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Potential for Commercialization and Value Chain Improvement of Wild Food and Medicinal Plants for Livelihood Enhancement in Uganda

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Abstract: Uganda is endowed with a wide diversity of wild plant species that can be commercialized for livelihood enhancement and poverty reduction. These wild plants are increasingly becoming a valuable source of livelihoods for many people through household use as well as trading as medicine, food and craft materials. However existing literature on commercialization of wild food and medicinal plants in Uganda is largely anecdotal and disjointed. In this review, we analyze available literature on importance of wild plants in sustaining people's livelihoods, value chains as production and marketing approaches in commercialization of wild plants, the demand and supply for wild plants products and its implication for commercialization of wild food and medicinal plants, ecological implications for commercializing wild plants and the potential for wild plant commercialization to contribute to household income. The literature points to gaps in literature, which necessitate further studies to assess the importance of wild plants in the daily life of households, market potential of the wild plants and their contribution to the local people's livelihoods.

Key words: Commercialization, demand and supply, household income, poverty reduction, Uganda, value chains, wild food and medicinal plants

INTRODUCTION

Uganda like many other tropical countries is well endowed with a wide diversity of useful wild plants species. These plants include varieties of food and medicinal species. A great number of these wild plants have potential to generate food, medicines and income to support people's livelihoods (Agea *et al.*, 2008). Wild plants are defined as plants that are gathered (not cultivated), even if some of them may grow on cultivated rather than on uncultivated or forest land (Ce´line Termote *et al*., 2011).

Some of the wild plants visible on some of Ugandan markets include *Mondia whitei* (Mulondo), *Prunus Africana* (Red stink wood), *Solanum nigrum* (eshwiga), *Rubus pinnatus* (enkyerere), *Munodota junodoii (*Ebyuufa*), Physalis peruviana (*Entuutu), *Cyphomandra betacea* (amashararazi), *Luffa cylindrica* (echangwe), *Afromomum angustifolium* (amatehe), among others.

Many of these plants are sold locally but information on their market demand and supply is lacking. A lot more others remain undocumented even though they may have potential for commercialization. Consequently, many of these wild plants of economic value are generalized as low economic priority plants because of lack of knowledge about their economic potential.

Once identified, marketed and their value chains improved, the wild plants have enormous potential to contribute to poverty reduction especially in a developing economy like Uganda. This has been found to be true for countries like South Africa and many western African economies (Shackleton *et al*., 2002).

The successful commercialization of plants requires a clear understanding of the demand and production systems of the plants and or their derivative products; Understanding what plants are sold on markets and assessing their market information is a crucial step towards commercialization of the same. Information on local, regional, national and possibly international demand for wild plants in Uganda is necessary to inform investment decisions. This is true because marketing and promotion of wild plants and their derivative products requires substantial capital investment that can hardly be committed without clear market and value chains information.

Today, wild plants supplied to Ugandan markets largely come from wild populations. There is limited if at all, cultivation of wild plants for commercial purposes.

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With increasing demand for wild plants products, there is need for a steady supply of wild plants to meet this growing demand. To be able to sustain a steady supply, assessment of the supply chain is essential to generate information that guides decision making in commercialization and value chain improvement of wild plants (Shackleton *et al*., 2007a).

Commercialization of wild plants comes with many economic benefits generally to the national economy but particularly to the people involved in trade (Schippmann *et al*., 2002). Many times however, distribution of these benefits are skewed with the grass root people like the collectors getting fewer benefits compared to the middle men and other players higher up in the value chain (Belcher and Schreckenberg, 2007).

To be able to use commercialization of wild plants as a vehicle for poverty reduction and livelihood improvement therefore requires that Governments ensures that the players in the lower levels of the value chain actually benefit and are not taken advantage of. To achieve this, data regarding what every chain player benefits from the value chain is fundamental. In addition, measuring what a household benefits from wild plants value chain at all levels of the chain, is a good starting point for ensuring fair and equitable trade.

Wild plants are used by many people in Uganda, because of their low costs and effectiveness against a background of poor infrastructure, cultural and religious preferences and inadequate provision of basic services such as medicines and food (Shanley and Luz, 2003). Commercializing wild plants therefore will result in increased demand which in turn may put more pressure on the source populations thereby compromising steady natural supply of these plants to the people who entirely depend on them as sole source of livelihoods. It is therefore essential that sustainability of harvesting methods and regulation of quantities be considered in any attempt to commercialize these plants.

Elsewhere, studies have however indicated that commercialization and value addition of the wild plants greatly influences attitude towards the need to conserve them to guarantee benefits (Marshall *et al*., 2006). Clear understanding of effects of commercialization on wild plants natural regeneration and survival in Uganda is therefore essential for proper development planning and conservation priority setting.

Commercializing wild plants in Uganda will require robust information to guide policy and institutional environment in order to boost investor confidence in the sector (Ingram and Bongers, 2009). It is therefore important, that analysis of value chains for wild plants be done to generate required scientific basis to formulate enabling policies and boost investor confidence to undertake wild plants trade.

The overall aim of this review is to analyze available literature on importance of wild plants in sustaining people's livelihoods. Specific objectives of the review include: to evaluate the role of value chain as a production and marketing approach in commercialization of wild plants; to assess the demand and supply for wild plants products and its significance in commercialization of wild food and medicinal plants; to identify ecological implications of commercializing wild plants; and to assess the potential for wild plant commercialization to contribute to household incomes.

IMPORTANCE OF WILD PLANTS IN SUSTAINING PEOPLE'S LIVELIHOODS

Wild plants are important in the livelihoods of many poor households in the tropics (Ticktin, 2004) but the contribution that these plants make to the livelihoods of the poor people is often not acknowledged in national statistical reporting (Agea *et al*., 2011). Wild plants are important to local economies (Ingram, 2006) in many ways; they contribute to poverty reduction through enhancing household food security and incomes (Agea *et al*., 2011).

Households eat wild plants as food and also sell them to earn incomes and employment opportunities. They therefore enable households to have ready access to products that they would otherwise have to buy (Jensen, 2009). Depending on the community, cultural practices and location, wild plants are therefore major sources of livelihood but their real economic value is less clear, hardly publicized and highly debated (Angelsen and Wunder, 2003).

Various studies in Uganda (Tabuti *et al*., 2004; Tabuti, 2007; Agea *et al*., 2011) reveal that wild food plants constitute essential components of the local people's diet more especially during periods of food shortage and scarcity. Elsewhere, it is reported by Wilson (1990) in Agea *et al*. (2011) that poor households rely on wild food plants as an alternative to cultivated food plants for a quarter of food supplies during a dry season in Zimbabwe. In Ethiopia, Fentanun and Hager (2009) indicate that wild plants are consumed in many household especially as nutrient supplements.

These plants are often one of the few income opportunities for households in rural economies (Belcher, 2005), provide a safety net when other activities fail to provide income and are also important for food security. It is reported that wild plants contribute 6-95% of household's annual income for the rural poor (Shackleton *et al*., 2007b) in the tropics.

In developing countries, wild plants are used by billions of people because of their low costs, their effectiveness, and the frequently inadequate provision of modern medicine and food alternatives in addition to cultural and religious preferences (Shanley and Luz, 2003).

The annual global market for herbal remedies alone is estimated at US$ 23 billion (Crabb, 2004). This makes a considerable contribution to the economies of producer countries (Schippmann *et al*., 2002). For instance, Cunningham (1997) reports that over 90% of the third world's rural population relies on wild plants for medicine.

In subsistence economies, wild plants are demanded for production of essential products and services for the life of local people such as "food, utensils, clothing, shelter, medicines and objects of spiritual or cultural significance" (Wong, 2000).

In Uganda, Naluswa (1993) reported that 16 vegetables, 17 edible fruits and five edible grasses were used as food at the time and that over 300 species of plants were in use in Uganda as medicinal plants.

Cunningham (1997) puts annual income from *Prunus africana* trade per year for Tanzania, at US$240,000-1,200,000. In India, wild plants generate US $700 million annually in Madhya Pradesh and US$115 million annually in Maharashtra (Osman *et al*., 2000).

Wild plants are reported to be important sources of food and medicines (Jensen, 2009) for rural (Ambrose-Oji, 2003; Agea *et al*., 2008) and urban (Stoian, 2005) people; and is a significant source of income for national (Chamberlain *et al*., 2004) and global (Leslie, 2005) economies. This significant importance and use of wild plants and or their products is a possible positive incentive for wild plants conservation by the local people (Turner and Cocksedge, 2001).

In Uganda, information on marketing and economic potential of these valuable plants is still lacking (Rubaihayo *et al*., 2003) and little attempt has been made to identify effective marketing and policy frameworks for promoting their use and maximizing their market values. Learning which wild-harvested plants are sold, the extent to which they are traded, and the perceived scarcity and popularity of these plants are the first steps in identifying species with resource management priorities (Cunningham, 2001) and a successful commercialization process.

Value chains as production and marketing approaches in commercialization of wild plants: A value-chain includes the full range of activities that are required to bring a product from its origin, through different phases of production, to its final customer (Weijers *et al*., 2006). The value chains look at all activities related to the production, transformation, processing and trading activities until the final consumption of a product. Related to value chains is value chain analysis, which is one of the most useful methodologies for understanding how markets operate for a particular good (Kanji *et al*., 2005).

Value chains help in conceptualizing the value-adding activities through which a product passes from the initial production stage to final delivery to the consumer (Kaplinsky and Moris, 2001). Identification of key actors and corresponding roles in a value chain is normally done through mapping the chain. Through mapping, impediments in the value chain may be removed and the chain structure improved through exclusions, inclusions or building bridges.

Describing of wild plants value chains is important to address governance issues that relate to commercialization and value chain improvement. The governance arrangements in a value chain have critical implications on how values are determined and benefits are distributed in the value chains (Kusters *et al*., 2006).

A good value chain system results in better commercialization of wild plants by the rural poor, which translates into greater opportunities for their generation of income, reduced poverty and inequality at the producer level resulting in overall livelihood improvement (Shahidullah and Haque, 2010) which is a prerequisite for social and environmental sustainability (Giuliani *et al*., 2005).

Even though the value of wild plants is significant among the people who use and trade them, misunderstanding of their value chains and success determinant factors has led to realization of modest economic profits (Kilchling *et al*., 2009) despite their high economic potential. It is argued by Schmitz (2005), that mere matchmaking between producers and processors makes value chain a buyer driven one, which tends to be exploitative, extracting as much resources and demanding lesser price from supplier.

In Bangladesh for example, it was observed that in a medicinal plants' value chain, the profit margin at the middleman level ranged from 59 to 139% and at the wholesale level it was 22 to 90% (Shahidullah and Haque, 2010). This was seen as a contributory factor to maintaining the producers in poverty while enriching the higher levels of the value chain. It is therefore important that value chains are studied, improved and integrated to make them more efficient.

There are several factors that are responsible for poor performance and lack of efficiency in value chains; these include market access and transaction problems, information gaps, lack of reliable buyers, lack of capacity at the producer level and discriminatory and unfair pricing (Van de Kop *et al*., 2006). In the upstream value chains, market information, capital and skills, volume, quality, and consistency of supply are major bottlenecks to especially small farmers (KIT and IIRR, 2006).

Efficient and integrated value chain enables primary producers not to remain merely as passive suppliers but to become active participants who are motivated to manage their resources, reinvest and innovate. It removes market access barriers for the primary producers, which are seen as key constraints to the eradication of rural poverty (Hellin *et al*., 2005).

An efficient value chain enables primary producers not to remain merely as passive suppliers but to become active participants who are motivated to manage their resources. It removes market access barriers and inequitable profit distribution for the primary producers, which are seen as key constraints to the eradication of rural poverty (Shahidullah and Haque, 2010).

An integrated value chain system also results in better commercialization of the products produced by the rural poor, which translates into greater opportunities for their generation of income (Giuliani and Padulosi, 2005). Integration of value chains is done through eliminating non-value added costs and activities along the chain (Baker, 2002). The integration removes market access barriers and inequitable profit distribution for the primary producers, which are seen as key constraints to the eradication of rural poverty (Shahidullah and Haque, 2010).

The value chains for wild plants are broken down into several segments including collection/production, transport, storage, processing, marketing and sale (Kusters *et al*., 2006); the relative importance of each of the chain segment differs for different plants. For some, they may not occur sequentially and some may even be repeated or omitted for particular products (Marshall *et al*., 2003). Some value chains, particularly for locally traded wild plants and or their derivative products, are very short and simple with harvesters selling their products directly to consumers.

Wild plants may be for instance harvested from one source and be consumed by the same person at the same location, but equally maybe exchanged or traded and processed, traded and/or consumed in another location and known as a different product (Ingram and Bongers, 2009). To be able to better understand value chains and improve them, a process of value chain analysis has to be conducted.

Value chain analysis of wild plants may result in increased resource productivity and biodiversity conservation, which would then result in improved standards of health and nutrition, economic growth through the development of a competitive industry and local empowerment, and good governance (USAID, 2006).

The prerequisite factors for a successful value chain promotion include the number of actors involved, the volume and the prices of the products, the profit margins at each chain segment, the economic profitability of each actor in the chain in relation to fixed costs, variable costs and labour costs (Marshall *et al*., 2006). Power relations, governance and the effect these aspects have on actors in the chain are also important to value chain analysis (Kaplinsky and Moris, 2001).

While the importance of value chain analysis is well understood, studies on wild plants value chains have been rather missing (Ros-Tonen and Wiersum, 2003) and this has resulted in vast amount of knowledge on wild plants trade remaining indigenous, with those who harvest and use wild plants.

It is clear from the literature, that efforts to simultaneously conserve biodiversity and reduce poverty will not be successful unless commercialization of wild plants trade is pursued much more aggressively through research on value chains and consequent value chain improvement (Belcher and Schreckenberg, 2007). There is therefore an urgent need to invest in studies that will identify wild plants on the market, with potential for commercialization and how this can be achieved (Leakey, 1999).

It is evident that wild plants commercialization is a viable strategy to ameliorate nutrition security; increase and diversification of farmers' income; and protection of the natural environment from overexploitation (Leakey, 1999; Leaky *et al*., 2003; Tchoundjeu *et al*., 2006; Ce´line Termote *et al*., 2011).

The demand and supply for wild plants products and its implication for commercialization of wild food and medicinal plants: Demand refers to an economic principle that describes a consumer's desire and willingness to pay a price for a specific good or service (Sullivan and Sheffrin, 2003). Holding all other factors constant, the price of a good or service increases as its demand increases and vice versa. Factors which influence demand include good's own price, price of related (complement and substitute) goods, Personal disposable income, tastes/preferences and consumer expectations about future prices and income.

On the other hand, supply refers to amount of some good that producers are willing and able to sell at various prices. Factors that influence supply include pproduction costs, technology used in production, the price of related goods, suppliers expectations about future prices and number of suppliers in the market.

The demand for wild plants and their products is increasing at a high rate for cash income generation (Fisher, 2000) and creation of employment opportunities (Kilchling *et al*., 2009). The demand for wild plants has also been increased by research on forest management, biodiversity, conservation and poverty alleviation (Lawrence, 2003) which has increased knowledge and awareness about the values of wild plants.

If demand for a species or product is high and supplies are still available, then the species will be sold in many market places. Conversely, a species or category of plant use in low demand would be less common in market places (Cunningham, 2001). Demand for wild plants tends to be higher near urban areas, where trading and commercial networks perform better (Ros-Tonen and Wiersum, 2003).

Demand for wild plants is not driven solely by poverty but human wellbeing in entirety (Rijsoort, 2000).

This is seen from a case study of dependency on forest and tree products for food security in the Northern Mountainous Region of Vietnam by Rijsoort (2000), which shows that wealthier groups of forest dwellers use forest vegetables for their own consumption or buy them from the poor. Rijsoort established that poor people sell vegetables, bamboo shoots and mushrooms from the forest and use the money to buy rice and that the wealthier families hunt to improve the quality of their meals while poorer families hunt to earn more income. This makes commercialization of wild plants a viable and sustainable industry.

In general, demand and supply of wild plants and their derivative products is driven by a host of factors including poverty avoidance, filling gaps during periods of low income, spreading risk, and functioning as a safety net" (Belcher and Kusters, 2004). However research, concerning management, marketing and consumption patterns of wild plants still lacks adequate attention (Tabuti, 2007) to be able to fully explain their demand and supply dynamics.

ECOLOGICAL IMPLICATIONS OF COMMERCIALIZING WILD PLANTS

When the wild plants move from subsistence use to commercialization, the economic and social livelihoods of harvesters, producers, processors, urban traders and consumers become interlinked through demand and supply interactions that can lead to unsustainable exploitation (Ingram and Bongers, 2009).

In the past, harvesting of wild plants was primarily done by traditional healers and subsistence food gatherers. As a result of urbanization and increased demand, however, harvesting has often become the domain of untrained, and often indifferent, commercial gatherers with no other income sources (Williams *et al*., 2000). Hence over harvesting or use of harvesting methods that threatens the ecological wellbeing of the species.

High profitability from wild plants and or their products on the other hand may result in high demand with limited supply of wild plants resulting in over harvesting (Subhrendu and Sills, 2001) which depletes the supply base. Ecological studies indicate a positive correlation between low biodiversity and high profitability of biodiversity related products (Roderick and Hirsch, 2000).

It is a fact that majority of medicinal plants are still harvested from the wild populations (Schippmann *et al*., 2002) world over. Harvesting without planting, deforestation and the increased marketing of wild plants may result in the decline and sometimes near-extinction of several valued medicinal plant species around the world (Ticktin, 2004). For many countries and species, however, information on the current harvesting sustainability is either lacking or nonexistent.

However, in some areas, demand dynamics has been reported to provide incentive for conservation of biodiversity (Ros-Tonen, 2000). For this reason, in Southern and East Africa, the management, roles and dependence of different groups on non-timber forest products has been given high research priority (Ruiz *et al*., 1997) in order to explain this phenomenon.

Commercialization of medicinal plants associated with urbanization has been reported not to invariably lead to a decline in resources and species (Andel and Havinga, 2008). In South-west Cameroon, research shows that the value of forests improves by increasing the use of wild plants and or their products, if it can incite users to engage with improved management and conservation strategies (Ambrose-Oji, 2003).

Generally, trade and production of wild plants has been found to sustain ecological and economic benefits in low developed countries (Giuliani *et al*., 2005). For instance, the commercial use of *Prunus Africana* has promoted its conservation and generated revenue to bark traders, private farmers and government (CITES, 2008).

It is however critical that good prices must be ensured through making information available, creating options, strengthening bargaining capacity and harvesters and vendors taking responsibility for the management of their resources and complying with sustainable harvesting techniques (Shahidullah and Haque, 2010).

While plant vendors may provide information on which species are becoming rare, a better way to detect the sustainability of commercialization is to visit the locality where the plants grow (Martin, 1992). Particular plant parts extracted must be taken into consideration, as this determines the survival of the individual species after harvesting.

For example, the removal of wood, roots or whole plants generally leads to the death of an individual, as does the cutting of bark when ring-barking takes place (Cunningham, 1993). The harvest of leaves, fruits or seeds is considered less destructive, although intensive pruning can affect reproductive performance (Gaoue and Ticktin, 2007).

The vegetation type from where wild plants are collected, abundance and growth rate are other major determinants for the sustainability of their extraction; for instance a slow-growing primary forest species that occur in low densities are particularly vulnerable to overharvesting (Peters, 1996).

Non-sustainable harvesting not only threatens the survival of valuable plant species, but also the livelihoods of communities that depend on them and therefore the national economy. Species with a great cultural and economic significance that are at risk of overexploitation

and population decline should thus be given conservation priority (Hamilton, 2004). Endangered species for example, should play a key role in resource management plans and Government Policy interventions (Cunningham, 2001) while considering commercialization.

The potential for wild plant commercialization to contribute to household income: The economic importance and value of natural resources in the lives of rural communities has long been established by studies locally and internationally (Campbell and Luckert, 2002; Dubois, 2003). Because of this, there is a significant international policy agenda to demonstrate complementarity between conservation of natural resources and economic wellbeing (Scherr *et al*., 2003).

Measuring the contribution of wild plants to household incomes is important because, when people attach an economic value to a resource, they are motivated to sustainably exploit it (Bognetteau *et al*., 2009). Promoting the use of wild plants and their products in domestic and wider markets is a possible approach to increasing household income, which is an incentive for conservation and sustainable use of these species (Wunder, 2001).

Attempts to quantify household incomes from wild plants trade has produced varying results (Campbell and Luckert, 2002) depending factors, such as proximity to markets, currency strength, diversity, abundance of resources available and opportunity costs (Shackleton and Shackleton, 2006). Narendran *et al.* (2001) reports over 50% of total household income while Ambrose-Oji (2003) reports less than 20%. In Uganda, Buyinza and Muyanja (2008) indicate that collection of *Tamarindus indica* fruits by the rural households account for 74% of their annual revenue.

Understanding the relationship between household incomes and wild plants has been identified as a key research area required for greater understanding of the economic value of wild plants to different wealth quartiles (Luckert *et al.*, 2000). While the income derived from wild plants by poor households makes a greater contribution to overall livelihoods because it represents a higher proportion of all income streams, this may be not true for wealthier households since they have a greater number of income streams.

In contrast, Shackleton *et al*. (2002) a total gross annual direct- value of wild plants per household being greater in a wealthy village relative to a poor one. The same pattern was found observed in the Kat River valley of the Eastern Cape (Shackleton *et al*., 2002). The higher values within the wealthier villages can be ascribed to higher local prices, rather than greater consumption of wild plants (Shackleton *et al*., 2002).

It is clear from all these studies that mean gross direct value across a sample of households in a village is potentially not a reliable indicator of household use of, and reliance on, wild plants. Both these studies however indicate that poor households are particularly reliant on wild plants for household consumption and income generation.

Greater wealth appears not to change the proportion of households extracting wild plants, nor the number of wild plants used Shackleton and Shackleton (2006). However, there are differences in amounts consumed, gross direct value of home consumption, and participation in commercialization but all tended to be, greater for poorer households than wealthy ones.

More case studies are needed to come up with a trend that may be based upon to come up with a conclusion on how wild plants trade contributes to household incomes of different wealth quartile groups.

CONCLUSION

Available literature generally indicates that wild plants play a significant role in sustaining people's livelihoods through provision of food, medicine and household incomes through commercialization. There are however gaps as to what extent the significance of this contribution is.

Value chain analysis has been found to be a fundamental approach for commercialization of wild food and medicinal plants. It is clear from available information that as a production and marketing tool, value chains are invaluable in commercialization of wild food and medicinal plants;

Demand and supply of wild food and medicinal plants is driven by poverty avoidance, filling gaps during periods of low income and spreading of risk. The literature available however is inadequate to enable affirmative conclusion as to the implications of Demand and Supply on Commercialization of food and medicinal plants.

Commercialization of wild food and medicinal plants has the potential to ensure the long term conservation of these plants due to the fact that people start seeing them as of much value. A valued plant has more protection than a non valued one.

The literature points to the necessity for further studies to assess the importance of wild plants in the daily life of households, market potential of the wild plants and their contribution to the local people's livelihoods. This is necessary in order to construct priority species lists that can be based upon to recommend sustainable harvesting and commercialization of the same.

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