforcement (Mngoli, 2018), with the fear of reporting stemming from further victimization or lack of legal recourse.

These risks are critically intensified during the "hunger season" (January to March) when depleted food stocks force higher risk-taking (Chinsinga et al., 2021). This entire nexus demonstrates that the current policy approach, which employs colonial-era vagrancy laws and focuses overwhelmingly on criminalization without providing viable, legal alternative livelihoods, inadvertently perpetuates vulnerability and severe human rights abuses, demanding a focused analytical review. In line with the FPE, this shows how governance interventions that ignore gendered power relations can reproduce, rather than resolve, inequalities within commons systems, thereby reinforcing the very struggles they intend to address.

GENDERED STRUGGLES IN CHARCOAL COMMONS GOVERNANCE

The persistent reliance on charcoal, set against a backdrop of environmental degradation and punitive legal frameworks in the LRUC, translates into distinct and acute gender struggles across three dimensions: access, control, and participation. Drawing from FPE, this section analyzes how patriarchal structures and institutional gaps systematically restrict women's rights and increase their vulnerability within the charcoal economy.

Access to Charcoal Resources

The primary struggle for women in the rural areas of the LRUC is securing access to resources, which is profoundly undermined by the increasing rate of deforestation driven by the informal charcoal trade. From an FPE perspective, access to natural resources is described as something that cannot be determined simply by physical availability, but it is mediated by socially constructed gender roles and power hierarchies (Mbunda & Ndunguru, 2025). Traditional gender roles mandate that women bear the primary responsibility for collecting firewood and non-timber forest products for household needs (Aguilar et al., 2015; Siraw, Zewude, et al., 2023). As forest resources recede due to extensive clearing by charcoal producers, women are forced to walk significantly longer distances to forage. This increased time commitment results in severe "time poverty," an invisible burden that restricts their capacity for education, engagement in other productive activities, or meaningful participation in community governance (Aguilar et al., 2015). This structural disadvantage effectively traps women in a cycle of subsistence, hindering their economic empowerment. Furthermore, resource access is gendered: men typically maintain land and tree tenure rights and control over higher-value commercial products like timber, while women's access is restricted to resources for subsistence. This differential access, often enforced by the interaction of customary and statutory governance systems that prioritize male ownership (Sikor & Lund, 2010), reinforces existing gender inequalities in resource benefits. Consequently, policies promoting alternative fuels or improved cookstoves are vital, not just for environmental benefits, but as critical gender-transformative interventions designed to reduce women's time poverty and enhance their overall quality of life.

Control and Decision-Making Power

FPE conceptualizes resource control as the primary source of power, determining how authority, ownership and decision-making rights are shared in the society. According to Kum, (2019) and Hussein, (2021), the dimensions of control and decision-making power are systemically constrained by deeply embedded patriarchal structures in Malawian society. These, patriarchal norms create unbalanced distribution of control which often designates men as the main holders of resources and decision-making power, (Aguilar et al., 2015). The impact is mostly evident as the inadequate state of legal reforms and the powerful influence of customary law mean that men largely remain the principal landowners (García-Morán & Yates, 2022). This lack of formal land and tree tenure rights curtails women's autonomy over the very resources they cultivate, limiting their livelihoods and income-generating opportunities. The struggle for control extends to the governance mechanisms of the charcoal market itself. Male dominance in formal charcoal licensing and market regulations indicate gendered inequalities in access to authority and resources. However, despite seemingly being formal, these systems are often exclusionary, which push many actors especially women into informal markets. From a Feminist Political Ecology perspective, this does not eliminate regulation but shifts it into informal spaces that are characterized by rent-seeking, coercion, and everyday power struggles. As a result, women with little power to decision making, become more exposed to exploitation and insecurity within these hybrid governance systems (Mngoli, 2018). This systemic lack of control undermines women's agency, subjecting them to arbitrary decision-making and exploitation from both within the community (customary norms) and from external formal actors (state enforcement).

Participation in the Charcoal Value Chain

Participation in the charcoal value chain is marked by a distinct gendered division of labor, characterized by high risks and marginal returns for women. The gender roles in production, transport, and marketing are highly stratified: men typically dominate the physically intensive and higher-value segments of production and long-distance transport. By contrast, women's dominance lies primarily in the low-level retail and vending of charcoal. While retail offers a flexible income source, it is also the most precarious segment, positioning women in high-risk, low-profit, and often highly visible roles. Their low-level participation exposes them to significant vulnerabilities and risks, including harassment, confiscation of goods, and fear of sexual assault by law enforcement (Mngoli, 2018).

DISCUSSION

The review has established that the informal charcoal trade is at the center of complexities in the commons governance and gender equality. The findings demonstrate that these governance complexities are particularly evident in the Lilongwe River Upper Catchment (LRUC), where the informal charcoal trade has emerged as both a livelihood strategy and an environmental governance challenge. Around the Dzalanyama Forest Reserve, charcoal production persists despite legal restrictions because it provides critical income for poor households while simultaneously contributing to deforestation in an ecologically important water catchment area. The findings further reveal the existence of an urban–rural feedback loop in which rising urban demand for charcoal drives forest degradation, prompting punitive state responses that push production further into informal and high-risk spaces. As environmental degradation intensifies, rural communities experience declining ecosystem services, while urban areas face increasing pressures on water and energy security. These findings highlight the interconnected nature of social, ecological, and governance challenges within the charcoal commons.

Drawing from an FPE perspective, charcoal production is seen as not merely an energy commodity but as a socio-ecological resource that is embedded in unequal power relations that shape both environmental outcomes and livelihood strategies. Despite contributing to environmental degradation, the commodity also functions as a critical survival mechanism for marginalized populations, thereby revealing a fundamental tension between ecological sustainability and social reproduction (Zorrilla-miras et al., 2018). FPE helps to make sense of this contradiction by showing how everyday gender roles place women at the intersection of environmental dependence and economic vulnerability. The findings reinforce this perspective by demonstrating that women experience the effects of charcoal-driven environmental degradation differently from men. Women bear primary responsibility for collecting firewood and other forest products, making them disproportionately affected by resource scarcity and increasing time burdens. At the same time, women involved in charcoal retail and marketing are exposed to harassment, abuse, confiscation of goods, and other forms of insecurity associated with informal trade. These vulnerabilities are often heightened during periods of food insecurity when households increasingly depend on charcoal-related income for survival. Such experiences illustrate how environmental change and governance interventions are filtered through existing gender relations, producing unequal outcomes.

Because women are primarily responsible for securing household energy, they are the first to feel the effects of resource scarcity. At the same time, their limited access to alternative income opportunities pushes them into a more insecure and risky charcoal value chain. In this way, environmental degradation does not impact everyone equally; instead, it shifts more labor, risk, and vulnerability onto women, deepening existing inequalities.

Additionally, exacerbated by a persistently unreliable electricity system and a lack of affordable alternatives, Kamanga et al. (2009) and Zulu (2018), wrote that charcoal is an indispensable energy product in urban areas. So, despite contributing to environmental degradation, the informal charcoal trade provides a livelihood for people in rural communities in LRUC. This presents a policy dilemma as policy fails to provide plausible interventions that can ensure environmental conservation without undermining survival and livelihood strategies for poor communities and exacerbating energy poverty in urban areas. Unfortunately, this entire crisis is not gender neutral, as it is characterized by gender complexities.

Furthermore, the common governance failures in the informal charcoal trade provide room for more gender struggles by limiting women's access to and control over resources and participation in commons governance while subjecting them to exploitation and harassment. The findings show that these struggles manifest through unequal access, control, and participation within charcoal commons governance. Women's access to forest resources is increasingly constrained by deforestation and tenure arrangements that privilege male ownership, resulting in greater time poverty and reduced livelihood opportunities. Control over resources and decision-making remains concentrated among men through both customary institutions and formal regulatory structures,

limiting women's influence over resource use and benefits. Participation in the charcoal value chain is similarly gendered, with women largely concentrated in low-profit retail activities while facing higher exposure to harassment, confiscation, and exploitation. These dimensions illustrate how governance systems reproduce gender inequalities rather than addressing them. This aligns with assertations by Aguilar et al. (2015) and Siraw, Zewude, et al. (2023) that poor environmental governance that may lead to environmental degradation serves as a tool that allows existing gender struggles to be reproduced and deepened. Unfortunately, the study reveals that both customary governance systems and statutory regulatory frameworks operate as what FPE conceptualizes as 'sites of power,' where access to resources, decision-making authority, and economic benefits are unevenly distributed, thereby promoting elite capture and male dominance, excluding women from access to and control over resources. This necessitates employing gender sensitive interventions in commons governance that can ensure equitable access to and control over resources and inclusive participation as well as protecting vulnerable women from exploitation and harassment.

POLICY AND GOVERNANCE IMPLICATIONS

There are a number of shortcomings in the current forest and energy policies on gender equity, primarily on the punitive approach of the Forestry Act and the implementation gaps of the National Charcoal Strategy (NCS). As criminalization aspect alone does not resolve deforestation, this creates a contradiction in policy outcomes where conservation efforts inadvertently deepen the poverty and vulnerability of the marginalized. This shows that regulatory frameworks continue to employ top-down governance approaches that ignore social and cultural realities and may undermine both environmental conservation and social justice aspirations. Furthermore, the NCS's focus on promoting alternative fuels and efficient cook stoves primarily targets and benefits better-off urban populations, leaving the poor communities reliant on unsustainable charcoal due to the high costs and skepticism regarding alternatives like gas (Zulu, 2018). This disparity may have negative gendered implications throughout the policy implementation cycle.

From a Critical Zone perspective, these governance failures go beyond social inequalities to undermine the biophysical foundations of habitability. The LRUC area experiences charcoal-based deforestation which causes hydrological flow disruptions while decreasing forest resilience and making water resources inaccessible to Lilongwe City. The urban-rural feedback system demonstrates that energy shortages in cities create direct connections to the struggles women face in managing rural common which creates a demand for social-ecological governance systems that require active participation from all stakeholders. The LRUC commons governance system faces additional challenges because of legal pluralism. The combination of customary authority and statutory regulation results in multiple policy overlaps which create legal conflicts. This elite capture indicates that commons governance in LRUC is not only reinforcing gender disparities, but also, it is restructuring the Critical Zone itself, thereby weakening the ecological balance. This therefore puts charcoal governance as a habitability crisis, not only as a conservation or energy issue.

COMPARATIVE STUDIES FROM SUB-SAHARAN AFRICA

While Malawian legal frameworks around forest management are focused on confiscation and criminalization, different countries in sub-Saharan Africa such as Tanzania, Mozambique and Kenya apply inclusive commons management which provide locals the access to use commons as a source of daily livelihood.

In Tanzania, the laws around forest management balance natural resource conservation with people's livelihood. the Tanzania's Forest Stewardship Council devolves authority to local councils, thereby enabling communities to balance livelihood needs with conservation goals. The law recognizes the rights of forest-dependent people and offers certification to use forest materials so that they improve their livelihoods while maintaining forest ecosystem integrity. In Kenya, Community Forest Associations integrate local participation into forest management, which offers women and youth opportunities to engage in charcoal production within formalized structures (Jackson, Durowoju, Adelabu, & Adeniyi, 2025). In Mozambique, community licensing schemes allow local groups to legally produce and sell charcoal under regulated quotas, creating incentives for sustainable harvesting while reducing conflict with enforcement agencies. These cases highlight that, while other countries use devolved and participatory governance to mitigate deforestation while enhancing social equity, Malawi's punitive forest legal frameworks push local forest-dependents into high-risk operations and vulnerabilities. This necessitates the need to revisit the laws that seem to conserve the natural environment yet in actual sense are fueling deforestation, leading to ecological decline.

CONCLUSION AND RECOMMENDATIONS

This review of gender struggles in the Lilongwe River Upper Catchment (LRUC) demonstrates a structural

failure in commons governance where access, control, and participation in the informal charcoal trade remain profoundly unequal. The review has highlighted that women may be trapped in a cycle of time poverty due to receding forest resources and are systematically excluded from decision-making by patriarchal norms and skewed land tenure, while bearing the highest risks in the value chain. Crucially, these gender struggles function as both a symptom of underlying governance failure manifested in the policy paradox where the criminalization of charcoal exacerbates women's marginalization and a driver of continued environmental degradation, as the most dependent resource users lack the agency to manage forests sustainably. Moving forward, the most crucial pathways for more inclusive commons governance must prioritize tackling the missing link of economic desperation by providing legal, accessible, and affordable alternative livelihood programs, focusing on environmental conservation. The integration of Critical Zone science through policy design will create unified governance systems which connect environmental assessment with social justice goals. Failure to shift current system of charcoal governance will keep threatening the habitability of interconnected rural and urban systems.

To specifically address these deeply entrenched gender struggles in commons governance within the LRUC, the following key priorities should be considered:

a) Gather substantial evidence of gender struggles: The nature and extent of gender struggles in informal charcoal trade require substantial data that can be used for determining and crafting of appropriate remedy. This requires research to provide evidence for gender-sensitive recommendations for policy formulation and implementation in commons governance.

b) Gender-Transformative Governance**:** It is imperative to move beyond symbolic inclusion and actively promote the meaningful representation and genuine influence of women in natural resource governance bodies. This requires deliberate strategies to strengthen women's voices, enhance their leadership skills, and create enabling environments where their expertise and perspectives are valued and integrated into decision-making processes.

c) Effective Alternative Livelihood Programs**:** Providing alternative income-generating activities and energy sources is crucial. The alternatives must be accessible and affordable for poor rural and urban women, taking into account their specific needs and constraints. Programs must explicitly address gender inequalities in access to finance, skills training, and markets to ensure women can effectively transition to and benefit from these new opportunities.

GENERATIVE AI STATEMENT

The author(s) declared that generative AI was used in the creation of this manuscript. The author(s) used QuillBot to assist with language editing and refinement. All ideas, data, and conclusions are the author(s)' own.

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COMPETING INTERESTS

The authors declare that they have no competing interests. None of the authors are currently members of the journal's editorial team, nor have any held such a position within the last three years.

AUTHOR CONTRIBUTIONS

Conceptualization, L.K.; methodology, and L.K software, L.K.; validation, J.K and J.C.; investigation, L.K., resources, L.K., J.K., and J.C.; data curation, L.K.; writing original draft preparation, L.K.; writing review and editing, LK., J.K., L.M. L.G., and J.C.; supervision, J.K. and L.M.; project administration, L.K.; funding acquisition, J.K & L.G. All authors have read and agreed to the published version of the manuscript.

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