

Non-Timber Forest Products and Rural Livelihoods in Sub-Saharan Africa: A Systematic Review of Socioeconomic Contributions, Sustainability Challenges, and Policy Pathways

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Systematic Review

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Non-Timber Forest Products and Rural Livelihoods in Sub-Saharan Africa: A Systematic Review of Socioeconomic Contributions, Sustainability Challenges, and Policy Pathways

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Abstract Non-timber forest products (NTFPs) are increasingly recognized as important contributors to rural livelihoods, poverty reduction, food security, and environmental sustainability in Sub-Saharan Africa. Despite growing scholarly attention, evidence regarding their socioeconomic significance remains fragmented across countries, ecological zones, and product categories. This study systematically reviews literature published between 2000 and 2025 to synthesize current knowledge on the contribution of NTFPs to rural household livelihoods in Sub-Saharan Africa. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, peer-reviewed articles and relevant institutional publications were retrieved from Scopus, Web of Science, ScienceDirect, CAB Abstracts, and Google Scholar. A total of 105 studies met the inclusion criteria and were subjected to thematic synthesis. The review reveals that NTFPs contribute substantially to livelihood diversification, household income generation, food security enhancement, employment creation, and climate resilience. Women emerge as key actors in NTFP value chains, particularly in harvesting, processing, and local marketing activities. Furthermore, sustainable utilization of NTFPs provides incentives for forest conservation and biodiversity protection. However, challenges including deforestation, unsustainable harvesting, weak market systems, insecure tenure arrangements, limited value addition, and climate change continue to constrain their full potential. The review concludes that NTFPs should be mainstreamed into national forestry, rural development, and climate adaptation policies. Strengthening value chains, improving tenure security, supporting community-based forest management, and promoting sustainable commercialization are critical for maximizing livelihood benefits while safeguarding forest ecosystems.

Keywords Non-timber forest products; rural livelihoods; poverty reduction; sustainable forest management; food security; Sub-Saharan Africa.

Key Points

- The review synthesizes evidence from 105 studies published between 2000 and 2025 on NTFPs and rural livelihoods in Sub-Saharan Africa.
- NTFPs contribute through household income, food and nutrition, employment, enterprise development, gender and social inclusion, climate resilience, and conservation.
- Sustainable outcomes are constrained by forest degradation, weak markets, insecure tenure, limited value addition and finance, and climate-related pressures; governance and value-chain interventions are therefore central.

Plain Language Summary Rural households across Sub-Saharan Africa obtain food, medicine, income, employment and other benefits from forests without necessarily harvesting timber. This review brings together evidence from 105 studies to examine how non-timber forest products (NTFPs)—including honey, wild fruits, mushrooms, medicinal plants, edible insects, fibres, gums and resins—support rural livelihoods. The evidence shows that NTFPs can diversify household income, strengthen food security, create employment and enterprise opportunities, and provide incentives for forest conservation. At the same time, these benefits can be weakened by forest degradation, unsustainable harvesting, weak markets, insecure resource rights, limited processing and finance, and climate change. The review therefore highlights the importance of sustainable harvesting, secure tenure, community participation, value addition, inclusive markets and policy support.

1. INTRODUCTION

Forests support the livelihoods of more than 1.6 billion people worldwide and provide a wide range of goods and ecosystem services that contribute to human well-being (FAO, 2020). Beyond timber, forests produce numerous biological resources collectively referred to as non-timber forest products (NTFPs), including wild fruits, mushrooms, medicinal plants, honey, edible insects, fibres, gums, and resins. These products play critical roles in sustaining rural economies, particularly among forest-dependent communities in developing countries.

Across Sub-Saharan Africa, NTFPs constitute important livelihood assets that support household income generation, food security, healthcare provision, and cultural practices. In regions characterized by widespread poverty, limited employment opportunities, and increasing climate variability, NTFPs often function as safety nets during periods of economic hardship and agricultural failure. Numerous studies have demonstrated that forest products contribute significantly to livelihood diversification and resilience among rural households (Angelsen et al., 2014; Vedeld et al., 2007).

Despite growing recognition of their importance, research on NTFPs remains fragmented across geographical regions, product categories, and disciplinary perspectives. Existing studies frequently focus on specific products, communities, or countries, making it difficult to develop a comprehensive understanding of the broader contribution of NTFPs to rural livelihoods across Sub-Saharan Africa.

This review therefore seeks to synthesize existing evidence and answer the following research questions:

- What are the major NTFPs contributing to rural livelihoods in Sub-Saharan Africa?
- How do NTFPs contribute to income generation, food security, and employment creation?
- What environmental and conservation benefits are associated with NTFP utilization?
- What challenges constrain sustainable utilization and commercialization?
- What policy interventions can enhance the contribution of NTFPs to sustainable rural development?

The findings are intended to inform policy development, sustainable forest management strategies, and future research directions.

2. METHODOLOGY

2.1 Review Design

This study employed a Systematic Literature Review (SLR) methodology to synthesize and critically evaluate existing evidence on the contribution of non-timber forest products (NTFPs) to rural household livelihoods in Sub-Saharan Africa. Systematic reviews have become increasingly important in environmental and natural resource research because they provide transparent, replicable, and evidence-based approaches to knowledge synthesis (Snyder, 2019).

Unlike traditional narrative reviews, systematic reviews follow structured protocols for literature identification, screening, appraisal, and synthesis, thereby reducing bias and enhancing the reliability of conclusions. The present review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework (Page et al., 2021), which provides internationally recognized guidelines for conducting and reporting systematic reviews.

The review focused on studies examining the socioeconomic, environmental, and institutional dimensions of NTFP utilization across Sub-Saharan Africa, with particular emphasis on income generation, food security, employment creation, gender

empowerment, climate resilience, and sustainable forest management.

2.2 Search Strategy

A comprehensive literature search was conducted between January and June 2026 using multiple academic databases and institutional repositories. The search strategy was designed to maximize coverage of peer-reviewed and grey literature relevant to NTFPs and rural livelihoods.

The databases consulted included:

- Scopus
- Web of Science
- ScienceDirect
- CAB Abstracts
- Google Scholar
- SpringerLink
- Wiley Online Library
- Taylor & Francis Online

In addition, relevant reports from international organizations such as the Food and Agriculture Organization (FAO), the Center for International Forestry Research (CIFOR), the World Agroforestry Centre (ICRAF), and the International Fund for Agricultural Development (IFAD) were reviewed.

The search employed combinations of keywords and Boolean operators to identify relevant publications.

Example search string:

```
("Non-timber forest products" OR "NTFPs" OR "non-wood forest products")
AND
("rural livelihoods" OR "household income" OR "food security" OR "poverty reduction")
AND
("Sub-Saharan Africa" OR Africa)
```

Additional search terms included:

- Forest-dependent communities
- Livelihood diversification
- Forest income
- Community forestry
- Sustainable forest management
- Forest products commercialization
- Environmental income

Reference lists of selected studies were further examined to identify additional relevant publications not captured through database searches.

2.3 Inclusion and Exclusion Criteria

To ensure consistency and relevance, predefined inclusion and exclusion criteria were applied.

Inclusion Criteria

Studies were included if they:

- Were published between 2000 and 2025.
- Focused on countries within Sub-Saharan Africa.
- Examined one or more NTFPs.
- Investigated livelihood-related outcomes.
- Were published in English.
- Provided sufficient methodological information.
- Appeared in peer-reviewed journals, books, book chapters, or institutional reports.

Exclusion Criteria

Studies were excluded if they:

- Focused exclusively on timber products.
- Examined ecological issues without livelihood implications.
- Were conference abstracts lacking full papers.
- Were duplicate publications.
- Were conducted outside Sub-Saharan Africa.
- Did not provide primary or synthesized evidence relevant to the review objectives.

2.4 Study Selection Process

The study selection process followed the four stages recommended by the PRISMA framework:

Identification

The initial search yielded 1,245 records across all databases.

Screening

After removal of duplicate records ($n = 215$), 1,030 articles remained for title and abstract screening.

Eligibility Assessment

A total of 250 full-text articles were assessed for eligibility based on the predefined inclusion criteria.

Inclusion

Following detailed evaluation, 105 studies were retained for final synthesis.

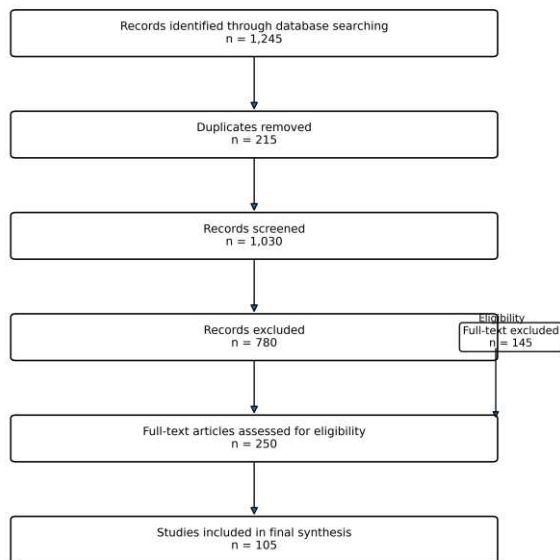


Figure 1. PRISMA-style study-selection flow based on the record counts reported in the review.

2.5 Data Extraction

A standardized data extraction framework was developed to ensure consistency during information collection.

The following information was extracted from each study:

Table 1. Data extraction framework used for the systematic review

Variable	Description
Author(s)	Lead author and co-authors
Year	Publication year

Variable	Description
Country	Study location
NTFP category	Product investigated
Research design	Methodological approach
Sample size	Number of respondents
Key findings	Major outcomes reported
Livelihood contribution	Income, food, employment, etc.
Challenges identified	Constraints affecting utilization

Source: Review methodology. The framework captures the principal variables extracted from each included study.

The extracted information was entered into a review matrix to facilitate comparison and synthesis across studies.

2.6 Quality Assessment

To ensure reliability of evidence, all included studies were subjected to quality appraisal.

Assessment criteria included:

- Clarity of objectives
- Research design appropriateness
- Sampling adequacy
- Data collection rigor
- Analytical transparency
- Validity of conclusions

Studies were classified as:

- High quality
- Moderate quality
- Low quality

Only studies rated as moderate or high quality were retained for synthesis.

2.7 Data Analysis and Synthesis

Given the diversity of methodologies employed across studies, a thematic synthesis approach was adopted.

Thematic analysis involved:

- Familiarization with study findings.
- Coding of recurring concepts.
- Grouping of codes into themes.
- Interpretation of patterns and relationships.

Eight major themes emerged:

- Major NTFPs utilized across Sub-Saharan Africa.
- Income generation and poverty reduction.
- Food security and nutrition.
- Employment and enterprise development.
- Gender and social inclusion.
- Environmental sustainability and conservation.
- Challenges affecting NTFP utilization.
- Policy implications and future opportunities.

Thematic synthesis enabled identification of both convergent and divergent findings across geographical regions and product categories.

2.8 Limitations of the Review

Several limitations should be acknowledged.

First, the review included only English-language publications, which may have excluded relevant studies published in French or Portuguese-speaking African countries.

Second, methodological differences among studies limited opportunities for quantitative meta-analysis.

Third, publication bias may have influenced the availability of studies reporting positive livelihood outcomes.

Nevertheless, the systematic and transparent approach adopted in this review enhances confidence in the robustness of the findings and conclusions presented.

3. RESULTS AND DISCUSSION

3.1 Characteristics of Included Studies

A total of 105 studies met the inclusion criteria and were included in the final review. The selected studies represented a broad range of ecological zones, forest types, and socioeconomic contexts across Sub-Saharan Africa. The studies employed diverse methodological approaches, including household surveys, participatory rural appraisal, key informant interviews, focus group discussions, ecological assessments, market analyses, and mixed-methods designs.

The majority of studies (approximately 62%) utilized quantitative research methods, while 24% employed qualitative approaches and 14% adopted mixed-methods designs. Household surveys were the most frequently used data collection method, reflecting the strong emphasis of NTFP research on livelihood outcomes and socioeconomic impacts.

Most studies focused on forest-dependent rural communities characterized by high levels of poverty, limited livelihood diversification, and significant reliance on natural resources. The reviewed literature consistently highlighted the importance of NTFPs as components of livelihood strategies among vulnerable households.

Table 2. Characteristics of included studies

Characteristic	Frequency (%)
Quantitative Studies	62
Qualitative Studies	24
Mixed Methods Studies	14
Household Surveys	58
Participatory Approaches	17
Market Studies	11
Ecological Assessments	8
Literature Reviews	6

Note: The percentages shown for methodological design and data-collection approaches describe the characteristics reported in the review and should not be summed across categories that use different bases.

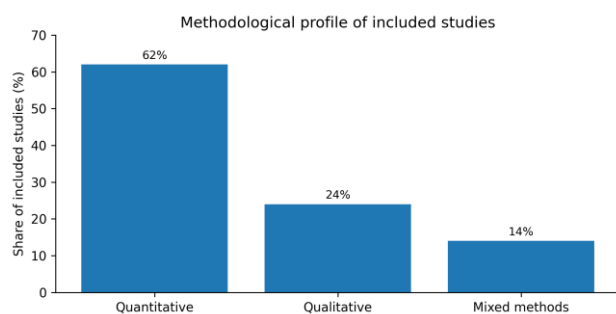


Figure 2. Methodological profile of the 105 included studies, showing the shares using quantitative, qualitative and mixed-methods approaches.

The increasing number of studies published after 2010 indicates growing scholarly interest in the role of NTFPs within broader debates concerning sustainable development, climate change adaptation, biodiversity conservation, and poverty alleviation.

Publication Trends

Analysis of publication dates revealed a substantial increase in NTFP-related research during the last decade. More than 70% of reviewed studies were published between 2010 and 2025, reflecting heightened international attention to the contribution of forest resources to sustainable livelihoods.

This trend may be attributed to several factors:

- Growing concern about rural poverty.
- Increased recognition of ecosystem services.
- Expansion of climate change research.
- Greater emphasis on community-based natural resource management.
- International commitments to the Sustainable Development Goals (SDGs).

The increasing research output demonstrates the rising importance of NTFPs within contemporary forestry and development discourse.

3.2 Geographic Distribution of NTFP Research in Sub-Saharan Africa

The reviewed studies were distributed across more than twenty countries within Sub-Saharan Africa. However, research intensity varied considerably among countries and regions.

Southern Africa accounted for the largest proportion of studies, followed by Eastern Africa, Central Africa, and West Africa.

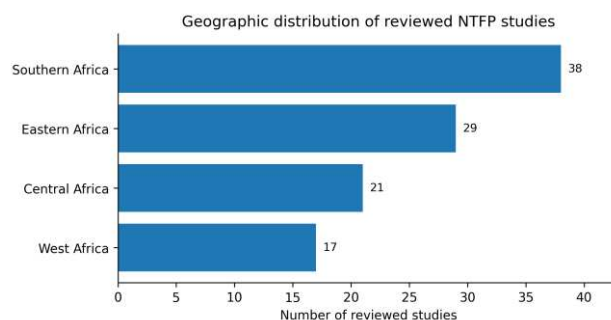


Figure 3. Geographic distribution of reviewed studies across the four Sub-Saharan African regions represented in the review.

Table 3. Geographic distribution of reviewed studies

Region	Number of Studies
Southern Africa	38
Eastern Africa	29
Central Africa	21
West Africa	17

Source: Review synthesis.

Among individual countries, South Africa, Zambia, Tanzania, Zimbabwe, Cameroon, Ethiopia, and Ghana were the most frequently represented.

Southern Africa

Southern Africa contributed the highest number of studies, reflecting the region's extensive woodland ecosystems and strong tradition of NTFP research.

Countries prominently represented include:

- Zambia
- Zimbabwe
- South Africa
- Malawi
- Mozambique
- Namibia

Research from Southern Africa frequently focused on:

- Indigenous fruits
- Honey production
- Fuelwood
- Medicinal plants
- Edible insects

The miombo woodland ecosystem emerged as one of the most extensively studied landscapes due to its ecological significance and contribution to rural livelihoods.

Eastern Africa

Studies from Eastern Africa primarily originated from:

- Tanzania
- Kenya
- Ethiopia
- Uganda

Research themes commonly included:

- Gum and resin production
- Medicinal plants
- Honey value chains
- Community forestry initiatives

Eastern African studies often emphasized interactions between forest resources, climate variability, and livelihood resilience.

Central Africa

Central African research was largely concentrated in:

- Cameroon
- Democratic Republic of Congo
- Republic of Congo
- Gabon

These studies frequently examined:

- Bush mango products
- Edible caterpillars
- Medicinal plants
- Forest commercialization

The Congo Basin emerged as a particularly important region because of its rich biodiversity and extensive tropical forest resources.

West Africa

Research from West Africa focused primarily on:

- Shea butter
- Gum Arabic
- Baobab products
- Medicinal plants

Countries represented included:

- Ghana
- Nigeria
- Burkina Faso
- Senegal
- Mali

West African studies frequently highlighted women's participation in NTFP value chains and the role of commercialization in poverty reduction.

Regional Research Gaps

Despite the broad geographic coverage, significant research gaps remain.

Several countries exhibited limited representation in the literature, including:

- Angola
- Chad
- Central African Republic
- South Sudan
- Eritrea

These gaps suggest opportunities for future research aimed at improving regional understanding of NTFP utilization and livelihood contributions.

3.3 Major Categories of Non-Timber Forest Products Utilized Across Sub-Saharan Africa

The reviewed studies documented a remarkable diversity of NTFPs utilized by rural households throughout Sub-Saharan Africa. These products provide food, medicine, construction materials, cultural services, and income-generating opportunities.

Although product availability varies across ecological zones, several categories emerged consistently throughout the literature.

Table 4. Major NTFP categories reported in the literature

Category	Examples
Wild Fruits	Baobab, Marula, Masuku, Tamarind
Honey and Beeswax	Forest honey products
Medicinal Plants	Indigenous herbal species
Mushrooms	Wild edible fungi
Edible Insects	Caterpillars, termites, grasshoppers
Fibres and Reeds	Bamboo, raffia, reeds
Gums and Resins	Gum Arabic, natural resins
Wild Vegetables	Indigenous leafy vegetables
Essential Oils	Aromatic plant products

Source: Review synthesis.

Wild Fruits

Wild fruits were among the most frequently reported NTFPs across the reviewed studies.

Common species included:

- *Adansonia digitata* (Baobab)
- *Sclerocarya birrea* (Marula)
- *Uapaca kirkiana* (Masuku)
- *Tamarindus indica* (Tamarind)

These fruits contribute to:

- Household nutrition
- Income generation
- Food security
- Traditional food systems

Many indigenous fruits possess high nutritional value and are increasingly being commercialized through processing into juices, jams, oils, and beverages.

Honey and Beeswax

Honey production emerged as one of the most commercially important NTFPs throughout the region.

Countries with significant honey industries include:

- Zambia
- Tanzania
- Ethiopia
- Kenya

Honey contributes to livelihoods through:

- Direct sales
- Export opportunities
- Value-added processing
- Employment generation

The review revealed growing interest in beekeeping because of its compatibility with forest conservation objectives.

Medicinal Plants

Medicinal plants constituted one of the most widely utilized NTFP categories.

Traditional medicine remains a primary healthcare source for many rural communities.

Medicinal plants are used for:

- Disease treatment
- Preventive healthcare
- Cultural practices
- Commercial herbal products

However, concerns regarding overharvesting and resource depletion were frequently reported.

Mushrooms

Wild mushrooms contribute significantly to food security and seasonal income generation.

The reviewed studies highlighted mushrooms as:

- Important protein sources
- Marketable products
- Cultural foods

Mushroom collection is often dominated by women and contributes significantly to household livelihoods.

Edible Insects

Edible insects were particularly important in Central and Southern Africa.

Common species included:

- Caterpillars
- Termites
- Grasshoppers

These products provide:

- High-quality protein
- Income opportunities
- Seasonal food security benefits

Several studies identified edible insects as valuable resources for addressing nutritional deficiencies.

Gums, Resins, and Fibres

In arid and semi-arid regions, gums and resins constitute important commercial products.

Examples include:

- Gum Arabic
- Frankincense
- Myrrh

Similarly, fibres derived from bamboo, raffia, and reeds support handicraft production and construction activities.

Emerging Commercial Products

The review identified increasing commercialization of:

- Essential oils
- Natural cosmetics
- Herbal products
- Organic honey
- Indigenous fruit products

These emerging markets present opportunities for enhancing rural incomes while promoting sustainable resource utilization.

Synthesis of Findings

The reviewed literature demonstrates that NTFPs represent highly diverse and multifunctional resources supporting livelihoods across ecological zones and socioeconomic contexts.

While product importance varies regionally, honey, medicinal plants, indigenous fruits, mushrooms, and edible insects consistently emerged as the most significant NTFPs in terms of livelihood contributions.

The diversity of products highlights the importance of adopting context-specific approaches when designing policies and interventions aimed at enhancing the contribution of NTFPs to rural development.

The next section critically examines the contribution of these products to household income generation and poverty reduction, which emerged as the most frequently reported livelihood outcome across the reviewed studies.

3.4 Contribution of Non-Timber Forest Products to Household Income and Poverty Reduction

3.4.1 NTFPs as Sources of Rural Household Income

Income generation emerged as the most frequently reported livelihood benefit associated with NTFP utilization across the reviewed studies. Evidence from diverse ecological and socioeconomic contexts demonstrates that NTFPs contribute significantly to household economies by providing both subsistence benefits and marketable products. For many rural households, particularly those residing near forested landscapes, NTFPs constitute an important source of environmental income that complements agriculture, livestock production, wage employment, and remittances.

Environmental income refers to income derived from natural resources and ecosystem services. According to Vedeld et al. (2007), forest-based environmental income contributes approximately 22% of total household income among rural communities in developing countries. Similarly, Angelsen et al. (2014) reported that environmental resources contribute nearly one-quarter of total household income in many forest-dependent communities worldwide, with NTFPs accounting for a substantial proportion of these earnings.

Across Sub-Saharan Africa, NTFPs contribute to household income through:

- Direct sale of harvested products.
- Processing and value addition.
- Small-scale enterprise development.
- Local and regional trade.

- Export-oriented commercialization.

The review indicates that the magnitude of income contribution varies considerably depending on resource availability, market access, product characteristics, household assets, and institutional conditions.

3.4.2 Income Contributions Across Countries

Studies reviewed from Zambia, Tanzania, Ethiopia, Cameroon, Ghana, Zimbabwe, and South Africa consistently demonstrate the economic importance of NTFPs.

In Zambia, honey production represents one of the most commercially significant NTFP activities. Research conducted in the miombo woodlands indicates that honey sales provide substantial income for rural households while requiring relatively low capital investment. The development of organic honey export markets has further enhanced livelihood opportunities for producers in Northwestern Province and other honey-producing regions.

Similarly, in Tanzania and Ethiopia, beekeeping has emerged as an important source of rural income due to growing domestic and international demand for honey and beeswax products. Studies report that households engaged in commercial beekeeping often experience higher incomes than those relying exclusively on subsistence agriculture.

In West Africa, shea butter production provides livelihoods for millions of women. Countries such as Ghana, Burkina Faso, and Nigeria have developed extensive value chains around shea products, creating opportunities for income generation and export earnings. The commercialization of shea butter demonstrates how NTFPs can contribute not only to household livelihoods but also to national economic development.

In Southern Africa, indigenous fruits such as marula (*Sclerocarya birrea*) and baobab (*Adansonia digitata*) provide seasonal income opportunities through local marketing and processing enterprises. These products contribute to household cash income while simultaneously supporting nutritional security.

Table 5. Examples of income-generating NTFPs in Sub-Saharan Africa

Product	Main Countries	Producing	Livelihood Contribution
Honey	Zambia, Ethiopia	Tanzania,	Household income, exports
Shea Butter	Ghana, Burkina Faso		Women's income, trade
Gum Arabic	Sudan, Chad		Commercial earnings
Baobab Products	Malawi, Zimbabwe	Zambia,	Seasonal income
Marula Products	South Africa, Namibia		Processing enterprises
Medicinal Plants	Kenya, South Africa		Local trade
Edible Insects	Zambia, DRC, Zimbabwe		Household income and food
Mushrooms	Zambia, Tanzania		Seasonal cash income

Source: Review synthesis.

3.4.3 NTFPs and Livelihood Diversification

One of the most important findings emerging from the reviewed literature is the role of NTFPs in livelihood diversification.

Livelihood diversification refers to the development of multiple income-generating activities to reduce vulnerability and improve household resilience. Rural households rarely depend on a single source of income; instead, they combine various livelihood activities to manage risk and enhance economic security.

NTFPs contribute to diversification by:

- Providing supplementary income.
- Reducing dependence on agriculture.
- Creating opportunities during agricultural off-seasons.
- Supporting coping strategies during shocks.

Several studies indicate that households relying on diversified livelihood portfolios tend to exhibit greater resilience to environmental and economic disturbances than households dependent on a single livelihood source.

For example, during drought periods, agricultural production often declines significantly. Under such circumstances, forest products become increasingly important as alternative income sources. Wild fruits, mushrooms, medicinal plants, and honey may provide critical financial support when crop yields are poor.

The ability of NTFPs to function as alternative livelihood resources highlights their importance within resilience-based approaches to rural development.

3.4.4 NTFPs as Safety Nets for Poor Households

The reviewed literature consistently identifies NTFPs as livelihood safety nets for vulnerable populations.

Safety nets are mechanisms that help households cope with shocks and prevent severe declines in welfare.

NTFPs function as safety nets because they:

- Are accessible to poor households.
- Require relatively low investment.
- Can be harvested when needed.
- Provide immediate sources of food and income.

Shackleton and Shackleton (2004) describe NTFPs as "natural insurance systems" that enable households to respond to periods of hardship.

Examples include:

- Selling fuelwood during financial emergencies.
- Collecting mushrooms during food shortages.
- Harvesting medicinal plants when healthcare costs are unaffordable.
- Marketing wild fruits to pay school fees.

The review found that poorer households often exhibit greater dependence on NTFPs than wealthier households, emphasizing the role of forest resources in poverty mitigation.

3.4.5 Poverty Reduction Pathways

NTFPs contribute to poverty reduction through multiple pathways.

Direct Income Effects

Sales of NTFPs provide cash income that can be used for:

- Food purchases.
- Healthcare.
- Education.
- Housing improvements.
- Agricultural investments.

Employment Creation

Harvesting, processing, and marketing activities create employment opportunities for household members.

Asset Accumulation

Income generated from NTFPs may be invested in productive assets such as:

- Livestock.

- Farm equipment.
- Small businesses.

Human Capital Development

Forest-derived income frequently supports expenditures on:

- School fees.
- Healthcare services.
- Skills training.

Through these pathways, NTFPs contribute not only to immediate consumption needs but also to long-term livelihood improvement.

3.4.6 Commercialization and Economic Transformation

Commercialization has become an increasingly important aspect of NTFP development.

Commercialization refers to the transition from subsistence-oriented utilization toward market-oriented production and trade.

Several factors have driven commercialization:

- Growing urban demand.
- Expansion of regional markets.
- International trade opportunities.
- Development interventions.
- Value addition initiatives.

Commercialized NTFPs often generate substantially higher returns than products used exclusively for subsistence purposes.

Successful examples include:

- Organic honey exports from Zambia.
- Shea butter exports from West Africa.
- Medicinal plant industries in South Africa.
- Baobab product processing enterprises.

However, commercialization also presents challenges.

Studies caution that increased market demand may result in:

- Resource overexploitation.
- Elite capture of benefits.
- Exclusion of vulnerable groups.
- Increased environmental pressures.

Consequently, commercialization strategies must be accompanied by sustainability safeguards and equitable benefit-sharing mechanisms.

3.4.7 Constraints Limiting Income Contributions

Despite their importance, several factors limit the income-generating potential of NTFPs.

These include:

- Poor market access.
- Limited processing capacity.
- Weak transportation infrastructure.
- Price fluctuations.
- Resource depletion.
- Inadequate policy support.
- Limited access to finance.

These constraints reduce profitability and limit opportunities for enterprise development.

Addressing such barriers is essential for enhancing the poverty reduction potential of NTFPs.

3.4.8 Synthesis and Critical Discussion

The evidence reviewed strongly supports the conclusion that NTFPs contribute significantly to household income generation and poverty reduction throughout Sub-Saharan Africa. However, their contributions are neither uniform nor guaranteed.

The review reveals considerable variation across countries, ecosystems, and product categories. In some contexts, NTFPs serve primarily as supplementary income sources, whereas in others they constitute major livelihood pillars.

Importantly, the relationship between NTFPs and poverty reduction appears to be mediated by broader socioeconomic factors, including market access, infrastructure development, tenure security, institutional support, and value chain development.

This finding suggests that NTFPs alone cannot eliminate rural poverty. Rather, their effectiveness depends upon supportive policy environments and complementary development interventions.

Nevertheless, the evidence clearly indicates that NTFPs represent valuable livelihood assets capable of contributing substantially to rural development objectives when managed sustainably and integrated into broader livelihood strategies.

3.5 Contribution of Non-Timber Forest Products to Food Security and Nutrition

3.5.1 NTFPs as Components of Rural Food Systems

Food security remains a major development challenge throughout Sub-Saharan Africa despite significant agricultural potential and numerous interventions aimed at increasing food production. According to the Food and Agriculture Organization (FAO), food security exists when all people have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Within this framework, non-timber forest products (NTFPs) play a critical but often underappreciated role in supporting food availability, food access, food utilization, and food system resilience.

The reviewed literature consistently demonstrates that forests contribute directly to household food systems through the provision of edible products including wild fruits, mushrooms, honey, nuts, seeds, roots, tubers, leafy vegetables, and edible insects. These resources supplement agricultural production and provide important nutritional benefits, particularly among rural households experiencing food insecurity.

Unlike conventional agricultural systems that often depend on a limited number of staple crops, forest-based foods contribute to dietary diversity and nutritional quality. Consequently, NTFPs should not be viewed merely as emergency food resources but rather as integral components of sustainable food systems.

3.5.2 Contribution to Food Availability

One of the most direct contributions of NTFPs to food security is through increasing household food availability.

Food availability refers to the physical presence of food resources that can be accessed for consumption.

Across Sub-Saharan Africa, forests provide numerous edible products that contribute directly to household food supplies.

Common forest foods identified in the reviewed studies include:

Table 6. Common forest foods reported in the reviewed literature

Category	Examples
Wild Fruits	Baobab, Marula, Masuku, Tamarind
Wild Vegetables	Indigenous leafy vegetables
Mushrooms	Edible fungi species
Honey	Forest honey and bee products
Edible Insects	Caterpillars, termites, grasshoppers
Nuts and Seeds	Indigenous tree species

Category	Examples
Roots and Tubers	Wild edible roots

Source: Review synthesis.

These products frequently supplement staple foods such as maize, cassava, millet, rice, and sorghum.

Research conducted in Zambia, Tanzania, Zimbabwe, Ethiopia, and Cameroon indicates that forest foods contribute significantly to household consumption, particularly among poor rural households with limited access to purchased foods.

3.5.3 Seasonal Food Security and Hunger Mitigation

A recurring theme across the reviewed literature is the importance of NTFPs in addressing seasonal food shortages.

Many rural households experience periods of food scarcity between harvest seasons when agricultural food stocks become depleted. During these periods, forest foods often serve as critical coping mechanisms.

Wild fruits and mushrooms are particularly important during seasonal hunger periods because their availability frequently coincides with times of reduced agricultural food supplies.

For example:

- Indigenous fruits often become available during the dry season.
- Mushrooms are abundant during rainy seasons.
- Edible insects appear seasonally and provide protein-rich foods.

Several studies from Southern Africa report increased dependence on forest foods during drought periods and crop failures.

This finding supports the argument that NTFPs function as livelihood safety nets not only through income generation but also through direct food provision.

3.5.4 Nutritional Contributions of NTFPs

Beyond increasing food availability, NTFPs contribute significantly to nutritional security.

Nutritional security refers to access to foods that provide adequate nutrients necessary for healthy growth, development, and well-being.

The reviewed literature demonstrates that many forest foods possess high nutritional value.

Wild Fruits

Wild fruits are rich sources of:

- Vitamin C
- Vitamin A
- Potassium
- Calcium
- Iron
- Dietary fibre

Baobab fruit (*Adansonia digitata*), for example, contains exceptionally high levels of vitamin C and is increasingly recognized as a valuable nutritional resource.

Similarly, marula fruits provide significant quantities of vitamins and antioxidants that contribute to improved dietary quality.

Mushrooms

Wild mushrooms provide:

- Protein
- B vitamins
- Minerals
- Dietary fibre

Several studies identify mushrooms as important sources of nutrients among rural populations with limited access to animal protein.

Honey

Honey contributes:

- Readily available energy
- Natural sugars
- Antioxidants
- Antimicrobial compounds

Although honey is not a complete food source, it contributes to dietary diversity and household nutrition.

Edible Insects

Edible insects emerged as one of the most nutritionally significant NTFP categories.

Research demonstrates that edible insects contain:

- High-quality protein
- Essential amino acids
- Iron
- Zinc
- Calcium
- Healthy fats

In some cases, protein concentrations exceed those found in conventional livestock products.

Consequently, edible insects represent important opportunities for addressing protein deficiencies and improving nutrition among vulnerable populations.

3.5.5 NTFPs and Dietary Diversity

Dietary diversity is widely regarded as an important indicator of food security and nutritional adequacy.

Households consuming a wider variety of foods generally achieve better nutritional outcomes than those relying on a limited range of staple crops.

The reviewed studies consistently indicate that access to forest foods contributes positively to dietary diversity.

Forest products add:

- Fruits
- Vegetables
- Proteins
- Micronutrients

to diets that might otherwise be dominated by carbohydrate-rich staples.

Studies from Ethiopia, Tanzania, Zambia, and South Africa report positive associations between forest access and dietary diversity scores.

This finding suggests that forests contribute not only to food quantity but also to food quality.

3.5.6 NTFPs and Climate Resilience in Food Systems

Climate change poses significant threats to food security throughout Sub-Saharan Africa.

Agricultural production systems are increasingly affected by:

- Droughts
- Floods
- Temperature increases
- Rainfall variability
- Extreme weather events

Under such conditions, NTFPs provide important adaptive functions.

Forest foods often remain available when agricultural crops fail.

Examples include:

- Drought-tolerant fruit trees.
- Wild vegetables.
- Edible insects.
- Forest honey.

These resources enhance household resilience by providing alternative food sources during climatic shocks.

Several studies reviewed indicate that dependence on NTFPs increases during drought periods, highlighting their role in climate adaptation strategies.

3.5.7 Indigenous Knowledge and Forest Foods

The utilization of NTFPs for food security is closely linked to indigenous knowledge systems.

Traditional knowledge enables communities to:

- Identify edible species.
- Understand harvesting seasons.
- Process potentially toxic foods safely.
- Preserve products for future use.

Women frequently play central roles in maintaining and transmitting such knowledge.

However, several studies highlight concerns regarding the erosion of traditional ecological knowledge due to urbanization, modernization, and cultural change.

Loss of indigenous knowledge may reduce future utilization of forest foods and weaken food security benefits associated with NTFPs.

3.5.8 Critical Discussion

Although the reviewed literature overwhelmingly supports the contribution of NTFPs to food security, several important considerations emerge.

First, most studies emphasize subsistence benefits but provide limited quantitative estimates of nutritional contributions. Consequently, the precise contribution of forest foods to dietary intake remains insufficiently understood.

Second, the role of NTFPs varies considerably across ecological regions. Communities residing near extensive forest resources generally derive greater food security benefits than those living in degraded or sparsely forested landscapes.

Third, commercialization may create trade-offs between household consumption and market sales. In some cases, increasing market demand may reduce local access to nutritionally valuable products.

These findings suggest that policies promoting NTFP commercialization should also consider food security implications.

3.5.9 Synthesis of Findings

The reviewed evidence demonstrates that NTFPs contribute substantially to food security and nutrition across Sub-Saharan Africa.

Their contributions extend beyond emergency food provision and encompass:

- Increased food availability.
- Improved dietary diversity.
- Enhanced nutritional quality.
- Seasonal hunger mitigation.
- Climate resilience.
- Support for traditional food systems.

Importantly, NTFPs appear to play particularly significant roles among poor and vulnerable households facing food insecurity and limited access to market-based food sources.

The evidence therefore supports growing calls for greater recognition of forests and NTFPs within food security policies and development strategies.

Integrating forest foods into national nutrition programs, climate adaptation initiatives, and rural development policies could enhance both food security and sustainable forest management outcomes.

3.6 Employment Generation and Rural Enterprise Development

3.6.1 NTFPs as Sources of Employment

Employment creation represents one of the most important pathways through which non-timber forest products (NTFPs) contribute to rural livelihoods in Sub-Saharan Africa. In many rural areas where formal employment opportunities are scarce and agricultural incomes are often uncertain, NTFP-related activities provide critical opportunities for income generation, self-employment, and enterprise development.

The reviewed literature indicates that NTFP value chains create employment across multiple stages, including:

- Resource harvesting
- Transportation
- Retail trade
- Export activities

Unlike many formal economic sectors, participation in NTFP activities generally requires relatively low levels of financial investment, making them particularly accessible to poor households, women, and youth.

Several studies suggest that NTFP-based employment functions as both a primary livelihood activity and a supplementary source of income depending on local socioeconomic conditions and market opportunities.

3.6.2 Employment Along NTFP Value Chains

The economic contribution of NTFPs extends beyond primary resource collection.

Modern NTFP value chains involve multiple actors and stages, creating diverse employment opportunities.

A typical NTFP value chain includes:

- Harvesters
- Collectors
- Traders
- Processors
- Transporters
- Wholesalers
- Retailers
- Exporters

Each stage generates employment and contributes to local economic activity.

For example, honey production supports:

- Beekeepers
- Hive manufacturers
- Honey processors
- Packaging enterprises
- Transport services
- Marketing agents

Similarly, medicinal plant value chains involve collectors, traditional healers, processors, wholesalers, and retailers.

The literature demonstrates that value chain development significantly increases the employment potential of NTFPs compared to subsistence-oriented utilization.



Value addition, employment and income can increase along the chain when market and governance conditions are supportive.

Figure 4. Simplified NTFP value chain from forest resources through harvesting, processing, marketing and consumption.

3.6.3 NTFP-Based Rural Enterprises

The commercialization of NTFPs has contributed to the emergence of numerous small-scale enterprises across Sub-Saharan Africa.

Examples include:

Honey Enterprises

Honey production has become one of the most successful NTFP-based businesses in several African countries.

Products include:

- Raw honey
- Processed honey
- Beeswax candles
- Cosmetics
- Medicinal products

Indigenous Fruit Enterprises

Wild fruits are increasingly processed into:

- Juices
- Jams
- Wines
- Dried fruit products

Medicinal Plant Enterprises

Medicinal plants support:

- Herbal medicine production
- Essential oil extraction
- Natural health products

Handicraft Enterprises

Fibres, reeds, bamboo, and raffia support:

- Basket weaving
- Furniture production
- Decorative products
- Construction materials

These enterprises contribute significantly to local economic development while creating opportunities for entrepreneurship and innovation.

3.6.4 Beekeeping as a Model Enterprise

Among the reviewed studies, beekeeping emerged as one of the most successful examples of NTFP-based enterprise development.

Several characteristics explain its success:

- Low capital requirements.
- Limited land requirements.
- Environmental sustainability.
- Strong domestic demand.
- Export market opportunities.

In Zambia, Tanzania, and Ethiopia, beekeeping has evolved from a traditional livelihood activity into a commercially viable enterprise sector.

Research from Zambia's miombo woodlands demonstrates that honey production provides:

- Household income.
- Employment opportunities.
- Foreign exchange earnings.
- Incentives for forest conservation.

Importantly, beekeeping is compatible with sustainable forest management because healthy forests provide the floral resources required for honey production.

This alignment between livelihood benefits and conservation objectives makes beekeeping particularly attractive from a sustainable development perspective.

3.6.5 Employment Opportunities for Women

Women play central roles within many NTFP value chains.

The review found that women are heavily involved in:

- Mushroom collection.
- Wild fruit marketing.
- Medicinal plant trade.
- Indigenous vegetable production.
- Shea butter processing.
- Handicraft production.

NTFP enterprises provide opportunities for women to generate independent income while balancing household responsibilities.

Several studies report that women frequently invest earnings from NTFP activities in:

- Children's education.
- Household nutrition.
- Healthcare.
- Small business development.

As a result, NTFP-based enterprises contribute not only to employment generation but also to broader social development outcomes.

3.6.6 Youth Employment and Entrepreneurship

Youth unemployment remains one of the most significant development challenges facing Sub-Saharan Africa.

Limited access to land, capital, and formal employment opportunities often constrains livelihood prospects for young people.

The reviewed literature suggests that NTFPs offer several opportunities for youth engagement.

Potential youth enterprises include:

- Modern beekeeping.
- Mushroom cultivation.
- Indigenous fruit processing.
- Essential oil production.
- Herbal product manufacturing.
- Digital marketing of forest products.

These activities are attractive because they often require relatively modest financial investment while offering opportunities for innovation and value addition.

Furthermore, growing demand for natural and organic products creates new market opportunities that young entrepreneurs may be well positioned to exploit.

3.6.7 Value Addition and Employment Multipliers

One of the most significant findings emerging from the review concerns the role of value addition in expanding employment opportunities.

Raw NTFPs generally generate lower economic returns than processed products.

Value addition activities include:

- Cleaning.
- Sorting.
- Packaging.
- Processing.
- Branding.
- Product diversification.

These activities create additional jobs and increase profitability.

For example:

Table 7. Examples of NTFP value-addition pathways

Product	Raw Product	Value-Added Product
Honey	Raw honey	Packaged honey, cosmetics
Baobab	Fresh fruit	Juice, powder
Marula	Fresh fruit	Wine, oil
Bamboo	Raw poles	Furniture
Medicinal Plants	Raw herbs	Extracts and oils

Source: Review synthesis.

Several studies indicate that value-added products can generate significantly higher returns than raw product sales.

Consequently, investment in processing technologies represents a major opportunity for enhancing rural employment.

3.6.8 Constraints Affecting Enterprise Development

Despite their potential, NTFP enterprises face numerous constraints.

Common challenges include:

Limited Access to Finance

Many entrepreneurs lack access to:

- Credit
- Loans
- Investment capital

Weak Infrastructure

Poor roads and transportation systems increase transaction costs.

Limited Market Information

Producers often lack information regarding:

- Prices
- Consumer preferences
- Market opportunities

Inadequate Technical Skills

Limited training constrains:

- Product quality
- Business management
- Value addition

Regulatory Barriers

Complex regulations may discourage commercialization and investment.

These constraints reduce profitability and limit opportunities for enterprise growth.

3.6.9 Critical Discussion

The reviewed literature demonstrates that NTFPs contribute significantly to employment generation and enterprise development.

However, several important observations emerge.

First, many NTFP enterprises remain concentrated within informal sectors characterized by low productivity and limited growth potential.

Second, while commercialization can increase incomes, benefits are often unevenly distributed across value chains. Producers frequently receive only a small proportion of final market values.

Third, insufficient investment in processing and marketing infrastructure continues to constrain enterprise development.

These findings suggest that employment benefits associated with NTFPs can be substantially enhanced through targeted interventions focusing on value chain development, entrepreneurship support, and market access.

3.6.10 Synthesis of Findings

The evidence reviewed indicates that NTFPs contribute meaningfully to rural employment and enterprise development throughout Sub-Saharan Africa.

Their importance arises from several characteristics:

- Accessibility to poor households.
- Low entry barriers.
- Compatibility with existing livelihood systems.
- Potential for value addition.
- Opportunities for women and youth participation.

Successful examples such as honey production, shea butter processing, indigenous fruit enterprises, and medicinal plant value chains demonstrate the capacity of NTFPs to support local economic development while contributing to poverty reduction.

Nevertheless, realizing the full employment potential of NTFPs requires investments in infrastructure, finance, entrepreneurship development, market integration, and sustainable resource management.

The next section examines gender dimensions and social inclusion, which emerged as important cross-cutting themes influencing access to, control over, and benefits derived from NTFP resources across Sub-Saharan Africa.

3.7 Gender Dimensions and Social Inclusion in NTFP Utilization

3.7.1 Introduction

Gender and social inclusion emerged as important cross-cutting themes throughout the reviewed literature. Access to, utilization of, and benefits derived from non-timber forest products (NTFPs) are strongly influenced by gender roles, social norms, cultural practices, resource tenure arrangements, and institutional structures. Consequently, understanding gender dynamics is essential for evaluating the contribution of NTFPs to rural livelihoods and sustainable development.

The reviewed studies consistently demonstrate that women, men, youth, and marginalized groups participate differently in NTFP value chains. These differences influence access to resources, opportunities for commercialization, control over income, and participation in decision-making processes.

While NTFPs often provide important opportunities for social inclusion and economic empowerment, significant inequalities remain regarding resource access, market participation, and benefit sharing.

3.7.2 Gendered Patterns of NTFP Utilization

The literature reveals clear gender-based specialization in the collection and utilization of NTFPs across Sub-Saharan Africa.

Women are commonly involved in the collection and processing of:

- Wild fruits

Mushrooms

- Medicinal plants
- Fuelwood
- Indigenous vegetables
- Fibres
- Shea nuts

Men tend to dominate activities involving:

- Commercial honey production
- Timber substitutes
- Construction materials
- High-value forest products
- Long-distance marketing

These patterns reflect broader divisions of labour within rural households and communities.

Women frequently collect products associated with household food security, healthcare, and domestic responsibilities, while men often engage in activities requiring greater mobility or access to commercial markets.

Several studies suggest that women possess extensive ecological knowledge regarding edible and medicinal forest resources, making them key custodians of traditional knowledge systems.

3.7.3 Women's Contribution to Rural Livelihoods

Women emerged as central actors within many NTFP value chains.

Across the reviewed studies, women contribute significantly to:

- Resource harvesting
- Product processing
- Local marketing
- Household nutrition
- Traditional healthcare systems

Income generated from NTFP activities is often used to support:

- Children's education
- Food purchases
- Healthcare expenses
- Household welfare

Research from West Africa demonstrates that shea butter production provides livelihoods for millions of women. Similarly, studies from Southern Africa indicate that women dominate local markets for mushrooms, indigenous fruits, and medicinal plants.

These findings suggest that NTFPs contribute not only to household income but also to women's economic empowerment and social well-being.

3.7.4 Women's Economic Empowerment

Economic empowerment refers to the ability of individuals to access economic opportunities, control resources, make financial decisions, and improve their socioeconomic status.

The reviewed literature identifies several pathways through which NTFPs contribute to women's empowerment.

Income Generation

NTFPs provide women with opportunities to earn independent income through collection, processing, and marketing activities.

Financial Autonomy

Independent earnings enhance women's capacity to make decisions regarding household expenditures and investments.

Entrepreneurship Development

Commercialization of NTFPs has facilitated the growth of women-led enterprises involving:

- Shea butter
- Honey processing
- Indigenous fruits
- Herbal products
- Handicrafts

Leadership Opportunities

Participation in producer groups, cooperatives, and community organizations often increases women's involvement in local decision-making processes.

Research from Ghana, Zambia, Tanzania, and South Africa indicates that women engaged in NTFP enterprises frequently report improvements in self-confidence, social status, and household influence.

3.7.5 Indigenous Knowledge and Gender

Traditional ecological knowledge plays a critical role in NTFP utilization.

Women are often the primary custodians of knowledge concerning:

- Medicinal plants
- Wild vegetables
- Edible fruits
- Food preservation techniques
- Sustainable harvesting practices

This knowledge contributes significantly to household food security, healthcare, and resource conservation.

However, several studies highlight concerns regarding the erosion of traditional knowledge due to:

- Urbanization
- Modernization
- Formal education systems
- Cultural transformation

Loss of indigenous knowledge may undermine sustainable utilization of NTFPs and reduce future livelihood benefits.

Consequently, documentation and preservation of traditional ecological knowledge should be integrated into NTFP development programs.

3.7.6 Youth Participation in NTFP Value Chains

Youth represent a growing demographic group in Sub-Saharan Africa and face considerable challenges related to unemployment and limited livelihood opportunities.

The reviewed literature suggests that NTFPs provide important opportunities for youth engagement through:

- Beekeeping
- Mushroom cultivation
- Indigenous fruit processing
- Herbal product manufacturing
- Ecotourism enterprises
- Digital marketing

These activities offer relatively low barriers to entry compared with many formal economic sectors.

Several studies emphasize that youth involvement in NTFP enterprises can contribute to:

- Employment creation
- Skills development
- Entrepreneurship
- Rural economic diversification

However, access to finance, training, and markets remains a major challenge for young entrepreneurs.

3.7.7 Inclusion of Marginalized and Vulnerable Groups

NTFPs are particularly important for marginalized populations because access to many forest products requires relatively limited financial capital.

Groups frequently benefiting from NTFPs include:

- Female-headed households
- Elderly individuals
- Landless households
- Indigenous communities
- Poor households
- Persons with disabilities

For these groups, NTFPs often function as livelihood safety nets that provide income, food, and social support during periods of vulnerability.

The reviewed studies consistently demonstrate that forest resources contribute to social inclusion by providing accessible livelihood opportunities for populations that may otherwise be excluded from formal economic activities.

3.7.8 Gender-Based Constraints

Despite their substantial contributions, women frequently face barriers that limit their participation in NTFP value chains.

Common constraints include:

Limited Resource Rights

Women often have weaker access to:

- Land ownership
- Forest tenure rights
- Productive resources

Limited Access to Finance

Financial institutions frequently require collateral that women may not possess.

Restricted Market Access

Women often participate primarily in local markets characterized by lower profit margins.

Time Constraints

Household responsibilities may reduce opportunities for commercial activities.

Limited Access to Training

Women frequently receive less support from extension services and development programs.

These barriers contribute to unequal benefit distribution and constrain opportunities for economic advancement.

3.7.9 Commercialization and Gender Dynamics

Commercialization can generate both opportunities and challenges for gender equity.

Positive outcomes include:

- Increased income opportunities
- Enterprise development
- Expanded market participation

However, commercialization may also lead to:

- Elite capture of benefits
- Increased competition for resources
- Exclusion of vulnerable groups
- Shifts in control over income

Several studies report that as NTFPs become more profitable, men sometimes assume control over activities that were previously dominated by women.

This phenomenon highlights the importance of gender-sensitive commercialization strategies that ensure equitable benefit sharing.

3.7.10 Critical Discussion

The reviewed literature suggests that NTFPs contribute significantly to social inclusion and gender empowerment. However, these benefits are not automatic.

The extent to which NTFPs promote equity depends upon:

- Resource governance systems
- Market structures
- Cultural norms
- Institutional support mechanisms

While women often play central roles within NTFP value chains, they do not always control the benefits generated.

Similarly, youth and marginalized groups may face barriers that limit meaningful participation.

Consequently, interventions aimed at promoting NTFP development should incorporate explicit gender and social inclusion objectives.

3.7.11 Synthesis of Findings

Overall, the evidence demonstrates that NTFPs constitute important mechanisms for promoting gender equity and social inclusion within rural livelihood systems.

Women contribute substantially to NTFP production, processing, and marketing while maintaining valuable traditional knowledge systems. NTFPs also provide opportunities for youth employment, entrepreneurship, and livelihood diversification.

However, persistent inequalities related to resource access, market participation, and benefit sharing continue to constrain the potential of NTFPs to support inclusive development.

Future interventions should therefore prioritize:

- Gender-responsive policies.
- Women's enterprise development.
- Youth entrepreneurship support.
- Secure resource rights.
- Equitable benefit-sharing mechanisms.

Such approaches can enhance both livelihood outcomes and social justice objectives.

The next section examines the environmental sustainability and forest conservation benefits associated with NTFP utilization, which represent important dimensions of the relationship between livelihoods and sustainable forest management.

3.8 Environmental Sustainability and Forest Conservation Benefits

3.8.1 Introduction

The relationship between non-timber forest products (NTFPs) and environmental sustainability has become a central theme in forestry and conservation research. Unlike conventional timber extraction, many NTFPs can be harvested without felling trees or causing significant damage to forest ecosystems when appropriate management practices are applied. Consequently, NTFPs are often promoted as mechanisms for simultaneously achieving livelihood improvement and environmental conservation.

The reviewed literature suggests that sustainable utilization of NTFPs can generate economic incentives for maintaining forest cover, protecting biodiversity, enhancing ecosystem services, and strengthening climate resilience. However, these positive outcomes are not automatic and depend upon effective governance, sustainable harvesting practices, and secure resource rights.

This section critically examines the contribution of NTFPs to environmental sustainability and explores their role in supporting sustainable forest management across Sub-Saharan Africa.

3.8.2 NTFPs and Sustainable Forest Management

Sustainable Forest Management (SFM) seeks to balance ecological integrity, economic viability, and social equity in the utilization of forest resources.

NTFPs contribute to SFM by providing economic value from standing forests without necessarily requiring large-scale forest clearance or destructive harvesting practices.

The reviewed studies indicate that NTFPs support SFM through:

- Diversification of forest-based income.
- Reduced dependence on timber extraction.
- Enhanced incentives for conservation.
- Increased community participation in forest management.

In several countries, forest-dependent communities derive greater long-term benefits from maintaining forest ecosystems than from converting forests to agricultural land.

For example, beekeeping enterprises depend on healthy forest ecosystems that provide nectar and pollen resources. Consequently, honey producers often have strong incentives to protect forest habitats.

Similarly, communities dependent on medicinal plants, wild fruits, and mushrooms frequently recognize the importance of conserving forests that sustain these resources.

3.8.3 Biodiversity Conservation

Sub-Saharan Africa contains some of the world's most biologically diverse ecosystems, including:

- Tropical rainforests
- Miombo woodlands
- Savannah woodlands
- Montane forests
- Dry forests

These ecosystems provide habitats for numerous plant and animal species while supporting human livelihoods.

The reviewed literature suggests that NTFPs can contribute to biodiversity conservation through several mechanisms.

Conservation Incentives

When communities derive economic benefits from forest resources, they may be more willing to support conservation efforts.

Economic incentives associated with NTFPs can reduce pressures for:

- Agricultural expansion.
- Unsustainable logging.
- Land conversion.

Protection of Indigenous Species

Many NTFPs are derived from indigenous species that possess ecological, cultural, and economic significance.

Examples include:

- Baobab (*Adansonia digitata*)
- Marula (*Sclerocarya birrea*)
- Shea tree (*Vitellaria paradoxa*)
- Various medicinal plants

Commercial and subsistence utilization of these species can create incentives for their protection and sustainable management.

Community-Based Conservation

Several studies highlight the role of community forestry programs in promoting both biodiversity conservation and livelihood development.

Community-based conservation approaches often encourage local participation in:

- Resource monitoring.
- Species protection.
- Forest restoration.
- Sustainable harvesting.

The review indicates that biodiversity conservation outcomes are generally stronger where communities possess secure access rights and derive tangible benefits from forest resources.

3.8.4 Ecosystem Services Supported by NTFPs

Forests provide a wide range of ecosystem services that support both environmental sustainability and human well-being.

NTFPs are closely linked to these ecosystem services because their availability depends upon healthy and functioning ecosystems.

The reviewed literature identified four major categories of ecosystem services associated with NTFPs.

Provisioning Services

These include:

- Food
- Medicine
- Fuel
- Fibre
- Water resources

Provisioning services directly support livelihoods and contribute to food security and household welfare.

Regulating Services

Forests regulate:

- Climate
- Water cycles
- Soil erosion
- Pollination processes

Many NTFP species depend upon these ecological functions for their productivity and survival.

Supporting Services

These services include:

- Nutrient cycling
- Soil formation
- Biodiversity maintenance
- Habitat provision

Supporting services underpin long-term ecosystem productivity and resilience.

Cultural Services

NTFPs frequently contribute to:

- Traditional knowledge systems
- Spiritual practices
- Cultural identity
- Recreational activities

These cultural values are particularly important among indigenous and forest-dependent communities.

Table 8. Ecosystem services associated with NTFPs

Ecosystem Service Category	Examples
Provisioning Services	Food, medicine, fibres
Regulating Services	Climate regulation, pollination
Supporting Services	Biodiversity maintenance
Cultural Services	Traditional knowledge, spiritual values

Source: Review synthesis.

3.8.5 NTFPs and Climate Change Mitigation

Climate change mitigation refers to efforts aimed at reducing greenhouse gas emissions and enhancing carbon sequestration.

Forests play critical roles in climate mitigation through:

- Carbon storage
- Carbon sequestration
- Emission reduction

The reviewed literature suggests that NTFP-based livelihood systems can contribute indirectly to climate mitigation by encouraging forest conservation.

Several mechanisms were identified.

Reduced Deforestation

Economic benefits derived from NTFPs may reduce incentives for:

- Forest clearing.
- Agricultural expansion.
- Unsustainable timber harvesting.

Carbon Stock Protection

Maintaining forest cover protects carbon stored in:

- Trees
- Vegetation
- Forest soils

Agroforestry Development

Many NTFP species can be incorporated into agroforestry systems that combine livelihood benefits with carbon sequestration.

Examples include:

- Baobab trees
- Marula trees
- Shea trees
- Indigenous fruit species

Agroforestry systems are increasingly recognized as climate-smart approaches to sustainable land management.

3.8.6 NTFPs and Climate Change Adaptation

Climate change poses significant challenges to rural livelihoods in Sub-Saharan Africa.

Increasing temperatures, erratic rainfall patterns, droughts, and floods negatively affect agricultural productivity and food security.

The reviewed studies indicate that NTFPs contribute to climate adaptation by:

- Diversifying livelihood options.
- Providing alternative income sources.
- Enhancing food security.
- Reducing vulnerability to climatic shocks.

Forest foods often remain available during periods when agricultural crops fail.

Several studies documented increased reliance on NTFPs during drought periods, suggesting that forests function as important buffers against climate-related risks.

This finding supports growing recognition of forests and NTFPs as components of climate adaptation strategies.

3.8.7 Community-Based Forest Management

Community-based forest management (CBFM) emerged as an important institutional approach linking NTFPs and conservation outcomes.

CBFM initiatives seek to empower local communities to participate in forest governance while benefiting from sustainable resource utilization.

Benefits identified in the reviewed literature include:

- Improved resource stewardship.
- Enhanced compliance with management rules.
- Reduced illegal harvesting.
- Increased local accountability.

Successful examples from Zambia, Tanzania, Namibia, and Cameroon demonstrate that community participation can strengthen both conservation and livelihood outcomes.

However, effectiveness depends upon:

- Secure tenure arrangements.
- Strong local institutions.
- Equitable benefit sharing.
- Adequate technical support.

3.8.8 Environmental Risks Associated with NTFP Utilization

Although NTFPs are often promoted as environmentally friendly alternatives to timber extraction, the reviewed literature highlights several environmental risks.

Overharvesting

Excessive harvesting can reduce species populations and threaten resource sustainability.

Habitat Disturbance

Unsustainable collection methods may damage vegetation and wildlife habitats.

Commercialization Pressures

Growing market demand can encourage unsustainable exploitation.

Species Vulnerability

High-value medicinal plants and commercially valuable species may become particularly vulnerable to overexploitation.

These risks demonstrate that NTFP utilization is not inherently sustainable and requires effective management systems.

3.8.9 Critical Discussion

The reviewed evidence supports the argument that NTFPs can contribute positively to environmental sustainability and forest conservation.

However, the relationship between NTFPs and conservation is complex.

While economic benefits may create incentives for conservation, commercialization can also generate pressures that threaten ecological sustainability.

This duality highlights the importance of governance systems capable of balancing livelihood objectives with conservation goals.

The review further indicates that positive environmental outcomes are most likely where:

- Resource rights are secure.
- Communities participate in management.
- Sustainable harvesting practices are enforced.
- Markets reward sustainable production.

3.8.10 Synthesis of Findings

Overall, the reviewed literature demonstrates that NTFPs can contribute significantly to environmental sustainability when managed appropriately.

Their contributions include:

- Supporting sustainable forest management.
- Promoting biodiversity conservation.
- Protecting ecosystem services.
- Enhancing climate resilience.
- Encouraging community participation in conservation.

However, environmental benefits are not guaranteed. Sustainable outcomes depend upon effective governance, secure tenure arrangements, community engagement, and responsible commercialization strategies.

The evidence therefore supports integrated approaches that recognize the interconnected nature of livelihoods, conservation, and sustainable development.

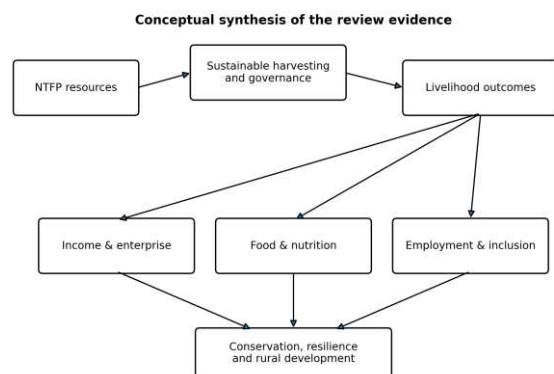


Figure 5. Integrated conceptual framework synthesizing the review's livelihood, governance, conservation and rural-development pathways.

3.9 Challenges Affecting Sustainable Utilization of Non-Timber Forest Products

3.9.1 Introduction

Despite the substantial socioeconomic and environmental benefits associated with non-timber forest products (NTFPs), numerous challenges continue to constrain their contribution to sustainable rural

livelihoods across Sub-Saharan Africa. The reviewed literature consistently demonstrates that while NTFPs possess significant potential for poverty reduction, food security enhancement, employment creation, and environmental conservation, multiple ecological, institutional, economic, and social barriers limit the realization of these benefits.

Importantly, these challenges are often interconnected and mutually reinforcing. For example, weak governance may contribute to resource degradation, while poor market access may reduce incentives for sustainable resource management. Understanding these constraints is therefore essential for designing effective interventions aimed at strengthening NTFP-based livelihood systems.

3.9.2 Deforestation and Forest Degradation

Deforestation emerged as one of the most significant threats affecting the sustainability of NTFPs throughout Sub-Saharan Africa.

Forest ecosystems continue to experience substantial losses due to:

- Agricultural expansion
- Settlement development
- Infrastructure projects
- Commercial logging
- Charcoal production
- Mining activities

The conversion of forest land to alternative uses reduces the availability of NTFP resources and undermines the ecological systems upon which they depend.

Several studies from Zambia, Tanzania, Cameroon, and Ethiopia reported declining availability of indigenous fruit trees, medicinal plants, and other NTFP species due to forest degradation.

Deforestation affects NTFPs through:

- Habitat destruction
- Species loss
- Reduced biodiversity
- Declining ecosystem productivity

The review indicates that forest degradation not only threatens environmental sustainability but also directly affects rural livelihoods by reducing access to valuable forest products.

3.9.3 Unsustainable Harvesting Practices

Many NTFPs are harvested from wild populations with limited management or monitoring systems.

The reviewed literature identifies several unsustainable harvesting practices:

- Overharvesting
- Destructive collection methods
- Premature harvesting
- Harvesting during reproductive periods
- Failure to allow resource regeneration

Medicinal plants are particularly vulnerable because harvesting often involves removing:

- Roots
- Bark
- Entire plants

Such practices can significantly reduce regeneration capacity and threaten long-term resource availability.

Similarly, excessive collection of mushrooms, edible insects, and wild fruits may negatively affect ecosystem functioning if harvesting exceeds sustainable levels.

The literature suggests that increasing commercialization may exacerbate harvesting pressures, particularly where market demand is strong and governance systems are weak.

3.9.4 Weak Market Access and Market Failures

Market-related constraints were among the most frequently reported barriers affecting NTFP commercialization.

Many rural producers face difficulties accessing profitable markets due to:

- Poor transportation infrastructure
- Remote geographic locations
- Limited market information
- High transaction costs
- Weak bargaining power

As a result, producers often depend on intermediaries who capture a substantial share of product value.

Several studies reported that NTFP collectors receive only a small proportion of final market prices despite bearing the primary costs of harvesting and transportation.

Market failures also arise from:

- Information asymmetry
- Lack of quality standards
- Weak producer organizations
- Inadequate storage facilities

These constraints reduce profitability and limit incentives for investment in sustainable production systems.

3.9.5 Limited Value Addition and Processing Capacity

Although numerous NTFPs possess considerable commercial potential, many products continue to be marketed in raw or minimally processed forms.

The review identified limited value addition as a major constraint affecting income generation and enterprise development.

Common challenges include:

- Lack of processing equipment
- Limited technical expertise
- Inadequate infrastructure
- Insufficient investment capital

For example:

- Honey may be sold without branding or packaging.
- Wild fruits are often marketed fresh rather than processed.
- Medicinal plants are frequently sold as raw materials.

The absence of value addition reduces income opportunities and restricts employment creation within NTFP value chains.

Several studies argue that strengthening processing capacity could significantly enhance the economic contribution of NTFPs.

3.9.6 Limited Access to Finance

Access to financial services remains a major challenge for many NTFP producers and entrepreneurs.

Common financial constraints include:

- Limited access to credit
- High borrowing costs
- Lack of collateral
- Limited savings opportunities
- Inadequate insurance mechanisms

Women and youth are particularly affected because they often possess fewer assets and face greater barriers to formal financial institutions.

The literature suggests that limited access to finance constrains:

- Enterprise expansion
- Technology adoption
- Product diversification
- Market participation

Consequently, financial exclusion reduces opportunities for commercialization and value chain development.

3.9.7 Insecure Resource Tenure

Secure access to forest resources is widely recognized as a prerequisite for sustainable management.

However, the reviewed studies indicate that tenure insecurity remains common across many parts of Sub-Saharan Africa.

Challenges include:

- Unclear property rights
- Conflicting claims
- Weak enforcement mechanisms
- Exclusion of local communities from decision-making

Insecure tenure may discourage investment in conservation and sustainable management because users lack confidence that they will benefit from long-term stewardship efforts.

Several studies demonstrate positive relationships between secure resource rights and improved conservation outcomes.

Communities possessing recognized tenure rights often exhibit greater willingness to invest in resource management and protection.

3.9.8 Inadequate Policy and Institutional Support

Although NTFPs contribute significantly to rural livelihoods, they frequently receive less policy attention than timber production or agriculture.

The review identified several institutional challenges:

- Weak policy frameworks
- Fragmented governance systems
- Limited extension services
- Inadequate monitoring systems
- Insufficient budget allocations

In many countries, forestry policies continue to emphasize timber production while underestimating the socioeconomic importance of NTFPs.

As a result:

- Research investment remains limited.
- Producer support services are inadequate.
- Commercialization opportunities are underdeveloped.

Strengthening institutional support therefore represents a critical priority for enhancing NTFP development.

3.9.9 Climate Change and Environmental Variability

Climate change has emerged as a significant challenge affecting both forest ecosystems and rural livelihoods.

The reviewed studies identify several climate-related threats:

- Increased temperatures
- Altered rainfall patterns
- Prolonged droughts
- Extreme weather events
- Changes in species distribution

These changes may affect:

- Flowering cycles
- Fruit production
- Mushroom abundance
- Pollinator activity
- Regeneration rates

For example, reduced rainfall may lower honey production by affecting floral resources and bee populations.

Similarly, prolonged droughts can reduce yields of indigenous fruits and medicinal plants.

The literature emphasizes the need for climate-resilient management strategies to maintain NTFP productivity under changing environmental conditions.

3.9.10 Loss of Indigenous Knowledge

Traditional ecological knowledge plays a central role in NTFP utilization and management.

However, several studies report increasing erosion of indigenous knowledge due to:

- Urbanization
- Modernization
- Formal education systems
- Cultural transformation
- Rural-to-urban migration

Loss of traditional knowledge may reduce:

- Species identification skills
- Sustainable harvesting practices
- Traditional processing methods
- Conservation awareness

This trend represents a significant challenge because traditional knowledge often underpins sustainable resource management systems.

3.9.11 Gender and Social Inequalities

Although NTFPs can promote social inclusion, significant inequalities continue to affect participation and benefit distribution.

Women frequently face barriers related to:

- Resource access
- Credit availability
- Market participation
- Decision-making authority

Similarly, youth and marginalized groups may encounter difficulties accessing resources and opportunities within NTFP value chains.

These inequalities can reduce the effectiveness of NTFP-based interventions and limit their contribution to inclusive development.

3.9.12 Critical Discussion

The reviewed evidence demonstrates that challenges affecting NTFP utilization are complex and interconnected.

Importantly, many constraints originate not from the resources themselves but from broader socioeconomic and institutional conditions.

For example:

- Resource degradation is often linked to weak governance.
- Low profitability is frequently associated with market failures.
- Unsustainable harvesting may result from poverty and limited livelihood alternatives.

These findings suggest that technical interventions alone are unlikely to address underlying challenges.

Instead, integrated approaches are required that simultaneously address:

- Resource management
- Market development
- Institutional strengthening
- Social inclusion
- Climate adaptation

3.9.13 Synthesis of Findings

Overall, the reviewed literature demonstrates that while NTFPs possess significant potential to contribute to sustainable rural development, multiple constraints continue to limit their effectiveness.

The most significant challenges identified include:

- Deforestation and forest degradation.
- Unsustainable harvesting practices.
- Weak market systems.
- Limited value addition.
- Financial exclusion.
- Tenure insecurity.
- Inadequate policy support.
- Climate change.
- Loss of indigenous knowledge.
- Gender and social inequalities.

Addressing these challenges will require coordinated action involving governments, local communities, researchers, development agencies, and the private sector.

The following section examines policy implications and future opportunities for strengthening the contribution of NTFPs to rural livelihoods and sustainable forest management across Sub-Saharan Africa.

3.10 Policy Implications and Future Opportunities

3.10.1 Introduction

The findings of this review demonstrate that non-timber forest products (NTFPs) have substantial potential to contribute to sustainable rural development, poverty reduction, food security enhancement, employment creation, biodiversity conservation, and climate resilience throughout Sub-Saharan Africa. However, realizing this potential requires supportive policies, effective institutions, improved market systems, and sustainable resource management practices.

This section discusses the policy implications emerging from the review and identifies future opportunities for strengthening the contribution of NTFPs to sustainable development.

3.10.2 Mainstreaming NTFPs into National Development Policies

One of the most important findings emerging from this review is that NTFPs remain undervalued within many national development frameworks despite their substantial socioeconomic contributions.

In many countries, policy attention remains focused on:

- Agriculture
- Timber production
- Mining
- Industrial development

while NTFPs receive relatively limited recognition.

Governments should therefore integrate NTFPs into:

- National forestry policies
- Poverty reduction strategies
- Food security frameworks
- Climate adaptation plans
- Rural development programs
- Biodiversity conservation strategies

Such integration would facilitate:

- Increased investment
- Improved institutional support
- Better coordination among sectors
- Enhanced recognition of forest-based livelihoods

Recognizing NTFPs as strategic development resources would strengthen their contribution to national economies and rural welfare.

3.10.3 Strengthening Community-Based Forest Management

The review consistently demonstrates that communities play central roles in sustainable NTFP management.

Consequently, policies should strengthen community-based forest management (CBFM) approaches that empower local people to participate in resource governance and benefit sharing.

Key interventions include:

- Secure community forest rights.
- Participatory management planning.
- Community monitoring systems.
- Local conservation committees.
- Capacity-building programs.

Evidence from Zambia, Tanzania, Namibia, and Cameroon suggests that community participation often improves both conservation outcomes and livelihood benefits.

Successful community-based approaches require:

- Clear tenure arrangements.
- Transparent governance structures.
- Equitable benefit-sharing mechanisms.
- Long-term institutional support.

3.10.4 Enhancing Tenure Security

Tenure security emerged as a critical determinant of sustainable resource management.

Where communities possess secure rights to forest resources, they are more likely to invest in:

- Conservation activities.
- Sustainable harvesting.
- Resource restoration.
- Long-term management.

Policy reforms should therefore focus on:

- Clarifying ownership arrangements.
- Strengthening customary tenure systems.
- Reducing resource conflicts.
- Enhancing legal recognition of community rights.

Improved tenure security can simultaneously support livelihood development and conservation objectives.

3.10.5 Promoting Sustainable Commercialization

Commercialization offers important opportunities for increasing income and employment generation from NTFPs.

However, commercialization strategies should be designed carefully to avoid resource depletion and social exclusion.

Sustainable commercialization requires:

Resource Sustainability

- Sustainable harvesting guidelines.
- Monitoring systems.
- Resource inventories.

Equitable Benefit Sharing

- Inclusive value chains.
- Support for small producers.
- Gender-sensitive approaches.

Market Development

- Improved market information.
- Quality standards.
- Certification systems.

Institutional Support

- Extension services.
- Technical assistance.
- Business development programs.

The review suggests that commercialization can generate significant benefits when accompanied by sustainability safeguards.

3.10.6 Value Addition and Enterprise Development

One of the most promising opportunities identified in the literature is value addition.

Many NTFPs continue to be sold in raw form despite possessing considerable potential for processing and product diversification.

Priority interventions include:

Processing Infrastructure

Investment in:

- Honey processing facilities.
- Fruit processing plants.
- Essential oil extraction equipment.
- Packaging facilities.

Product Development

Promotion of:

- Herbal products.
- Natural cosmetics.
- Nutritional supplements.
- Processed food products.

Entrepreneurship Support

Provision of:

- Business training.
- Marketing support.
- Financial literacy programs.

Value addition can substantially increase profitability while creating employment opportunities throughout value chains.

3.10.7 Expanding Access to Finance

Financial exclusion remains a major constraint affecting NTFP producers and entrepreneurs.

Policy interventions should focus on expanding access to:

- Microcredit.
- Savings schemes.
- Cooperative financing.
- Enterprise development grants.
- Climate finance mechanisms.

Particular attention should be directed toward:

- Women entrepreneurs.
- Youth enterprises.
- Community-based organizations.

Improved financial inclusion would facilitate business expansion, technology adoption, and market participation.

3.10.8 Gender-Responsive Development Approaches

The review highlights the central role of women within NTFP value chains.

Consequently, development interventions should adopt gender-responsive approaches that:

- Strengthen women's resource rights.
- Improve access to finance.
- Support women-led enterprises.
- Promote leadership opportunities.
- Enhance participation in decision-making processes.

Gender-sensitive interventions are likely to generate broader social benefits because women often invest income in household welfare, education, and nutrition.

3.10.9 Youth Entrepreneurship and Employment

Youth unemployment represents a major challenge throughout Sub-Saharan Africa.

NTFPs offer opportunities for youth engagement through:

- Beekeeping enterprises.
- Mushroom cultivation.
- Indigenous fruit processing.
- Digital marketing.
- Ecotourism ventures.

Governments and development agencies should support youth participation through:

- Skills training.
- Access to finance.
- Innovation hubs.
- Enterprise incubation programs.

Encouraging youth involvement can contribute to rural economic diversification and reduce migration pressures.

3.10.10 Climate-Smart NTFP Development

Climate change presents both risks and opportunities for NTFP development.

Climate-smart approaches should focus on:

- Diversifying livelihood systems.
- Promoting agroforestry.
- Supporting ecosystem restoration.
- Conserving climate-resilient species.
- Enhancing adaptive capacity.

Examples include:

- Domestication of indigenous fruit trees.
- Expansion of sustainable beekeeping.
- Restoration of degraded woodlands.

Integrating NTFPs into climate adaptation policies can strengthen resilience while supporting sustainable livelihoods.

3.10.11 Research Priorities

The review identified several important knowledge gaps requiring further investigation.

Future research should focus on:

Economic Valuation

Improved quantification of:

- Household income contributions.
- National economic value.
- Ecosystem service benefits.

Climate Change Impacts

Assessment of:

- Species vulnerability.
- Adaptation strategies.
- Climate-resilient management systems.

Commercialization Pathways

Analysis of:

- Market opportunities.
- Value chain performance.
- Export potential.

Gender and Social Inclusion

Investigation of:

- Benefit distribution.
- Empowerment outcomes.
- Youth participation.

Long-Term Ecological Monitoring

Research examining:

- Resource sustainability.
- Harvesting impacts.
- Biodiversity outcomes.

Addressing these knowledge gaps would strengthen evidence-based policymaking and improve NTFP management.

3.10.12 Emerging Opportunities

The review identified several emerging trends that may enhance future prospects for NTFP development.

Growing Demand for Natural Products

Global demand is increasing for:

- Organic foods.
- Herbal medicines.
- Natural cosmetics.
- Sustainable products.

Green Economy Initiatives

NTFPs align closely with:

- Green growth strategies.
- Nature-based solutions.
- Sustainable development agendas.

Digital Technologies

Digital platforms can improve:

- Market access.
- Product promotion.
- Information sharing.
- Consumer engagement.

International Environmental Agreements

Global commitments related to:

- Biodiversity conservation.
- Climate action.
- Sustainable development

provide opportunities for increased investment in forest-based livelihood systems.

Table 9. Policy priorities for strengthening NTFP contributions

Policy Area	Recommended Intervention
Forest Governance	Strengthen community forestry
Resource Rights	Improve tenure security
Market Development	Enhance market access
Enterprise Development	Promote value addition
Financial Inclusion	Expand rural credit
Gender Equality	Support women-led enterprises
Youth Development	Promote entrepreneurship
Climate Adaptation	Integrate NTFPs into resilience strategies
Research	Increase investment in NTFP studies
Conservation	Strengthen sustainable harvesting systems

Source: Review synthesis.

3.10.13 Synthesis of Findings

The evidence reviewed indicates that NTFPs possess considerable potential to contribute simultaneously to poverty reduction, food security, employment creation, climate resilience, and biodiversity conservation.

However, maximizing these benefits requires integrated approaches that address ecological, economic, institutional, and social dimensions of resource management.

Future policy frameworks should recognize NTFPs as strategic assets capable of supporting multiple Sustainable Development Goals (SDGs), particularly those related to poverty alleviation, food security, gender equality, decent work, climate action, and life on land.

By strengthening governance systems, promoting sustainable commercialization, supporting value addition, and enhancing community participation, policymakers can significantly increase the contribution of NTFPs to sustainable rural development across Sub-Saharan Africa.

4. CONCLUSION

4.1 Overview of the Study

This systematic review examined the contribution of non-timber forest products (NTFPs) to rural household livelihoods across Sub-Saharan Africa. Drawing upon evidence from 105 studies published between 2000 and 2025, the review synthesized current knowledge regarding the socioeconomic, environmental, and institutional dimensions of NTFP utilization.

The review was motivated by growing recognition that forests provide far more than timber resources and that NTFPs constitute critical livelihood assets for millions of rural households. Despite increasing scholarly interest, evidence regarding the contribution of NTFPs has remained fragmented across countries, ecological zones, and product categories. This review sought to address that gap by providing a comprehensive synthesis of available literature.

4.2 Summary of Major Findings

The findings demonstrate that NTFPs make substantial contributions to rural livelihoods throughout Sub-Saharan Africa.

The review identified a wide range of economically and socially important products, including:

- Honey and beeswax

- Wild fruits
- Medicinal plants

Mushrooms

- Edible insects
- Gums and resins
- Fibres and handicraft materials
- Indigenous vegetables

These resources support livelihoods through multiple pathways.

Income Generation

Income generation emerged as the most widely documented livelihood benefit associated with NTFP utilization.

Across the reviewed studies, NTFPs contributed to:

- Household cash income
- Livelihood diversification
- Enterprise development
- Poverty reduction

The review revealed that forest-based income often serves as an important complement to agriculture, livestock production, and wage employment.

In many cases, NTFPs function as livelihood safety nets during periods of economic hardship, crop failure, or climatic stress.

Food Security and Nutrition

The review found strong evidence that NTFPs contribute significantly to food security and nutrition.

Forest foods enhance:

- Food availability
- Dietary diversity
- Nutritional quality
- Seasonal food security

Products such as wild fruits, mushrooms, edible insects, and indigenous vegetables provide essential vitamins, minerals, proteins, and micronutrients.

Importantly, NTFPs often become particularly valuable during periods of food scarcity and agricultural production shortfalls.

Employment and Enterprise Development

The reviewed literature demonstrates that NTFP value chains generate employment opportunities at multiple stages, including harvesting, processing, transportation, marketing, and retailing.

Commercial activities involving:

- Honey production
- Shea butter processing
- Indigenous fruit enterprises
- Medicinal plant trade

have created important opportunities for entrepreneurship and local economic development.

The review further highlights the potential of value addition and processing to increase profitability and employment generation.

Gender and Social Inclusion

Women emerged as key actors within NTFP value chains.

Across many regions, women play central roles in:

- Resource collection
- Product processing
- Marketing activities
- Traditional knowledge systems

Income generated through NTFP activities frequently supports household welfare, education, healthcare, and nutrition.

The review also found that NTFPs provide livelihood opportunities for youth, indigenous communities, and other marginalized groups, thereby contributing to social inclusion.

Environmental Sustainability

The evidence reviewed suggests that NTFPs can support environmental sustainability and forest conservation when managed appropriately.

Positive environmental contributions include:

- Sustainable forest management
- Biodiversity conservation
- Climate change mitigation
- Climate adaptation
- Ecosystem service protection

The review indicates that NTFPs can create incentives for maintaining forest cover by generating economic value from standing forests.

However, environmental benefits depend upon effective governance and sustainable harvesting practices.

4.3 Key Challenges Identified

Despite their substantial contributions, numerous challenges continue to constrain the sustainable utilization of NTFPs.

The most significant challenges identified include:

- Deforestation and forest degradation
- Unsustainable harvesting practices
- Weak market access
- Limited value addition
- Financial constraints
- Insecure tenure arrangements
- Inadequate policy support
- Climate change impacts
- Loss of indigenous knowledge
- Gender inequalities

These challenges frequently interact and reinforce one another, limiting the livelihood and conservation benefits associated with NTFPs.

4.4 Policy Implications

The review demonstrates that NTFPs should no longer be viewed as minor forest products but rather as strategic resources capable of supporting sustainable rural development.

Several policy priorities emerge from the findings.

Governments should:

- Integrate NTFPs into national forestry and rural development policies.
- Strengthen community-based forest management.
- Enhance resource tenure security.
- Promote sustainable commercialization.
- Support value addition and enterprise development.
- Improve access to finance.
- Strengthen gender-responsive interventions.
- Promote youth entrepreneurship.
- Invest in research and innovation.
- Integrate NTFPs into climate adaptation strategies.

Implementation of these interventions would enhance both livelihood outcomes and conservation objectives.

4.5 Contribution to Knowledge

This review contributes to existing literature in several ways.

First, it provides one of the most comprehensive syntheses of evidence regarding NTFPs and rural livelihoods in Sub-Saharan Africa.

Second, it integrates socioeconomic, environmental, and institutional perspectives within a single analytical framework.

Third, it identifies key policy priorities and research gaps that can guide future interventions and scholarly inquiry.

Finally, the review highlights the interconnected nature of livelihoods, conservation, and sustainable development, demonstrating that NTFPs occupy a unique position at the interface of these domains.

4.6 Future Research Directions

Although considerable progress has been made in understanding the role of NTFPs, important knowledge gaps remain.

Future research should prioritize:

Economic Valuation

More accurate quantification of:

- Household income contributions
- National economic impacts
- Ecosystem service values

Climate Change

Assessment of:

- Species vulnerability
- Climate adaptation strategies
- Resilience of NTFP value chains

Gender and Youth

Further investigation of:

- Women's empowerment outcomes
- Youth participation
- Social inclusion mechanisms

Commercialization

Research examining:

- Value chain efficiency
- Market opportunities
- Sustainable commercialization pathways

Ecological Sustainability

Long-term monitoring of:

- Resource availability
- Harvesting impacts
- Biodiversity outcomes

Addressing these research gaps will strengthen evidence-based policymaking and support sustainable resource management.

4.7 Final Conclusion

In conclusion, non-timber forest products constitute indispensable components of rural livelihood systems throughout Sub-Saharan Africa. Their contributions extend far beyond income generation and encompass food security, nutrition, employment creation, social inclusion, climate resilience, and environmental sustainability.

As governments and development partners seek solutions to interconnected challenges related to poverty, food insecurity, unemployment, biodiversity loss, and climate change, NTFPs offer

significant opportunities for achieving multiple development objectives simultaneously.

However, realizing this potential requires supportive policies, secure resource rights, sustainable management systems, inclusive value chains, and continued investment in research and innovation.

The evidence presented in this review strongly supports the integration of NTFPs into broader strategies for sustainable development, forest conservation, and climate resilience across Sub-Saharan Africa.

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Author Contributions

Mulenga Brian Nsofu: conceptualization; methodology; literature search; data curation; formal analysis; investigation; visualization; validation; writing—original draft; writing—review and editing. The author has read and approved the final manuscript.

- Conceptualization
- Methodology
- Literature Search
- Data Curation
- Formal Analysis
- Investigation
- Writing – Original Draft
- Writing – Review and Editing
- Visualization
- Validation

The author has read and approved the final manuscript.

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The author declares no conflicts of interest regarding the publication of this manuscript.

Data Availability Statement

All data supporting the findings of this study were obtained from publicly available literature sources cited within the manuscript. No new datasets were generated during the review process.

Ethics Statement

Ethical approval was not required because this study involved a systematic review of published literature and did not include human participants, animal subjects, or primary data collection.

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NTFPs and Rural Livelihoods in Sub-Saharan Africa

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Table 10. Synthesis of principal livelihood pathways and enabling conditions

Livelihood pathway	Representative NTFPs	Mechanism	Enabling conditions
Income and diversification	Honey; wild fruits; mushrooms; medicinal plants	Direct sales, processing and supplementary income	Market access; value addition; finance
Food and nutrition	Wild fruits; mushrooms; edible insects; vegetables	Food availability, dietary diversity and seasonal buffering	Resource availability; sustainable harvest; local knowledge
Employment and enterprise	Honey; shea; medicinal plants; processed fruits	Harvesting, processing, transport, trade and retail	Skills; infrastructure; market linkages
Gender and social inclusion	Honey; shea; food products; medicinal plants	Women's participation, traditional knowledge and enterprise activity	Secure rights; equitable benefit sharing; gender-responsive support
Conservation and resilience	Forest-derived NTFPs across categories	Economic incentives for standing forests and diversified coping options	Community governance; tenure security; sustainable harvesting

Source: Conceptual synthesis of themes and relationships described in the review. This table summarizes mechanisms rather than reporting a new quantitative analysis.