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Cultural Semiotics, Forest Governance and Justice for Improved Household Food Security and Rural Energy Poverty Reduction Among Women Farmers in Forest Reserve Areas of Imo State, Nigeria

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ABSTRACT

This research explores the confluence of cultural semiotics, forest governance, and equity in enhancing food security and alleviating energy poverty, especially in communities reliant on resources. Cultural semiotics denotes the array of meanings, symbols, convictions, and practices through which individuals comprehend and engage with their natural surroundings. In numerous traditional cultures, these symbolic frameworks influence environmental practices and resource stewardship, rendering them crucial for fostering food security and safeguarding forests. By integrating ecological wisdom into cultural manifestations such as proverbs, prohibitions, rituals, and legends, societies establish informal structures that govern the utilization of forest resources.It identifies forest resources available to women farmers; examines the level of access to the resources of the forest, the extent of women farmers' energy poverty; identifies forest resources and semiotics culture contributions to food security and energy poverty reduction, challenges and strategies for improvement. A total of 120 women farmers was selected purposively from the six forest reserves in Imo State and interviewed using a questionnaire and oral interview. Data got were analyzed descriptively. Results showed that forest resources such as charcoal (95%), fuel wood (98.3%), medicinal plants (91.6%) and mushrooms/snails (100%) exist. The women have access to certain forest resources and do not have in some, such as timber/woods (M=2.50), firewood (M=2.40) and fruits. While many do not have access to some resources such as rubber (M=1.20), resin (M=1.30), honey (M=1.20), and fibers (M=1.41). There is high dependency on fuel wood, showing a poverty situation. Forest provides food, income and prestige to the women farmers. To reduce poverty, there is equitable access to forest resources (M=2.55), sustainable forest management (M=2.50), reduction of time burden in fuel collection (M=2.51), and promotion of environmental sustainability (M=2.54).The challenges affecting forest justice include gender inequality (98.3%), land tenure (100%), forest degradation/deforestation (95%). To solve these problems, land tenure be reformed, women's participation promoted, improve access to clean/affordable energy.

Keywords: *Forest governance, forest justice,semiotics culture, energy, poverty, food security, women.*

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Introduction

Forest resources are crucial for supporting rural livelihoods, especially for women farmers residing in forest reserve regions. In numerous developing nations, including Imo State, forests supply vital resources like fuelwood, medicinal herbs, food products, and materials for domestic purposes.

Women, frequently in charge of food production and energy supply at home, rely significantly on these forest resources for their everyday survival. Nevertheless, inequitable access to forest resources, unfavorable policies, and environmental decline have curtailed the capacity of women farmers to maximize benefits from forest ecosystems. This scenario has led to ongoing energy poverty and food insecurity for women in communities reliant on forests [1].

Forest governance and justice have become vital frameworks for tackling rural livelihood issues, especially in communities reliant on forests in developing nations. In Imo State, Nigeria, forest resources are vital for supporting the livelihoods of rural communities, particularly for women farmers who rely on these resources for food production, energy, and earning income. Nonetheless, inadequate governance frameworks, unfair resource distribution, and insufficient participation of women in decision-making have hindered the capacity of forest systems to significantly enhance food security and energy access (2,1). Forest governance denotes the systems, regulations, and procedures that oversee the administration and utilization of forest resources, while forest justice highlights fairness, equity, and inclusiveness in the allocation of forest advantages and the authority in decision-making. In various forest resource regions of Imo State, governance structures are frequently marked by centralized authority, ambiguous land rights, and insufficient enforcement of ecological laws. These difficulties primarily impact women farmers, who are often sidelined in terms of land ownership and forest management, despite being the main consumers of forest resources like fuelwood, medicinal plants, and non-timber forest products (NTFPs) [2,1].

Energy poverty continues to be a prevalent problem in rural Nigeria, where dependence on conventional biomass—especially fuelwood—is common. Women are primarily responsible for obtaining this energy, frequently traveling great distances, which limits their time for agricultural tasks and impacts their productivity and health [3]. Concurrently, forest degradation and unsustainable logging methods intensify energy shortages and jeopardize food security by diminishing soil fertility, biodiversity, and the ecosystem services vital for agriculture. Thus, enhancing forest governance systems to guarantee sustainable resource utilization and fair access is essential for tackling energy poverty and food insecurity. Improving food security for women farmers necessitates not just access to land and forest resources but also the empowerment of women via inclusive governance systems. Engaging in participatory forest management, implementing gender-aware policies, and acknowledging customary rights can greatly enhance women's access to productive resources and decision-making arenas [4]. In Imo State, enhancing local organizations and combining traditional knowledge with formal governance can promote more sustainable and fair forest management practices.

In the end, forest governance and justice act as essential routes for enhancing the livelihoods of women farmers by advocating for fair resource access, boosting agricultural productivity, and ensuring sustainable energy consumption. Tackling structural disparities and institutional shortcomings in forest management can enhance food security results and lessen energy poverty in communities reliant on forests. This highlights the necessity for policy changes and focused actions that emphasize gender equality, community involvement, and sustainable resource management in Imo State and comparable situations.

Energy poverty describes the inability to obtain modern, affordable, and dependable energy services essential for cooking, heating, and productive tasks. In the countryside of Nigeria, women largely depend on conventional biomass energy sources like firewood and charcoal sourced from woodlands. While forests offer these energy resources, women frequently encounter barriers in reaching forest reserves because of government policies, conservation laws, and land tenure systems that favor male ownership and control [5]. The idea of forest justice highlights fairness, equity, and inclusiveness in the management and allocation of forest resources. Forest justice guarantees that marginalized communities, especially women, hold equal rights to access, manage, and benefit from forest resources. Advocating for forest justice can significantly contribute to alleviating energy poverty and enhancing food security for women farmers in communities surrounding forest reserves.

Cultural Semiotics in Forest Protection, Governance and Justice Context

The definition of cultural semiotics suggests that it is an approach to researching symbols, signs, and semiotics of culture at large. The use of this concept as a framework in analyzing food insecurity and energy poverty is useful due to the fact that these problems can be examined from a cultural perspective, as well. Food insecurity and energy poverty involve technical and economic aspects, but there is a cultural dimension to these problems as well because natural resources have symbolic meanings in particular cultures and societies. Forests and landscapes serve as sources of food and energy as well as symbolic objects with spiritual meanings in many communities and societies worldwide [6]. By applying cultural semiotics as a framework to analyze such problems, one may uncover important things about people's attitudes toward food, energy, and the environment. This, in its turn, will help to understand what behavioral patterns, social norms, and preferences should be considered to make interventions successful and appropriate to local realities. In addition, cultural semiotics makes it possible to understand the relationship between traditional ecological knowledge and food systems developed in particular communities and societies. In fact, many cultural practices involving ritual activities and seasonal cycles have semiotic meanings as well, but they reflect substantive ecological knowledge as well [7]. This means that traditional semiotic and cultural practices can contribute to food security. Finally, it should be noted that cultural semiotics makes it possible to understand cultural values that determine people's acceptance of innovations and modern approaches to food production and consumption [8].

Cultural semiotics plays a role in addressing energy poverty by influencing how people perceive and relate to different energy sources and technologies. In numerous communities, fuelwood and biomass are not merely fuels but are deeply embedded in daily life, rituals, and social interactions [9. Recognizing the symbolic value of traditional energy practices allows development practitioners to design interventions—such as enhanced cookstoves or locally managed renewable energy systems—that align with cultural norms and community aspirations. A semiotic perspective helps uncover how ideas about modernity, tradition, and progress shape decisions around adopting alternative energy options, thereby affecting shifts in energy use.

This approach emphasizes the role of meaning and communication in fostering collective efforts toward sustainable resource management. Shared symbols, stories, and metaphors help construct visions of desirable futures, enabling communities to unite around common objectives like food security and energy access [10]. When development initiatives strategically employ such narratives and symbols, they can strengthen community engagement and social unity—key elements of effective governance and fair resource allocation. As a result, cultural semiotics provides valuable insight into the social and cultural aspects of food insecurity and energy poverty, offering practical guidance for policy and action in development work.

This theoretical perspective, drawn from natural resource governance, explores how culture, belief systems, and symbolic meanings shape human interactions with forests, land, and energy sources [11]. It emphasizes that behaviors related to food and energy use are not solely driven by scientific or economic logic but are deeply embedded in social and cultural contexts. Cultural semiotics offers a valuable lens for understanding these dynamics in resource management. Recognizing the cultural meanings tied to food and energy production enables the design of policies that are both effective and culturally appropriate, supporting food security, reducing energy poverty, and fostering sustainable livelihoods.

Food security, cultural semiotics influences agricultural practices, biodiversity conservation, and the stewardship of forest resources. Indigenous knowledge often guides decisions on planting schedules, crop selection, and soil management, enhancing productivity and resilience to environmental changes [12]. For example, cultural prohibitions against harvesting certain species during specific periods contribute to ecological balance and long-term food availability. These culturally rooted practices improve food access and sustainability, especially in rural and forest-dependent communities [1]. Similarly, cultural semiotics plays a key role in forest protection. In many societies, forests are regarded as sacred or as ancestral heritage, leading to the preservation of sacred groves and community-protected areas. Such beliefs act as deterrents to deforestation and reinforce conservation values closely linked to cultural identity [13]. These traditional approaches to conservation often function effectively alongside—or even independently of—formal regulatory systems. When local values and meanings are recognized, communities are more likely to engage in sustainable forest management [14].

Food security is characterized as a situation in which everyone has physical and financial access to enough, safe, and nutritious food that satisfies their dietary requirements and choices for a healthy and active lifestyle [15]. Female farmers play a crucial role in agricultural output and family food availability in rural areas. Nonetheless, when access to forest resources is restricted, women may encounter difficulties like diminished availability of fuelwood for cooking and food preparation, reduced access to wild food sources, and constrained land for agriculture. These elements can adversely impact farming efficiency and the availability of food within households. Research indicates that forest resources offer additional food options like fruits, nuts, vegetables, and bush meat, enhancing nutrition and food variety in rural homes [16]. In the forest reserves of Imo State, women farmers frequently participate in small-scale farming and rely on forest resources for fuelwood and various livelihood activities.

Nonetheless, limitations on access to forests and inadequate governance frameworks hinder their involvement in managing forests and participating in decision-making. Consequently, women continue to be at risk of energy poverty and food insecurity. Forest justice frameworks emphasize inclusive policies that acknowledge women's rights to forest resources, encourage sustainable forest management, and enhance livelihood prospects for communities reliant on forests [17]. Advancing forest governance and justice can consequently boost women's ability to access energy resources, enhance agricultural productivity, and fortify household food security. By guaranteeing fair access to forest resources, women farmers can secure fuelwood for cooking and food preparation, decrease the time spent gathering energy resources, and dedicate more time to agricultural production and other income-generating endeavors. As a result, forest justice programs can aid in reducing poverty, enhancing food security, and promoting sustainable rural development in communities near forest reserves. Considering the significant role forests play in the livelihoods of rural women farmers, it is essential to explore how forest justice can help alleviate energy poverty and enhance food security for women farmers in the forest reserve regions of Imo State. Grasping the obstacles women encounter in obtaining forest resources and pinpointing methods to encourage fair forest governance will aid in shaping policies and actions designed to improve rural livelihoods and sustainable management of forests.

Statement of the Research Problem

Women farmers residing in forest reserve regions rely significantly on forest resources for energy and food production for their households. Nonetheless, disparities in access to forest resources, stringent forest management policies, and gender disparities have constrained women's capacity to gain advantages from these resources. In numerous rural areas, women's participation in the decision-making processes related to forest resource management and use is frequently overlooked in forest governance systems. This exclusion has led to restricted access to fuelwood, non-timber forest items, and farmland in forest reserves [17]. Energy poverty continues to be a significant issue in rural Nigeria, with numerous households depending on traditional biomass fuels like firewood and charcoal for cooking and heating. Women and girls frequently dedicate numerous hours gathering fuelwood from forests, which limits their time for farming and other productive tasks. Moreover, the significant distances to forest regions and limitations on collecting forest resources further elevate the challenges faced by women [18]. Food insecurity is widespread in rural households, especially among women farmers reliant on small-scale agriculture for their livelihoods. Restricted access to forest resources diminishes the availability of wild food sources and agricultural inputs, consequently impacting food production and family nutrition. Forest degradation and unsustainable resource use exacerbate the problem by diminishing the supply of forest-related resources crucial for rural livelihoods [16,28,29,30].

Although forests play a crucial role in sustaining rural communities, conservation policies frequently neglect the requirements of women farmers who rely on these resources. Lacking fair access to forest resources, women stay stuck in cycles of poverty, energy scarcity, and food insecurity. Consequently, it is essential to investigate ways to advance forest justice to guarantee fair access to forest resources and improve food security for women farmers in the forest reserve

regions of Imo State. This research is significant as it emphasizes the importance of forest governance and justice in tackling two critical development issues: energy poverty and food insecurity faced by rural women farmers. Women in communities near forest reserves depend significantly on forest resources for energy in cooking, food preparation, and farming activities. Nonetheless, unequal access to forest resources restricts their capacity to enhance household welfare. The results of this research will aid in the development of policies focused on enhancing gender equity in forest management and resource allocation. Guaranteeing fair access to forest resources can enable women farmers, enhance agricultural output, and bolster food security in rural areas. Additionally, the research will offer understanding for government bodies, development organizations, and ecological institutions aiming to create sustainable forest management initiatives that take into account the requirements of women and other underrepresented groups [1]. The specific objectives of the research are to: a). Identify the types of forest resources used by women farmers in forest reserve areas; b). examine the level of access women farmers have to forest resources; c) determine the extent of energy poverty among women farmers; d). assess the contribution of forest resources to household food security; e). Identify challenges affecting forest justice and resource access among women farmers; f).ascertain strategies for improving forest justice to reduce energy poverty and enhance food security.

Methodology

This study took place in Imo State of Southeastern Nigeria within the tropical rainforest zone. Geographically, Imo State is situated between latitudes 4.45°N and 7.15°N of the humid tropical region of Nigeria and shares boundaries with Abia State of Nigeria to the east, Anambra State to the north, Delta State to the west, and Rivers State to the south. The study area is drained by rivers such as the Imo, Njaba, Otamiri, and Orashi, with Oguta Lake constituting the largest inland water. The climate within the region changes between the wet season of April–October and the dry season of November–March, with the average precipitation being around 1,500 to 2,200 mm [19].Economically, the people within the state engage in agriculture with major crops cultivated being cassava, yams, maize, palm, and various vegetables. Women farmers constitute a vital element in the agricultural sector and food supply [19]. Also, the state is endowed with natural resources such as crude oil and natural gas, placing the state within the Niger Delta. The revenue derived from the oil production industry has sometimes been unevenly distributed [20, 21].Imo State is made up of tropical rainforest vegetation covering forest reserve communities that have their rural livelihoods relying heavily on forests. Communities within these areas show considerable dependence on fuelwood and non-timber forest products, making them appropriate as case studies in researches pertaining to energy poverty and food security among women farmers. Forest reserves that have been recognized are Ohaji/Egbema Forest Reserve, Oguta Forest Reserve, and Okigwe Forest Areas.Multi-stage sampling technique was used for this study. In the first stage, forest reserve communities of Imo State were chosen randomly and these are Ohaji/Egbema Forest Reserve, Oguta Forest Reserve, and Okigwe Forest Reserve. The second stage involves the purposive selection of the communities within these forest reserves which are known to be close to forest reserves and populated by many women farmers. These communities are Ekeugba and Etekuru within Ohaji/Egbema; Izombe and Eziorsu within Oguta; and Umulolo and Ubaha within Okigwe. Third stage is random selection of 20 women farmers within each community leading to a sample size of 120 respondents. The data collection tools included structured questionnaire surveys, oral interviews, and secondary sources. The analysis methods included descriptive statistics such as frequencies and percentages.

Results and Discussion

Forest Resources Available to the Women Farmers

Table 1 showed the forest resources available to the women farmers. These include fuelwood (98.3%), charcoal (95%), wild fruits/edible plants (90.8%), medicinal plants (91.6%), non-timber forest products (86.6%), forest leaves/fodder (78.3%), timber & wood (70%), and mushrooms & snails (100%).Women farmers residing in or near forest reserve regions rely significantly on diverse forest resources for their livelihoods, food security, and income. These resources are generally divided into timber and non-timber forest products (NTFPs), with women mainly involved in the gathering, processing, and selling of non-timber resources because of accessibility, cultural responsibilities, and reduced capital needs (Agarwal, 2010). Non-timber forest products represent the largest category of forest resources used by women farmers. These consist of consumable items like fruits, nuts, vegetables, mushrooms, and honey, which directly enhance household nutrition and food stability. Wild fruits such as bush mango *(Irvingiagabonensis)* and leafy greens are often gathered and either eaten or sold in nearby markets. Moreover, women gather fuelwood, which continues to be a major source of household energy in numerous rural areas, especially in developing nations [22]. Medicinal plants are commonly utilized, as women frequently hold traditional knowledge of herbal treatments for common illnesses, thus lessening dependence on expensive modern healthcare options. An additional significant category includes fiber and craft materials like bamboo, rattan, and palm leaves, utilized for creating baskets, mats, ropes, and various household products. These items are crucial for home use and also provide income when they are sold. Women participate in gathering fodder and grasses utilized for livestock feed, particularly in agroforestry systems that combine agriculture and animal husbandry. Timber resources are available in forest reserves, yet women exploit them less often due to legal limitations, physical challenges, and gender norms that frequently restrict their participation in logging activities. Nonetheless, women might still gain indirectly from timber via minor processing tasks like fuelwood preparation or charcoal manufacturing [2].

Table 1: Forest Resources used by Women farmers

Forest Resources *Frequency Percentage
Fuel wood 118 98.3
Charcoal 114 95.0
Wild fruits / edible plants 109 90.8
Medicinal plants 110 91.6
Non-timber forest products 104 86.6
Forest leaves / fodder 94 78.3
Timber & wood materials 84 70.0
Mushrooms & Snails 120 100

**Multiple responses*

Women Farmers Level of Access to Forest Resources

Table 2 showed the level of access to certain forest resources by women farmers. Access determines wealth, empowerment and improved livelihoods. With an accepted mean score of 2.0, the respondents have access to timber/wood (M=2.30), firewood (M=2.40), fruits (M=2.50), medicinal plants (M=2.45). They do not have access to the following: rubber (M=1.45), resin/gum (M=1.30), honey (M=1.20), bamboo (M=1.26), fibres (M=1.41), wild animals (M=1.33) and access to forest land for farming (M=1.21). Women farmers' access to forest resources varies significantly across regions and is shaped by socio-cultural, economic, and institutional factors. In many developing countries, particularly in Sub-Saharan Africa, women depend heavily on forest resources such as fuelwood, medicinal plants, fruits, fodder, and non-timber forest products (NTFPs) for household sustenance and income generation. Despite their reliance on these resources, women often experience limited and unequal access compared to men due to entrenched gender norms and structural inequalities [18, 14, 23,22].

Customary systems of land tenure significantly influence who can access forest resources. In numerous rural areas, forests are managed by institutions dominated by men, which often limits women's ownership rights and their role in decision-making. Women typically hold only secondary or usufruct rights—allowing them to use forest products without owning or controlling the land. This arrangement undermines their ability to manage resources sustainably or engage in long-term forest-based livelihoods [4]. Compounding the issue, inheritance norms and cultural traditions commonly prevent women from inheriting land, reducing their access to forest areas and the benefits they provide. Institutional barriers also play a part: forest regulations may unintentionally marginalize women if they fail to consider gender-specific roles and needs. For example, conservation policies that restrict entry to protected zones can disproportionately impact women, who rely on these forests for daily subsistence. The lack of women's representation in forest management bodies further exacerbates the problem, as their voices and priorities are often excluded from policy discussions (4).

Economic and educational disparities also shape access. Women in agriculture frequently encounter obstacles in obtaining credit, technical support, and relevant information, limiting their effective use of forest resources or participation in value chains. Moreover, heavy domestic workloads reduce the time available for traveling to distant forest areas [22]. Despite these challenges, there is growing recognition of the importance of improving women's access. Gender-sensitive policies, community-based forest management approaches, and legal reforms that strengthen women's land rights have shown positive outcomes. Efforts to expand education, build skills, and include women in governance structures can significantly enhance both livelihoods and conservation effectiveness [24,25,26].

Table 2: Women Farmers Level of Access to Forest Resources

Forest Resource	Mean (M)	SD
Timber/woods	2.30	0.45
Firewood	2.40	0.55
Fruits	2.50	0.61
Medicinal plants	2.45	0.53
Rubber	1.45	0.48
Resin/gums	1.30	0.51
Honey	1.20	0.67
Bamboo	1.26	0.58
Fibres	1.41	0.43
Wild animals	1.33	0.64
Access to forest land for farming	1.21	0.58

Accepted Mean = 2.0

Extent of Energy Poverty Among Women Farmers in Forest Area

Table 3 showed the extent of energy poverty among women farmers. With a discriminating mean value of 2.0, the extent of energy poverty is seen in their dependence on use of forest energy resources. These include heavy dependence on biomass energy (M=2.41) instead of dependency on clean energy sources, limited access to electricity (M=2.35), time burden of fuelwood collection (M=2.51), health on women (M=2.44), charcoal use being regular (M=2.55), use of kerosene lamps (M=2.35), health problems from indoor air pollution (M=2.41), limited study time for girls (M=2.39), difficulty running small business (M=2.43) and heavy economic burden (M=2.51) arising from too much spending of money on purchase of items of fuel.

Energy poverty remains a pressing challenge for women farmers living in forested areas, particularly in developing countries where access to modern energy services is limited. It refers to the lack of reliable, affordable, and sustainable energy needed for basic domestic activities and income-generating work. Women in these communities often face additional obstacles due to social, economic, cultural, and infrastructural constraints that further limit their access to energy [3]. In forest regions, many households depend heavily on traditional biomass—such as firewood, charcoal, and crop residues—for cooking and heating. These energy sources are typically inefficient and environmentally harmful, contributing to deforestation and ecosystem degradation [1]. Since women are usually responsible for gathering fuel, they spend substantial time and physical effort collecting firewood from increasingly distant forests. This burden reduces the time available for farming and other livelihood activities, while also exposing them to safety risks and adverse health effects.

Access to electricity in forested regions remains constrained by weak infrastructure and the remote location of these areas. Consequently, women farmers frequently lack dependable access to essential modern technologies—such as irrigation systems, food processing tools, and adequate storage—despite their potential to enhance agricultural output and minimize post-harvest losses. The lack of reliable power also hampers their ability to use information, educational materials, and communication tools that could support better farming methods and stronger market links [31]. The health consequences of energy deprivation further underscore its impact. Cooking with traditional biomass in homes with poor ventilation contributes to indoor air pollution, which is associated with respiratory conditions, eye disorders, and other health problems. Women and children are especially vulnerable, as they generally spend more time near cooking spaces [32]. Gender disparities also significantly influence the extent of energy poverty. Women farmers often have little say in financial matters or household decisions, limiting their ability to invest in cleaner energy options like liquefied petroleum gas (LPG), solar energy, or more efficient cookstoves. Additionally, social expectations and unequal land rights can hinder their access to credit or prevent full participation in energy initiatives, reinforcing existing inequalities [27].

Table 3: Extent of Energy Poverty Among Farmers

Measures of Energy Poverty	Mean (M)	SD
Heavy dependence on biomass energy	2.41	0.61
Limited access to electricity	2.35	0.58
Time burden of fuelwood collection	2.51	0.49
Health implications on women	2.44	0.68
Charcoal use being regular	2.55	0.57
Use of kerosene lamps for lighting	2.35	0.74
Health problems from indoor air pollution	2.41	0.64
Safety risks during fuel collection	2.45	0.51
Limited study time for girls	2.39	0.48
Difficulty running small businesses	2.43	0.50
High economic burden	2.51	0.48

Accepted mean = 2.0

Forest Resources Contribution to Household Food Security

Table 4 highlights how critical forest resources are for food security in the reserve areas. The contributions are both directly and indirectly related to food security situation. These contributions include provision of wild fruits (99.1%), sources of bush meat (100%), medicinal plants for healthcare, (100%), sources of income from forest products (100%), supply of leafy and green vegetables (98.3%), provision of edible mushroom (97.5%), provision of honey for multipurpose use (91.6%), supply of nuts and seeds (86.6%), fuel wood supply for cooking (97.5%), habitat for fishes and aquatic food animals (96.6%), Forest resources significantly contribute to improving food security for households, especially in rural and forest-dependent communities within developing nations. Food security, as defined by the Food and Agriculture Organization, refers to the availability of enough, safe, and nutritious food at all times, and it is closely related to the sustainable utilization and availability of forest resources [14]. Forests play a crucial role in food security both directly and indirectly by providing a variety of food products, generating income, and offering ecosystem services that enhance agricultural output. Forests provide a variety of edible goods that enhance family diets. This encompasses wild fruits, vegetables, nuts, mushrooms, honey, game meat, and fish sourced from forest streams. These foods are frequently high in vital nutrients, thus enhancing dietary variety and tackling micronutrient shortages in at-risk groups (24). In times of food shortages, like during droughts or when crops fail, forest foods serve as safety nets, assisting families in managing seasonal hunger and emergencies

Forest resources contribute to food security indirectly by providing income. Numerous rural families participate in gathering and selling non-timber forest products (NTFPs), including medicinal herbs, firewood, and charcoal. The income generated from these activities allows families to buy food and fulfill other essential needs [20]. Moreover, forests supply resources for small enterprises, enhancing livelihoods and bolstering economic stability. Forests additionally assist agricultural systems by providing ecosystem services. They support soil fertility, control water cycles, and defend against erosion and climate variations. Trees enhance soil structure and nutrient levels by decomposing leaf litter, which boosts crop productivity. Forests contribute to pollination and pest management, both crucial for sustainable farming practices (16,22). Agroforestry techniques, incorporating trees into agricultural systems, illustrate how forest resources can enhance food production and sustainability. Nonetheless, the role of forest resources in food security is progressively jeopardized by deforestation, land degradation, and unsustainable use. Population density, agricultural development, and logging operations diminish forest area and constrain access to resources derived from forests. This weakens the capacity of families to depend on forests for sustenance and earnings [14,20]. Sustainable forest management, community involvement, and supportive policies are vital to guarantee that forest resources persist in enhancing food security.

Table 4: Forest Resources Contribution to Household Food Security

Forest Resources Contributions	*Frequency	Percentage
Provision of wild fruits	119	99.1
Supply of leafy and green vegetable	118	98.3
Source of bushmeat	120	100
Provision of edible mushroom	117	97.5
Provision of honey for plenty uses	110	91.6
Supply of nuts and seeds	104	86.6
Fuelwood supply for cooking	117	97.5
Habitat for fish & aquatic food sources	116	96.6
Medicinal plants for health	120	100
Income from forest products	120	100

**Multiple responses*

Forest Governance and Justice: Guarantors of Rural Energy Poverty Reduction

Table 5 showed forest governance and justice as guarantors of rural energy poverty reduction. With an accepted mean score of 2.50, forest justice guarantees equitable access to forest resources (M=2.65), promotes sustainable forest management (M=2.50), empowerment of women/vulnerable groups (M=2.61), source of alternative livelihoods/income generation (M=2.51), community participation in governance (M=2.57), reduction of time burden in fuel collection (M=2.51), protection of customary/indigenous rights (M=2.55), conflict prevention/social stability (M=2.50), promotion of environmental sustainability (M=2.54) and integration of renewable energy solution (M=2.55).Forest governance and justice are essential frameworks for addressing rural energy poverty, particularly in developing countries where forest resources constitute a major source of household energy. Rural energy poverty is characterized by limited access to affordable, reliable, and clean energy services, forcing households to depend heavily on traditional biomass such as fuelwood and charcoal [3]. In this context, effective forest governance—encompassing the policies, institutions, and regulations that shape how forests are used—plays a key role in promoting sustainable management and fair access to forest resources, directly supporting better energy security in rural regions. For many rural populations, particularly across sub-Saharan Africa, forests are a primary source of energy for everyday needs. Yet, poor governance, corruption, and ambiguous land rights frequently result in unequal access and excessive use of forest assets [1]. These shortcomings tend to hit marginalized groups hardest, such as women and small-scale farmers, who depend heavily on forest-derived energy. Improving governance through clearer rules, inclusive decision-making, and stronger enforcement can lead to more equitable and sustainable outcomes [17].

Environmental justice reinforces governance by emphasizing fairness in both decision-making processes and the distribution of benefits. Procedural justice ensures local communities have a meaningful voice in forest-related decisions, while distributive justice focuses on ensuring that the advantages from forest use are shared fairly [1]. Incorporating traditional knowledge and local practices into forest management fosters greater inclusion and strengthens community stewardship, which is vital for long-term sustainability. Community-oriented forest management (COFM) has emerged as a practical approach that aligns governance with principles of justice.

By devolving authority to local users, COFM increases accountability, improves resource oversight, and helps ensure that forest benefits meet local priorities, including energy access [1]. Additionally, integrating forest governance with broader energy strategies can support the adoption of cleaner, more efficient technologies—such as improved cookstoves and renewable energy—reducing dependence on traditional biomass [3]. Sustainable forest management and equity are thus critical tools in addressing rural energy poverty. By enabling fair resource access, promoting responsible use, and empowering local populations, these approaches address both ecological and socio-economic dimensions of the challenge. Strengthening institutions, aligning policies, and prioritizing inclusive governance are essential steps toward sustainable energy access and improved rural livelihoods.

Table 5: Forest Governance and Justice' Contributions to Rural Energy Reduction

Forest Governance and Justice Components	Mean (M)	SD
Equitable access to forest resources	2.65	0.84
Sustainable forest management	2.50	0.74
Empowerment of women/vulnerable groups	2.61	0.61
Alternative livelihoods & income generation	2.51	0.64
Community participation in governance	2.57	0.51
Reduction of time burden in fuel collection	2.51	0.48
Protection of customary/indigenous rights	2.55	0.48
Conflicts prevention & social stability	2.50	0.70
Promotion of environmental sustainability	2.54	0.63
Integration with renewable energy solutions	2.55	0.67

Accepted mean = 2.50

Contributions of Cultural Semiotics to food security, forest protection and rural energy poverty reduction

Table 6 showed the numerous contributions of cultural semiotics to food security, forest protection and rural energy poverty reduction. With a discriminating mean (M) index of 2.50, the following contributions were recorded ; influence on resource use (M=2.55), behavioural guidance (M=2.60), communication and education (M=2.67), influence on agricultural practices (M=2.54), preserving traditional ecological knowledge (M=2.58), enhance adoption of innovations (M=2.61), shaping energy use bahaviour (M=2.65), supports adoption of sustainable management of resources (M=2.74), promotes resilient food system (M=2.65), facilitates sustainable energy solutions (M=2.63), Promotes community agency and participation (M=2.59), guiding sustainable harvesting practices (M=2.61), romoting conservations through rituals (M=2.55), strengthening biodiversity protection (M=2,63).

Cultural semiotics plays a crucial role in forest conservation by influencing how communities perceive, value, and interact with forest environments. In many societies, specific trees, groves, or woodland areas carry symbolic or spiritual meaning, guiding behaviors toward more responsible and restrained use [5]. Sacred groves, for example, are often preserved due to their religious or communal significance, effectively functioning as informal protected areas that support biodiversity and maintain ecological functions [6]. Additionally, cultural symbols and meanings embedded in rituals, oral traditions, and taboos transmit ecological knowledge across generations—such as guidance on seasonal harvesting, species protection, and sustainable land management. These culturally rooted practices promote balanced resource use, reduce overharvesting, and strengthen the long-term resilience of forest ecosystems.

Oral discussions showed that local customs and values shape decisions about which forest resources are used and how they are managed. Certain tree species may be protected based on cultural beliefs, contributing to both biodiversity and sustainable yields. Symbolic systems—including rituals, prohibitions, and traditional ecological knowledge—help regulate the collection of food and fuel, preventing excessive exploitation. Understanding these cultural signs is essential when designing community-based initiatives aimed at promoting sustainable energy solutions, like improved cookstoves, or encouraging dietary diversity. When conservation and development efforts reflect local cultural frameworks, they are more likely to gain community support and participation, improving outcomes for food security and energy access.

People's choices about agriculture and resource use are often shaped by the cultural meanings attached to particular plants or landscapes. For instance, trees considered sacred may be conserved not for ecological reasons per se, but because of their spiritual status—yet this preservation indirectly sustains vital resources like food and medicine [5]. Traditional practices such as storytelling, seasonal rituals, and taboos often encode practical ecological knowledge, supporting stable food systems over time. Cultural expressions like folk tales, calendars, and symbolic representations frequently reflect effective farming techniques—such as crop rotation, soil conservation, and livestock management—that boost agricultural productivity [6]. Introducing new agricultural methods or development projects in ways that respect and align with these cultural contexts increases their acceptance and effectiveness, leading to better harvests and improved nutrition [7,8].

Similarly, cultural norms and symbols influence how communities engage with energy resources. Traditional fuels like firewood and biomass fulfill not only practical needs but also hold social, ceremonial, or symbolic value [9]. Acknowledging these cultural dimensions enables energy initiatives—such as cleaner cooking technologies or community-run renewable energy systems—to be designed in ways that resonate with local values, improving uptake and long-term use. Shared beliefs about environmental responsibility can discourage overuse of forests, ensuring continued access to biomass while protecting ecosystem health. When policies incorporate local knowledge, taboos, and cultural understandings of nature, both food and energy systems become more adaptive and durable. Energy solutions that reflect cultural realities are more sustainable and widely embraced, enhancing access without increasing pressure on natural resources. This approach also strengthens community agency, encouraging active participation in managing resources and linking cultural heritage with lasting environmental care.

Table 6: Cultural semiotics roles in food security, forest protection and rural energy poverty reduction

Cultural Semiotics Contributions	Mean (M)	SD
Influence on resource use	2.55	0.64
Behavioral guidance	2.60	0.54
Communication and education	2.67	0.61
Influence on agricultural practices	2.54	0.64
Preserving traditional ecological knowledge	2.58	0.61
Enhance adoption of innovations	2.61	0.58
Shaping energy use behaviour	2.65	0.78
Supports adoption of sustainable energy technologies	2.58	0.82
Promote sustainable management of resources	2.74	0.73
Promotes resilient food systems	2.65	0.66
Facilitates sustainable energy solutions	2.63	0.45
Promotes community agency and participation	2.59	0.52
Guiding sustainable harvesting practices	2.61	0.72
Promoting conservation through rituals	2.55	0.81
Strengthening biodiversity protection	2.63	0.72

Accepted mean = 2.50

Challenges Affecting Forest Governance and Justice for Resource Access

Table 7 indicates that access to forest resources and forest justice are affected by factors such as governmental regulations (89.1%), gender inequality & cultural norms (98.3%), limited participation in decision-making (99.1%), land tenure issues (100%), distance and accessibility (86.6%), forest degradation and deforestation (95%), poverty and lack of alternative energy (98.3%), and limited access to information and training (96.6%). One major challenge stems from insecure land and natural resource rights. In many developing regions, traditional land tenure systems tend to disadvantage women. As Agarwal (18) notes, women typically gain access to land through male family members rather than holding it in their own right. This limits their ability to make independent decisions about land use and reduces their motivation to invest in sustainable forest management. Unclear property rights also heighten the risk of women being displaced or denied access to forest resources.

Forest governance further reflects gender disparities. Women are underrepresented in forest management committees, which are responsible for shaping and enforcing policies. Even when women do participate, entrenched patriarchal norms often prevent them from actively contributing or advocating effectively. As a result, their voices and specific needs are rarely reflected in decision-making processes. Another barrier is limited access to information, education, and support services [18]. High illiteracy rates and restricted mobility hinder women's understanding of forest-related laws and sustainable practices. They also lack the financial, material, and technical support needed to engage in forest management or launch sustainable enterprises. Heavy domestic responsibilities further limit their time and capacity to join political discussions or develop income-generating projects, confining many to low-income tasks like gathering fuelwood.

Table 7: Challenges Affecting Forest Governance and Justice for Resource Access

Challenges of Forest Justice *Frequency Percentage
Government regulations / Laws 107 89.1
Gender inequality and cultural norms 118 98.3
Limited participation in decision-making 119 99.1
Land tenure problems 120 100
Distance & accessibility issues 104 86.6
Forest degradation / deforestation 114 95.0
Poverty and lack of alternative energy 118 98.3
Limited access to information & training 116 96.6

**Multiple responses*

Forest Governance and Justice Strategies for Reducing Rural Energy Poverty

Table 8 revealed the strategies to employ to achieve energy poverty reduction among women farmers. These include promoting women participation in forest governance (M=2.62), land tenure reforms (M=2.54), promotion of sustainable forest management (M=2.71), improve access to clean/affordable energy (M=2.81), supporting forest-based livelihood programs (M=2.63), provision of education/capacity building (M=2.55), improve rural infrastructure & market access (M=2.81), and strengthen environmental protection policies (M=2.67).

Effective governance and equitable management of forests are critical for tackling energy poverty and improving food security, especially in rural regions and among forest-dependent communities. Weak governance, unequal access to forest resources, and ambiguous land tenure systems frequently hinder local populations—particularly women—from benefiting fully from these resources.

Strengthening governance frameworks and adopting policies centered on equity can improve access to energy and support more resilient food systems. A central strategy involves reforming land ownership and resource rights. Clear and legally recognized rights to land and forests empower communities to manage resources sustainably and commit to long-term improvements. When communities hold secure tenure, they are more inclined to adopt conservation measures and agroforestry practices, which in turn boost both energy availability—such as fuelwood—and food production [21]. Securing land rights for women is especially important, given their central role in securing household energy and producing food.

Another vital strategy is fostering participatory forest governance. Involving local communities, indigenous peoples, and marginalized groups in decision-making enhances transparency and accountability. This inclusive approach ensures that forest policies reflect local knowledge and needs, leading to fairer distribution of resources. It also helps prevent conflicts and promotes collaboration in managing forests, ultimately supporting improved livelihoods and food security [19]. In addition, advancing sustainable forest management practices is crucial. Techniques such as agroforestry, reforestation, and regulated harvesting help preserve ecosystem functions while ensuring ongoing access to forest goods. Agroforestry, for instance, combines trees with crops and livestock, enriching soil health, raising agricultural yields, and providing sources of fuel.

Table 8: Forest Governance and Justice Strategy for Energy Poverty Reduction

Energy Poverty Reduction Strategy Mean (M) SD
Promote women participation in forest governance 2.62 0.84
Land tenure / rights reforms 2.54 0.73
Promotion of sustainable forest management 2.71 0.87
Improve access to clean / affordable energy 2.81 0.64
Supporting forest-based livelihood programs 2.63 0.58
Provision of education & capacity building 2.55 0.47
Improve rural infrastructure & market access 2.81 0.61
Strengthen environmental protection policies 2.67 0.70

Accepted mean = 2.50

Conclusion

The field of cultural semiotics links together the processes of meaning creation in humans and their ecological consequences. With the help of cultural semiotics, one can achieve sustainability in forest conservation efforts by learning about local cultural symbols and traditions. Instead of applying laws from the outside, one can create an interactive link between culture and conservation.Forest governance and justice are vital factors influencing the effectiveness of forest resources in supporting rural livelihoods. In Imo State, where female farmers rely significantly on forest resources, guaranteeing fair access and sustainable management is crucial for tackling food insecurity and energy poverty. Ineffective governance structures and gender disparities at present restrict the advantages gained from forests, thus worsening the vulnerability of women in rural areas. Enhancing forest governance via inclusive policies, active community involvement, and reinforced institutional frameworks can improve access to and use of resources. Advancing justice through tackling gender inequalities and guaranteeing fair allocation of resources will strengthen women farmers and enhance their living conditions. In the end, a well-managed and equitable forest system can act as a strong channel for improving food security and alleviating energy poverty.

By emphasizing sustainability, inclusivity, and fairness, policymakers and stakeholders can harness the complete potential of forest resources to aid rural development and enhance the welfare of women farmers in Imo State.

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