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ASSESSING THE NON WOOD FOREST PRODUCTS (NWFP): A CHALLENGE FOR ACHIEVING ECOSYSTEM, SPECIES CONSERVATION AND IMPROVING LIVELIHOODS. THE CASE OF UMRAWABA LOCALITY (NORTH KORDOFAN STATE, SUDAN)

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ABSTRACT

The aim of this study was to assess the Non Wood Forest Products(NWFP) and their contribution to the rural communities livelihood and to end up with specific management strategies to conserve NWFP producing species in the study area. The study carried out at Umrawaba locality which is located in the Northern East part of the Northern Kordofan State between latitudes (12^0-14^0) north and longitudes (30^0-32^0) east. A combination of methods was adopted for data collection these included: Reconnaissance survey, structured and semi- structured interviews, group discussion and observation. Respondents were selected through simple random selection. The household was the basic unit of data collection, sixty households were sampled out. Four villages were selected on the basis of availability of NWFP producing species. The data was processed and analyzed using statistical package of social science (SPSS). The study provides a list of NWFP producing species in the study area and documenting the local knowledge regarding the uses and management of the forest resources in the area. The results revealed that the non timber forest products have a clear role in the contribution of rural people income and represents secondary source after farming and livestock. The study revealed that there are various constraints, which negatively affect the distribution and abundance of the non-wood forest products producing species. The study recommended due attention to the way the NWFP exploitation and commercialization and also recommended community participation in the conservation and management with clear indication of sense of ownership.

KEY WORDS: Sudan, non timber forest products, livelihood, ecosystem conservation.

INTRODUCTION

Relative to forest management for the production of timber, non-timber forest products (NTFPs) and environmental services received only scant attention by forest departments until recently (Simmons, 1996). Interest in NTFPs grew slowly during the 1980s, in response to calls for using forests sustainably for the benefit of the wider society and particularly the rural population. In the environmental and development dialogue of the late 1980s, and especially in the post-Rio 1990s, non-timber forest products (NTFPs) – first brought to public attention in the form of 'rainforest crunch' – became quite literally the flavor of the day. Conservation and development organizations alike, particularly those working in the tropical rain forest, promoted the idea that NTFP production and trade had the potential to supply local people with sufficient incomes to provide them with incentives to maintain the forests (Nepstad and Schwartzman, 1992; Ruiz Pérez and Arnold, 1996; Wollenberg and Ingles, 1998). By the end of the century, the number of NTFP initiatives had grown rapidly, leading also to questions about their real impact (Sheil and Wunder, 2002).

In Sudan vegetation cover contains many useful trees and shrubs (Elamin,1981). These species are an integral part of the rural household economy and their contributions are significant to food security of the rural households in providing wood and non-wood products. The non-wood products include fodder, wild fruits, vegetables, roofing material (thatch roofing, mats), edible gum, incenses, latex, tannin, dyes, medicine, nuts, seasoning and flavoring products, drinks, soup, oil, syrup, medicine, fiber used for making rope and veterinary medicine, insecticides, cosmetics, smoke bath, brooms, toothbrush (Wickens, 1994).

During periods of drought, the vegetation serves as a source of emergency food for humans, livestock and wildlife. Under normal climatic conditions, gum and incenses are export commodities and generate foreign exchange earnings for the economy. During the long dry season, which extends from seven to nine months, the pastoral communities depend on the perennial multipurpose drought tolerant trees and shrubs as a source of fodder for their livestock and as source of food and other valuable resources, which have direct and indirect uses. Among the non-wood forest product producing species the prominent ones include *Boswellia papyrifera* (frankincense tree), *Acacia senegal* (L) Willd. (Gum arabica), *Hyphaene thebaica* (doum palm), *Balanites aegyptiaca* (Desert date) *Zizyphus spinachristi*, and *Adansonia digitata* (Tabaldi). The economic and ecological functions of these species are not systematically documented, but they are thought to play a significant role in soil and water conservation and greening of the landscape and contribute to the household economy as well (NEF, 2015).

Elsewhere, the sustainable extraction of non-wood forest products has been advocated as a strategy to conserve biodiversity (Belcher and Schreckenberg, 2007). However, the development and implementation of such exploitation systems, which aim to reconcile conservation and economic development, are hampered by lack of quality and relevant information. The essential information required includes the biological sustainability of these resources in the face of the current exploitation systems, the impact of the different exploitation systems on biological diversity, and more knowledge on the tangible and intangible role of non-wood forests products on the rural household economy and hence their prospects for economic development (Boot,1997 and Pandey *et al.*,2016).

Despite the recognition of NTFPs importance to livelihood there is inadequate information regarding their types and benefits, consumption, extraction, collection and marketing. Accordingly this research comes as an attempt to assess the NTFPs and their contribution to the rural communities' livelihood and to end up with specific management strategies to conserve NWFP producing species in the study area.

RESEARCH METHODOLOGY

The study carried out at Umrawaba locality which is located in the northern east part of the North Kordofan State between latitudes (12^0-14^0) North and longitudes (30^0-32^0) East. It lies at the low rainfall woodland savannah zone with an average rain fall of 250-350mm. The area is estimated to be about 14326 square kilometer. The vegetation is dominated by several Acacia species which are important multi purposes species. Subsistence farming and seasonal wages are the main means of livelihoods.

Reconnaissance survey

Reconnaissance survey was conducted using Rapid Rural Appraisal (Conway *et al*. 1987) at village levels. Four villages were selected and the age range was between 18-80 years. Discussions were carried out with the NWFP users using semi-structured questionnaires to gather information about management of natural resources, type of vegetation, farming practices and resources used. Sixty households were further interviewed using structured questionnaire. The questionnaire dealt with demographic characteristics, number and types of trees used, number and types of livestock owned, income from livestock, crop production, off farm activities, and the contribution of the NWFP. Descriptive statistics were used to analyze the collected data using the statistical package of social science software (SPSS) version (22).

Ethno botanical studies

In each village area, ethno botanical methods were employed to study the traditional use and management of the plants. The checklist of the major woody plant species found in the study area was prepared. For each species, the vernacular names used by the various ethnic groups, plant parts used, season of harvest and type of use were recorded. In addition, the season of production (harvest) and the purpose of extraction were documented. Besides, the indigenous management aspect of the exploitable resources was recorded and analyzed to understand how the local people perceive the values of NWFP in their village areas.

RESULTS AND DISCUSSIONS

1. Socioeconomic characteristics of the respondents

Sixty respondents (51%) men and (49%) women were interviewed. The number of males is more than females. This is because males dominate most of the outdoor activities in the rural households in the study area. Most females are engaged in domestic household activities such as child rearing, weaving, and processing the NWFP. The ages of respondents ranged from 18 to 80 years, with a median age of about 60 years, primarily rural workers (70% farmers, 30% other jobs). Of those who revealed no regular education are 31%. Those who have received Khalwa (Quran education), primary, intermediate, secondary and university educational levels are 18%, 35%, 5%, 8%, and 3% respectively. Most of the respondents (89%) are not members of any type of social committees. They were not government employees and never practiced any form of leadership (Sheik 4%, member of village committee 4%, and member of rural town council 3%).

In the study area, there are nine ethnic groups, which are distinguished by their own language and cultural tradition. Each group gives specific names to identify the NWFP producing species. This suggests the wealth of traditional knowledge that exists regarding the land resources base. Moreover, these ethnic groups possess rich indigenous knowledge on the use and management of the useful plant species in their respective village

areas. One representative from each ethnic groups assisted in identifying the various species used and how they manage the non-wood forest producing species. The largest group being the ethnic group of Gawamaa (48%) followed by Flata (21%) and Gaafra (15%). The remaining groups are Kenana (5%) Darhamid (3%), Maaly(2%), Khuzamya (2%), Shanabla(2%), and Miseerya (2%). This result also reflects the demographic trend in the study area.

2. Farmers' perception about availability of non wood forest products in the study area

In an attempt to identify and evaluate the perception of the respondents about abundance of non wood forest products (NWFP) in the study area; results presented in table (1) show that the majority of the respondents (71%) think that, nowadays, it is difficult or moderately difficult to get non-wood forest products from the surrounding vegetation as is evidenced by the gradual decline of the resource base in the study area. Results in table (1) also show excessive cutting of trees, and shrubs for fire wood for domestic energy consumption and sale, overgrazing and land clearing for agricultural purposes are considered as being the most serious factors with devastating effects on the local vegetation. The consequence of these factors is the disappearance and degradation of the NWFP producing species in the study area (Table 1).

Table 1: Availability and factors contributing to the decline of non wood forest products in the study area.

Availability			**Factors**		
	F	**%**		**F**	**%**
Difficult to get	43	71	Illegal cutting of trees	37	61
Moderately difficult to get	10	17	Overgrazing	10	17
Always available	3	5	Land clearing for agriculture	6	10
Impossible to get	3	5	Rains	4	7
Based on the season	1	2	Climbers	3	5
Total	60	100	Total	60	100

3. Access to Non-wood Forest Products

Results of this study show that among the respondents interviewed 87% believed that there is no a need of getting license or permission from the local authorities, before one can collect NWFP and 13% of the respondents believe that, they should get permission to collect NWFP for the trees belong to individuals and for NWFP producing species of high economic value such as *Hyphanea thebacia* and *Ziziphus spin christi*.

Concerning property rights there are no restrictions regarding the access to fruit trees in the forests. Informal rules, however, apply to anyone collecting. For instance, one should not collect under a tree where some other person is already collecting at the same time. Indications to gender differences regarding access to natural resources were not found. It was often said that mostly women collect forest foods, but exceptions were found during the study. This issue, however, requires further investigation.

Respondents stated that extraction of NWFP products take place on farms (63%), naturally growing trees in the woodlands (30%), around homes (5%) and from forest (1%), respectively (table 2).

Table 2: Extraction of NWFP.

Area of extraction	**F**	**%**
Farms	38	63%
Naturally woodlands	18	30%
Around homes	3	5%
Forest	1	2%
Total	60	100%

Generally, in the study area NTFP is part of an integrated farming system comprised primarily of small scale farmers, characterized by small production and the use of family labor without modern equipment or agricultural inputs NWFP primarily serves as a livelihood diversification strategy particularly to mitigate crop failure and a source of on-farm supply of fuel wood and fodder. However, it also has positive environmental impacts, namely tree species, such as the Acacias and *Ziziphus spina-christi* trees' long lateral root system reduce soil and wind erosion. They have a regenerating impact on the land.

4. Trade of the NWFP

Present survey results revealed that NWFP are important and useful to people in the Umrawaba area. Respondents stated that the main NWFP widely traded are the leaves and fruits of *Ziziphus spina christi* (nabag), *Hyphanea thebacia* (Doum), the fruits of *Adansonia digitata* (Tabaldi), Besides, gums extracted from *Acacia senegal* (16%) and fruits of *Grewia tenax* (gudeem) these were mentioned by 70%,41%, 35%, (16%) and 13% of the respondents, respectively.

In the group discussion the respondents indicated that their customers are the local population while some of their sale goes to other states of Sudan and this depends on the quantity and the type of the product. They also indicated that the most exploited commodity is the fruits of *Ziziphus spina-christi* and the leaves of Doum palm, which are processed into various colourful household artefacts. The commodities manufactured from these leaves include prayer mats, breadbasket, baskets, beds, chairs, chicken baskets and childbeds, water containers, fans, hats, robs, brooms, etc. in addition to raw material

including the leaves, stalks and fruits. These items are handmade commodities that deserve special attention towards their improvement. With a slight improvement in the appearance of these articles and training of the women who make them, it would be possible for the rural households to earn the desired amount and hence improve their income.

For gum extraction the situation is different from the other NWFP exploitation modalities which farmers have the right to use for household consumption However, with regard to the large-scale commercialization aspect of gum, it is the right of licensed concessionaires to hire tappers from the local community or outside to harvest and collect the products. Hence, the local communities do not receive direct revenue, other from selling their labour in the form of wage from exploiting the gum. Due to this, the local communities do not have a vested interest in conserving these valuable resources other than using them for fodder by lopping their branches. Consequently, due to mismanagement the species are threatened by extinction from the area.

According to Ibnaouf (2002) during periods of drought, the vegetation serves as a source of emergency food for humans, livestock and wildlife. Under normal climatic conditions; some of the non-wood products generate income for the households. During the long dry season (7-9 months), the pastoral communities depend on the perennial multipurpose drought tolerant trees and shrubs as a source of fodder. The contribution of the NWFP is more important in areas where the natural resource base does not allow other forms of production or in the event of droughts that result in total crop failure, the NWFP then serves as a support to the rural households during periods of emergency.

4. Uses of NWFP by local people

The vegetation of the study area contains many useful trees and shrubs (Elamin, 1981). These species are an integral part of the rural household economy and contribute significantly to the rural household food security in providing wood and non-wood products. The NWFP are used for various purposes.

Medicinal uses

Different parts of various woody plants are collected during the different seasons and used as major sources of cure in the area. In this study, 32 woody plants are used in traditional human and livestock medicine (table3) These plant products are sold in the nearby local markets and traders take some of the products to the markets in Elobied and Kosti towns where they are sold at higher prices.

Table 3: Medicinal plants used for Human and animals in the study area.

Species Name	Local name	Uses for human and/or animals	Season of collection (from---to)
Acacia nilotica	Sunt	Human	Jan. To Dec.
Cucumis prophetarum	habshtour	Human	Jul. to Nov.
Balanites aegyptiaca	Heglig	Human	Jan. to Dec.
Ziziphus spina-christi	Sider	Human	Jan. to Dec.
Guiera senegalensis	Gebaish	Human	Jan. to Dec.
Geigeria alata	Gadgad	Human	Jul. to Oct.
Combretum spp	Habeel	Human	Jan. to Dec
Bauhinia rufescens	Khroub	Human	Jul. to Dec.
Anogeissus leiocarpus	Sahab	Human	Jan. to Dec
Acacia Senegal	Hashab	Human	Jan. to Dec
Ocimum americanum	Rihan	Both	Aug. to Oct.
Grewia tenax	Gudaim	Human	Aug., Sep. & Oct.
Azadirakhta indica	Neem	Human	Jan. to Dec
Sonchas oleraceous	Molita	Human	Jul. to Oct.
Hyphaen thebaica	Doum	Human	Jan. Feb. &Dec.
Acacia seyal	Talih	Both	Jan. to Dec
Adansonia digitata	Tabaldi	Human	Nov. to Dec.
Eucalyptus spp	Ban	Human	Jan. to Dec
Commiphorg africane	Alarkala	Human	Jan. to Dec
Cypers rotundus	Sidda	Human	Jul. to Nov.
Blepharis linaarifolia	Begail	Human	Jan. to Mar.& Dec.
Cassia senna	Sanamaka	Human	Jul. to Dec.
Sclerocarya biree	Hemaid	Human	Jan. to Dec
Striga hermonthica	Bouda	Human	Jul. to Dec.
Capparis deciduas	Tundub	Human	Jan. to Dec
Cordia rothii	Andrab	Human	Jan. to Dec
Acacia oerfota	Laout	Human	Jan. to Dec
Cyamophorg tetragonoloba	Gouar	Human	Jan. to Dec

Rubus fruticosus	Elig	Human	Jan. to Mar.& Dec
Colcynthis vulgaris	Hanzal	Human	Jan. to Mar.& Dec
Dobera glabra	Mikih	Human	Jan. to Mar.& Dec.
Albizzia anthelminthica	Umtakirna	Both	Jan. to Dec

Fruits of *Acacia nilotica* (Garad) combined with other herbs heal certain diseases. For instance, the seeds of Garad mixed with the flowers of *Hibiscus sabdarifa* (Karkede), are purgative to clean the bowls and treat chest infection. When it mixed with tea papers it treats wound and fever. The crushed leaves of *Ziziphus spina-christi* (Sider) are applied on the head to cure dandruff, crushed park mixed with hot water used to cure diarrhea and stomach pain and the roots used for malaria treatment. Fruits of *Cucumis prophetarum* (habshtour) used to treat addiction. The ach of burned wood *of Dobera glabra (mikih*) treat tonsillitis. The fruits of *Balanites aegyptiaca* (heglig) are soaked in water and left to stay overnight. The filtrate taken orally is used as purgative and to treat enlargement of the spleen. In addition, the bark and roots are a relaxant for colic and used against stomach ache and gynecological diseases.

The pulp of *Adansonia digitata* (Tabaldi) fruit is used in various medicinal preparations. It is mixed with various parts of annual and perennial plant species. In some cases, it is not even clear whether its use is purely medicinal or as a food flavouring ingredient. The boiled fresh leaves of *Eucalyptus spp* used orally to treat chest infection, bloats, and removal of placenta and as mouth wash for tooth pain. Boiled roots of *Cypres rotundus* (sidda) cure bloat and chest pain. The leaves of *Cassia senna* (sanamaka) are socked in water overnight and then filtered and take orally to treat constipation and for abdominal pain. The crushed green leaves are used for treating snake bites. The pulp of the fruit of *Hyphaene thebaica* (Doum) when eaten raw relieves gastritis and reduce blood pressure. The seeds are mixed with other herbs to treat joint arthritis. When the fruits are burned, they kill or repeal insects. Fresh fruits of *Grewia tennax* (gudaim) raise hemoglobin and treated anemia when taken as juice.

A wet preparation of *Guiera senegalensis* (Gebaish) is made by boiling fresh leaves and the liquid filtrate is orally administered before meals to empty bowls. There is no precise prescription but a reasonable amount not exceeding one cup per day is recommended. It is used to treat malaria, Jaundice, lowering blood pressure and diabetes. The three parts (roots, leaves and stem) of *Geigeria alata* (gadgad) are boiled in water, then filtered and used orally to treat diabetes, lowering blood pressure, heart diseases and colic.

For *Combretum spp* (Habeel) sawdust with bark are boiled and drank to relief colic while the boiled bark of *Anogeissus leiocarpus* (sahab) is administered to treat jaundice. Fruits of *Azadirakhta indica* (neem) cure ear infection and the fresh leaves of the plant are sacked in water and the liquid is filtered and used to treat warms. The fresh leaves of the plant are applied to cover the whole body to relief fever. *Sonchas oleraceous* (molaita) are taken as salad and it is useful in treating malaria, diabetes and lowering blood pressure. Women use the wood of *Acacia seyal* as a sauna (locally called dukhan) to clean their skin and for beautification and good smell.

Plants and their extracts in the form of infusion or concoction have been traditionally serving people in the study area to cure against diseases. Since recent years, modern health care centres have been established in the area mainly focusing on modern medical treatments. In spite of these changes medicinal plants remain an important source of drugs in traditional medicine in the study area. A number of traditional healers use herbs as sources of drugs to treat various diseases; from the above mentioned medicinal uses farmers identified a number of plant species used in traditional medicine. From the discussions one realized that the indigenous knowledge of medicinal plants is widespread in the area. In most cases, most of the knowledge is well implanted in the society. Yet there is also certain knowledge on the use of plants, which is transmitted from parents to offspring. Thus, some of the information regarding specific aspects of the indigenous knowledge is confidential and is beyond the scope of this study since it requires a different approach to be extracted.

The demand for herbal medicine is ever increasing despite the steady flow of many synthetic therapeutic substitutes (Kaimowits, 2003). Even if there may exist other possible reasons why this is occurring, some visible and obvious reasons are the lack of affordability by the rural households to buy medicine, accessibility due to long distance from most health centers, and lack of confidence of the farmers on the use of medicine. In view of this, plants will continue to occupy an important place in therapeutics despite the production of a number of synthetic drugs, which in most cases are expensive and unavailable for most of the rural households in the study area.

Food uses

There is a variety of fruit or nut producing tree species important to the communities in the focus area. *Balanites aegyptiaca* (heglig) and *Ziziphus spina-chresti* (sider) appear to be the most important and most widespread tree species in the area. The nuts of both species locally called (laloub and nabag, respectively) were mentioned as the most important forest food among natural resources. Other important fruit tree species are *Hyphaen thebaica* (doum), *Grewia tenax* Gudaim, *Dobera glabra* (mikih) and *Bauhinia rufescens* (kharoub). Further fruit tree species are listed in table (4).The fruiting season varies from species to species but most of them produce

fruits during the dry season. There are also a number of different kinds of tubers and berries can be found in the area and are mostly used as snacks during walks in the woodland, or sometimes also collected and used for meals.

In the study area respondents recognized a number of some species of wild vegetables and herbaceous plants. The rural populations in the study area are heavily depend on them during the dry season and are used for food (table 4).

Oils and Edible Gums

The few species which provide edible gum are Acacia mellifera, Acacia senegal, Adansonia digitata, Balanites aegyptiaca, and Hyphaen thebacia. Some fruit are also used for the production of oil Such as *Balanites aegyptiaca*. The oils extracted from the fruits of the species are sold locally.

Table 4: Nonwood and wood specie use for food, vegetables and oil.

Uses	Specie name	Season of collection From-to
Vegetables	Cassia tora (kawel)	Aug. to Oct.
	Sonchas oleraceous(molita)	Jul. to Oct.
	Gynandropsis gynandra(tamalika)	Jul. to Oct.
	Commiphorg africane(arkla)	Jul. to Oct.
Fruits	*Balanites aegyptiaca*	Feb to May
	Ziziphus spina-chresti	Jan. to Mar.&Dec.
	Hyphaen thebaica	Jan. to Mar. &Dec.
	Dobera glabra	Jan. to Feb. Jul. to Oct. &Dec.
	Grewia tenax (Gudaim)	Jan. &Oct., Nov., Dec.
	Bauhinia rufescens	Aug. to Oct
Oils	*Balanites aegyptiaca*	Feb to May

Tannin and Dyes

Tannin and Dyes are crude extracts from barks and leaves of some species. The study revealed that the various colorants used to paint the various plant and animal-based artifacts in the market places come from tannins and dyes harvested from naturally growing plant species. The main purposes of tannins are to soften the skins used to store grains and water as well as to make colourful bags, belts etc. Tannins give good flavour to the drinking water, seal the pores of hides to make them impermeable to water, and are anti-septic.

Dyes locally called Subak are colouring material used to improve the appearance of certain locally made material. It improves the quality of the artifacts and adds market value to it. Dyes when applied to hides, mats and baskets woven from the leaves of doum palm improve their quality. The commonest and visible colours used in the rural areas are brownish, pinkish and dark-brown. The colourful products sold at a reasonably higher price in the markets may need further research and marketing to help farmers and herders gain the desired level of benefits from their products. Moreover, it is equally important to study the quality of the dyes and improve them through the introduction of appropriate technologies available to farmers at affordable prices. Table 5 list the plant species used as sources of tannins.

Table 5: List of species used as sources of tannins and dyes by rural households.

Species	Season
Acacia mellifera	Jan to Dec.
Acacia nilotica	Jan to Dec.
Acacia oerfota	Jan to Dec.
Acacia seyal	Jan to Dec.
Acacia tortilis	Jan to Dec.
Adansonia digitata	Jan to Dec.
Ziziphus spina Christi	Jan to Dec.

Fodder

As the dry season is long, the rural households depend on the woody perennial species as sources of feed for livestock. The major plant species that play significant role as fodder are shown in Table (6). The Fruits of *Faidherbia albida* are used as excellent fodder to feed animals after the rainy season, The specie has a reversed phonology in which the trees shed their leaves during the rainy season and produce succulent leaves at the beginning of the dry season, and very rich pods in protein during the critical dry season. While the leaves of *Combretum spp* (habeel) are used during winter others like *Sclerocarya birrean* (humaid) and *Guiera senegalensis* (Gebaish) are is evergreen plant species found in abundance. These species produce a reliable source of fodder throughout the year.

Table 6: List of Fodder species in the study area.

Species	Season(From- To)
Faidherbia albida	JantoMarc.
Combretum spp	Jul to nov.
Sclerocarya birrea	Jan to Dec.
Guiera senegalensis	Jan to Dec.

Other uses

Among the plant species, the leaves of *Hyphane thebaica* (doum palm) are invariably used as thatches to build huts and sheds. Its wood is resistant to termites and hence, it is the preferred species by the local communities as construction material. Leaves of doum palm are woven into special mats to make out of it tent-like materials, locally known as broush. These tents are water resistant and farmers are able to make use of it as excellent roofing material for houses in sedentary settlements and as mobile tents to pastoralists. Women also make mats and other artefacts manufactured out of doum palm leaves. The bark of *Adansonia digitata* (Tabaldi) and *Cordia rothii* (andrab) are used for making robes.

Smoke bath is a widely practiced custom among the various ethnic groups. Women value smoke baths very much. They use it as cosmetics and as a means of medicinal beautification. The smoke bath is skin smoothening and gives it an attractive tint. Branches of *combretum spp* sources of smoke bath and are used by the local communities.

Local management of the resources

Farmers do not have the same level of understanding of the management of the resources in their environment. The majority 96% of farmers think that the government or nobody owns the woodlands and forests. Because of this negative attitude, they think that the Forest National Corporation (FNC) should be responsible for their management and protection. Table (7) presents the various farmers' opinion about the actors responsible for the management of the local vegetation.

Table 7: Farmers' opinion about the actors responsible for the management of the local vegetation.

Actors	F	%
FNC	34	57%
Village committees & farmers together	22	37%
Farmers only	4	6
Total	60	100

In the group discussion most of the respondents in the study area indicated that, at the local level, village community level, NWFP producing species are managed by farmers and herders followed by forest guards hired by the Forest National Corporation. In this case, farmers and herders should be encouraged to look at woodlands and forests as theirs.

Constraints to NWFP producing species & Opportunities to their conservation

There are various constraints, which negatively affect the distribution and abundance of the non-wood forest products producing species. Respondents identified certain constraints as perceived by the local people and shown in Table (8) .These are the major constraints, which negatively affect the sustainable utilization of NWFP producing species in the study area (Table 8).

Table 8: Major constraints to NWFP producing plants species in the study area.

Constrain	F	%
Illegal felling of trees and land clearing for agriculture	27	45
Rains	23	38
Overgrazing	7	12
Insects and wind	3	5
Total	60	100

The above table shows that the main factor affecting the distribution and abundance of the NWFP is illegal felling of trees and land clearing for agriculture. As the result of this removal of trees, there are evidences in the study area which show damage to the forest and woodland. Unless this problem is solved land forest and woodland degradation might be further aggravated and irreversibly. On the other hand respondents also identified several opportunities to solve the problem affecting the deterioration of the local vegetation as shown in Table (9).

Table 9: Opportunities identified by respondents for the Sustainable use of NWFP.

Item	F	%
Adoption of effective Forest Laws	24	40%
Rehabilitation of the forest lands	16	27
Controlled grazing and browsing	11	18
Agroforestry systems	6	10
Extension camping	2	3
Charging for forest encroachment	1	2
Total	60	100

most of the respondents (40%) suggest the enforcement of effective forest laws. This would empower farmers and herders to have full control over the resource base in their village areas. Controlled grazing and rehabilitation

together with agroforestry systems ensure sustainable utilization of the NWFP species and hence conservation.

The role of NWFP in rural peoples' livelihood

The non-wood forest products represent a significant contribution to the rural households in the study area. The study shows that the contribution of the NWFP accounts for about 13% of the total annual household income in the study area (Table 10).

Table 10: Source of income including NWFP.

Source	F	%
Farming	27	45
Livestock	25	42
NWFP	8	13
Total	60	100

When discussing this with the respondents they explained that the main sources of the NWFP come from the exploitation of leaves of doum palm and the sale of various fruits and other minor products.

The value of the NWFP producing species has been neglected and they have instead been taken for granted – there is a need for greater awareness on the vulnerability of these species. Because of this, there has been a wide spread neglect of the conservation and rational utilization of these resources. Looking at the overall economic contribution of the NWFP, it is lower than both the crop and livestock production (13%). One should however bear in mind that this percentage excludes the income generated from the sale of wood of the NWFP producing species as almost all of them are exploited for their wood for either household consumption or sale on the local markets. Most of the NWFP producing species have decreased in distribution (the study area), as well as in abundance; the total volume of the NWFP produced is low due to climatic and human induced factors. Some of the valuable species have disappeared or endangered and the rural households are negatively affected. The contribution of the non-wood forest resources to the rural communities is significant. The sustainable extraction of non-wood forest products should be advocated as a strategy to conserve biodiversity and should include the sustainable exploitation of the NWFP species to ensure the regeneration of these species. The development and implementation of such exploitation systems, which aim to reconcile conservation and economic development, should be based on availability of information.

CONCLUSIONS & RECOMMENDATIONS

This study prepared a checklist of the major non-wood yielding plant species, describing their use, assessing the contribution of the non-wood forest products to the rural communities, and documenting the local knowledge regarding the management of the forest resources in the study area and coming up with specific management intervention strategies to conserve the remaining NWFP producing species in the study area. The study recommended that:

1. Unless due attention is given to the way the NWFP are exploited and commercialized there is a high risk for overexploitation which may result in their degradation and extinction.
2. Community participation in the conservation and management with clear indication of sense of ownership could help in conserving the remaining NWFP resources in the study area.
3. Establishing property rights for NWFP and access to the markets and scarcity prices should permit the users and owners of the NWFP benefit from the conservation or face the implications of degradation in their village areas.
4. With concern to poverty level in the study area it can be assumed that poor people's dependence on these resources will continue for the near future. Hence, strategies should be designed in such a way that the benefits from the NTFP are shared equitably among the local communities. The poor should have access to the resource base and in this regard, poverty eradication could be an excellent instrument to conserve the NWFP resources.
5. Farmers in the study area have indigenous knowledge on the uses and management of the forest resources in their village areas. However, this knowledge is gradually disappearing and needs to be preserved and documented so that future generations can make use of it.

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