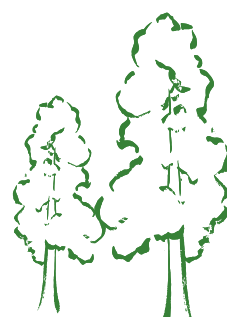




Food and Agriculture Organization
of the United Nations

MAXIMIZING NUTRITION IN FORESTRY

**A GUIDANCE NOTE ON
IMPACT PATHWAYS FOR
MAINSTREAMING NUTRITION
BASED ON A CASE STUDY
FROM UGANDA**



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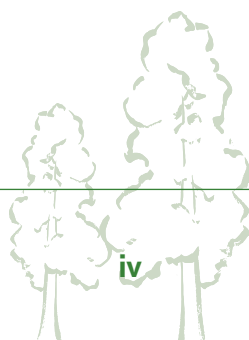
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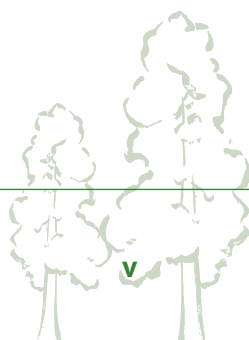
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Abbreviations and acronyms

CAADP	Comprehensive Africa Agriculture Development Programme
CFS	Committee on World Food Security
CIFOR	Centre for International Forestry Research
EbA	Ecosystem-based adaptation
FAO	Food and Agriculture Organization of the United Nations
FSN	Food security and nutrition
HLPE	High-Level Panel of Experts on Food Security and Nutrition
ICRAF	World Agroforestry Centre
INFOODS	International Network of Food Data Systems
NTFP	Non-timber forest products
NWFP	Non-wood forest product
PES	Payment for environmental services
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
TOC	Theory of change
UBOS	Uganda Bureau of Statistics
UNDP	United Nations Development Programme
UNHCR	Office of the United Nations High Commissioner for Refugees
USAID	United States Agency for International Development





Executive summary

Wild foods are consumed in many parts of Uganda, particularly in the northeast and northwest of the country and the West Nile regions. However, there is considerable variation in terms of: a) their geospatial distribution (where different types of foods are found), b) the types of foods consumed, c) the quantities consumed, and d) awareness of their nutritional value. Nonetheless, there is evidence that wild foods serve three main roles: a) as a food source when food security is reduced due to drought or other factors, b) as a supplementary source of food nutrition deriving from social and cultural tradition, c) as a source of modest income for both the men and women who sell wild food products at local markets.

This guidance note focuses on mainstreaming nutrition into the wild food subsector of the forestry sector, using Uganda as a case study. The guidance is part of a series of guidance notes examining the main food sectors (crops, fishing, forestry and livestock) in 12 sub-Saharan African countries and providing practical suggestions on how to formulate programmes and policies that contribute to healthy diets and enhanced nutrition. This is part of a collaboration by the Food and Agriculture Organization (FAO) and World Vision (WV) to support national decision-makers and programme implementers in strengthening sector policies, programmes and investments aimed at improving food security and nutrition outcomes, especially for those who currently rely on or could rely on this sector for subsistence and sustenance.

Using a food systems approach, the methodology recognises the role played by different actors at all stages of the food chain – from production, processing and retail to consumption of food – while keeping a focus on the most vulnerable communities to ensure that their food security and dietary needs are met. The guidance notes have each developed theories of change (TOCs) to identify key transformative actions across the food system in order to enable healthy diets and improved nutrition. The resulting notes contain not only agreed TOCs, but also impact pathways in order to show in practical terms what entry points should be prioritised across the food systems to implement the required transformative actions. For Uganda, a TOC and impact pathways were developed for Uganda's wild foods sub-sector.

Only a few wild foods in Uganda have what could be considered established value chains. These include honey, shea butter, balanites oil and edible insects. Even in these cases, however, the value chains are highly variable in terms of their structure and process compared to traditional food crops. Shea nut is an exception, due to its potential high value in both domestic and international markets.

The public sector is only minimally involved in the wild foods value chains, and in a few parts of the country, supporting the propagation, processing, storage and marketing of wild food crops. Pressures created by rapid land use changes pose a constant threat to the sustained supply and quality of wild foods.

Notwithstanding these constraints, efforts to use and improve the quality of wild foods to support nutritional outcomes, currently at a nascent stage, are being driven by international organizations such as the Food and Agriculture Organization of the United Nations (FAO), World Agroforestry Centre (ICRAF), the Centre for International Forestry Research (CIFOR) and Bioversity International, who are working in collaboration with local Ugandan universities and research organizations.

The precondition for wild foods beginning to contribute systematically to improved nutrition is the emergence of a supportive policy, institutional and research environment that enables forest-dependent communities to identify, improve and sustainably manage their wild food resources whilst also maintaining their cultural and traditional practices. Accomplishing this could lead to improved health and nutritional outcomes, particularly for vulnerable groups such as women and children, and strengthen the resilience of food chains to threats such



Four impact pathways have been identified to facilitate and accelerate a transition towards the greater use of wild foods for improved nutritional outcomes in forest-dependent communities.

Pathway 1 seeks to build the facilitating environment needed, through explicit and formally adopted policies that place wild foods in a more central role *vis-à-vis* forest management practices. Standards for existing wild food value chains such as honey or shea would be maintained or improved and applied with more rigour. Where there are gaps in quality standards, such as for edible insects, these would be filled through collaborative efforts from the public and private sectors.

Pathways 2 and 3 form the basis for increasing our knowledge of wild foods and expanding good practices, primarily through more thorough documentation of value chains and closer collaboration with local communities. Certification schemes would determine best practices, apply packaging logos and provide nutritional information on consumer products. Existing food data and information would be systematically included into the International Network of Food Data Systems (INFOODS), and direct support would be provided to certain subsectors, such as honey, to build on the progress already made.

Pathway 4 focuses on maintaining or improving the ecological environment which supports wild food production. Agroforestry would play a key role here, as would the preservation of essential ecosystem services and restoration, such as through reforestation, of degraded landscapes. Given the significant influxes of refugee populations to Uganda, indigenous tree and plant species could be introduced in and around refugee settlements to maintain and protect local landscapes and help meet nutritional and energy needs.



1. Introduction

Mainstreaming nutrition: from theory to practice

As part of the follow-up to the Comprehensive Africa Agriculture Development Programme's (CAADP's) Agriculture Nutrition Capacity Development Initiative (2011) and the report by the High-Level Panel of Experts on Food Security and Nutrition (2017), FAO, World Vision and Action contre la Faim have been collaborating to provide practical guidance to governments on formulating policies and programmes promoting healthy diets and improved nutrition, especially among vulnerable groups such as women and young people.

This guidance note focuses on mainstreaming nutrition into the wild food subsector of the forestry sector, using Uganda as a case study. The guidance is part of a series of guidance notes examining the main food sectors (crops, fishing, forestry and livestock) in 12 sub-Saharan African countries and providing practical suggestions on how to formulate programmes and policies that contribute to healthy diets and enhanced nutrition. This is part of a collaboration by the Food and Agriculture Organization (FAO) and World Vision (WV) to support national decision-makers and programme implementers in strengthening sector policies, programmes and investments aimed at improving food security and nutrition outcomes, especially for those who currently rely on or could rely on this sector for subsistence and sustenance.

Using a food systems approach, the methodology recognises the role played by different actors at all stages of the food chain – from production, processing and retail to consumption of food – while keeping a focus on the most vulnerable communities to ensure that their food security and dietary needs are met. The guidance notes have each developed theories of change (TOCs) to identify key transformative actions across the food system in order to enable healthy diets and improved nutrition. The resulting notes contain not only agreed TOCs, but also impact pathways in order to show in practical terms what entry points should be prioritised across the food systems to implement the required transformative actions. For Uganda, a TOC and impact pathways were developed for Uganda's wild foods sub-sector and aims to support the Ugandan forestry sector and relevant partners to move the gathering of food from forests (referred to here as "wild foods") towards a more prominent position within development planning, in order to deliver nutritional benefits to forest-dependent communities.

The challenges to improving the use of wild foods from forests and woodlands will be examined by focusing primarily on foods gathered traditionally by local communities, either for their direct consumption or to be sold at local markets after limited processing (e.g. fruits, nuts, oils, juices and powders). Another class of wild foods are found in swidden agriculture or shifting cultivation systems which combine traditional cropping and agroforestry with diversified food and livelihood crops (e.g. beans, fruit trees, yams).

With the help of international and national stakeholders, Uganda's public sector could strengthen the role of wild foods beyond typical informal markets and seasonal consumption by creating wild food value chains. This could be achieved by filling policy gaps, strengthening partnerships and providing strategic technical support to forest-dependent communities.

The guidance note for Uganda was informed by a literature review on forestry and nutrition based on the latest evidence available (*Mainstreaming nutrition in forestry. An evidence-based literature review (forthcoming)*) and facilitated by the work of a consultant.

Due to local constraints in Uganda and a limited timeframe, it was not possible to conduct regular consultations with stakeholders from the public and private sectors and academia. Instead, an informal group of technical experts with direct experience and knowledge of forests and wild foods were asked to contribute their expertise.



These experts, mentioned in the Acknowledgements, served as focal points for preparation of the situational analysis, theory of change and impact pathways. They provided input, expert opinion and proofed individual sections before receiving a full draft for review. Based on their input, the final draft was finalised and delivered to the three partners: FAO, World Vision and Action Contre le Faim.

Concepts and definitions

A food system encompasses the interconnected value-adding activities of all those involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry, or fisheries, as well as parts of the broader economic, societal and natural environments in which these activities take place (FAO, 2018). The emergence of a broad range of factors and processes affecting existing food systems (e.g. population growth, urbanisation, changes in consumption patterns, climate change and the depletion of natural resources) has required changes to these food systems. These factors have also resulted in a growing number of challenges, with potentially wide-reaching consequences for the state of food security and nutrition (FSN). In order to gain a better understanding of how a diverse range of food systems function, a framework to assess different food systems was developed that would ensure that that they develop in such a way to minimise their negative impact and maximise their positive contributions.

Building on the international political momentum created around nutrition by the 2030 Agenda, the 2014 Rome Declaration on Nutrition and the subsequent UN Decade of Action on Nutrition (2016–2025), the UN's Committee on World Food Security (CFS), at its 42nd Plenary session in October 2015, requested that the High-Level Panel of Experts on Food Security and Nutrition (HLPE) prepare a report on nutrition and food systems, to be presented at CFS 44 in October 2017. The conceptual framework developed by the HLPE identified three interacting elements of food systems: (i) agriculture and food supply chains, (ii) food environments, and (iii) consumer behaviour and individual factors (HLPE, 2017). In particular, the framework highlighted the central role of the food environment in which the consumer engages with the food system in facilitating healthy and sustainable consumer food choices.

The conceptual framework proposed for this report was based on the following constituent elements and definitions:

Agriculture and food supply (AFS) chains. AFS chains consist of the people and activities that take food from production and consumption to the disposal of its waste (Hawkes and Ruel, 2012). From a nutrition and diet perspective, food supply chains commonly consist of the following stages: (i) the food production system, (ii) storage and distribution, (iii) processing and packaging, and (iv) retail and marketing.

Food environment. The food environment refers to the physical, economic, political and socio-cultural context in which consumers engage with the food system in order to make their decisions about acquiring, preparing and consuming food. Specifically, it consists of: (i) “food entry points”, or the physical spaces where food is purchased or obtained; (ii) features and infrastructure of the built environment that allow consumers to access these spaces; (iii) personal determinants of consumer food choices (including income, education, values, skills, etc.); and (iv) the surrounding political, social and cultural norms that underlie these interactions. The key elements of the food environment that influence consumer food choices, food acceptability and diets are: (i) physical and economic access to food (proximity and affordability); (ii) food promotion, advertising and information; and (iii) food quality and safety (Caspi, Sorensen, Subramanian and Kawachi, 2012; Swinburn and Moore, 2014; Hawkes, 2015).

Consumer behaviour. Consumer behaviour reflects all the choices and decisions made by consumers, at the household or individual level, on what food to acquire, store, prepare, cook and eat, and on the allocation of food within the household (including gender repartition and the feeding of children). Behaviour is largely

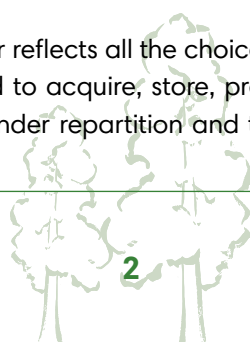
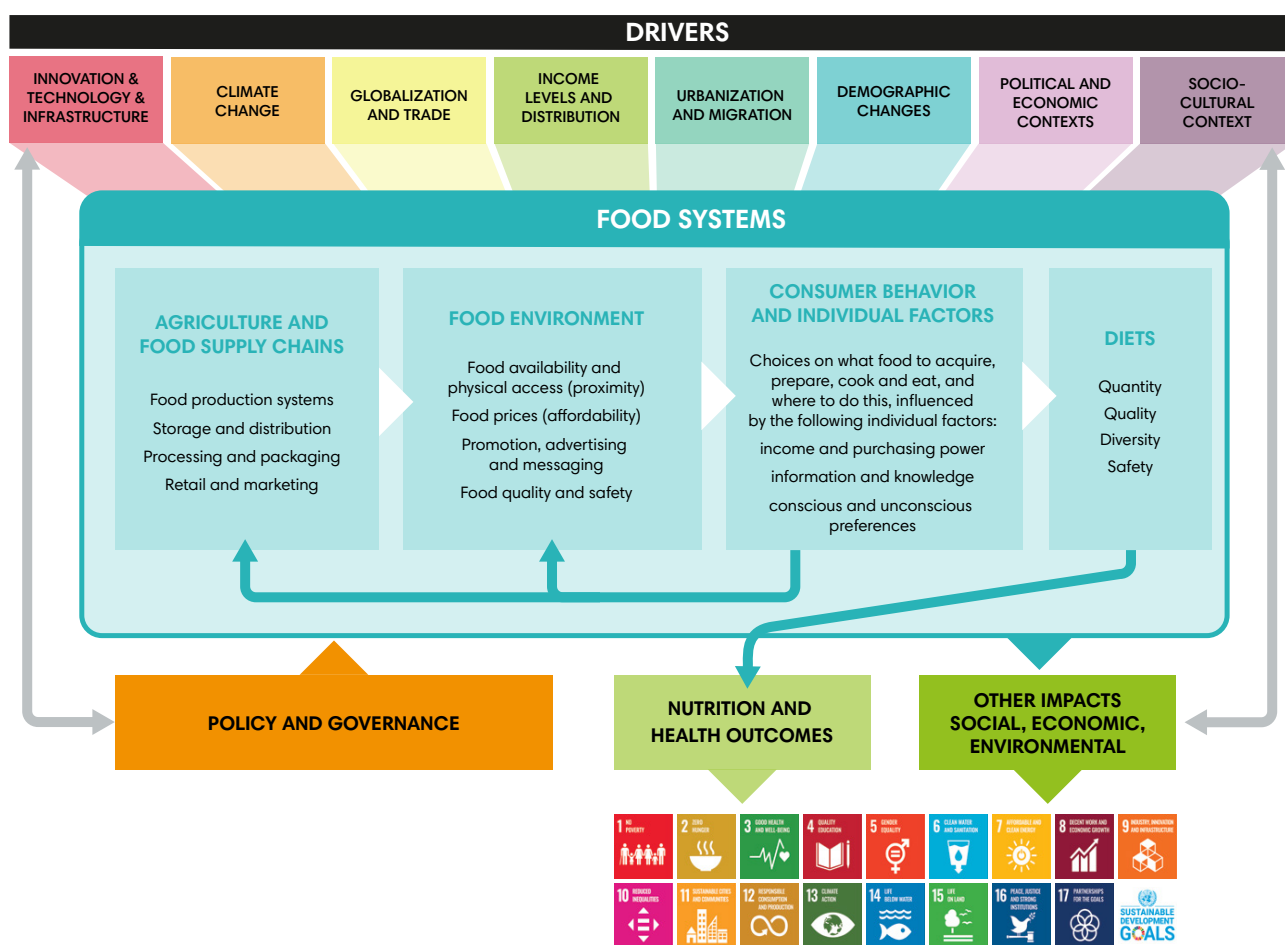


Figure 1. Food systems for healthy diets



Source: Adapted from the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security (FAO, Rome, 2017).

shaped by the existing food environment, which includes personal and collective determinants of consumer food choices (including food prices, income, knowledge and skills, time and equipment, and social and cultural norms).

Diets. Diets comprise the individual foods that a person consumes. Dietary patterns are the quantities, proportions and combinations of different foods and beverages in diets, and the frequency at which they are habitually consumed (Hu, 2002). Dietary patterns interact with food systems, not only as an outcome of existing food systems, but also as a driver of change for future food systems. Sustainable diets are those characterised by a low environmental impact and which contribute to food and nutrition security and a healthy life for present and future generations. Sustainable diets are “protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy, while optimising natural and human resources” (FAO, 2012a). Food systems, through diets, give rise to a variety of outcomes. These relate not only to nutrition and health, but all aspects of sustainability, which in turn link back to the food system drivers (see below).

Drivers. A driver is an external pressure that affects change. The HLPE’s conceptual framework identified five main categories of drivers of food system changes. These were: (i) biophysical and environmental; (ii)

innovation, technology and infrastructure; (iii) political and economic; (iv) socio-cultural; and (v) demographic (Ingram, 2011).

Theory of change. A theory of change (TOC) outlines the process of change, identifying causal linkages between short-term, intermediate and long-term outcomes in a project's design (or process). A "pathway" shows the logical relationship between the outcomes over time (Taplin and Clark, 2012).

Impact pathways. A pathway map is a sequence of stages between activities (e.g. those involved in a project) and the impact of these activities over time. A theory of change adds to an impact pathway by describing the causal assumptions behind the links in the pathway.

Underlying assumptions. These are assumptions on what has to happen to enable the expected changes in the impact pathways.

Trade-offs. These are recognised and/or agreed compromises between two or more options, whereby the risks of favouring one option over another have been duly considered in the decision process.

Forestry sector-wild foods and non-wood forest products (definitions specific to this guidance note)

Wild foods

Wild foods are an ecosystem service that contributes to household food consumption in both developed and developing countries. In poorer countries, wild foods from forests often make up a significant part of dietary and nutritional profiles. However, contrary to popular belief, these foods are consumed not only at times of food insecurity but as part of a complete and healthy diet, with fruits, vegetables and fungi providing important micronutrients to the diets of forest-dependent communities, especially women and young people (Rowland, 2016).

Non-wood forest products

To increase consistency in country reporting, FAO's Forest Resource Assessment of 2015 defined non-wood forest products (NWFPs) as "goods derived from forests that are tangible and physical objects of biological origin other than wood". However, there are variations on this term – such as "secondary", "minor" or "non-timber forest products" (NTFPs) – being used by governments, institutions and academics which, depending on their needs and objectives, may also include foods from outside forests, such as woodlands or natural ecosystems, or goods such as fuelwood.

Examples of NWFPs include foods such as fruits, vegetables, tubers, nuts, mushrooms, insects and wild meats, as well as food additives such as herbs, spices, condiments and aromatic plants. Also included under the NWFP definition are fibres used for construction, furniture, clothing or utensils, and resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes. (FAO and UNEP, 2020) NWFPs are also found in areas that may not be strictly defined as forests, for example shrublands, rangelands and agroforestry systems.

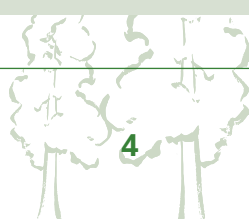
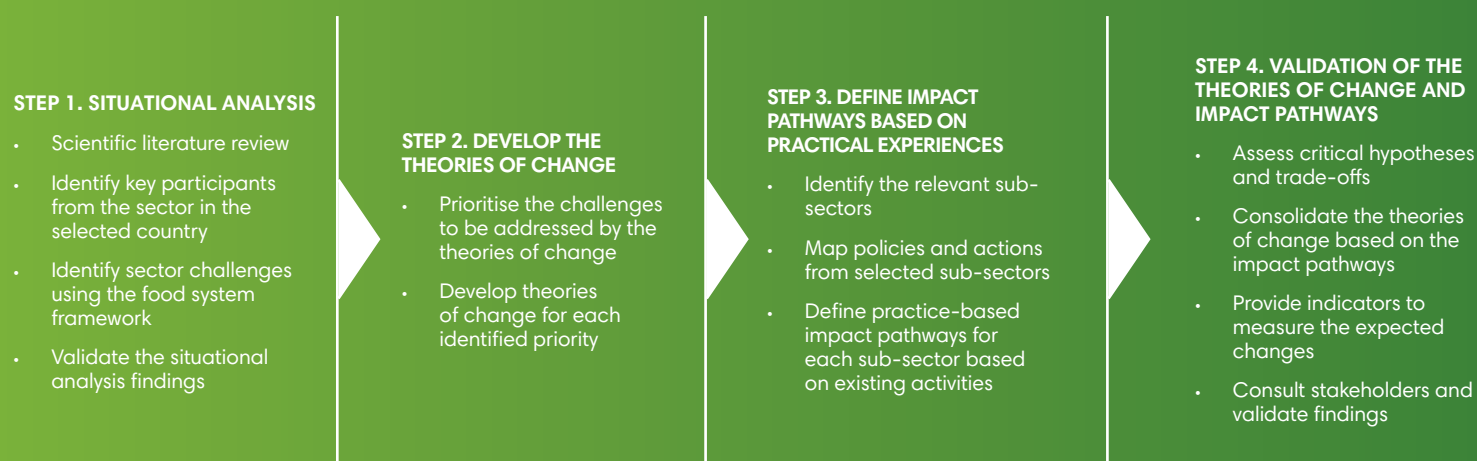


FIGURE 2. THE KEY STEPS OF THE METHODOLOGICAL PROCESS

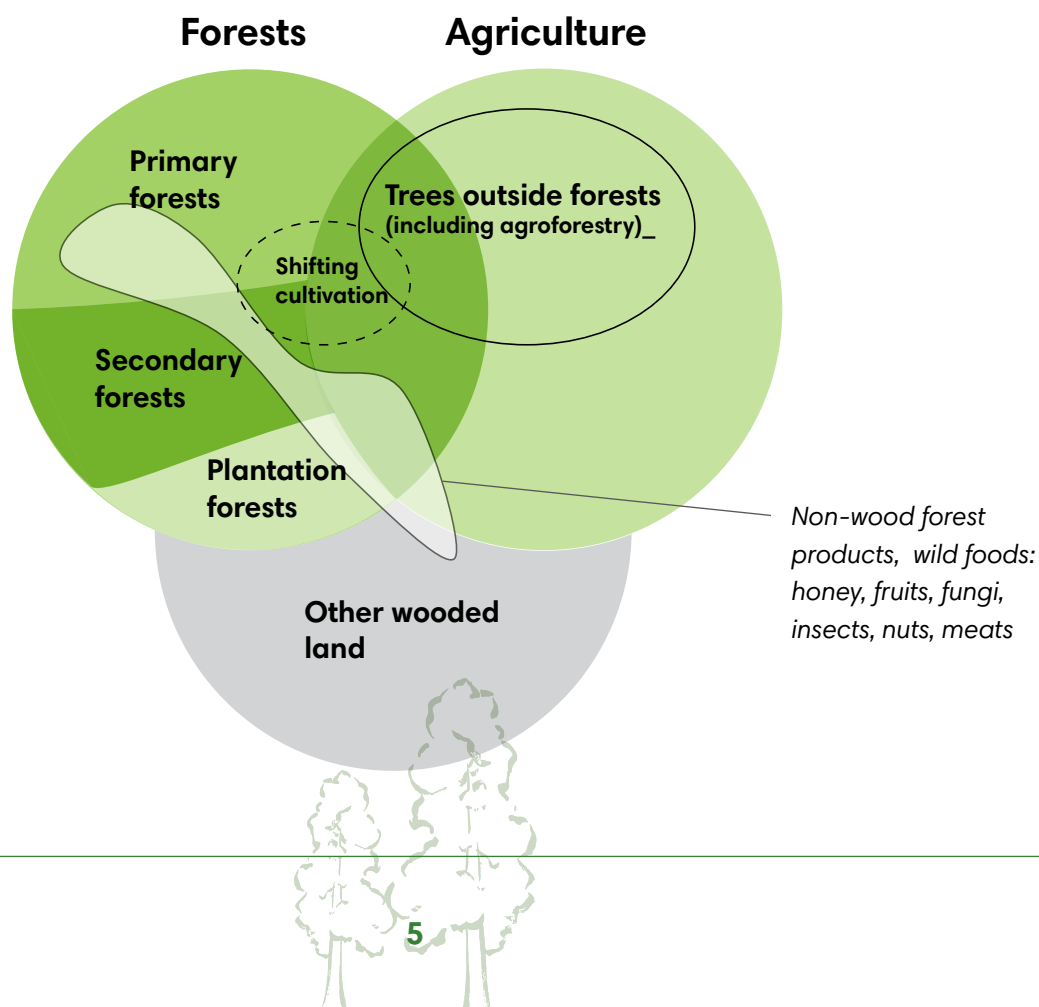


2. Stepwise approach

Step 1. Situational analysis

Primary and secondary forests deliver ecosystem services that directly support human well-being, serving as carbon sinks, providing energy, supplying medicinal products, conserving soil biodiversity and protecting watersheds (FAO, 2017). Most of these ecosystem services, including the provision of wild foods, are used on a daily basis by forest-dependent communities, but are seldom recognised as having a direct economic value or contributing to food and nutrition security.

Figure 3. Landscapes that offer non-wood forest products, including wild foods, adapted from FAO, 2013





The collection of wild foods takes place in different ecological settings. In Uganda, more than ninety different types of wild plant foods were reported as being consumed by forest-dependent communities (Musinguzi *et al.*, 2011).

Wild foods offer at least four distinct benefits:

1. They fill food and nutrition security gaps, especially for women and children, in particular with respect to micro-nutrients and proteins.
2. They strengthen community resilience to shocks by diversifying food types and sources.
3. They create opportunities for local communities to establish small enterprises that generate income and improve livelihoods.
4. They help maintain essential ecosystem services derived from forests (e.g. pollination, water conservation, disease control and medicinal products).

Although forests support the livelihoods of hundreds of millions of people worldwide, wild foods from forests are generally only either consumed directly or sold at informal markets. Formal food systems involving the large-scale production, aggregation, processing, packaging, storage, distribution and consumption of foods do not exist for most wild foods, leading to low subsistence incomes and food insecurity.

Wild foods in Uganda are commonly characterised by seasonality, variation in quality and minimal processing, and are often sold on roadsides or at local markets. The value chains needed to comply with food, processing,



storage and transport standards have not yet been widely established for wild food crops, and this is particularly true of honey, fruits and insects, for which there is significant demand (Acanakwo, 2019).

Ecosystem and landscape change increases the risk of a long-term negative impact on nutrition (Ickowitz *et al.*, 2014). This has been observed in Uganda, where vitamin A deficiency has been widely reported as a result of reduced forest cover, affecting the availability of wild fruits rich in vitamin A (Okidi *et al.*, 2018).

In western Uganda, households derive more than a quarter of their total income from forests and other wild areas, including fallows, agricultural lands, wetlands, grasslands and shrubland. For the most part, these lower income households are more dependent on forest and wild products than wealthier households. However, the degradation of forest cover is reducing the income from these wild products. This loss of income has implications for rural livelihoods and the well-being of poorer households (Jagger, 2012).

Ecosystem fragmentation and degradation are also known to be drivers of the emergence or re-occurrence of zoonotic diseases such as malaria, dengue fever, Ebola and Lyme disease. Evidence suggests that landscape change and biodiversity loss affect human disease by expanding the number of hosts or vectors they infect, increasing virulence or resistance, and encouraging the evolution of more genetically diverse strains (Daszak *et al.*, 2001; Patz *et al.*, 2004, 2002; Brearley *et al.*, 2013).

Agroforestry combines the use of trees or shrubs mixed with crops or pastureland. Agroforestry systems are used throughout Africa, as they diversify production, reduce risks and strengthen resilience. In Uganda, they are used for commercial crops such as bananas, coffee and tea. Benefits include increased biodiversity, improved soil fertility and reduced erosion, as well as a more diverse range of food products (plant and animal) that can be used to meet direct nutritional needs or be sold or bartered (ICRAF, 2019).

Uganda's food security and nutrition profile

Food vulnerability and insecurity in Uganda are primarily the result of poverty, landlessness, high fertility, natural disasters, high food prices and lack of education. Producing greater amounts of staple foods is no guarantee of fewer stunted children or improved nutritional outcomes. The southwest region, considered the "food basket" of Uganda, has one of the country's highest rates of stunting among children under five years old.

As a result of the expansion of towns and settlements, pastoralists have moved into more concentrated areas, leading to overgrazing and ecological degradation. This undermines their livelihoods and ability to cope with droughts and other climate-related disasters (Ministry of Environment and Water and FAO, 2016).

Almost one-third of children under five years of age in Uganda are stunted (USAID, 2018). This increases with age, peaking at 37 percent among children aged 18–35 months. Stunting is greater among children in rural areas (30 percent) than urban areas (24 percent), and there are some regional variations: stunting ranges from a high of 41 percent in the Tooro sub-region to a low of 14 percent in the Teso sub-region. The prevalence of stunting decreases in reverse proportion to mothers' education levels. Around forty percent of children born to mothers with no education are stunted, compared with ten percent of children born to mothers who have been educated beyond secondary level. Similarly, stunting decreases in line with increasing wealth. The prevalence of wasting (low weight for height) nationally is four percent, but in the regions of Karamoja and West Nile it is ten percent.

Anaemia, which can be caused by micronutrient deficiencies and infections, affects more than half of children under five and around 30 percent of women. Regional differences in the prevalence of anaemia among women range from 17 percent in the Kigezi sub-region to 47 percent in the Acholi sub-region (UBOS and ICF, 2018).

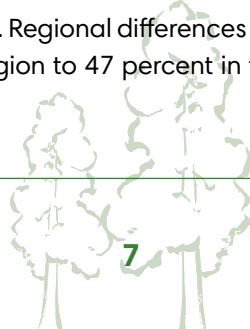
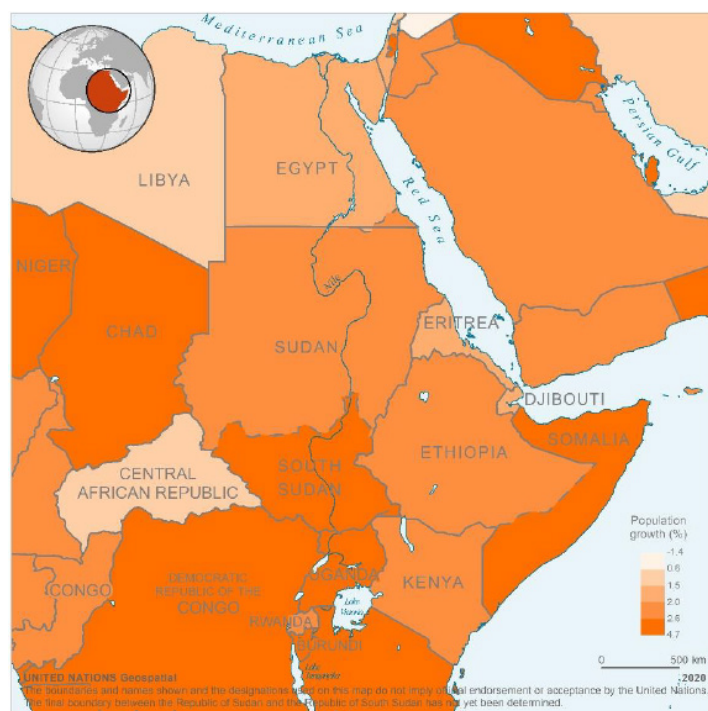


Figure 4. Loss of forest cover in Uganda, 1990–2015 (Ministry of Environment and Water and FAO, 2016)



Source: adapted from Map No. 4045 Rev. 8.1 UNITED NATIONS. Department of Field Support Geospatial Information Section (formerly Cartographic Section).

Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Sudan and South Sudan has not yet been determined.

While the use of nutritional supplements such as iron for pregnant women increased dramatically between 2011 and 2016, the prevalence of anaemia also increased during this same period (USAID, 2018).

On average, Ugandan women give birth to five children, representing one of the highest fertility rates in East and Southern Africa. However, drivers of malnutrition such as lack of access to clean water and sanitation, high disease burden, childhood diarrhoea, malaria, and poor infant and young child feeding practices are widespread.

The forestry sector in Uganda

Uganda's natural forests are being lost and degraded at a high rate. The total net loss of the country's forests between 2000 and 2015 was estimated at 1.8 million ha, which represents an average annual loss of approximately four percent (Ministry of Environment and Water and FAO, 2016). The drivers of forest loss and degradation include agricultural expansion, wood extraction for fuel, urbanisation related to high population growth, free-grazing animals and wildfires.

Influxes of refugees into northwestern Uganda have been ongoing over many years, contributing to accelerated forest degradation and leading to inadequate access to fuelwood for cooking, competition with local people for water and other natural resources, and the loss of wild foods.

Agriculture¹ is a major driver of forest loss both worldwide and in Uganda. Between 2015 and 2020, the rate of deforestation in the country was estimated at ten million hectares per year, down from 16 million hectares per

¹ "Agriculture" here refers to a combination of land use practices that involve producing plants or animals for food.



year in the 1990s. As a result, the average area of forest per capita has halved from 1.2 hectares in 1960 to 0.59 hectares in 2008. However, despite a decline in the rate of forest loss, current losses are likely permanent and have reduced the resilience of forest food systems. It is therefore essential that forest and agriculture policies protect the livelihoods of forest-dependent communities by explicitly protecting the landscapes and ecosystems in which they live.

Legal and policy context

Although there are legal and policy provisions in place to protect forests and natural areas, implementation is weak, and forest laws are unevenly enforced. This leads to chronic incursions into forest areas to extract wood and non-wood products for construction, fuelwood and livestock grazing, and creates uncertainty over the traditional roles of forests in supporting cultural practices and community well-being.

The handling of land rights and issues of tenure is an ongoing obstacle to the sustainable management and use of forested lands in Uganda. In cases where forest-dependent communities are actively using forest areas for wild food production, land rights are informally defined through traditional uses and practices which become known to persons or groups who might otherwise convert forest to non-food uses. This can serve as an informal means of protection in cases where governance or legal enforcement is weak.

The main types of forest land – forest reserves, wildlife conservation areas, private forest holdings and community forests – each have individually recognised legal rights. With respect to community forests, these include:

- access rights held by a community allowing them to enter a forest area.
- withdrawal rights held by a community allowing them to use and benefit from NWFPs and wood resources derived from the forest area. A community may have a withdrawal right for subsistence and/or commercial purposes.
- management rights held by a community allowing them to decide how the forest area can be used or transform the resource. Such management rights are exercised whilst respecting the boundaries of the other rights and may not equate to the right to withdraw wood for commercial purposes.
- exclusion rights held by a community allowing them to decide who can use the resources and who cannot.
- alienation rights held by a community allowing them to sell or lease the land or use it as collateral, including the right to sell all other rights (Khaukha and Nsita, 2013).

The legal and policy frameworks in Uganda are particularly weak when it comes to protecting the tenure rights of forest-dependent communities. Existing mechanisms such as collaborative resource management and collaborative forest management offer opportunities to develop wild food value chains, but are undermined if tenure arrangements are in doubt. Communities negotiate their rights to resources that are valuable to them socially, culturally, spiritually and economically through resource use agreements. Most local communities are weak negotiators and lack the skills and abilities to engage with powerful stakeholders such as government agencies. Uganda's policy/legal framework was also found to be deficient in vital provisions, such as the enforcement of the tenure rights of local communities, and its inadequate and ineffective resolution of rights violations.

One assessment of forest policy and legal frameworks (Tumusiime, 2019) looking at Uganda's tenure-related policies and laws identified the "undefined and insecure rights of forest communities" as a major underlying cause of continued forest loss and degradation in the country. Communities' rights of access to and ownership and management of forest resources have continued to be restricted through various statutory provisions.



As in other countries, forest policies in Uganda give limited recognition to non-wood forest products as economic and social resources. There is no explicit mention of wild foods or forest foods in forest policies relating to investment or management practices, which focus primarily on timber and other commercial wood products.

While access to wild food is recognised as a right, there are no protection measures in place. The use of wild foods among forest-dependent communities in Uganda is generally considered to be widespread. One survey of 400 households found that two-thirds consumed foods gathered from forests (Rowland *et al.*, 2016). Although there are wide geographical variations in the use of wild foods in Uganda, research indicates that maintaining forest and tree cover can lead to improved diets among food insecure groups (Ickowitz *et al.*, 2014; Muir and Sorrenti, 2020, draft).

Wild food value chains

Value chains in Uganda's traditional farming systems have been characterised (Mazur, 2013) as follows:

- few contacts or linkages from product to market or with individual products (vertical and horizontal);
- limited knowledge of market requirements with regard to quantity and quality;
- no distinction is made between products of different quality;
- inefficient storage, transport, market infrastructure and logistics;
- low prices.

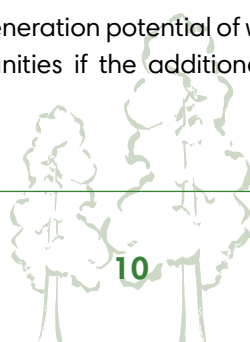
There are two main stakeholder groups in wild food value chains: 1) food aggregators who have access to transport and may collect forest products from forest-dependent communities in order to sell them at more distant markets, and 2) the forest-dependent communities themselves, who live near forests, already make use of wild foods and could benefit from improved knowledge and incremental investments allowing them to sustainably manage and develop the potential of wild food value chains. The latter group of stakeholders are highly vulnerable to shocks such as climate events and are risk adverse. At the same time, they recognise that improved nutrition and the ability to generate even relatively small amounts of income can allow them to better manage risks.

Men and women have differing tasks and responsibilities in relation to wild foods, and their roles change across communities and landscapes. Women spend a large amount of time collecting wild foods and are highly knowledgeable on the subject of fruits and green vegetables. In some places, they are also active in selling wild food products at markets. Men, on the other hand, normally undertake tasks requiring greater strength or endurance, such as collecting honey or catching grasshoppers.

Women often bear a significant labour burden, being the ones responsible for gathering resources, childcare, food preparation and household management. As a result, the dietary diversity and food security of both women and children can suffer when there is insufficient time to perform all household tasks.

Children were also traditionally involved in carrying out tasks such as collecting wild foods, but this practice is becoming less common as children are increasingly enrolled in formal schooling and have less time to spend on such tasks.

Efforts to significantly expand the income generation potential of wild foods could create an unintended labour burden in some forest-dependent communities if the additional workload of the new income-generating activities is not taken into consideration.



Wild foods are almost by definition collected in remote areas where transport and a lack of storage and processing can present obstacles. Related to this, these foods tend to have short shelf lives, be seasonal and undergo little processing.

Erratic weather patterns and land degradation can lead to an unstable supply of wild foods. Moreover, overexploitation can occur if sustainable harvesting techniques are not employed and harvesting in remote locations raises issues of safety, particularly for women and children.

Quality standards are lacking for many wild foods. For example, the Codex Alimentarius, the international system for setting food standards, has regional standards for shea, honey and gum Arabic, but most wild fruits, vegetables and other food products derived from forests do not have food standards associated with them, largely due to the informal nature of their markets.

The process of adding value to wild foods begins by maintaining or improving the quality of the raw material and preserving it. However, adulteration and poor storage often reduce product quality, leading to sub-standard products and low prices at markets.

Despite the above challenges, and uncertainty over legal and tenure-related issues, wild foods continue to be used throughout Uganda. **Honey, balanites oil, shea butter and grasshopper**, for example, have received a great deal of local and international consumer interest and enjoy consistent market demand. Omujal *et al.* (2020) found that:

- The physico-chemical characteristics of honey, balanites oil and shea butter in the West Nile sub-region meet national and international standards.
- Nutritionally, honey is rich in fructose, glucose and natural antioxidant compounds.
- Balanites oil and shea butter provide vitamin A and vitamin E, and essential fatty acids to the household diet.
- The bush cricket *Ruspolia differens* contains fats, proteins, minerals (Fe, Zn and Se) and unsaturated fatty acids (oleic acid) that are essential to the human diet.

Greater consumption of shea butter, balanites oil, *R. differens* and other wild foods offers an opportunity to improve the nutritional status of rural populations and generate household income. Shea butter and balanites oil can be promoted not only as edible oils, but also for industrial applications such as soap making, cosmetics and pharmaceutical products. Due to the potential for export, shea butter is perhaps the only wild food crop that has received significant support from the Ugandan government.

Honey is widely available and consumed in Uganda both locally and nationally. It provides some forest-dependent communities with a source of income, but can be of variable quality and therefore does not obtain a premium in the marketplace. Efforts to address this issue could help raise the income generated from honey production.

Box 1. Primary non-wood forest products in Uganda's domestic market

- African Tulip (*Spathodea campinulata*)
- Aloe vera
- Bamboo (multiple species)
- Cashew (*Anacardium occidentale*)
- Gum Arabic (*Acacia senegal*, *Balanites aegyptica*)
- Honey and bee products
- Mushrooms and fungi (multiple species)
- Mutuba (*Ficus natalensis*)
- Nsenene (grasshopper, *Ruspolia differens*)
- Prunus africana (vulnerable species)
- Shea butter (*Vitellaria paradoxa*)
- Tamarind (*Tamarindus indica*)
- Tonic root (*Mondei whytei*)

Source: Ministry of Environment and Water and FAO, 2016.



Table 1. Wild food and nutrition-related goods and services

Forest foods, Products	Nutritional components	Seasonal components	Environmental components	Gender, age components	Food System components							
					Production	Aggregation	Processing	Marketing	Distribution	Preparation	Consumption	Disposal
Fruits	Carbohydrates, minerals	Seasonal, 10 months		Women, men	Natural	Direct collection	None	None	Local markets, Roadside	Raw and cooked	Raw, steamed	Compost
Fungi	Minerals, proteins	Seasonal, 2 months		Men	Natural	Direct collection	None or drying	None	Local markets	Cooked	Boiled	Not applicable
Honey	Carbohydrates	Annual		Men	Managed, natural	Direct collection	Cleaning, packaging	Local markets	Local markets	None	Direct use	Not applicable
Insects	Proteins	Seasonal		Women, men	Natural	Gathered	Solar drying	None	Markets	Dried	Fried, roasted	Not applicable
Leaves	Micronutrients, minerals, fibre	Annual		Women, men	Natural	Gathered	None to little	None	None	None	Raw, boiled	Compost
Medicinal plants	Micronutrients, minerals	Year-round		Men	Natural	Specialized collection	None to little	Informal	None	Boiled or raw	Direct use	Not applicable
Native animals - aquatic	Minerals, proteins	Year-round		Women, men	Natural	Fishing	None, solar drying	Local markets, landing points	Local markets, landing points	Boiled, fried or smoked	Dried, cooked	Not applicable
Native animals - terrestrial	Fat, minerals, proteins	Year-round		Men	Natural	Hunting	Cut into parts	Local markets, roadside	Local markets, roadside	Boiled, fried or smoked	Boiled, fried or smoked	Not applicable
Nuts	Micronutrients, proteins	Seasonal, 5 months		Women, men	Natural	Direct collection, extraction	Solar drying	Local, national markets	Local, national markets	Dried or raw	Raw, roasted	Compost
Oils	Fats, minerals	Year-round		Men	Managed, natural	Direct collection, extraction	Mechanical extraction (compression)	None	Local markets	Base for frying foods	Through food consumption	Not applicable
Seeds	Proteins	Seasonal, 5 months		Women, men	Natural	Direct collection, extraction	Solar drying	None	Local, national markets	Dried or raw	Raw, Roasted	Not applicable
Vegetables	Fibre, minerals	Seasonal, 5 months		Women, young people	Managed, natural	Direct collection	None or drying	None	Local markets	Cooked	Boiled, roasted	Compost
Water	Bacteria- and virus-free water	Year-round		Women, young people	Natural	Impoundment	None	None	Collection points	Boiled	Through food consumption	Not applicable

Source: adapted from State of Uganda's Forestry (Ministry of Water and Environment and FAO, 2016).



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While some forest products (e.g. honey or shea butter) have been successfully commercialised at scale in Uganda, the benefits to forest-dependent communities of large-scale aggregation seldom extends beyond the generation of local income. Infrastructure for processing, storage and transport is rarely a part of this. What is more, the large-scale commercialisation of wild foods is for the most part neither feasible nor sustainable if essential forest ecosystem services are to be maintained intact for forest-dependent communities.

Consumer behaviour with respect to wild foods

Surveys in the West Nile region reveal a general lack of consumer knowledge of the nutritional benefits of most wild foods (Okidi *et al*, 2018). Some consumers unfamiliar with wild foods perceive them as being of low quality and unsafe. If such perceptions are widespread across Uganda, efforts undertaken in forest-dependent communities to expand the reach of wild foods beyond local markets and generate greater opportunities to increase local incomes may be of limited success unless accompanied by information and education campaigns. Educating consumers and producers and raising their awareness of safety precautions when selling, purchasing, storing and preparing perishable products such as bushmeat and wild fruits and vegetables (Arnold *et al.*, 2011) is also essential.

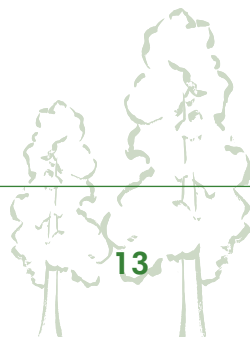


Table 2. Market surveys of non-wood forest products in Uganda's West Nile sub-region

Market surveys of non-wood forest products in Uganda's West Nile sub-region	
Rural markets	Urban markets
<ul style="list-style-type: none">• Sold mainly in raw form• Usually a single product sold per trader• Carried on the head• Sold by wild food gatherers to local residents and urban market agents• NWFPs sold only once a week at some markets	<ul style="list-style-type: none">• Sold mainly in processed form• NWFPs sold together with other products e.g. agricultural produce• Transport to market by vehicle• Traders usually buy NWFPs in bulk and store• Some NWFPs obtained from as far as the Democratic Republic of the Congo

Source: adapted from Omujal et al., 2020.

Step 2. Develop a theory of change

Main challenges faced by the wild food subsector

The following are the *priority challenges* that will need to be addressed if wild foods are to be given a more prominent position within the food system and value chain mainstream in Uganda:

- Forest degradation changes the ecological conditions required to sustainably produce wild foods.
- The quality of wild foods varies widely, and producers are unable to adhere to the few quality standards that exist.
- Although some wild foods can be harvested year-round, many tend to be seasonal and unavailable at other times of the year.
- Many wild foods are consumed directly by households and local communities due to a lack of access to markets.
- Most forest-dependent communities rely on informal markets to sell honey, fruits and nuts, and receive low prices for these products.
- The infrastructure to process, store and transport wild foods to markets in a timely way is limited, except among some larger aggregators.
- Some consumers view wild foods as less appealing than supermarket foods.
- Consumer information on and knowledge of wild foods, and their nutritional characteristics and availability, is limited.

A top priority is the need to **fill evidence gaps to inform public policy and programmes** by systematically identifying, describing and evaluating the vast array of wild food species that are currently undocumented.

With the exception of the small number of wild foods mentioned in this guidance note, there are hundreds of tree and plant species reported as being consumed by forest-dependent communities, but about which little is known in terms of their nutritional characteristics.

Given the limited capacity of government to address the issue of wild foods, efforts to fill evidence gaps should build on existing efforts to document wild food value chains. Some value chains, such as those for honey, shea, balanites and grasshoppers, have already been documented, but numerous others have not. A modest amount of research on wild foods is already being undertaken by organizations such as Makerere University, the Food and Agriculture Organization of the United Nations (FAO), World Agroforestry (ICRAF) and the Centre for International Forestry Research (CIFOR).

These collaborative efforts should continue and be expanded to other regions of Uganda and other food crops. Among the findings of the research carried out so far is the discovery that knowledge and production practices for a single crop, whether it be honey or shea, vary widely throughout the country. There is therefore unlikely to be a single formula for improving wild food value chains that could be applied to all producers.

Efforts could be undertaken on a case-by-case basis to strengthen less developed wild food value chains through direct consultation with a select number of forest-dependent communities to identify priority food crops that could directly strengthen their nutrition profiles and improve the quality of the foods they sell at markets. This should be accompanied by the demonstration of positive results related to income generation, improvements in food quality, access to markets, increased food consumption and sustainable forest management, which would serve as evidence for government ministries of the legitimate role of wild foods in supporting food security and nutrition in vulnerable rural communities. Training, capacity development and technology transfer will need to be provided throughout.

Additional considerations are **issues related to gender equity and social inclusion**, which are not yet fully understood for wild food value chains. Areas that require further documentation include the access, distribution and sharing of resources, and participation in decision making.

Theory of change

Although wild foods are beginning to receive more visibility, traditional forestry still tends to focus predominantly on timber and wood products. Addressing this issue will require greater commitment from a number of different stakeholders in both private and public institutions. Cross-sectoral partnerships will need to be established, new financial resources for investment made available and specialised expertise drawn on.

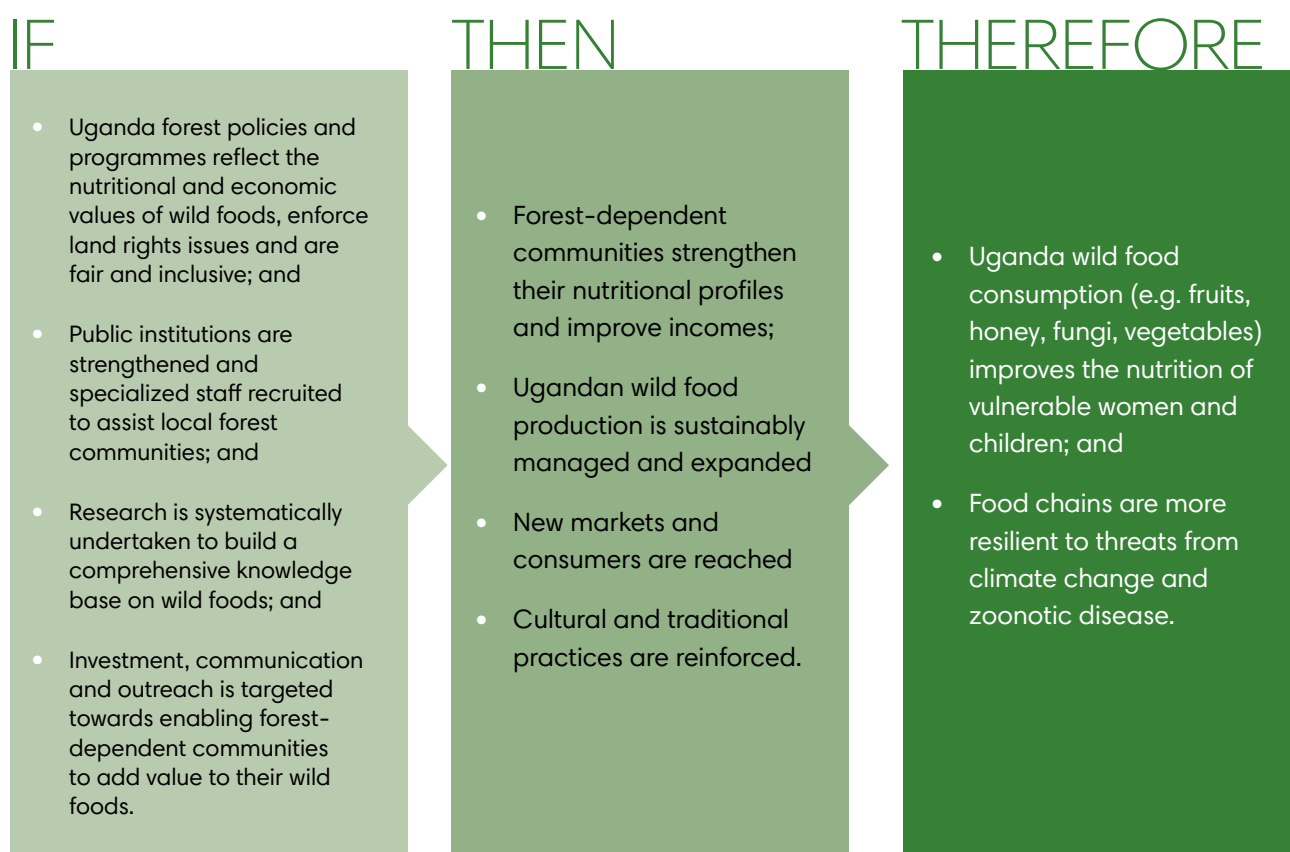
Numerous surveys have confirmed the role of wild foods in supporting well-being, food security and nutrition in rural communities, with this being particularly true at times of food insecurity. The evidence of wild food acting as a food security safety net and source of income, playing a role in dietary diversification and cultural tradition, and serving as a means of maintaining community resilience through biodiversity conservation and climate-smart adaptation, is widespread and justifies support from the public sector.

The key premise is that the wild food subsector needs to become visible when policy, programming and financial, are being made with due consideration given to the environmental and social risks for forest communities, whose livelihoods, in addition to the diversity and quality of their diets, ultimately depend on sustainably managed ecosystems and landscapes.

In the **theory of change** presented here, the management of ecosystems and landscapes are used to increase the availability and diversity of wild foods, while greater access to and demand for wild foods from sustainable



Figure 5. Wild food from forests in Uganda



Source: the authors

value chains provide forest-dependent communities with the direct benefit of increased income. Indirectly, local populations will also be able to access wild foods to complement their diets, this being of particular benefit to vulnerable women and children.

Four emerging areas are targeted through this theory of change:

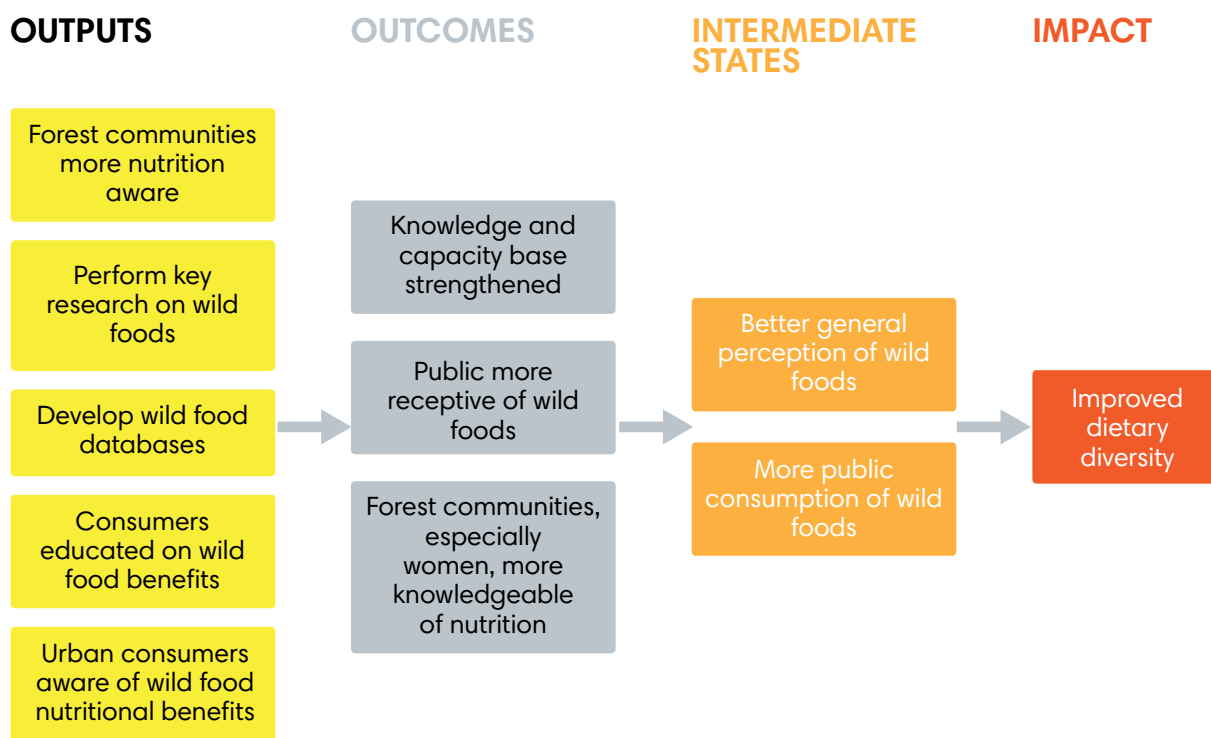
- **Expanding the evidence base on wild foods and increasing public awareness of the variety of them:** If researchers were to begin working with forest-dependent communities to systematically identify, describe and assess the vast array of wild food species, this would allow their nutritional and economic value and potential sustainability risks to be properly documented. This additional information could then be used to increase awareness among policy makers and the public.
- **Creating an enabling policy and legal environment for wild foods:** Policy makers and regulators considering the nutritional and economic values of wild foods (and related sustainability risks), enforcing land right issues and promoting fair and inclusive wild food value chains would allow for greater collaboration between the various stakeholders. This would ensure that wild food products are duly considered when making decisions on key sectoral policies, plans and investments relating to forestry, nutrition, climate change adaptation and mitigation, and natural resource management.
- **Protecting ecosystems and landscapes through sustainable management:** Forest-dependent communities threatened by environment degradation and pressures due to migration (e.g. influxes of refugees) should be enabled to sustainably manage their ecosystems and landscapes, therefore increasing their food security and resilience.

- **Developing sustainable and inclusive wild food value chains:** For forest-dependent communities directly involved in prioritising wild foods for experts based on their traditional wisdom and ecosystem management capacity, any training and technology transfer should be tailored to their needs and help them improve the quality and safety of their marketable products. This would allow them to generate additional income and increase their food security while reaching new markets and consumers.

Step 3. Define the impact pathways

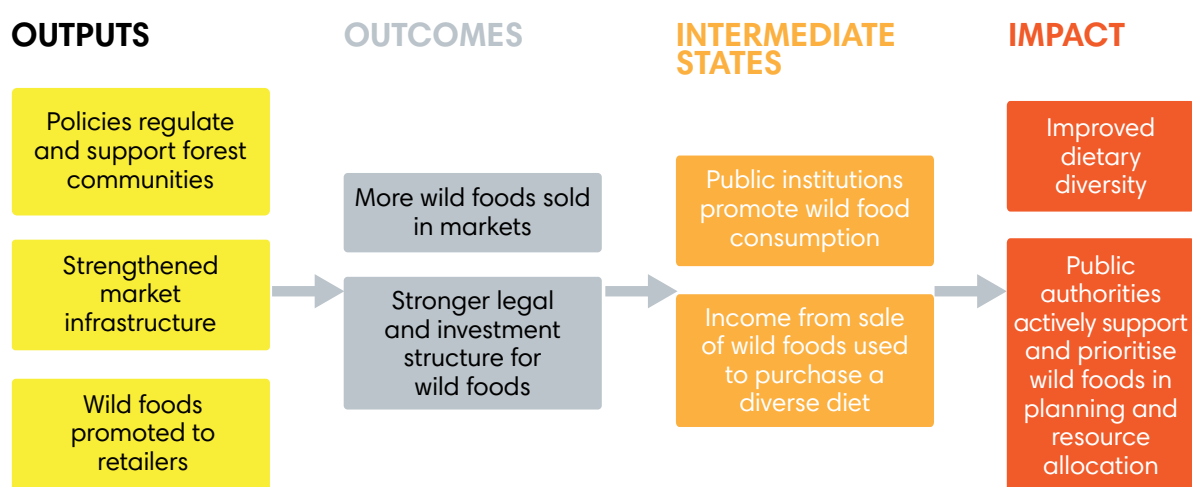
Expanding the evidence base on wild foods and increasing public awareness of them

This impact pathway focuses on research, with the aim of expanding the evidence base on wild foods by identifying the nutritional characteristics and economic value of selected varieties. The development of a national, geospatially-based information system on wild foods in Uganda would provide the scientific basis for the formulation of policies and programmes, including nutrition and food security initiatives such as school feeding and farmer field schools. This information could then be used to increase consumer awareness, including of nutritional and safety considerations, and to inform decisions on the front-of-package labelling of marketable wild food products. The data could then eventually feed into the FAO INFOODS system as a reliable public source of information that could be used by researchers, technical experts and policy advisers to inform the development of dietary guidelines, thus increasing consumer confidence.



Creating an enabling policy and legal environment

This impact pathway is a cross cutting pathway that targets all the domains of the food systems and aims to ensure that the policy environment in place in Uganda protects the rights of forest-dependent communities while also making sure that wild foods are sustainably and safely produced and made available to consumers. It seeks to construct the facilitating environment that would be required using explicit and formally adopted policies that accord wild foods a more central role in forest management practices. It also looks at ways to ensure wild food products are given greater recognition and consideration when making decisions on sectoral policies, plans and investments. Food standards for existing wild food value chains, such as honey or shea butter, would be maintained or improved and applied with more rigour. Where there are gaps in quality standards, such as for edible insects, these gaps would be filled through collaborative efforts between the public and private sectors.

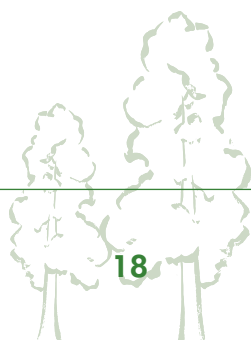


Protecting ecosystems and landscapes through sustainable management

This impact pathway recognises the role of agroforestry in the maintenance of essential ecosystem services and restoration, such as through reforestation, of degraded landscapes. In light of the significant influxes of refugee populations to Uganda, indigenous tree and plant species could be introduced in and around refugee settlements to maintain and protect local landscapes and help meet nutritional needs.

This impact pathway looks at expanding agroforestry systems in rural communities through the use of indigenous wild trees and plants (e.g. balanites, tamarind) and participatory domestication of desirable traits. It also considers how these indigenous tree and plant species selected by these communities could be planted in and around refugee settlements to maintain and protect local landscapes.

Importantly, it also considers the use of incentives, such as payments for environmental services and ecosystem-based adaptation initiatives, to provide an income to these communities. Such incentives would need to be complemented by education on nutrition in order to ensure that both the host and refugee communities benefit from the fruits and related wild products produced, since it is expected that for the most part these will be consumed directly.

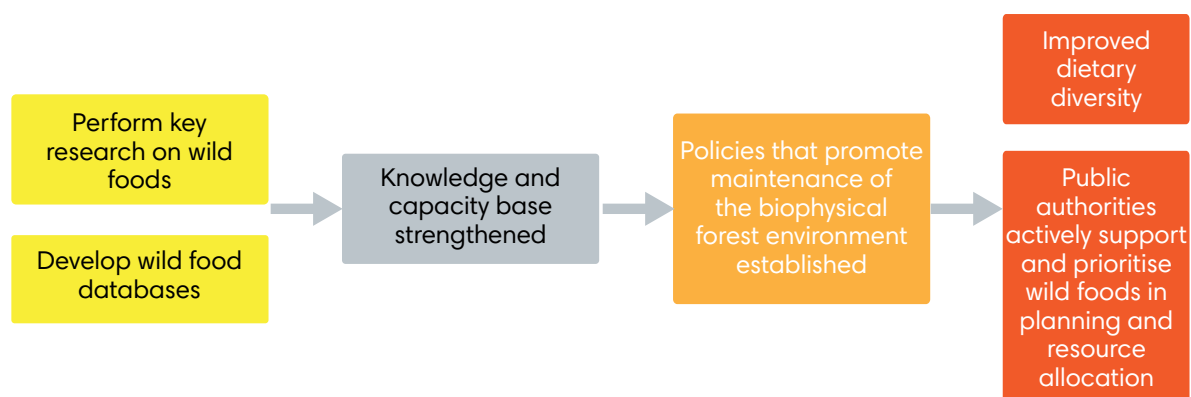


OUTPUTS

OUTCOMES

INTERMEDIATE STATES

IMPACT



Developing sustainable and inclusive wild food value chains

The associated impact pathway involves all three domains of the food system, from its ecosystems (or food supply) and the food environment all the way to consumer behaviour. As with the previous pathways, close collaboration with forest-dependent communities will be crucial to properly incorporating traditional knowledge with respect to the selection of wild foods, both when it comes to strengthening already existing value chains (e.g. for honey and shea butter) and/or developing new ones (e.g. for tamarind and balanites).

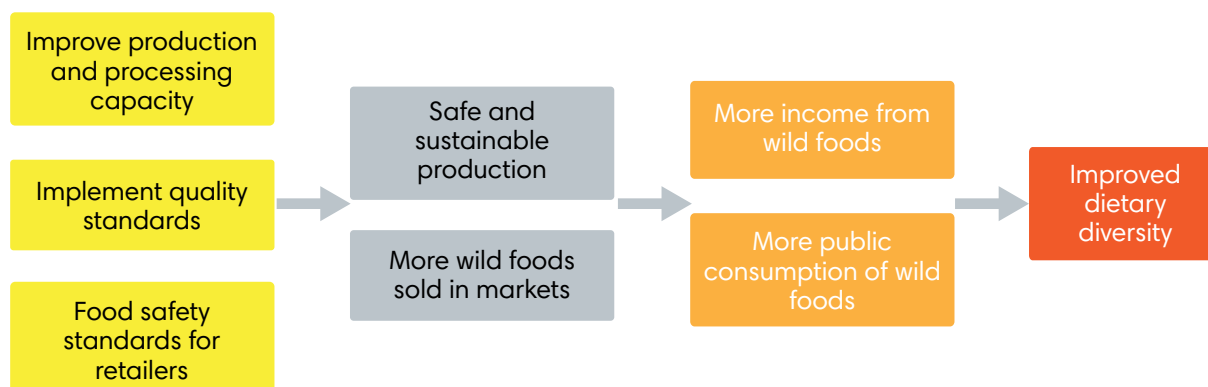
Training and technology transfer will need to be context-specific given the fact that, as mentioned above, a wide variety of practices are followed even for the same wild food. Food safety and quality standards will need to be improved for marketable products, and this will require the adoption of technologies that are both feasible and sustainable, with an emphasis on increasing capacity for storing, minimal processing and marketing. For selected products, the creation of a certification scheme defining best practice and use of a logo may help to increase visibility and recognition, particularly if alongside these consumers are provided with information on nutritional value, equity considerations, fair trade and sustainable production, as well as advice on the preparation and consumption of these foods.

OUTPUTS

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IMPACT



Key external drivers

Biophysical and environmental

One of the biggest drivers of biophysical and environmental damage is deforestation. Such ecological losses are caused by the removal of forests to make way for agriculture (and occasionally infrastructure). Over time, deforestation results in the loss of the forest cover and habitats necessary for wild food to grow. The importance of ecological capital is often overlooked by policymakers; it is critical that policymakers are aware of and motivated to preserve the ecosystem services that are needed to sustain forest ecosystems, and by extension, wild food production systems.

A more indirect driver of ecological and habitat loss is climate change. A rise in average temperatures has been associated with drought and the migration of wild animals. As climate change worsens, it affects both growing seasons and the general forest ecosystem, making it progressively more difficult to cultivate wild foods.

Zoonotic diseases from game meat are a major barrier to wild food consumption. This issue has recently gained traction as a result of the emergence of COVID-19. It is important that game meat is properly prepared if it is to be used for one's own consumption, or properly processed and packaged if sold commercially.

Innovation, technology and infrastructure

A key driver of low levels of support among the public and private sectors is the limited scientific research and lack of knowledge on the nutritional characteristics of wild foods and consumer preferences. Further awareness of these issues would likely lead to more buy-in from the various stakeholders and facilitate an enabling environment for forest communities.

Another major barrier to the viability of commercial wild foods is the limited capacity of forest communities to manage and maintain processing equipment. If local infrastructure and capacity is limited, this is likely to impede production, and safety and quality may be jeopardised.

Political and economic

Following on from the points addressed in the sub-section on biophysical and environmental drivers above, it is important to note that most forest-based activities relate to commercial agriculture or the extraction of timber and wood products. A preference for these activities is a major barrier to the preservation of forest communities and wild food value chains. It is therefore essential to remove this barrier by advocating for policies that prioritise the livelihoods and cultural heritage of forest communities, such as by supporting income-generating activities, land and tenure rights, investment in wild food value chains, the development of infrastructure and moves to restrict activities that cause deforestation.

Socio-cultural

Both the private sector and the forest communities themselves are often unaware of how to introduce wild foods into the larger retail market. Robust development of market linkages and business community frameworks that engage forest communities are needed to address this issue.

Women are often marginalised in forest communities. They are responsible for a number of different tasks within the community – gathering resources, childcare, food preparation and household management – but lack the resources necessary for performing these multiple tasks. They also do not tend to benefit from the production or commercial activities associated with wild food production. It is important to address this at a community level, through education and capacity building.



Some forest communities may have taboos that prevent them from extracting certain types of forest foods or produce from certain areas. These may act as “permanent” barriers that should be identified and acknowledged when formulating interventions.

Demographic

The promise of more opportunities and greater social mobility may encourage young people from forest communities to move to urban areas. Losing these community members can reduce the productivity and hinder the development of forest communities. It may be possible to prevent such migration by offering better income opportunities, education and training within communities.

Consumers in both rural and urban areas are becoming wealthier and gaining greater access to supermarkets. Foods from such retail outlets are often associated with a higher social class and tend to appeal to consumers in Uganda. It will be important to direct consumers towards a more diverse range of foods through a combination of better value chains and better packaging and promotion of wild foods (e.g. through advertising or by inclusion in the school curriculum).

Step 4. Validation of theory of change and impact pathways

Underlying assumptions

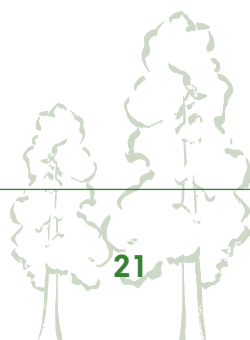
In the short term, it was assumed that small and isolated forest-dependent communities would be willing to form wild food produce cooperatives. This would help strengthen wild food value chains by bringing together traditional knowledge on wild foods from different communities. With the support of a local forestry authority, these newly formed groups could be more easily organised and provided with advice, facilitating the sustainable management of the forest food system.

It was also assumed that the targeted forest ecosystems have local produce with good nutritional characteristics. Some communities have access to nutrient-rich products such as shea butter, whilst others may have better access to firewood. Interventions must account for these differences: communities with access to nutrient-rich produce would be more supply chain-focused, whilst communities without such access would be more trade focused.

A third short-term assumption was that financial support/donors would be available for research and development and wild food supply chain development. Wild food value chains are a relatively new research and investment area. It is therefore imperative that an appropriate level of funding is available for the proposed interventions. The pathways referred to in this document assume sufficient investment is available.

The final short-term assumption was that local markets would be willing to expand their offer to include wild foods. It is essential that there is continuity and communication between the market and the supply chain, as the additional wild food supply must have a market.

In the medium term, it was assumed that there would be demand for quality-certified wild foods from consumers. The current lack of awareness and interest in most wild foods from the larger community is a critical barrier that it was assumed would be overcome through better quality certification, market access and promotional material.





It was assumed that the above short-term financing is both sufficient to finance the construction of processing facilities, roads and markets and appropriately used for these purposes. Such infrastructure is critical for the commercial plans laid out in this guidance note.

Another medium-term assumption was that the training provided as part of these interventions would be sufficient to increase the capacity of forest-dependent communities. Most forest communities use traditional methods of production and commerce. It is important that these methods are streamlined and modernised, such as by introducing quality standards and sustainable branding, whilst still retaining forest communities' unique production practices.

The final medium-term assumption was that land rights would be able to be assigned and enforced following the formation of cooperatives. This is essential for preventing conflict and maintaining sustainable supply chains.

In the longer term, it was expected that participating government entities and donors would take note of the results of the various interventions and scale up successful evidence-based options. Perhaps the most critical gap in most forest food systems is the absence of an enabling environment. The successes achieved as a result of these interventions are expected to attract greater involvement and support from the public and private sectors, thus filling this gap.

It was assumed that the capacity building and commercial activities connected with these interventions would help forest communities autonomously manage their wild food supply chains and generate a sustainable income. The long-term viability of the wild food cooperatives proposed here is based on this assumption.



Finally, it was assumed that wild foods would become commercially viable. This means that, as urban communities become more aware of wild foods, they become more willing to pay a premium for wild food products produced as part of sustainable and inclusive value chains. It was expected that such consumer behaviour would play a critical role in financially sustaining forest communities in the long term.

Safeguards to manage risks and protect the most vulnerable

Environmental risks

The large-scale commercialisation of wild foods is for the most part neither feasible nor sustainable if essential forest ecosystem services are also to be maintained intact.

The production and consumption of wild foods can take place only in the context of the sustainable management of forest ecosystems, which are currently under significant environmental pressure in Uganda. Sustaining wild food production requires the preservation of vegetation cover, species and landscape diversity, and the enforcement of limits on extraction activities, such as the extraction of wood for fuel or charcoal production.

From a “do no harm” perspective, there are limits to the total amount of wild food that can be taken from forests sustainably. As climate risks increase across the planet, Uganda can expect to see – and is probably already experiencing – changes in climate in the form of more frequent droughts and flooding, and greater intra-seasonal temperature variation. Such changes could disrupt the conditions needed to produce certain wild foods and, if not managed carefully, will reduce the resilience of forest-dependent communities to climate shocks.

Conversely, the preservation of essential ecosystem services and landscape characteristics can reduce exposure to climate risk, and wild foods may therefore be seen to be of even greater value at times of climate stress (Ojelele *et al.*, 2015), which would also help maintain positive food security and nutritional outcomes.

Risks related to gender and age

Most members of forest-dependent communities in Uganda struggle to maintain diets that are nutritionally complete. However, women of child-bearing age and children below the ages of twelve are particularly vulnerable to the risks of insufficient calorie and nutrient intake. Wild foods can directly help vulnerable groups to reduce their nutritional risks while at the same generating a modest income that allows them to purchase nutritious foods. However, there are several social and gender aspects that must be addressed.

When considering efforts to expand wild food production or increase communities’ capacity to process and market wild foods, it is essential to understand the additional labour burden that this may involve for women and children. It is also important to consider the role women may play in operating equipment, selling food at markets and managing any income that may be generated.

Failure to incorporate consideration of these issues into wild food projects can lead to conflict, or even to the deterioration of nutritional outcomes within the communities.

Corona viruses and zoonotic risk

There is reliable evidence of the presence of corona viruses (not only COVID-19) and other zoonotic diseases in wild animal supply chains that end with human consumption. A large number of corona viruses have been detected at food supply chains that interface with bats and rodents, which is of concern when assessing the potential for exposure and spill-over to other animal species and humans (Huong *et al.*, 2020).

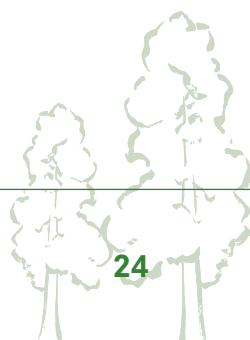


Although this guidance note does not focus much attention on the use of wild animal protein to improve diets and nutritional outcomes, **the consumption of wild meat is known to be a common practice in Uganda**. In light of the current COVID-19 pandemic, the risk of infection from zoonotic viruses must not be underestimated.

Viral amplification along wildlife trade food chains intended for human consumption can result from the mixing and close confinement of stressed live animals kept near humans. This suggests that there is a potential for corona viruses to spread into other wildlife supply chains wherever larger numbers of animals are collected, transported and processed. Livestock and people living in close contact with rodents, bats and birds provide opportunities for intra- and inter-species transmission and potential viral recombination.

Human behaviour facilitates the spill-over of viruses from animals to people through wildlife trade supply chains. There are numerous points at which spill-over events can occur, from the animal's natural environment all the way up to the point of consumption. To reduce the risk to public health of viral contamination and to safeguard livestock-based production systems, recommended precautions include:

- restrictions on the killing, commercial breeding, transport, buying, selling, storage, processing and consuming of wild animals;
- creating and increasing local capacity to detect viruses, and linking this to national and international animal health networks;
- surveillance systems that rapidly detect and characterise coronaviruses in humans, wildlife and livestock; and
- science-based information systems that inform policymakers and the public on good practices that reduce the risk of zoonotic viral transmission to humans.



3. Conclusions and recommendations

The food system framework and its components – food supply, food environment and consumer behaviour – provide a basis for understanding which actions should be taken to enhance the contribution of wild foods to healthy diets and improved nutrition, especially those of vulnerable forest-dependent communities.

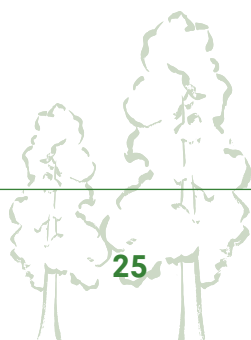
A number of interventions are needed in the forestry and agriculture sectors to allow wild foods from forests to support nutritional and food security outcomes. Research suggests that wild foods play a significant role in daily food intake, particularly with regard to quality of diet and essential nutrients, and serve as a safety net at times of food insecurity.

A first priority is to raise the visibility of non-wood forest products (a category which includes wild foods) when it comes to the formulation of public policies and programmes. This could be achieved through advocacy from interested stakeholders at the international level in collaboration with local stakeholders.

An important further step to intensify efforts nationally is to maintain the momentum built by the workshop on Enhancing Opportunities for Sustainable Exploitation of Non-Wood Forest Products in Uganda, held in Kampala in February 2020. A follow-up workshop could focus specifically on wild foods and their nutritional value, and provide an impetus for expanding the groups of stakeholders and setting multi-year priorities.

Given the uncertainty faced in a world afflicted by COVID-19 and its associated restrictions on travel and gatherings, it is unclear how a workshop in 2021 might best be organised. Should it prove to not be possible, cooperative efforts between relevant ministries; international organizations such as FAO, ICRAF, CIFOR, the United Nations Development Programme (UNDP) and the Office of the United Nations High Commissioner for Refugees (UNHCR); Ugandan universities; and others could focus on the following:

1. Cultivating inter-ministerial support within the Ugandan government for working collaboratively towards a national coordinated programme to promote wild foods for nutrition and food security among vulnerable groups, building on the theories of change and impact pathways identified here.
2. Continuing or expanding efforts to document and improve our knowledge of Uganda's wild foods, such as efforts aimed at providing a better understanding of their value chains, nutritional benefits, and health and safety issues, as well as opportunities for scaling up production.
3. Raising awareness among international donors of the role played by wild foods in both meeting humanitarian needs and building resilience within local forest-dependent communities.



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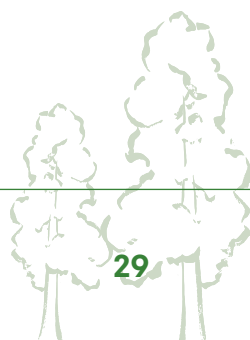


Annexes

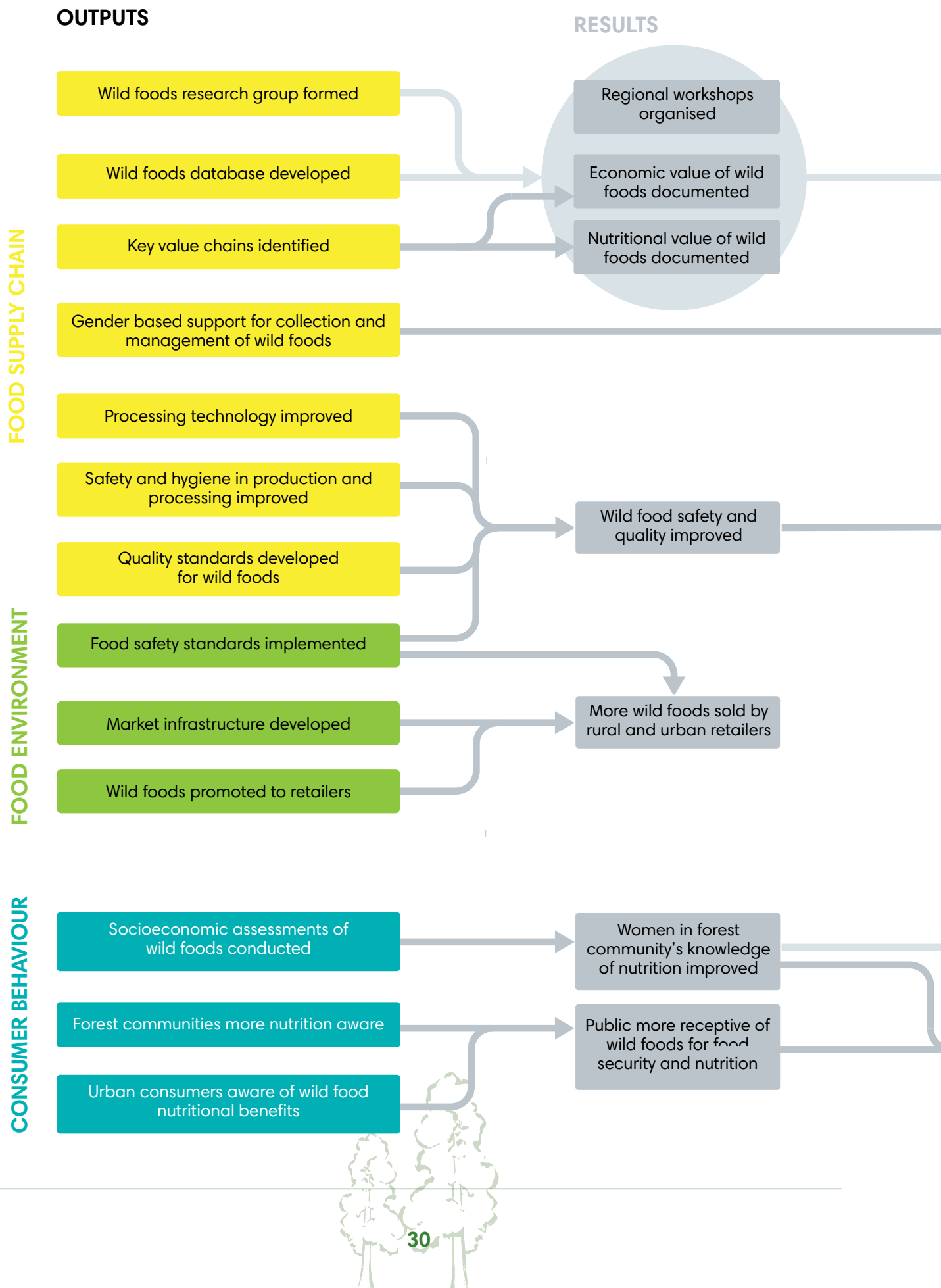
Annex 1. Impact pathway outputs and activities

Domain	Output	Activities
FOOD SUPPLY CHAIN	Wild food database	<p>Include NWFP and wild food considerations in forestry policy reviews, forest management plans, REDD+, rangeland and pastoralism policies, and nutrition action plans</p> <p>Expand research on wild foods' nutritional characteristics and value throughout Uganda</p> <p>Input Uganda wild food data into the FAO INFOODS information system</p>
	Wild foods policy and research group	<p>Regular meetings of scientists and resource managers to coordinate activities to promote wild foods</p> <p>Include NWFP and wild food considerations in forestry policy reviews, forest management plans, REDD+, rangeland and pastoralism policies, and nutrition action plans</p>
	Key value chains documented for a wider variety of foods	<p>Identify and document nutritious wild foods with the potential for wider human consumption and develop value chains with local forest communities</p> <p>Create NWFP and wild food cooperatives</p>
	Gender-based support for the collection and management of wild foods	<p>Support the development of efficient technologies for capturing edible grasshoppers and adjust their scale to appropriate rural locations</p> <p>Expand agroforestry systems in rural communities using wild trees and plants (e.g. balanites, tamarind) and include participatory domestication of desirable traits</p> <p>Safeguard the land and NWFP rights of forest communities, including women and children</p>
	Improvements to safety and hygiene in production and processing	<p>Expand access of forest community district 'Nutritious Food Portfolios' (AgBio) targeting year-round food harvest and nutrient gaps</p> <p>Scale up training in methods for the sustainable production of quality honey and beeswax</p>
	Improvements to processing technology	<p>Introduce technologies for efficient oil extraction from shea and balanites</p> <p>Expand use of modern beehives to increase productivity and quality</p>
	Quality standards for wild foods	<p>Accelerate use of payments for environmental services (PES) and ecosystem-based adaptation (EbA) initiatives to support wild foods</p> <p>Develop quality standards for priority wild foods, with a focus on edible insects, honey, shea oil and balanites oil</p>

Domain	Output	Activities
FOOD ENVIRONMENT	Implementation of food safety standards	Improve food quality and safety by reinforcing the capacity of local communities to store and process wild foods, especially fruits and oils
	Development of market infrastructure	Improve transport and access to local markets for forest-dependent communities
	Promotion of wild foods to retailers	Develop a manual of best practices and logo to increase the visibility of selected wild food products and ensure their quality, safety and the ethicality of their source (e.g. inclusive and sustainable value chains)
CONSUMER BEHAVIOUR	Socioeconomic assessments of wild foods	Continue organising both national and district level workshops on the nutritional benefits of non-wood forest products and wild foods
	Forest-dependent communities more nutrition aware	Incorporate wild foods into nutrition and food security initiatives such as educational campaigns, school meals programmes and farmer field schools Introduce indigenous tree and plant species based on community preferences in and around refugee settlements to maintain and protect local landscapes and help meet nutritional and energy needs
	Urban consumers aware of nutritional benefits of wild foods	Promote a consumer awareness campaign to increase consumer knowledge of the nutritional value of wild foods, safety considerations, and how to properly prepare and consume such foods



Annex 2. Improving dietary diversity of forest communities through wild foods in Uganda

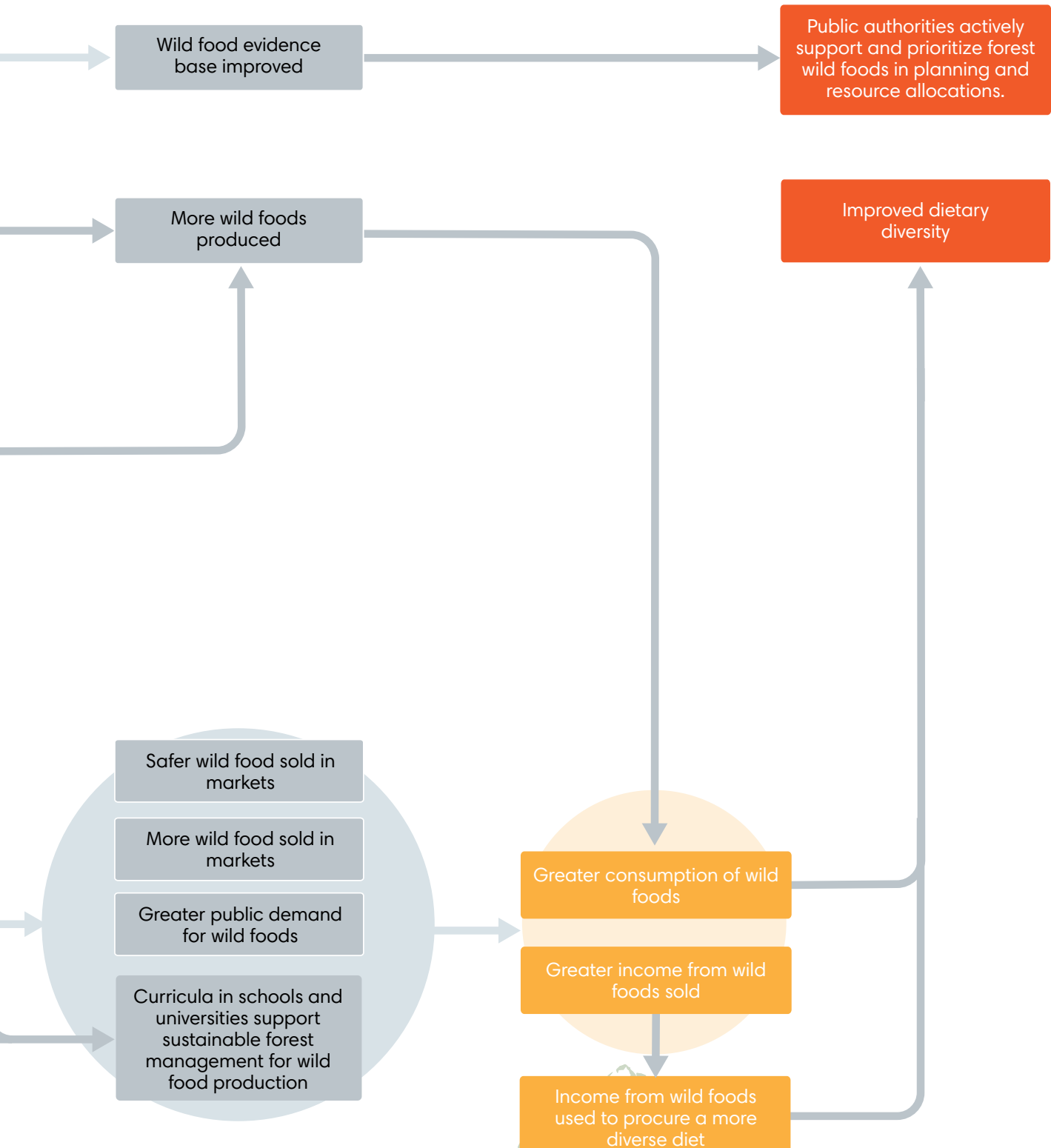


To visualize the impact pathway in a two-page view, go to Adobe Reader ribbon and click on View > Page display > Two pages, then check Show Cover Page in Two Pages View.

RESULTS

INTERMEDIATE STATES

IMPACT



Annex 3. Bridging nutritional knowledge gaps relating to wild foods from forests

KNOWLEDGE GAP 1

Issue: There is limited scientific data on the nutritional content, characteristics, productivity and pest challenges of most wild foods. For the most part, forest-dependent communities consume wild foods based on their anecdotal experiences and preferences (Bharucha and Pretty, 2010).

Recommended action: Conduct a multi-year campaign working with universities and international organizations to assess and describe the wild foods used in Uganda, their nutritional characteristics, their capacity to be produced sustainably and the potential to incorporate them into community agroforestry production systems.

KNOWLEDGE GAP 2

Issue: Vitamin A and iron deficiencies are common throughout much of Africa, including Uganda, and yet only a small fraction of the country's wild foods has been evaluated for its vitamin A and iron content. Much of the current knowledge on this topic has come from studies conducted in more affluent societies using commercial food products (Hoogenboom *et al.*, 2009; Scully *et al.*, 20082012; Sichen-Hellert *et al.*, 2011).

Recommended action: International organizations should collaborate with universities and relevant ministries to carry out systematic and rapid assessments of the vitamin A and iron contents of all known wild fruits and vegetables consumed in Uganda.

KNOWLEDGE GAP 3

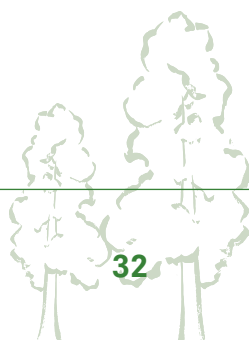
Issue: Many wild foods are consumed by forest-dependent communities without direct awareness of their nutrition value.

Recommended action: Conduct surveys of forest communities to assess their wild food consumption preferences and indigenous knowledge and compare this with these foods' known nutritional characteristics.

KNOWLEDGE GAP 4

Issue: The wild food supply chain – including the harvesting, processing and consuming of wild foods – is very informal and lacks the essential management skills and infrastructure needed to undertake improvements and add value. With a few exceptions (e.g. mango, shea butter, tamarind, balanites oil, grasshoppers), wild foods are harvested opportunistically and when labour is available.

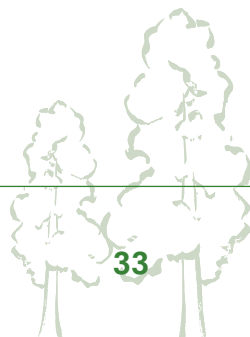
Recommended action: Using a food systems framework, identify the main nutritionally important wild foods consumed by a few selected forest-dependent communities, and assess the feasibility of further developing the value chains for these foods, taking into account quality improvement, availability, transport and marketing requirements.

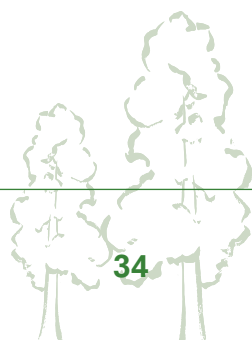


KNOWLEDGE GAP 5

Issue: Existing data on the nutritional and botanical characteristics of Uganda's wild foods is widely dispersed and not easily accessible.

Recommended action: Establish an internet-based national information system in collaboration with Ugandan universities that is georeferenced and contains all existing knowledge on the country's wild foods. Using common metadata descriptors, add additional information and new wild foods as information becomes available. Allow for the ability to add information on wild foods in other African countries.





For more information check also:



**Maximizing nutrition in forestry using
a food systems approach**

An evidence-based literature review

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**Maximizing nutrition in the forestry sector
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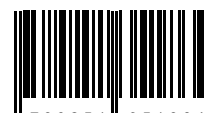
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