



An Ethnobotanical Study of Swamp Wetland Vegetation in Uasin Gishu County, Kenya

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Research

Abstract

Ethnobotanical knowledge associated with wetland plants in Uasin Gishu County, Kenya, was assessed and documented. Data on the uses of plants, their local names, and parts used were collected through semi-structured interviews. Fifty wild plant species distributed across 45 genera and 23 families were cited as having traditional uses in the area. Of these, 26 were used as fodder, 14 as medicine, 12 as firewood, 9 as food, and 11 for construction. Some, like *Cyperus papyrus* L. and *Acacia seyal* Delile, had multiple uses. Thirty-one plants (62%) of the total recorded were herbs, 13 (26%) shrubs, 3 (6%) trees, and 3 (6%) climbers. Various plant parts were used for different purposes. Medicinal plants were useful in treating a total of 19 ailments and had various methods of preparation.

Introduction

Many years of people growing and using plants from the wild has resulted in the accumulation of indigenous knowledge on plants and their uses (Khan & Khaton 2007, Signorini *et al.* 2009). However, habitat loss, industrialization, migration of rural populations to urban areas, and cultural changes in indigenous communities are threatening this knowledge (Signorini *et al.* 2009, Zent 1999). Therefore, there is urgent need to document this knowledge before it vanishes.

Plant resources provide humans with materials that have economic, medicinal, and forage values (Bayafers 2000). This includes indigenous knowledge on the use and management of plant resources among the local people of an area (Bayafers 2000, Lulekal 2008, Signorini *et al.* 2009). However, when such resources are over-exploited and not used wisely, they can be eliminated from the environment, and the information associated with them may

eventually be lost as well (Peters 1996). Ethnobotanical knowledge is useful for broadening our knowledge on plant use (Benz *et al.* 2000).

Uasin Gishu County, Kenya, has many swamp wetlands which benefit the local people (e.g., harvesting of plants for food, medicine, and firewood). They also act as grazing grounds, especially during the dry season (Odongo 1996). Currently, human impact on the wetlands is pronounced, potentially resulting in loss of plants and knowledge of people living around the wetlands. The goal of this study was to compile a checklist of ethnobotanical knowledge of wetland plant use from people living around the swamps in Uasin Gishu County.

Methods

Study area

Uasin Gishu County is located in mid-western Kenya, Rift Valley Province, between 34°55'33" and 36°38'58"E and

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between 0°2'44"S and 0°55'56"N (Figure 1; after Njuguna 1996, Odongo 1996). The total land area of the county is approximately 3218 km² (GoK 2002) with large- and small-scale farming of maize and wheat being the main activities for which the land is used. The county has a total population of approximately 829,046 people (Kahuthu *et al.* 2005). The mean annual rainfall ranges between 1100 and 1500 mm, with two peaks in May and August and a drier spell from November to February (GoK 2002). The mean annual temperature is 23°C. Four swamps—Marula, Leseru, Singilai, and Chepkongony—were selected for the study (Figure 1). They are all permanent riverine public swamps located about 9 km NE, 15 km NW, 40 km SE, and 27 km NE of Eldoret town, respectively. Combined they cover a total area of about 11.8 km². The catchment area of the swamps is under large-scale wheat and maize cultivation. The main human activities within the swamps include farming of various vegetables like *Solanum nigrum* L. and *Brassica oleracea* var. *acephala* DC. and harvesting of wetland plants. The swamps are a source of domestic water supply as well as cattle watering and grazing points, especially during the dry season.

Methods

Ethnobotanical data was collected using semi-structured interviews held from 2006 to 2007. The interviews were conducted using a previously developed questionnaire. Information was collected on the uses of wild plants from people living in homes neighboring the swamps. The homes were selected randomly. The interviews were individual, and the informants were selected independent of their age or gender. The interviewers were comprised of both men and women. A total of 80 volunteers of different age groups, 20 per swamp, were interviewed. A majority of them were local people without any scientific knowledge who were born or had spent most of their lives in the area. No appointment was made prior to the visits. The interviews were done in the field in order to minimize the risk of confusing identity of plant species. Kiswahili, Nandi, and Keiyo languages were used during the interviews. The interviews focused on basic questions concerning the informants' knowledge of the uses of local plants, including their local names and the parts used. For medicinal

plants, the methods of preparation and ailments treated were also recorded.

Plants were collected with the interviewees *in situ* and identified using taxonomic keys in Agnew and Agnew (1994), Beentje (1994), Ibrahim and Kabuye (1987), Haines and Lye (1983), Clayton (1970, 1974, 1982), and by comparing them with already identified herbarium specimens at the East African Herbarium in Nairobi. Later they were grouped into their various use-categories. Voucher specimens of the collected plants were dried, pressed, and de-

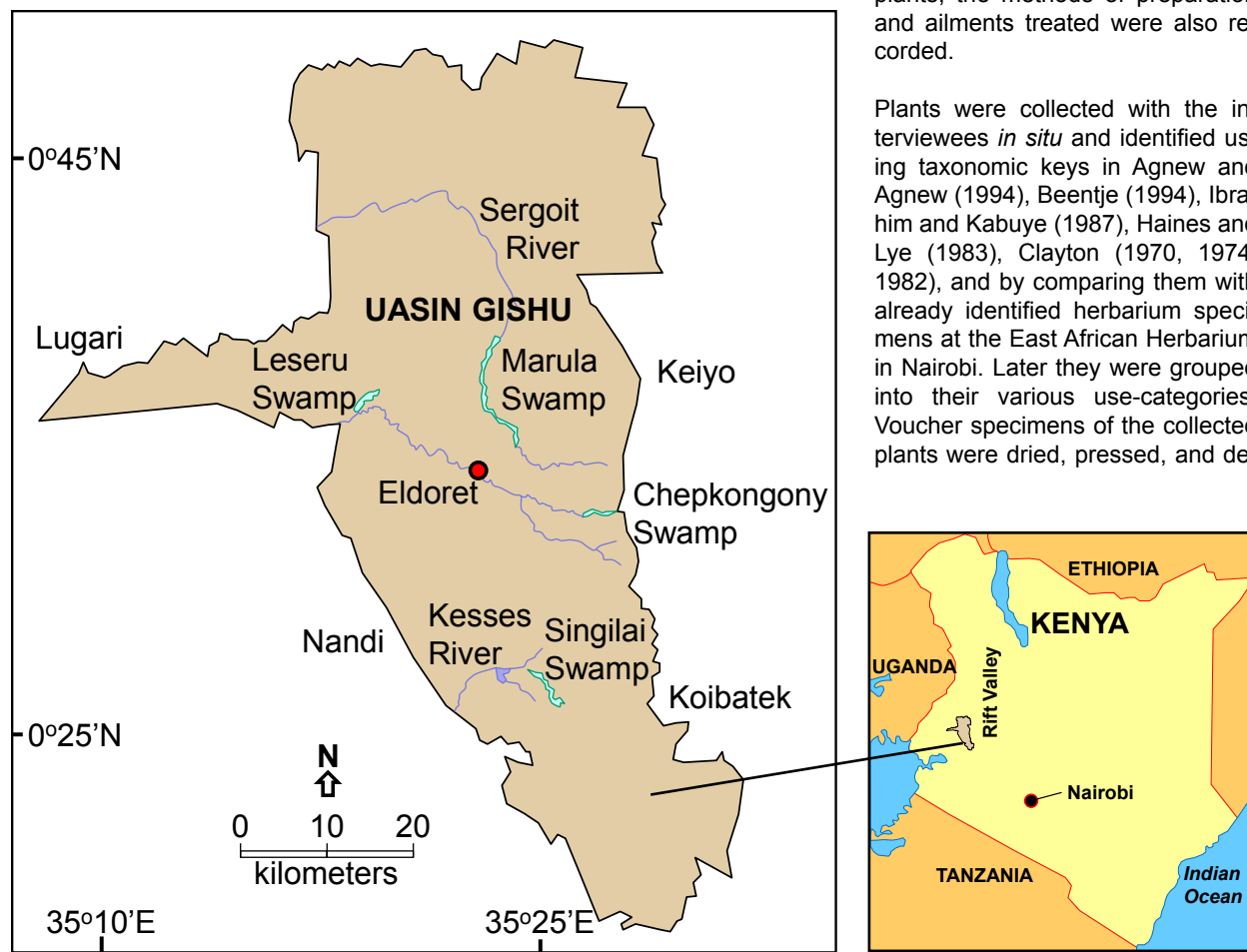


Figure 1. Uasin Gishu County, Kenya, with four study site swamps: Chepkongony, Leseru, Marula, and Singilai.

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posited in the herbarium of the Department of Biological Sciences, University of Eldoret.

Descriptive statistics were used to summarize the ethnobotanical data collected.

Results

The socio-demographic data characterizing the respondents interviewed in the four swamps is given in Table 1. From the 80 respondents, 68.7% were males and 31.3% females. Farmers dominated the respondents while artisans represented the smallest group. The largest respondent category was those above 35 years of age.

Fifty plant species distributed in 45 genera and 23 families and encompassing 4 different life forms were cited by the informants as having various traditional uses in the area (Table 2). The family Cyperaceae had the highest number of useful species followed by Fabaceae, Poaceae, Asteraceae, and Polygonaceae (Table 3). The most frequently used species were *Pycnopus nitidus* (Lam.) J. Raynal, *Cyperus papyrus* L., and *Typha latifolia* L. (Table 4). Of the differ-

Table 1. Socio-demographic data of informants living near Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

Demographics		Informants	
		Number	Percent
Gender			
Male	55	68.7	
Female	25	31.3	
Age			
Under 18	16	20.0	
19–35 years	27	33.7	
Above 35 years	37	46.3	
Occupation			
Farmer	51	63.8	
Unemployed	13	16.2	
Casual laborer	7	8.8	
Student	5	6.2	
Artisan	4	5.0	

Table 2. Useful plants reported for Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya. Habit: climber (C), herb (H), herb-grass (G), shrub (S), tree (T). Plant part: bark (B), fruit (F), flowers (Fl), leaf (L), pollen (P), root (R), stem (S), whole plant (W); mature (m), young (y). Languages: ¹Keiyo, ²Kiswahili, ³Luhya, ⁴Nandi.

Plants	Local Name	Habit	Part used	Uses
Amaranthaceae				
<i>Amaranthus hybridus</i> L.	Chepkerta ²	H	L	Vegetable
Apiaceae				
<i>Afroligusticum linderi</i> (C. Norman) P.J.D. Winter	-	H	L, S	Fodder
Apocynaceae				
<i>Carissa spinarum</i> L.	Legetetwa ²	S	L	Fodder
			F	Edible, medicinal
			R	Medicinal
Asteraceae				
<i>Acmella caulirhiza</i> Delile	Putputiet ⁴	H	L	Medicinal
			F	Edible
<i>Aspilia mossambicensis</i> (Oliv.) Wild	Chepsitet ⁴	H	W (y)	Fodder
			L (m)	Dish-cleaning
<i>Baccharoides lasiopus</i> (O. Hoffm.) H. Rob.	Yebengwet ²	S	L	Fodder, medicinal
<i>Bidens pilosa</i> L.	Kipkoleitet ⁴	H	L	Fodder, medicinal
<i>Galinsoga parviflora</i> Cav.	Chepsitaki ¹	H	L, S	Fodder
Basellaceae				
<i>Basella alba</i> L.	Nderema ²	C	L	Vegetable
Boraginaceae				
<i>Cynoglossum coeruleum</i> A. DC.	Kimnambwet ⁴	H	L	Medicinal

Plants	Local Name	Habit	Part used	Uses
Commelinaceae				
<i>Commelina diffusa</i> Burm.f.	-	H	W	Fodder
<i>Floscopa glomerata</i> (Willd. ex Schult. & Schult.f.) Hassk.	-	H	W	Fodder
Crassulaceae				
<i>Crassula granvikii</i> Mildbr.	-	H	W	Fodder
Cucurbitaceae				
<i>Zehneria scabra</i> (L.f.) Sond.	Porowet ⁴	C	L, R	Medicinal
Cyperaceae				
<i>Courtoisia</i> sp.	Saonet ²	H	W (y)	Fodder
<i>Cyperus ajax</i> C.B.Clarke	Saonet ²	H	L	Thatching
<i>Cyperus digitatus</i> Roxb.	Saonet ²	H	L (y)	Fodder
			L (m)	Thatching
<i>Cyperus papyrus</i> L.	Maruriat ⁴ , Matoko ³	H	R	Firewood
			S	Firewood, fence, mat-weaving, seats, book covers, edible
			Fl	Broom, green manure, cultural
<i>Cyperus rotundus</i> L.	Saonet ²	H	L	Fodder
<i>Pycurus nitidus</i> (Lam.) J.Raynal	Saonet ⁴ , Kumunyu ³	H	L	Thatch, mulching, brick cover, fodder (young leaves), medicinal, cultural, provide shade in fish ponds
<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.) J.Raynal	-	H	S	Fodder
Fabaceae				
<i>Acacia seyal</i> Delile	Chemnyaliliet ²	S	L	Fodder
			S	Firewood, construction
<i>Aeschynomene abyssinica</i> (A. Rich.) Vatke	Koibeiyot ⁴ , Chepkopeyot ¹	S	S	Construction, firewood
<i>Aeschynomene mimosifolia</i> Vatke	Koibeiyot ²	S	L	Fodder
<i>Leucaena leucocephala</i> (Lam.) de Wit	-	T	S	Construction, firewood
<i>Senna didymobotrya</i> (Fresen.) H.S.Irwin & Barneby	Senetwet ¹	S	L	Medicinal
<i>Sesbania sesban</i> (L.) Merr.	Koibeiyot ²	S	S	Construction, fence, firewood
			R	Medicinal
Lamiaceae				
<i>Ajuga integrifolia</i> Buch.-Ham.	Chelelgiat ⁴	H	L	Medicinal
<i>Leonotis nepetifolia</i> (L.) R.Br.	Chepchai ²	H	L	Medicinal
<i>Ocimum kilimandscharicum</i> Baker ex Gürke	-	S	L, R	Medicinal
Lythraceae				
<i>Rotala tenella</i> (Guill. & Perr.) Hiern	-	H	W	Fodder

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Plants	Local Name	Habit	Part used	Uses
Malvaceae				
<i>Dombeya burghessiae</i> Gerrard ex Harv. & Sond.	-	T	S	Firewood, construction
			B	String for construction
<i>Pavonia urens</i> Cav.	Motoshe², Motosiet²	S	S	Firewood
			B	Rope
			L	Dish-cleaning
Myrtaceae				
<i>Syzygium cordatum</i> Hochst. ex Krauss	-	T	F	Edible
			S	Firewood, construction
Poaceae				
<i>Cynodon transvaalensis</i> Burtt Davy	Susuat²	G	W	Fodder
<i>Digitaria scalarum</i> (Schweinf.) Chiov.	Susuat²	G	L	Fodder
<i>Echinochloa pyramidalis</i> (Lam.) Hitchc. & Chase	Susuat²	G	W (y)	Fodder
<i>Leersia hexandra</i> Sw.	Susuat²	G	L, S	Fodder
<i>Panicum poioides</i> Stapf.	Susuat²	G	L, S	Fodder
<i>Pennisetum sphacelatum</i> (Nees) T.Durand & Schinz	Seyiot²	G	L	Fodder
Rosaceae				
<i>Rubus apetalus</i> Poir.	Monget²	S	S	Firewood
			F	Edible
Solanaceae				
<i>Solanum incanum</i> L.	Lavutwi⁴	S	R	Medicinal
Phytolaccaceae				
<i>Phytolacca dodecandra</i> L'Hér.	Kobot²	S	S	Firewood
Polygonaceae				
<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	Mutwet⁴	H	L, S	Fodder
<i>Persicaria strigosa</i> (R.Br.) Nakai	Mutwet⁴, Cheborowa², Loplopitiet¹	H	L, S	Fodder
<i>Polygonum pulchrum</i> Blume	Mutwet⁴, Cheborowa¹	H	L	Fodder
			S	Cultural, rope
<i>Rumex nepalensis</i> Spreng.	Masisiriet⁴	H	L	Vegetable
Typhaceae				
<i>Typha latifolia</i> L.	Cherugut⁴	H	F	Decoration
			P	Beauty powder
			L (m)	Thatch, cultural
			L (y)	Fodder
Verbenaceae				
<i>Lantana camara</i> L.	Lantana⁴	S	S	Firewood
			F	Edible
Vitaceae				
<i>Cyphostemma adenocaula</i> (Steud. ex A. Rich.) Desc. ex Wild & R.B.Drumm.	Simet²	C	L, R	Medicinal

Table 3. Plant families and numbers of species of useful plants reported for Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

Family	Number of species
Cyperaceae	7
Fabaceae	6
Poaceae	6
Asteraceae	5
Polygonaceae	4
Lamiaceae	3
Commelinaceae	2
Malvaceae	2
Amaranthaceae	1
Apiaceae	1
Apocynaceae	1
Basellaceae	1
Boraginaceae	1
Crassulaceae	1
Cucurbitaceae	1
Lythraceae	1
Myrtaceae	1
Rosaceae	1
Solanaceae	1
Phytolaccaceae	1
Typhaceae	1
Verbanaceae	1
Vitaceae	1

Table 4. Most frequently used (mentioned) plant species within Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

Species	Frequency (%)
<i>Pycreus nitidus</i> (Lam.) J.Raynal	62.5
<i>Cyperus papyrus</i> L.	22.5
<i>Typha latifolia</i> L.	21.1
<i>Sesbania sesban</i> (L.) Merr.	16.3
<i>Aeschynomene abyssinica</i> (A.Rich.) Vatke	15.0
<i>Polygonum pulchrum</i> Blume	12.5
<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.)	11.3
<i>Floscopa glomerata</i> (Willd. ex Schult. & Schult.f.) Hassk.	7.5
<i>Acacia seyal</i> Delile	7.5
<i>Leersia hexandra</i> Sw.	6.3
<i>Basella alba</i> L.	6.3

ent growth forms of plants collected, herbs comprised the highest proportion followed by shrubs, trees, and climbers (Figure 2). The plants collected were differentiated into 21 use categories (Figure 3). Those used as fodder comprised the biggest proportion followed by those used as medicine, firewood, construction, and food in that order.

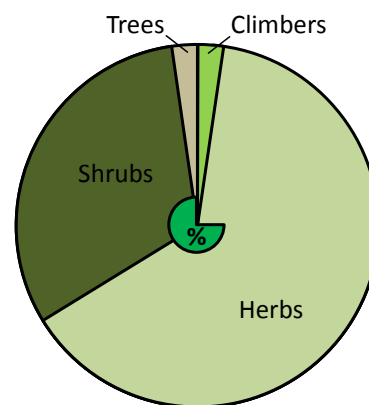


Figure 2. Growth forms of the useful plants reported in Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

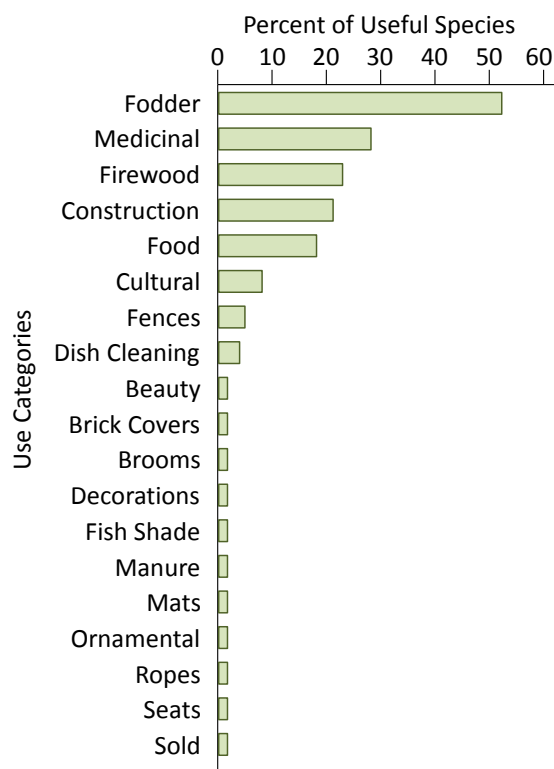


Figure 3. Reported frequency of plant use categories in Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

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Different parts of the plants collected were used for various purposes (Table 5). A very high proportion of interviewees (89%) indicated that they used plant leaves as fodder, while 33% of respondents used stems as firewood. Plants that were used for medicinal purposes were useful in treating a total of 19 ailments, and some con-

ditions—e.g., mouth ulcers, malaria, stomach ache, dysentery, and infertility in women—were treated using more than one species (Table 6). Of the plants used as medicines, about half were prepared for use by boiling to make decoctions (Table 7).

Table 5. Frequency of use (%) of various plant parts by people living near Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya. Frequencies are the percent of respondents who use a particular part for a particular use category and are not cumulative across categories or plant parts.

Use categories	Plant part use respondent frequency (%)					
	Stem	Roots	Leaves	Bark	Fruits	Flowers
Food	-	-	21.3	-	16.0	-
Building	21.3	-	-	1.3	-	-
Fodder	7.5	-	88.8	-	-	2.5
Medicinal	1.3	11.3	16.3	-	-	2.5
Cultural usage	3.8	-	27.5	-	-	1.3
Firewood	32.5	7.5	-	-	-	-
Mat use	17.5	-	-	-	-	-
Fence	20.0	-	-	-	-	-
Thatching	-	-	61.3	-	-	-
Rope-making	-	-	-	2.5	-	-
Dish-cleaning	-	-	5.0	-	-	-
Seat-making	3.8	-	-	-	-	-
Brick-covering	7.5	-	-	-	-	-
Mulching	-	-	2.5	-	-	-
Green manure	-	-	-	-	-	1.3

Table 6. Number of species used to treat different medical conditions as reported by users of Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

Medical conditions	Number of species
Dysentery/diarrhea	2
Infertility in women	2
Malaria in man and animals	2
Mouth ulcers	2
Stomachache	2
Burn wounds	1
Chest problems	1
Colds	1
Digestion problems	1
Earache	1

Medical conditions	Number of species
Impotence	1
Pain	1
Rheumatism	1
Ringworms	1
Skin rash	1
Stomach problems after delivery	1
Thrush	1
Thyroid/goiter	1
Wounds	1

Table 7. Methods used to prepare medicinal plants as reported by users of Chepkongony, Leseru, Marula, and Singilai swamps, Uasin Gishu County, Kenya.

Method used	Species
Boiling	9
Grinding	5
Burning & grinding	2

Method used	Species
Burning & boiling	1
Chewing	1
Crushing & homogenizing in water	1

Discussion

The prevalence of farmers among the respondents interviewed in this study can be explained by the fact that Uasin Gishu County is predominantly an agricultural area where a majority of the residents of the local communities engage in farming activities. Although male respondents were the majority of those interviewed, this does not in any way imply that men had more information on the traditional uses of plants than women. The low number of female respondents could be attributed to the fact that women who were approached, in many instances, shied away from the interviews.

In many parts of Kenya, wetland plants have been traditionally used, though at a very small scale and mainly for making mats, baskets, ropes, roofing material, and firewood (Gichuki *et al.* 2001). However, this has changed following the emergence of commercial exploitation of wetland plants (Abila 2002, Otieno *et al.* 1998). In this study, 50 species were documented as being useful in various ways to the communities living adjacent to the swamps. This suggests that despite the wetland-adjacent communities being exposed to influences from modern culture, they still preserved their knowledge of the uses of many of the plants occurring around them. Most of the plants exploited by the swamp-adjacent communities were herbs, a fact that can be explained by the abundance and year-round availability of herbaceous species in the study area. Grazing of animals in wetlands seems to be the most widespread use of wetlands in Uasin Gishu County. The likely reason for this is that wetland vegetation provides the most reliable source of fodder for animals during the dry season. A similar observation was made by Abila *et al.* (2005) in a study of wetlands located around Lake Victoria.

The use of several plant species as firewood and food by people in the study area suggests that the communities living around the swamps still depend on the natural environment for their energy and food needs. Some of the plants reported here as being used as sources of food—e.g., *Basella alba* L., *Lantana camara* L., *Amaranthus hybridus* L., and *Rubus apetalus* Poir.—also have similar uses in other parts of Kenya (Mathenge 1997, Maundu 1997).

The species that was most frequently mentioned by the respondents interviewed in this study was *P. nitidus*. This species is widely used as fodder and thatching material by the wetland-adjacent communities, and it is abundant in all the swamps. A previous study by Odongo (1996) also revealed that this species, together with *Pennisetum* spp., were used as thatching material by communities living around the swamps in Uasin Gishu County. The high cost of purchasing alternative roofing materials like iron sheets, nails, and timber could be the reason why the

communities living around the four swamps have resorted to the use of cheaper, locally-sourced roofing materials.

The frequency of use of *C. papyrus* was second to that of *P. nitidus*. However, *C. papyrus* only occurs in Marula swamp, and it is used for many purposes (fencing, firewood, furniture making, book covers, fodder, construction, mat weaving, etc.). The fact that it has many uses could explain its high frequency of mention. This species has been documented in other swamps around the country as being useful for making mats, baskets, and furniture (Abila *et al.* 2005, Terer *et al.* 2012). Its use for craft production has also been reported around the wetlands in Kwa Zulu Natal in South Africa (Kotze & Traynor 2011). Mats and baskets are popular as they are utility products and need continual replacement in households. Papyrus also has the potential for use as paper and fodder (Muthuri & Kinyamario 1989) and provision of energy (Jones 1984). The frequency of usage of other species was relatively low because, comparatively, they had fewer uses and/or they occurred in just a few swamps.

Medicinal plants documented in this study were used for the treatment of 19 ailments. The most commonly reported medical conditions were malaria, stomach ache, ringworm, dysentery, and thrush. The presence of medicinal plants and associated ethnomedicinal knowledge indicates that the swamps likely have useful pharmacochemical diversity. This knowledge correlates with uses reported elsewhere. For example, the leaves of *Ajuga integrifolia* Buch.-Ham. and *Senna didymobotrya* (Fresen.) H.S.Irwin & Barneby were used for the treatment of malaria while those of *Ocimum kilimandscharicum* Baker ex Gürke and *Zehneria scabra* (L.f.) Sond. were used to treat stomach ache. *Ajuga integrifolia* has been used for malaria treatment in Kenya (Cocquyt *et al.* 2011, Gitua *et al.* 2012, Kuria *et al.* 2002) while the leaves of *Z. scabra* have elsewhere been found to be useful for treating skin diseases, gonorrhoea, syphilis, and malaria (Moshi *et al.* 2012).

These results also show that there were species which had multiple uses. For example *C. papyrus* was used as firewood, in building, weaving mats, fencing, and fodder, and *Acacia seyal* Delile was used as fodder, in building, and firewood. This mirrors the work of Saharia and Sarma (2011) which found similar indigenous uses of wetland plants in India.

Conclusion

This study illustrates the usage of wetland plants by communities living around the four swamps in Uasin Gishu County. This knowledge is still part of the cultural heritage in these communities. The plants are used for various purposes such as fodder, medicines, firewood, for building, and food. Those that are medicinal are used to treat a spectrum of human ailments such as malaria, mouth ul-

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cers, stomach ache, dysentery, skin rash, and infertility. Preservation of this knowledge is important for posterity.

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