

Original Research Article

The role of Indigenous Knowledge on Use and Conservation of Wild Medicinal food Plants in Loita sub-county, Narok County

ABSTRACT (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)

Aims: To evaluate the role of indigenous knowledge in use and conservation of wild medicinal food plants in Loita sub-county, Narok County.

Study design: Stratified random sampling was used to select respondents.

Place and Duration of Study: The study was conducted in Loita sub-County of Narok County in Kenya for a period of six months.

Methodology: Data was collected through household survey, key informant interviews and focused group discussions using a semi-structured questionnaire. For the household survey, 160 households were interviewed while 10 key informants consisting of traditional healers, village elders, spiritual leader and opinion leaders were used. The focus group discussions comprised of 15 participants (8 men and 7 women). The data collected was on habitat categorization and use, knowledge sharing and traditional conservation methods for the species. The data were analyzed using descriptive statistics to generate means, frequencies and percentages.

Results: Three habitat categories were identified; grasslands (*olpurkel/Ongata*), bush land (*oloiparag*) and highland forests (*osupuko*) based on topography and dominant species. On use and importance of the habitats, the forest habitat was ranked 1st as a source of water and wild medicinal food plants and 4th (men) and 2nd (women) for dry season grazing. The grass- and bushlands were considered best for grazing, cultural activities and wildlife by both gender. Further, the results indicated that the community named localities after dominant or unique species occurrence. For use and conservation, the community has cultural zones with differentiated use, sacred species such as *Ficus thoningii* (*Oreteti*) and *Arundinaria alpina* (*Oltiyani*) and indigenous knowledge on sustainable use of the species.

Conclusion: The indigenous knowledge on habitat classification and different uses of wild plant species has contributed to conservation of wild medicinal food plant species in Loita. The use of dominant plant species to give names to localities can be used to reconstruct environmental history even after species are depleted.

Keywords: [Wild medicinal food plants, Indigenous knowledge, conservation, Kenya }
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18 **1. INTRODUCTION (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)**

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20 Indigenous and local communities depended on natural resources especially
 21 plants for their welfare and survival. To harvest various plant resources from
 22 wild or managed landscapes, local people used intuitive indigenous
 23 knowledge to guide them on what resources, where, when and how to collect
 24 and process products for use [1]. Indigenous knowledge (IK) on plant use is
 25 heavily influenced by the environment within which a community lives [2]. In
 26 the case of wild medicinal food plants, Achigan-Dako et al. [3] observed that
 27 while sociolinguistic characteristics are an important factor in explaining
 28 dietary diversity, the floristic makeup of a region contributes to selection of
 29 species as wild vegetables. Indigenous knowledge on use of wild plants can
 30 vary within the same ethnic group living at different eco-geographic regions.
 31 Thus traditional ecological knowledge is determined by specific ecological,
 32 historical, cultural and socio-economic context of the population [4, 5]. Earlier
 33 work on wild medicinal food plants have mainly focused on ethnobotanical
 34 documentation, taxonomical, phytochemical and pharmacological analysis [6.
 35 7]. Despite previous attempts on documentation and conservation, there is
 36 concern over loss of Kenyan indigenous knowledge on wild medicinal food
 37 plants and the biological resources [8]. The study was conducted to fill the
 38 gap in knowledge on the role of indigenous knowledge in conservation and
 39 use of wild medicinal food plants in Loita sub-county, Narok County.

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41 **2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY**
 42 **(ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)**
 43 **STUDY SITE**

44 Loita sub-county is situated 320km south of nairobi towards the Kenya-
 45 Tanzania border and covers an area of approximately 1718km² in the great rift
 46 valley. This sub-county is located at an elevation of 2000-2600 meters above
 47 sea level. On the east it borders Nguruman escarpment which drops steeply
 48 3000-5000 feet to the rift valley floor towards the Kajiado boundary. On the
 49 north are the Loita plains while on the west are the hills and valleys which
 50 lead to the Mara fly area. Towards the south-west is the Tanzania border
 51 which artificially cuts across the plateau a few miles from the topographical
 52 edge (figure 1). For this study the research was carried out in all the five
 53 locations of loita sub-county namely Morijo, Entasekera, Olemesutye and
 54 Ilkerin administrative locations (figure 1).

55

Data collection

56 Data was collected through household survey, key informant interviews and
 57 focused group discussions (FGDs) following martin [10] and cotton [11]. The
 58 interviews were conducted using a semi-structured questionnaire. The
 59 sampling frame for household survey was guided by the Kenya national
 60 sample survey and evaluation programme (NASSEP) which is based on the
 61 national population and housing census [9]. Stratified random sampling
 62 method was used to select respondents during this study whereby area

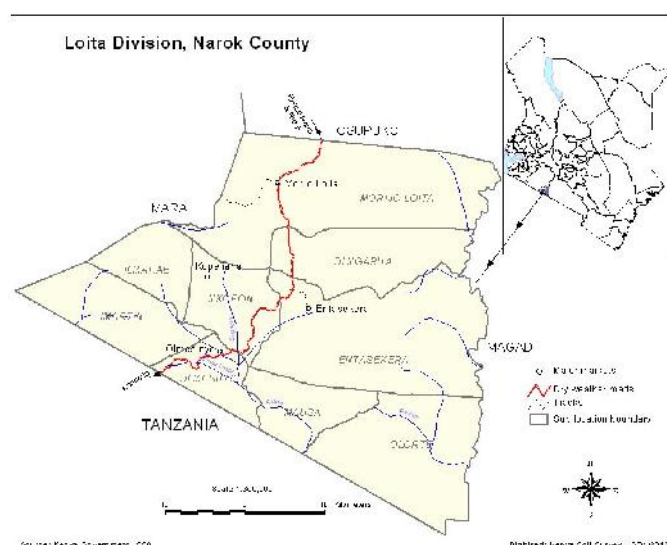


FIGURE 1: MAP SHOWING ADMINISTRATIVE LOCATION OF LOITA SUB-COUNTY NAROK COUNTY (INSET- MAP OF KENYA)

3. RESULTS AND DISCUSSION

Habitat categorization and use amongst Loita Maasai

Three broad habitat categories were identified as grasslands (*olpurkel/Ongata*), bush land (*oloiparag*) and highland forests (*osupuko*) (Table 1). This classification was based on the respondents' views of vegetation cover and elevation.

Table 1: Landscape classification based on indigenous criteria

Local name(s)	Translation (English equivalent)	Description (elevation and vegetation)	Plant species found growing in the habitat
<i>Osupuko</i>	High land forests	Thick forest mostly found on higher elevations	Mainly high canopy trees <i>Warburgia ugandensis</i> , <i>Cassipourea</i> , <i>Olea Africana</i> , <i>Prunus Africana</i> ,
<i>Oloiparag</i>	Bushland	Bushland/woodland or degraded grassland	<i>Acacia tortilis</i> , <i>Acacia zanthophloea</i> , <i>Combretum spp</i> , <i>Rhus natalensis spp</i> , <i>Carissa</i>

<i>Olpurkel/ Ongata</i>	Wooded grassland	Acacia woodland	<i>spinarum</i> , Dispersed acacias mainly grasses interspersed by <i>Acacia drepanolubium</i>
	Open grassland	Mainly grass vegetation	Open grass land with dispersed acacias on the valleys and hills

77

78 Traditionally habitat classification in Loita was found to be on the basis of
79 topography, dominant species and vegetation cover or a combination of these
80 factors, for example *osupuko* according to this community means highland
81 forest while *ongata* means open grassland. Habitat categorization in Loita by
82 vegetation types, dominant species and vegetation cover is similar to
83 conventional ecological classification [12]. This similarity between
84 indigenous and conventional habitat classification offers an opportunity for
85 these two knowledge systems to complement each other. This concurs with a
86 study in Tanzania by Mapinduzi et al. [13] who observed that indigenous
87 systems of landscape assessments can be used to understand human effects
88 on rangeland biodiversity alongside ecologists.

89 When the communities were interviewed by gender on the uses and
90 importance of the different habitats, the forest habitat was ranked 1st by both
91 men and women as a source of water and wild medicinal food plants and 4th
92 (men) and 2nd for dry season grazing (Table 2). The grassland and bush land
93 habitats were considered best for grazing, cultural activities and
94 wildlife/tourism purposes by both men and women (Table 2).

95 Table 2: The use and importance of the various habitats segregated by gender
96 (men and women)

Use of habitat	<i>Habitat ranking for the different uses</i>					
	Forest		Bushland		Grassland	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Water	1	1	8	8	3	8
Dry season grazing	4	2	10	10	10	9

Cultural activities	8	9	9	9	2	1
Normal grazing	10	6	2	1	1	2
Food	1	1	4	6	5	4
Medicine	1	1	6	2	8	7
Wildlife/Tourism	5	8	1	4	6	10

Note: Rank of 1 = most important habitat for the use; rank of 10 = least important habitat for the use

Gender ranking disparities on use and value of the habitats may be attributed to the extent of exposure to a habitat. For instance women normally interact more with the grassland during grazing and collection of food plants while the men are in charge livestock during the dry season taking them into the forest in search of feed (*Personal communication with the local elder*). In Uganda, Ojelel and Kakudidi [14] reported that knowledge of wild edible plants species was influenced by both age and gender while overall knowledge held was directly related to responsibilities performed by individuals in the community. For example, Thongam et al.[15] reported increased knowledge amongst women than men and children about wild leafy vegetables due to their association with household chores.

The study revealed that the maasai community in Loita named localities/sites after dominant or unique species occurrence in an area (Table 3). For example, local names of two locations *Morijo* (plant species -*olmorijoi*) and *Olorte* (Plant species-*Olorte*) are derived from *Ackonthera schimperii* and *Faurea saligna* dominant tree species growing in these localities.

Table 3: Names of localities in Loita and their corresponding plant names

Local place	Area	Species local	Species botanical
Olorte	Location	Olorte	<i>Faurea saligna</i>
Morijo	Location	Olmorijoi	<i>Ackonthera</i>
Olkiloriti	Village	<i>Olkiloriti</i>	<i>Acacia nilotica</i>
Nkosesiai	Village	<i>Oloksesiai</i>	<i>Osyris lanceolate</i>
Ing'arwa	Village	Olngarwa	<i>Pennisetum sp</i>
Olpopong	Village	Olopoponi	<i>Eurphobia</i>
Esentu	Village	Osentu	<i>Tarconarthus sp</i>
Oltarkwai	Village	Oltarakwai	<i>Juniperus procera</i>
Iltararani	Village	Oltarara	<i>Acacia abyssinica</i>
Olirien/nkoriento	Village	<i>Oloirien</i>	<i>Olea europaea ssp</i>
Oloorgisoyia	Village	Oloorgisoyia	<i>Vigna friesiorum</i>
Enuraelera	Village	EmuruaElai	<i>Acacia</i>
Iltumaro	Village	Oltumaro	<i>Cussonia spicata</i>
Nkamuriak	Village	<i>Olamuriaki</i>	<i>Carissa edulis</i>
Oltiyani	Sacred site	Oltiyani	<i>Arudinaria alpine</i>

119

120 Since place names remain even after species are depleted they can be used to
 121 reconstruct environmental history. This information once documented can be
 122 used to guide restoration of habitats based on local people's knowledge. In
 123 some instances to restore degraded areas, indigenous knowledge may be the
 124 only available source of information [16]. Indigenous knowledge is important
 125 in adaptive management, however it may be inconsistent [16]. This
 126 inconsistency is a result of the shifting baseline syndrome [17]. Addressing
 127 perceptiveness of environmental change is important because the way in
 128 which individuals detect and respond to ecological change shapes how
 129 information feeds back into the socio-ecological system and this feedback
 130 affects peoples livelihoods and resource governance systems as they adapt
 131 to new circumstances [18]. A good example is the idea of building synergies
 132 between science and local and indigenous knowledge in the initial work

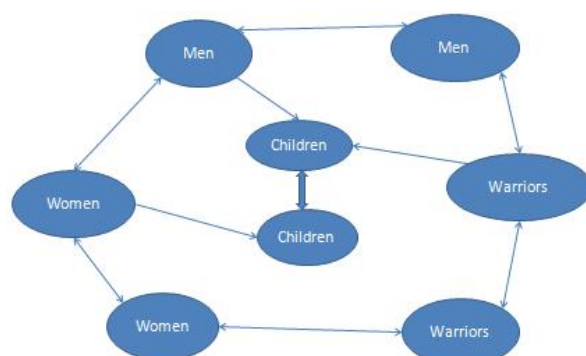
133 program for the United Nations (UN) organ on the Intergovernmental Platform
134 on Biodiversity and Ecosystem Services (IPBES) in which the indigenous and
135 local knowledge taskforce seeks to ensure integration of indigenous and local
136 knowledge with science [19].

137

138 **Indigenous knowledge (IK) transmission and use in Loita division**

139 The study results revealed that IK amongst Loita Maasai was passed on
140 throughout life along vertical and horizontal social structures differentiated by
141 gender and age within the community (Figure 2). Fifty percent of the
142 respondents acquired the knowledge on use and conservation of WMFPs
143 from their elders (both male and female) while 26% acquired through
144 apprenticeship from expert practitioners, 16% acquired this knowledge during
145 moran-hood and meat camps and 11% learnt from their peers (Figure 3).

146



147

148 **Figure 2: Indigenous knowledge (IK) transmission amongst Loita Maasai**

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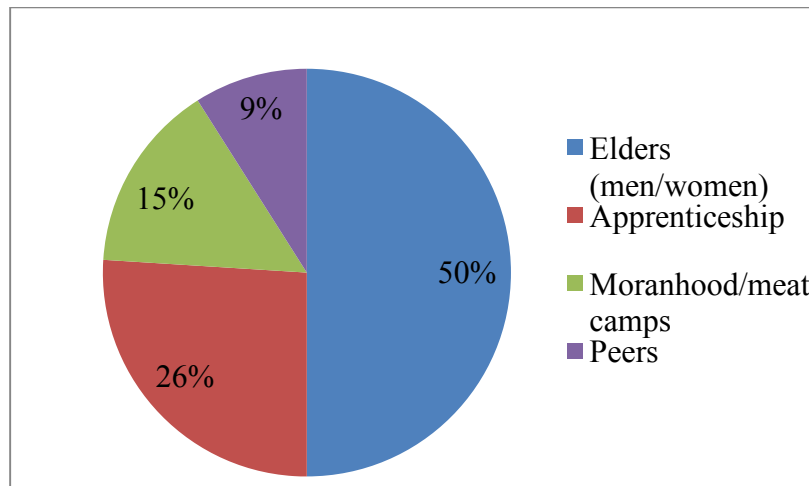


Figure 3: Indigenous knowledge (IK) acquisition from different sources amongst Loita Maasai

It is the responsibility of senior elders to pass on indigenous knowledge to warriors and junior elders throughout life. Indigenous knowledge (IK) was passed on during cultural activities and ceremonies. During ceremonies there was shared learning for age groups and inculcation of IK within and between age groups.

Transmission of IK in Loita was similar to other reported studies in Kenya [20] and Tanzania [21] and among the Achi Mayans in Guatemala [4]. Indigenous knowledge on WMFPs was well entrenched in the lifestyle and livelihoods of the communities thus ensuring continuity.

The study found out that environmental interactions and routine activities dictated by gender roles, age group and family explained the differentiation in knowledge amongst the Loita Masai members. Moreover, there were people with unique knowledge due to specialization and they included herders, traditional health practitioners and honey harvesters.

169 Indigenous practices that enhance wild medicinal food plants conservation
170 amongst Loita Maasai

171

172 From the study findings, the Loita Maasai have classified their landscapes
173 into several cultural zones (Table 1), each having culturally differentiated use
174 and this has supported conservation of large tracks of indigenous vegetation
175 within the division. One notable example of traditional conservation of
176 important WMFP was having cultural sites in areas of abundant occurrence of
177 the species. Among the Loita maasai, Loita forest was such a site that
178 encompasses several shrines (*Oltukai*, *Oloitoktok*, *Oltiyani* and
179 *Emugurrolkine*). These sites were conserved and revered, only used during
180 cultural ceremonies or special prayers under the protection of the
181 cultural/spiritual leader the *Oloibon*. The highest point in Loita forest is a
182 sacred site named by the species *Oltiyani* (*Arundinaria alpina*).

183

184 The other way of species conservation was having sacred/cultural species
185 such as *Ficus thoningii* (*Oreteti*) which according to the community was a
186 taboo to cut and *Arundinaria alpina* (*Oltiyani*) which was believed that felling it
187 would result in a drought. Community members were discouraged from using
188 species of cultural significance such as *Oloirien* (*Olea europaea* spp *africana*),
189 *Olgigal* (*Teclea simplicifolia*) and *Osinoni* (*Lippia javanica*) for ordinary
190 purposes such as fencing and firewood. While *olmedungi* (*do not cut*); mainly
191 in an area of strict preservation such as those on top of the hills with high

192 species diversity for extraction of plant materials and products was
193 prohibited.

194

195 Sacred sites and controlled use of certain species has resulted in
196 conservation of wild species in Loita; cultural sites including *Oltiyani* and
197 *Oltukai* and hilltops such as *ole megili* and *ole medungi* are areas of strict
198 preservation where no extraction was allowed. Sites that have cultural
199 significance were revered and protected traditionally by the community and
200 are islands for biodiversity conservation as the case of Loita forest. This
201 agrees with findings on cultural sites in Coast, Central, Western and Northern
202 Kenya, Nyamweru [22] noted that though some cultural sites in Kenya had
203 been degraded or destroyed, others continue to be preserved retaining
204 religious importance and indigenous governance while acquiring other roles
205 as biodiversity conservation sites. In Obalanga Sub-County in Uganda, Ojelel
206 and Kakudidi [14] reported that conservation of some species such as
207 *Tamarindus indica* and *Vittelaria paradoxa* was supported by community by-
208 laws and ancestral land tenure systems.

209

210 In addition it was noted that the Loita Maasai practiced sustainable harvesting
211 of wild plant resources and a number of ways were highlighted as being used
212 to promote sustainable use such as harvesting some stems from a multi-
213 branched tree and partial bark removal to allow continuity of life of the
214 harvested plant (Table 4)

215

216 **Table 4: Ways used to promote sustainable use/conservation of wild**
 217 **medicinal food plants among the Loita Maasai**

	<i>Ways to promote sustainable use/conservation</i>
1	Harvesting only what is needed
2	Cutting only one stem from multi-stemmed tree or clump
3	Cutting the branches instead of the main stem
4	Cutting tree stems at least 1½ - 2 m above ground to allow re-sprouting from the stems (i.e. Locally referred to as “allowing continuity of life”
5	Harvesting only a portion of stem or bark at a time and after de-barking the wound is covered with soil or cow dung to avoid desiccation
6	For roots and tubers one should only remove a few and return the soil so as not to expose the roots
7	For firewood purposes, dead or fallen wood was the first option followed by cutting branches. Felling trees was not encouraged

218
 219 **Traditional conservation practices that involve sustainable harvesting**
 220 **procedures and setting aside some areas for preservation are passed down**
 221 **through beliefs and taboos. They are deeply ingrained in belief systems and**
 222 **influence behavior in private and public with threats of social repercussions if**
 223 **not observed. Besides, traditional Loita Maasai lifestyle put little demand on**
 224 **the environment, for example, in construction of their houses known as *Enkaji***
 225 ***e modiei*, small diameter stems (withies and fitos) were used while tree**
 226 **crowns/branches were used to make livestock enclosures (kraals).**
 227 **Similar practices are reported in traditional communities in west Usambara**
 228 **Mountains in Tanzania [23] and among the South Africa collectors who**
 229 **harvest only a few lateral roots from each plant covering remaining roots to**
 230 **help survival of the plant [24]. The study results are also in line with those**
 231 **obtained by Shangali et al. [25] who reported traditional methods of**
 232 **sustainable collection and domestication of WMFPs among the Hehe of**
 233 **Tanzania.**

234

235 **The Loita Maasai are careful not to harvest plant products (roots or bark)**
 236 **causing death of a plant as they believe it would lead to death of the person**
 237 **responsible. A similar belief was reported in South Africa by Tshisikhawe et**
 238 **al. [24] where Venda traditional healers emphasized the need to preserve**
 239 **plants for the herbal medicine to be effective. Traditional beliefs and taboos**
 240 **were effective in modifying the behavior of community members unlike in**
 241 **modern times where harvesters can deplete resources without care of**
 242 **sustainability. This is fueled by market demand which is driven by sales and**
 243 **profits at the expense of sustainability.**

244
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 246
 247

4. CONCLUSION

248 Seasonal use of the grassland, bushland and forest habitats allowed regeneration of wild
 249 plant resources. In addition the traditional livelihood put low demands on the environmental
 250 resources while indigenous conservation practices contributed to preservation of the Loita
 251 landscape. This shows that conservation was effectively ingrained in the life of this
 252 community. This was enabled by low demand from a small population, poor technology used
 253 in exploitation and limited access to markets. Despite the current high demand and improved
 254 technology indigenous knowledge on use and conservation of WMFPs could play a key role
 255 in guiding biodiversity conservation.

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