Environ Dev Sustain (2012) 14:347–363
DOI 10.1007/s10668-011-9329-1

Traditional management and conservation of shea trees (*Vitellaria paradoxa* subspecies *nilotica*) in Uganda

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Received: 16 May 2011 / Accepted: 13 October 2011 / Published online: 2 November 2011

Abstract Traditional practices are universally recognised as a basis for conservation of biodiversity. However, such practices are often not included in natural resource conservation policies. This study assessed local conservation practices of shea trees (*Vitellaria paradoxa*) within different farming systems in Uganda and developed conservation guidelines for the species. The assessment involved 300 respondents, 15 focus groups and 41 key informants. Content analysis was used to identify the most important management and conservation practices. Local uses were categorised on the basis of shea tree products while differences in conservation practices were analysed using the Friedman test. The results show that eight shea tree products are used for 36 different purposes. Respondents' age significantly influenced their knowledge about the shea tree. Traditional conservation practices include on-farm retention during cultivation and the use of folklore (mainly

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taboos), customs and rituals. Traditional management practices include weeding, bush burning, pollarding and pruning. Based on the current management and traditional conservation practices, a framework for the conservation of shea trees is proposed for integration into conservation policy decisions.

Keywords Shea tree · Vitellaria paradoxa · Conservation · Taboos · Folklore · Traditional knowledge

1 Introduction

The importance of traditional practices as a basis for conservation of biodiversity is gradually gaining universal recognition (Berkes et al. 2000; Colding and Folke 2001; Kajembe et al. 2003; Mgumia and Oba 2003; Moller et al. 2004; Saj et al. 2006). Since many of the traditional conservation practices serve similar functions to those provided by formal and contemporary conservation (Colding and Folke 2001), traditional practices can therefore be invaluable in ensuring successful utilisation of natural resources (Alieu 2010). Indeed, the literature abounds of participatory community conservation practices involving indigenous communities in such diverse places as Africa (Adams and Hulme 2001; Alcorn 1993; Fargey 2009; Infielda 1988), Asia (Anthwala et al. 2010; Bhagwat et al. 2005; Chandrakanth et al. 2004; Chandrashekara and Sankar 1998) and America (Colding and Folke 1997, 2001).

In many cases, however, traditional conservation practices are not included in formal natural resource conservation. This is partly due to the narrow definitions of conservation (Colding et al. 2003) and failure to appreciate the 'immense conservation capital' in traditional systems. In most cases, traditional conservation consists of informal measures that are largely 'invisible' in conventional analyses (Colding and Folke 2001; Colding et al. 2003). An inherent feature of traditional conservation is the central role of cultural and traditional practices (Hongmao et al. 2002). Cultural practices include a set of social behaviours and responsibilities that are important to a community of people (Arnett 2007).

Transmission of cultural practices from generation to generation is usually through folklore in an oral manner (Mafu 2004). However, there is lack of clarity in understanding the relationships between cultural practices, traditional practices and folklore. According to Ben-Amos (1971) and Kuruk (1999), folklore includes all the un-codified practices of different communities and consists of legends, sayings, words, poetry, riddles, songs, dances, plays and all works that portray the culture of a community. Traditional practices on the other hand involve the adherence to and inheritance of such cultural practices between generations. These cultural and traditional practices influence the interactions between people and their environment in a complex and dynamic manner (Masalu et al. 2010).

The shea tree (*Vitellaria paradoxa* C. F. Gaertn.) is one of those African trees with a long history of traditional management and conservation (Hall et al. 1996; Neumann et al. 1998). It is a characteristic tree of the Sudano-Sahelian savannah vegetation, distributed over a 6,000 km long and 500 km wide belt stretching from Uganda to Senegal (Hall et al. 1996). Two subspecies of *V. paradoxa* are recognised: subspecies *paradoxa* (distributed exclusively in West Africa, extending from Cameroon to Senegal) and subspecies *nilotica* (distributed exclusively in eastern Africa), extending from Central African Republic to south-western Ethiopia in the east and Uganda in the south (Hall et al. 1996). This research focused exclusively on subspecies *nilotica* found in Uganda.

Shea trees serve a range of important ecological and livelihood roles including the provision of food, medicinal, economic and cultural needs (Boffa 1995, 1999; Hall et al. 1996; Maranz et al. 2004). Shea trees are most prominently valued for their nuts whose kernels are rich in oil (Hall et al. 1996; Lovett et al. 2000; Maranz et al. 2004; Saul et al. 2003). Apart from its use for cooking, shea oil[1] is also used as an illuminant, in soap making, as a hair and skin lotion, and as a medicine (Boffa 1999; Hall et al. 1996; Maranz et al. 2004). Shea butter can be used as a nasal decongestant (Tella 1979) and is a common component of commercial skin moisturisers (Kraft and Lynde 2005). Shea oil is used for the treatment of wounds (Abbiw 1990; Maranz et al. 2003) and to facilitate child birth (Moore 2008). The ripe mesocarp (fruit pulp) is full of sugars (Hall et al. 1996; Maranz et al. 2003, 2004; Okullo et al. 2010b) and is a delicacy, usually eaten by children and women who are mainly involved in fruit and nut collection (Boffa et al. 2000; Lovett et al. 2000; Maranz et al. 2003). Since shea trees are found in the hotter areas of the African savannah, they also provide shade for crops, farmers, herders and their animals (Boffa et al. 2000). In some communities, shea trees and oil are used for cultural rituals such as in traditional marriages and weddings (Ferris et al. 2004; Carette et al. 2009).

Due to their socio-cultural and economic importance, a form of traditional management and conservation of shea trees that involves local selection of superior land races has been practiced in Africa for a very long time, over 1,000 years (Neumann et al. 1998; Wicker 1998). In West Africa, archeobotanical evidence from Saouga village in northern Burkina Faso (Neumann et al. 1998) shows that in the last 1,000 years, millet was grown under agroforestry systems that included trees such as *Vitellaria paradoxa*, *Sclerocarya birrea* Hochst., *Adansonia digitata* L. and *Diospyros mespiliformis* Hochst. ex A.DC. Apart from the evidence of shea tree presence at Saouga, the authors (Neumann et al. *ibid*) also presented evidence of shea tree charcoal remains, indicating that selection of individual trees for burning was practiced. In eastern Africa, despite the lack of archeobotanical records that mention the ancient presence of shea trees, evidence for its historical presence can be gleaned from Egyptology (Allal 2010), especially the works of Wicker (1998). Historical records indicate important trade contacts between ancient Egypt and a more southerly kingdom called 'Punt' which was a primary supplier of luxury goods, including some of the 'seven sacred oils' used in beautification, worship and temple rituals (Wicker 1998). One of the seven sacred oils sought then by the ancient Egyptians from Punt is 'hknw-oil' which Wicker (1998) suggests would probably have been shea oil. Although the exact location of Punt is not known, there is agreement among most Egyptologists that this kingdom covered the area between the Lake Albert and 'Mountains of the Moon' in Uganda to the Red Sea areas of present day Eritrea and Ethiopia (Glenister 2008; Kitchen 1971; Smith 1962; Wicker 1998). This would imply that shea tree management in this area must have been in practice since the first mention of Punt in Ancient Egyptian records in the third millennium BC (Glenister 2008).

Evidently therefore, traditional shea tree management has had a long history. Contemporary farmers spare particular trees with desirable characteristics including those used in traditional rituals and only cut those that are of undesirable form, usually the smallest in size or those that are unproductive (Boffa 1995, 1999; Lovett and Haq 2000). Apart from cutting, undesirable trees are sometimes ring barked to kill them (Lovett and Haq 2000). Shea trees have therefore been protected through participatory management involving a complex mix of traditions and customs.

[1] Shea oil is the same product (albeit with a different melting point) as "shea butter" that is extracted from the shea tree in West Africa and that is commonly referred to in the literature.

The traditional conservation practices of shea trees in Uganda, however, remain inadequately documented (Alieu 2010); hence there is a general paucity of scholarly literature on this subject. Further, the traditional management and conservation of shea tree resources in Uganda is threatened by the breakdown of informal and self-imposed community restrictions (Okumu-Alya 2009). In this paper, we explore the hypothesis that local conservation of shea trees is strongly influenced by the traditional and cultural uses of shea tree products. We assess the traditional knowledge and management practices that are used in local conservation of shea trees. We specifically document the traditional knowledge, management practices and utilisation. We then propose guidelines for the conservation of shea trees in form of a market-based community conservation framework. The documentation of local conservation practices and development of conservation guidelines will contribute to conservation policy decision making and foster a linkage between contemporary conservation and the local communities whose livelihoods are largely met by shea tree products and services. The conservation framework will be used in the design of the shea conservation interventions.

2 Methods

2.1 Study area

Uganda is located in East Africa astride the Equator stretching from 4°12′N, 1°29′S to 29°34′W, 35°0′E with an area of 241,551 km^2 (UBOS 2010). The country is divided into nine broad farming systems with fairly homogeneous farming practices and ecological conditions (Rusoke et al. 2000). This study was conducted in the Teso, Northern and West Nile farming systems which form the shea tree–dominated wooded savannah parklands of Uganda (Fig. 1). The combined population of the three farming systems is six million persons which is 25% of Uganda's population (UBOS 2010). The Northern farming system is the most densely populated (11%) while each of the West Nile and Teso farming systems has 7% of the national population. The three farming systems are inhabited by 19 ethnic groups (UBOS 2006, 2010). The two largest ethnic groups are the Acholi and Iteso found in the northern and Teso farming systems, respectively. Other large ethnic groups include the Lango, Lugbara, Madi, Madi-Okollo,[2] Kuku and Thur. The Kuku (found in the West Nile farming system) and the Thur (from the northern farming system) form the smallest ethnic groups each with less than 1% of the national population and are faced with extinction due to their diminishing numbers of 34,692 and 2,342 individuals, respectively (UBOS 2006, 2010).

The vegetation cover is composed of Sudanian undifferentiated woodlands and Guineo-Congolean mosaics (White 1983). The dominant vegetation community is *Vitellaria/Combetrum/Terminalia* woodland (Mwebaze 2010). The Teso farming system receives between 800 and 1,000 mm of bimodal rainfall annually (Ebanyat et al. 2010) while the northern and West Nile farming systems receive 800–2,000 mm of rainfall annually in a less markedly bimodal pattern (Mwebaze 2010; NEMA 1997). Most people in the area are

[2] In this study, the Madi speaking people of Okollo County in Arua district (often referred to as Madi—Okollo) are considered a distinct ethnic group on account of the different speech characteristics in comparison to the Madi of Moyo district (often simply referred to as Madi) with whom they have similar origins (Boone and Watson 1996). The Madi—Okollo have a lexical similarity of 87% with the Lugbara compared to 76% with the Madi of Moyo district (Boone and Watson 1996).

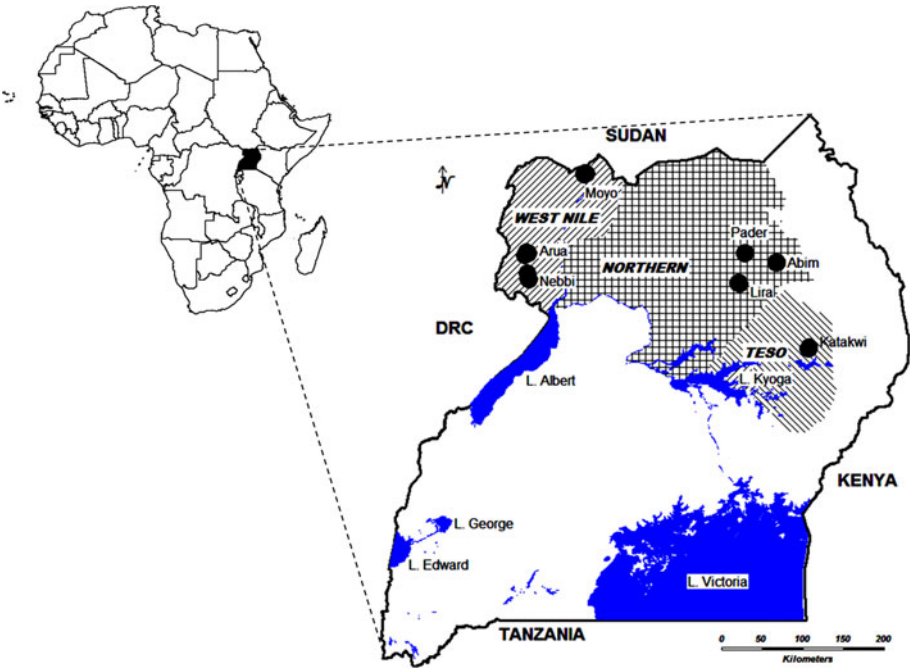

Fig. 1 Location of study sites in the West Nile, northern and Teso farming systems of shea tree distribution in Uganda

agro-pastoralists and are heavily dependent on subsistence mixed annual cropping and livestock production for their livelihoods (Okorio et al. 2004; Oluka et al. 2002).

Management of tree resources in the study area is driven by customary land tenure. Land ownership is regulated by local customs through clan affiliation. Land and tree resources are owned by families or households by superintendence of clans through which rules on land tenure are enacted. Although most of the shea tree belt has experienced a large increase in human population, there are considerable areas under fallow in the northern farming system (Adebua et al. 2002). Fallow periods are variable and are based on human population size, with short fallows ranging between 1 and 5 years (Byakagaba et al. 2011). Long fallows may range between 5 and 10 or as long as 10–20 years (Okia et al. 2005; Byakagaba et al. 2011). Most shea trees in Uganda occur on cultivated land because of the increase in human population. Moreover, most of the shea belt of Uganda faced political and social instability (from 1986 to 2004). During this period, people were gathered in internally displaced persons (IDP) camps resulting in the decimation of shea trees targeted for charcoal, fuel wood and income (Okumu-Alya 2009).

2.2 Data collection

Data collection was conducted between April 2008 and March 2010 comprising of key informant interviews, focus group discussions and semi-structured interviews as detailed in the following three steps:

Step I. Selection of 41 key informants (13 from Teso, 18 from northern and 10 from West Nile) with the help of local civic leaders and community/opinion leaders. They

were selected from sub-counties with relatively high shea tree population densities based on their knowledge of traditional management of shea trees. A pre-set questionnaire was also pre-tested through cognitive interviewing (Fisher and Geiselman 1992) of the key informants.

Step II. Data collection comprised 15 focus group discussions of 6–10 participants each (6 in Teso, 4 in Northern and 5 in West Nile). Participants in the discussions were randomly selected from the local community. The discussions provided an in-depth understanding of the traditional uses and management of shea trees and triangulated the information obtained from the key informants. While the discussions were guided by an agenda, the sequence of inquiry in each group was based on the nature of preceding discussions.

Step III. A total of 300 respondents were interviewed using a semi-structured questionnaire to document traditional knowledge and management, utilisation as well as conservation of shea trees. Variables investigated included traditional shea tree utilisation and management practices as well as folk classification knowledge. The structuring of folk classification within the farming systems and age categories was investigated. Traditional and cultural beliefs (proverbs, taboos, rituals and folklore) regarding shea trees and their uses were explored.

In order to capture the whole range of local management and conservation practices, eight representative ethnic groups consisting of the Acholi, Iteso, Kuku, Lango, Lugbara, Madi, Madi-Okollo and Thur were surveyed. With the exception of the Kuku and Thur ethnic groups, we selected ethnic groups that comprise over 1% of the national population.

2.3 Data analysis

Data were coded in Microsoft Excel and analysed using the Statistical Package for Social Scientists (SPSS) version 16.0 (2007 release, © IBM Corp., Chicago, IL, USA). Descriptive statistics were used to group the different local uses of shea trees and their products while differences in conservation practices across different ethnic groups and age groups in the three farming systems were analysed using the non-parametric Friedman test (Friedman 1937). The Friedman test is used to detect mean differences between several related samples (Ho 2006; Hinton et al. 2004). Qualitative content analysis was performed to identify the uses, traditional management and conservation practices. Content analysis is a form of scientific inquiry that helps researchers to explain common trends in survey data (GAO 1989). In content analysis, it is assumed that words and phrases that are frequently mentioned are relatively more important to the subject matter than those less frequently mentioned (Stemler 2001). Multiple response data for uses, taboos and proverbs relating to shea trees were grouped together using the multiple response command of SPSS. The descriptive words provided for each use were categorised and counted through the multiple responses command, collapsed into larger categories to represent particular shea tree products and used to clarify the interpretation of common underlying conservation practices.

3 Results

A total of 36 uses of shea trees and eight product-related use categories were identified (Table 1). The use categories were shea oil, wood, whole tree use, fruit pulp, bark, latex,

Table 1 Shea tree products and their uses among the communities in the shea belt of Uganda

Product	Use	No of responses	% of responses
Oil	Cooking	238	20.3
	Body/hair cream or lotion	230	19.7
	Treating wounds	52	4.4
	Facilitating child birth	36	3.1
	Bride price	26	2.2
	Lubricating tools	22	1.9
	Soda ash	20	1.7
	Insect repellent	12	1.0
	Smearing traditional costumes	12	1.0
	Soap making	7	0.6
	Anointing	7	0.6
	Ingredient in food sacrifices	6	0.5
	Special gifts	5	0.4
	Making traditional body marks or decorations	5	0.4
	Fattening lean children	2	0.2
	Softening traditional napkins	2	0.2
	Charcoal from residues of charcoal production	1	0.1
	Smearing mourners during funerals	1	0.1
	Smearing warriors for bravery during war	1	0.1
	Chasing demons	1	0.1
	Preserving certain foods, e.g. termites	1	0.1
	Celebration of twins	1	0.1
	Smearing widows/widowers during bereavement	1	0.1
	Smearing walls for decoration	1	0.1
Wood	Firewood	29	2.5
	Charcoal	14	1.2
	Domestic tools	14	1.2
	Poles	9	0.8
Tree	Shade	18	1.5
	Windbreaks	13	1.1
	Soil conservation	1	0.1
Pulp	Eaten when ripe	157	13.4
Bark	Decorating pots	12	1.0
Latex	Trapping small mammals	36	3.1
Leaves	Soil manure	15	1.3
Nuts	Sale	162	13.8
	Total response	1,170	100.0

leaves and shea nuts. Twenty-four (67%) of the 36 uses involve shea oil, which is thus the most prevalently used shea tree product (Fig. 2). Shea nuts and fruit pulp were mentioned by over 50% of the respondents. The nuts were highly valued for commercial purposes but the oil was most valued for use in cooking. Only a small percentage (4%) of the respondents mentioned the ecological service roles of shea trees (shade, windbreaks, soil conservation and soil fertility).

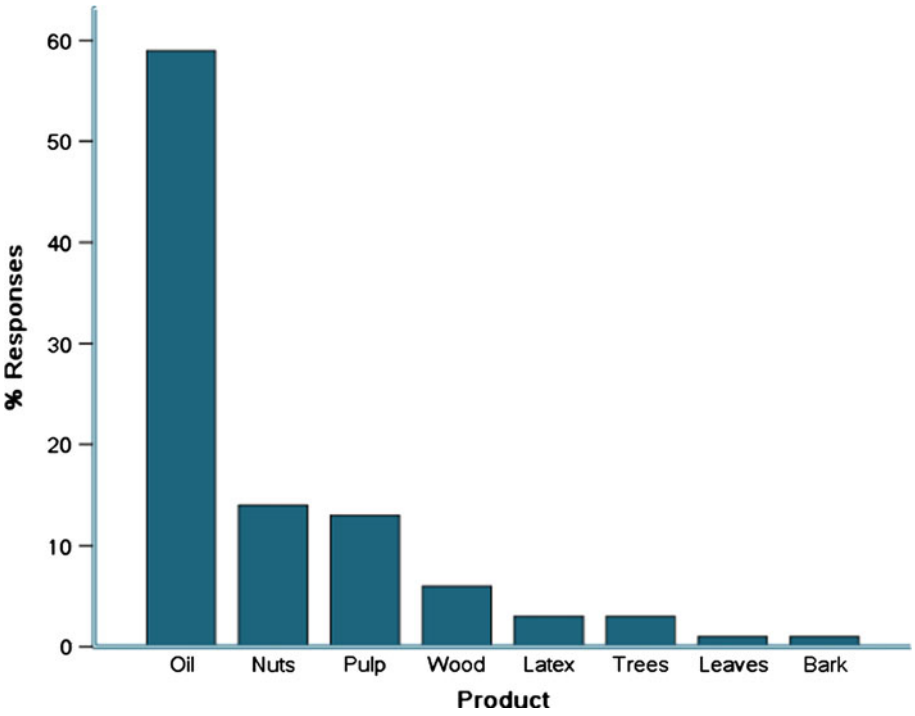

Fig. 2 Shea tree uses in the three farming systems determined by content analysis. Uses are based on per cent *open*-ended responses of respondents ($n = 300$)

There was no significant difference in shea tree uses between ethnic groups across the three farming systems (Friedman $\chi^2 = 12.65$, $df = 7$, $p > 0.05$). However, based on presence/absence of particular uses by the respondents, middle-aged respondents (aged 20–49 years, $n = 216$) mentioned more uses compared to the relatively younger ones (aged <20 years, $n = 12$) or the older (>49 years, $n = 72$) respondents (Friedman $\chi^2 = 76.7$, $df = 7$, $p < 0.001$).

The traditional knowledge of shea tree management practices, taboos and rituals is transmitted from one person to another orally through parents (56%), elders (45%) as well as peers and friends (27%). Some knowledge was obtained from personal experiences (6% of respondents) and folklore (8% of respondents). Several cultural rituals were prominently mentioned in the management of shea trees (Table 1). The highest percentage of respondents who mentioned ritual practices were recorded from the northern (49%) and West Nile (47%) farming systems compared to only 4% from the Teso farming system. There were significant differences between age groups (Friedman $\chi^2 = 28.36$, $p < 0.001$) and farming systems (Friedman $\chi^2 = 8.71$, $p < 0.05$). Up to 71% ($n = 104$) of the responses regarding taboos and rituals were from respondents aged between 20 and 49 years. Among ethnic groups, knowledge of taboos and rituals was not significantly different (Friedman $\chi^2 = 10.95$, $p = 0.09$).

In general, 10 management practices were recorded (Fig. 3), most of them common to all three farming systems (Friedman $\chi^2 = 0.054$, $p = 0.973$). Twenty-nine per cent of the respondents reported pruning as a frequent management practice. Over 70% of the respondents weeded their gardens as a management practice. This practice was prevalent in

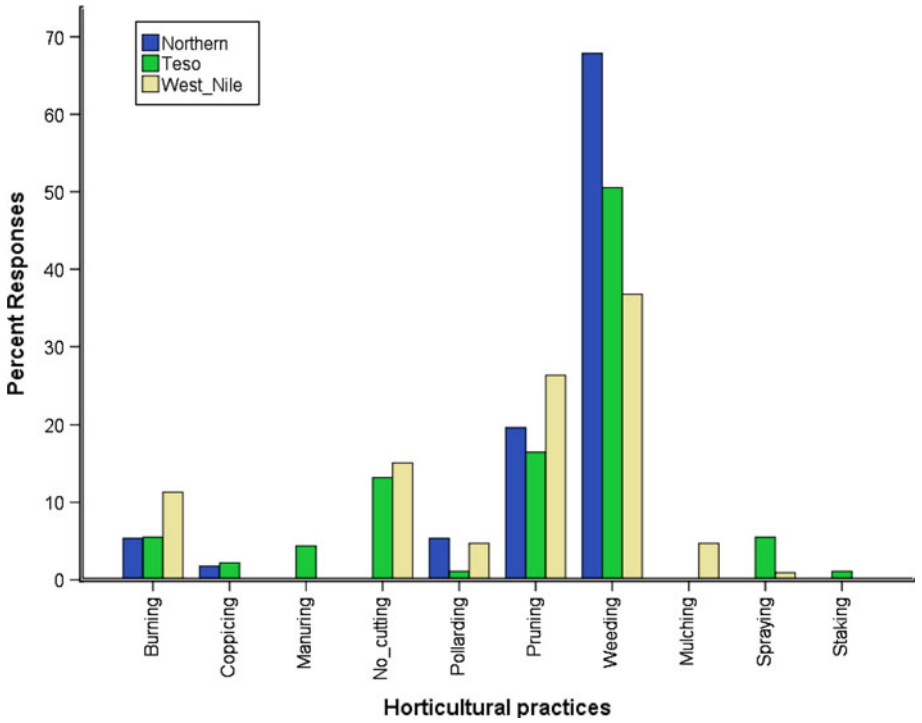

Fig. 3 Reported shea tree management practices commonly used in the shea belt of Uganda

northern and West Nile farming systems. Selective sparing of shea trees was the third most prominent practice followed by burning of vegetation around shea trees (Fig. 3). Coppicing and pollarding (cutting of tree trunks and branches, respectively, to encourage re-sprouting), manuring, mulching and staking were reported by less than 10% of the respondents. Some of the management practices (e.g. mulching, staking and manuring) were not reported in all farming systems. Selection of trees for retention on farm was based on oil yield from the nuts (52% of the responses, $n = 177$) and sweet fruit pulp taste (46% of responses, $n = 157$). Other selection criteria included heavy fruiting (1%) and large-sized nuts (1%). A higher proportion of female respondents (over 64%, $n = 124$) than males (51%, $n = 176$) learned shea tree management practices from their parents. Most female as well as male respondents (85 and 72%, respectively) considered weeding around shea trees as the most important management practice. A similar proportion of males (63%) and females (62%) reported that selection of shea trees was mainly based on high oil content and sweet pulp. Over 83% of the women were able to extol the importance of shea trees in song and folklore compared to only 54% of the men.

4 Discussion

4.1 Uses of the shea tree

This study shows that the utilisation of the shea tree and its products in Uganda is not different from that reported elsewhere in Africa. While there are references to the

medicinal and cultural uses of the shea tree, such as in the making of funeral beds, pregnancies, births and weddings (Goreja 2004), the use of shea oil in war rituals that is reported here has only previously been reported in Uganda (Sturges 2008).

The use of shea tree products for commercial purposes was not as prominent as it is in West Africa where shea butter is marketed internationally through organised groups under fair trade arrangements (François et al. 2009; Greig 2006). The sale of shea oil in Uganda is at subsistence level in the local market (Ferris et al. 2004). This is probably because of the informal nature of shea oil trade in Uganda where the market sector is entirely traditional and commercial consumption levels are minimal (Ferris et al. 2004). The low commercialisation of shea tree products, especially shea oil, is probably due to the increase and availability of alternative oil for cooking, e.g. sunflower and palm oil as well as modern skin care products that are more vigorously advertised on the local market.

Use of the shea tree for firewood, charcoal, poles and domestic tools was hardly mentioned. This is in contrast to widespread cutting of shea trees in the area (Okumu-Alya 2009) and its use for charcoal or firewood as reported by Ferris et al. (2004). Shea tree wood is highly preferred over wood from most savannah trees for tool handles and poles mainly due to its durability and resistance to termites (Hemsley 1968; Okia et al. 2005). Respondents are probably afraid of mentioning such uses because it is illegal to cut shea trees (ALCODE 2007; Ferris et al. 2004). With regard to ecological service roles, a small percentage (4%) of respondents was able to mention the importance of shea trees in soil conservation, soil fertility, wind control and shade. Shea trees are known to play important roles in microclimate modification, nutrient cycling and soil fertility, especially in crop gardens of the parkland agroforestry systems (Bayala et al. 2006; Traore et al. 2002). The shallow root system of shea trees also stabilises soil structure against soil erosion and acts as a wind break (Hall et al. 1996). In recognition of these functions, harvesting of shea trees in Uganda is highly discouraged both traditionally (through taboos and other prohibitions) and legally (through community bye-laws; ALCODE 2007; Ferris et al. 2004). The enforcement of these community initiatives has been rather difficult. This is partly due to high economic and social depression resulting from the long and protracted period of political and social instability in northern Uganda between 1986 and 2004.

4.2 Traditional knowledge

The absence of ethnic differences in the use of shea trees and their products suggests a considerable degree of local knowledge and cultural homogeneity regarding the shea tree in Uganda. In addition, it could be due to cultural integration of the shea tree and its products into the lives of the different ethnic groups. The different ethnic groups are also largely dependent on similar subsistence means of survival, with the shea tree providing the single largest source of vegetable oil. The fact that the ethnic groups in Uganda's shea parklands live in a continuous shea belt may also explain the similarities in shea tree utilisation across farming systems.

In terms of gender, the lack of differences in responses from women and men is not surprising at all. Similar findings have been recorded in Ghana (Lovett and Haq 2000) and Burkina Faso (Elias 2010) where women's knowledge was found to be more detailed but not significantly different from that of men. Considering the different age categories, elderly people are generally expected to have more local knowledge about plant uses than the youth (Camejo-Rodrigues et al. 2003; Johnson 1992), but we found a higher diversity of uses reported by respondents aged between 20 and 49 years contrary to the widely known view. Even when local knowledge may be possessed by the elders, it is the younger

people who work with shea trees everyday and are most likely to easily mention more uses of shea trees. The fewer responses from the elderly may be attributed to loss of memory with advanced age (Grady and Craik 2000) and the fact that some of the uses may be non-traditional. The 20–49 year olds should therefore be considered a major repository of knowledge on utilisation of shea trees. This implies that local knowledge of shea tree utilisation may not disappear soon because of the multiple uses of shea trees.

The relatively high diversity of uses of shea trees recorded in the northern and West Nile farming systems compared to the Teso farming system may be the result of differences in knowledge of taboos and cultural rituals between the farming systems. According to Colding and Folke (1997), natural resources that are often used are usually protected by indigenous communities through co-evolutionary processes that involve taboos and cultural rituals. Hence, ethnic groups in the northern and West Nile farming systems probably still retain more intimate knowledge and relationship with shea trees compared to those in the Teso farming system. Even if only a small percentage of the respondents reported personal experiences as a source of their knowledge (probably due to low appreciation for this as a source of knowledge), it is also generally accepted that frequent exposure to the natural environment is a major avenue for acquiring knowledge of traditional uses (Pilgrim 2006).

Regarding the traditional management practices, there were strong similarities with those that are practiced elsewhere in the shea belt of Africa (Boffa 1999; Boffa et al. 2000; Djossa et al. 2008; Hall et al. 1996; Lovett and Haq 2000; Maranz et al. 2003; Masters 2002). Undesirable trees are cut down while selected trees are spared during weeding. Pollarding and pruning are popular in our study sites but they are considered to be 'sub-conscious' management practices (Lovett and Haq 2000), as they are usually undertaken with different intentions. Pollarding, for example, may be done to obtain branches for conversion to charcoal which is sold to cater for immediate financial needs. Whereas fruit yield, tree age, vigour and health (absence of infestation with mistletoes) are important considerations for shea tree selection in West Africa (Lovett and Haq 2000; Maranz et al. 2003), only nut/oil yield, pulp taste, prolific fruiting and size of nuts influenced shea tree selection in Uganda. While the shea oil production is clearly the central focus of shea tree selection in Uganda, in West Africa, shea trees are viewed much more as important components of agroforestry production systems (Boffa et al. 2000). Subsequently, shea tree uses as well as the economic contribution to livelihoods of the local people are very important in the conservation of shea trees.

Since shea trees are economically and socially important to the local communities in the shea belt of Uganda, sustainable management and conservation of shea trees may be enhanced by promoting community involvement (Lufumpa 2005). Local communities are recognised as a central locus in conservation, in view of the decline in funding for conservation and increasing poverty in Africa (Agrawal and Gibson 1999). Given that traditional and economic motivations are important in balancing livelihoods and natural resource use by local communities, we propose a conservation framework based on shea tree use, traditional management and market access. We hope that this conservation framework will influence the direction and execution of shea tree conservation. The locus of the proposed framework is the local community (farmers) whose impact on tree resources is critical. The framework aims to devise management strategies geared towards fostering a linkage between contemporary conservation and the local communities whose livelihood is, in a large part, met by shea tree products and services.

4.3 Market-based shea tree conservation framework

Our framework fronts shea tree products and traditional uses/beliefs as the basis of conservation (Fig. 4). At the base of this framework (first tier) are traditional knowledge and shea tree uses and beliefs. Our view is that the conservation context of traditional customs and beliefs is borne out of the reciprocal service between shea tree use and associated beliefs or customs. Since the service functions provided by traditional beliefs and customs can be harnessed as an incentive for conservation of shea trees, our emphasis in this tier is in recognising the conservation value of traditional beliefs or customs and therefore protecting them from erosion by proclaiming their virtues.

The second tier of the framework utilises the five traditional knowledge transfer mechanisms (parents and elders; legends; stories, poems and songs; taboos; as well as customs and rituals). Through these, conservation efforts are targeted at the major products and services from shea trees. The traditional uses of shea trees draw their importance from folklore, chiefs, elders and depth of their integration into culture and tradition.

The third tier revolves around three main categories of shea tree products: (1) shea oil (and its cultural service functions), (2) shea fruits and nuts and (3) other products and services (such as poles and shade). However, for the framework to be effective, marketing and market access of shea tree products are vital. The sale of shea tree products does not feature prominently in the interview responses of our study, but there is a vibrant and profitable market, particularly for shea oil (Ferris et al. 2004). In addition, shea oil (from subspecies *nilotica*) contains a high oleic acid content (Maranz et al. 2003; Okullo et al. 2010a), making it highly suitable for use in cosmetics manufacture. Its pulp also contains as much as thrice the potassium content of bananas (Maranz et al. 2003; Okullo et al. 2010b). The market potential of shea products has, however, not been sufficiently exploited (Ferris et al. 2004; Lovett et al. 2000) and there is only an intermittent and low-scale trade in shea oil/butter. Lybbert et al. (2002) argue that it is important to include marketing and market access as a kind of market-based conservation strategy to complement traditional conservation practices in order to improve benefits accruing from the conservation. Hence, we include market access and marketing of shea tree resources in the framework. These are currently not given proper attention in local shea tree agroforestry and conservation in Uganda. We believe that this component will play an important role in the success of the proposed framework. Poor marketing of shea tree products is currently one of the causes of destructive exploitation of shea trees in Uganda (Ferris et al. 2004).

This framework is based on the belief that people need to be active participants in conservation decisions, and traditional knowledge has to be accepted and/or regularised as a component of conservation. This framework demonstrates that conservation does not need to undermine the traditional wisdom base; rather traditional knowledge can be used and complemented with contemporary methods to produce an acceptable and working conservation framework. Implementation of this framework will ensure that shea tree management maintains and enhances the sustainable flow of benefits to the communities.

5 Conclusion

Shea trees are important to the rural communities of the shea belt of Uganda as they have a range of domestic and socio-cultural uses. Thirty-six different uses of shea trees and their products have been identified in this study. Shea oil is the most important product, but products such as pulp and nuts were mentioned as important. The main traditional

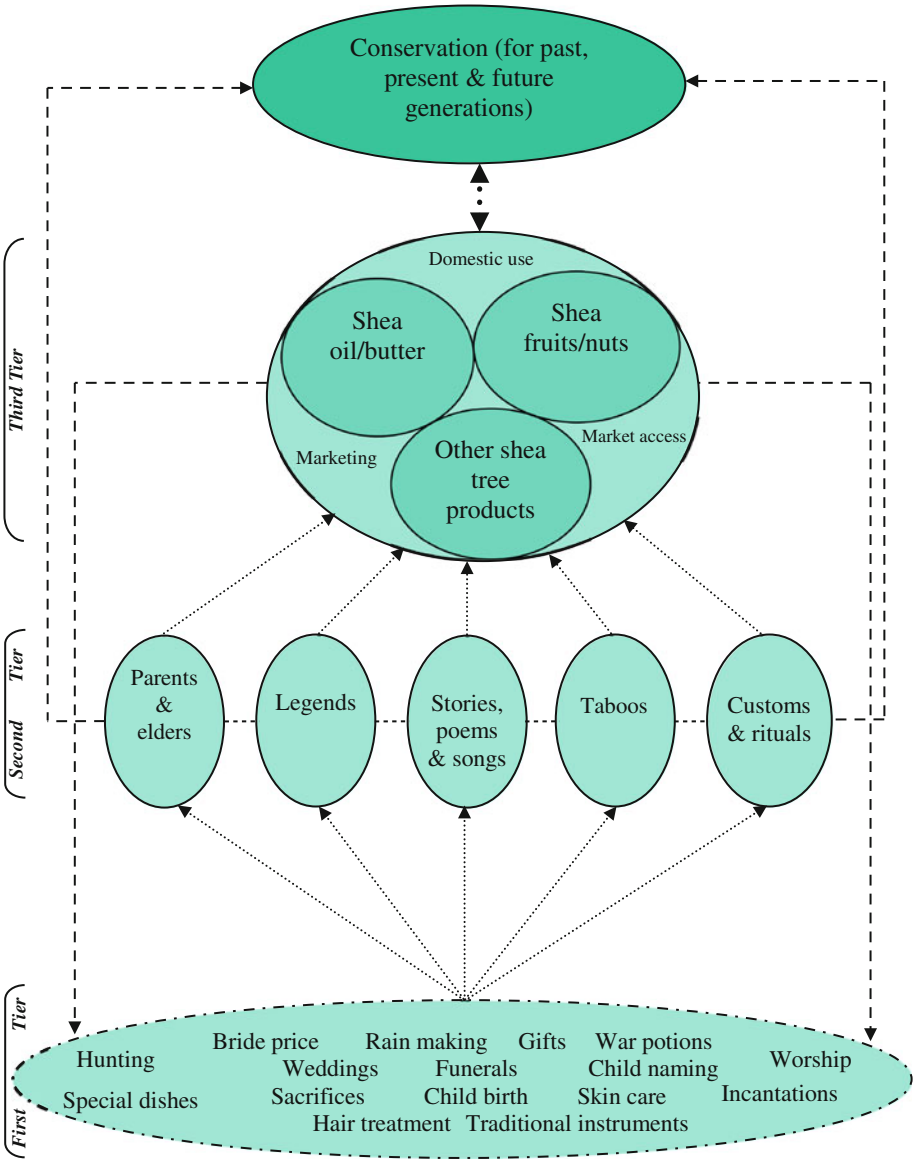

Fig. 4 Conceptual framework of the proposed market- and community-based conservation of shea trees

management practices include weeding, sparing on farm, natural coppicing, pruning and seasonal burning. Most of the practices are aimed at improving the production of shea oil, and traditional conservation through taboos, rituals and beliefs is still extant in the communities. The conservation of shea trees can therefore be achieved through an integrated approach that incorporates the traditional practices, marketing and market access into a holistic management mechanism. Traditional practices can ultimately play an important conservation role and should be given more attention by policy makers and conservation managers.

Acknowledgments We are grateful to all the farmers and communities in the districts of Amuria, Abim, Moyo, Pader and Arua for their cooperation during data collection for this study. We sincerely thank Henry Asindua, Jaspher Okello, Paul Okiror, Richard Amuge and Abok Openytho for assisting in language translation and data collection. We are grateful to the financial support from the European Union through the INCO – CT project no. 032037 (Innovative Tools and Techniques for Sustainable Use of the Shea Tree in Sudano—Sahelian zone—INNOVKAR), the Makerere University Directorate of Research and Graduate Training, Uganda (through the Carnegie Corporation Grants), and the World Agroforestry Centre, Nairobi through the SII/World Agroforestry Project: 'Advancing Agroforestry Research and Development through Training and Education'. We are indebted to all the anonymous reviewers for their valuable comments that greatly shaped this manuscript.

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