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Species Distribution, Diversity and Conservation of Indigenous Medicinal Plants in Selected Areas of Baringo County, Kenya

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Abstract: The study was conducted with the main objective to determine the species distribution, diversity and conservation of indigenous medicinal plants in Koipirir, Ilchurai and Ikumae in Baringo County, Kenya. *Balanites aegyptiaca (26.26%), Acacia nilotica (17.68%)* and *Balanites aegyptiaca (*15.80%) were relatively abundant in Koipirir, Ilchurai and Ikumae respectively. *Balanites aegyptiaca* was the dominant species in all three areas. Ikumae had high species diversity (H'2.698) and evenness (0.849), as compared to Koipirir (H'2.447) and (E 0.769) and Ilchurai (H'2.511) and (E 0.7901).

Keywords: Species diversity; richness, evenness; Indigenous Medicinal plants; Baringo County.

INTRODUCTION

In developing countries, it has been estimated that up to 90% of the population rely on the use of medicinal plants to help meet their primary health care needs[1]. Apart from the importance in the primary health care system of rural communities, medicinal plants also improve the economic status of the people

involved in their sales in markets all over the world. In Kenya, traditional medicine has still continued to play a major role in as a source of local building material and fuel wood and in Primary Health Care (PHC)[1].

Increasing demand for medicinal plants locally and internationally has resulted in the over-exploitation and indiscriminate over-harvesting[2]. The degree of vulnerability of medicinal plants to overexploitation and disturbance largely depends on the part used be it bark, leaves, twigs, roots or stem and the life form[3], species and partly because of their scarcity[4]. The harvesting technique employed in the prevailing area is important in the conservation of medicinal plants as some of the practices may be destructive. In view of these threats to medicinal plants there is need for sustainable management, cultivation and conservation of medicinal plants[5]. It is documented that 95% of drug needs in Africa come from medicinal plants, and as many as 5000 plant species in Africa are used for medicinal purposes[2,6]. Today one of the major concerns is the loss of the Earth's biological diversity[7].The absence of ecological knowledge implies hindrance to the conservation, management and sustainable use of medicinal plant species, especially in due to overexploitation and land use changes.

Along with overexploitation, land use changes threaten many medicinal plant species in Africa[8,9]. Insufficient knowledge about the conservation of medicinal plants is a major issue for resource managers[10]. Thus the protected areas may assist in the conservation of indigenous medicinal plant species in[11].

The communities knowledge on traditional medicine, changing lifestyles and practices is also affecting the status of medicinal plants[12]. It is widely agreed that in the African countries which are considered less developed countries, anthropogenic activities are taking a serious toll on renewable resources including plant species that are valuable to rural communities[13, 14].

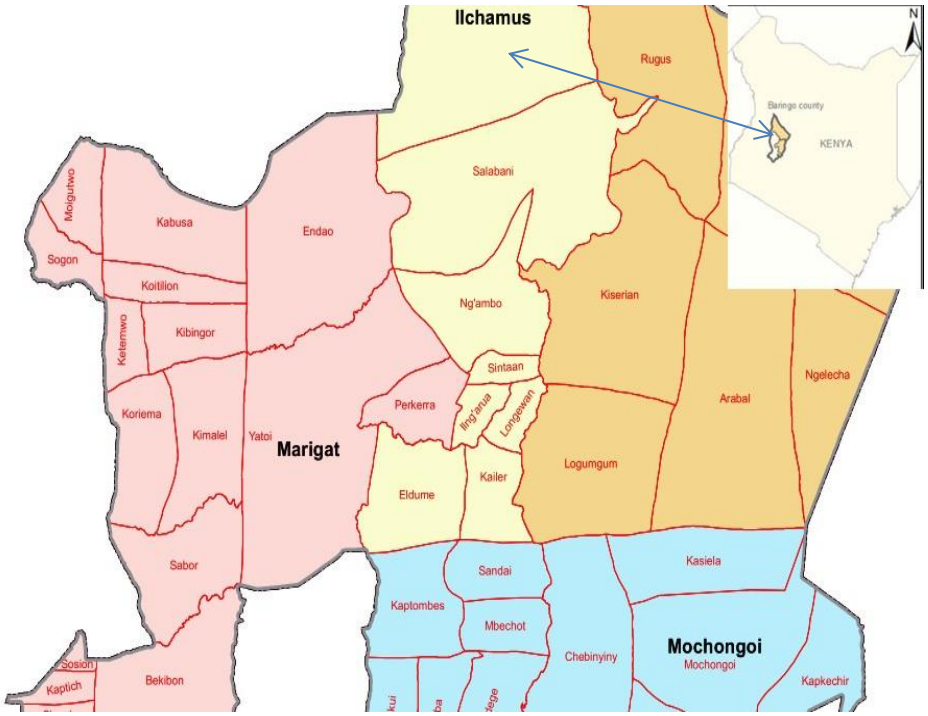
Deforestation and land use changes are some of the human activities that have led to serious loss of important plant resources in both the developed and developing countries. In Baringo County, Kenya, these are not exceptional as it has been widely felt and has made agriculture more popularized as in other areas, including West Pokot and Samburu where medicinal plants are preferred as means of treatment[15]. These issues have the potential of undermining the conservation of useful plant resources to the community. Based on these changes that appear to move swiftly across Baringo land, this study tried to investigate the distribution, diversity and conservation measures of locally available indigenous medicinal plants in Koipirir, Ilchurai and Ikumae in Baringo County.

STUDY AREA

The study area is Koipiriri, Ilchurai and Ikumae sites in Baringo County, Kenya. Baringo County is situated between longitudes 35°36' and 36°30' east and between latitude 00°13' and 1°40' south. Baringo County located to the southern part of the entire Rift Valley region. It borders Turkana County to the North, Nakuru to the South, Elgeyo Marakwet County to the West and Samburu and Laikipia Counties to the East.

The altitude varies from 300m at the plains to 1,000m above the sea level. The rainfall is bimodal with short rains being experienced between November to January and long rains in March to May. The mean annual rainfall is 410 mm. Temperatures vary from 300 ^{0}C and occasionally rise to over 350 ^{0}C. The

hottest months are from January to March with temperatures of above 300 ^{0}C. The coldest months have temperatures ranging from 160 ^{0}C to 180 ^{0}C but can drop[16] to as low as 100 ^{0}C.



Map 1: *Study area (Source:* Ministry of Environment and Natural Resources, 2000)

MATERIALS AND METHODS

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Questionnaires were administered randomly to 19 household per village (5 villages per area) to collect data on common IMPs used to treat diseases, plants local names, method of administration, part used, availability, modes of exploitation and conservation strategies which are in place.

Plot based line transects were used where the composition, abundance, evenness and diversity of the IMPs were identified along a 500m transect. After every 50m, a quadrant was used on both sides of the transect 50m from the main transects thus forming 50 by 50 meter grids, which were assigned a number. Six plots, 15 long transects (500m long) and 150 quadrats were taken for each study site therefore in total 45 transects were used forming 450 quadrats. In each quadrat, all plants identified as used for medicinal purposes were numbered. A botanist helped to identify the plants. Identification was also done using the relevant taxonomic literature on the Flora of Tropical East Africa.

Data analysis and presentation: Data on IMPs abundance were captured and analyzed using Biodiversity Calculator Index (BCI). The abundance of the locally available IMPs was calculated in terms of percentage abundance. Shannon Weiner Index was used to calculate Species diversity and evenness. The results were presented in form tables.

RESULTS

The results of this study showed that the preferred means of treatment was use of IMP with 84% while 16% preferred modern medicine. This is the case because of easy accessibility to the traditional medicine as compared to modern facilities to health for most people in Baringo and specifically in the study area. Also the IMPs are relatively inexpensive, locally available, and usually accepted by the local communities as compared to modern conventional medicine[17]. The study also revealed that the composition of IMPs in the study areas varied (Table 1). All three areas show high species richness.

Table 1: Composition of Indigenous Medicinal Plants in Koipiriri (K), Ikumae (IK) and Ilchurai (IL) areas

Species Local name (Tugen/Njemps)	**Scientific names**	**Presence (p), Not present(n)**		
		Koipirir	**Ilchurai**	**Ikumae**
Mwarobaini	*Azadirachta indica*	*p*	*p*	*n*
Sokwe /Lelekwet	*Cussonia holstii*	*p*	*p*	*p*
Otonwo/Lemukutan	*Albizia anthelmintica*	*p*	*p*	*p*
Olglei/Kuriot	*Vepris simplicifolia*	*p*	*p*	*n*
Chuchuniet	*Leonotis nepetifolia*	*p*	*p*	*p*
Sitet/OlSitete	*Grewia tephrodermis*	*p*	*p*	*p*
Chepkumiande /Olabai	*Psidia punctulata*	*p*	*p*	*p*
Senetwet/Olesenetoi	*Senna didymobotrya*	*p*	*p*	*p*
Tengeretwo/Tangeretwet	*Aloe secundiflora*	*p*	*p*	*p*
Ntulelei/Endulelei/Tawolwot	*Solanum incanum*	*p*	*n*	*p*
Tebeswet/Oletepessi	*Acacia lahai*	*p*	*p*	*p*
Lorityet/OlKiloriti	*Acacia nilotica*	*p*	*p*	*p*
Tepes	*Acacia tortilis*	*p*	*p*	*p*
Seketetwo/Mogoiywet	*Ficus sycomorus*	*p*	*p*	*p*
Soket /OlSoket	*Elaedendron buchananii*	*p*	*p*	*p*
Tangawizi/Lemunyi	*Zingiber officinale*	*p*	*p*	*p*
Ukwaju	*Tamarindus indica*	*p*	*p*	*p*
Ilamai/lamaek	*Ximenia americana*	*p*	*n*	*p*
Elil	*Obetia pinnatifida*	*p*	*p*	*p*
Sigowet /Osigawai	*Solanum aculeastrum*	*p*	*p*	*p*
Kipnandi /Kibabstaniet	*Maesa lanceolata*	*p*	*p*	*p*
Oiti	*Acacia mellifera*	*p*	*p*	*p*
Ngoswet	*Balanites aegyptica*	*p*	*p*	*p*
Otitmaei	*Commiphora campestris*	*p*	*p*	*p*

DISCUSSION

Solanum incanum and *Ximenia americana* were absent in Ilchurai while *Azadirachta indica* and *Vepris simplicifolia* were absent in Ikumae. However, in the IUCN Red List 2015, the above absent species are not indicated as threatened. The absence of these species could be attributed to the harsh climatic changes such as the prolonged dry periods that have been taking place especially in the ASALs of Baringo[18], which could affect the soil hence their unavailability. Also the unavailability of plants such as *Solanum incanum, Azadirachta indica* and *Ximenia americana* could be attributed to the fact that they are utilized to treat many kinds of ailments translating to overharvesting.

In Koipiriri and Ikumae, *Balanites aegyptiaca* was the most abundant/ dominant species at (26.26%) and (15.80%) respectively, while in Ilchurai *Acacia nilotica* at (17.68%) was the most dominant IMP **(Table 1).** This can be attributed to the climatic conditions which favour the growth of these species, the soils and the degree of utilization of each individual species. In many cases, species with less utilization are usually found to be abundant in the fields as compares to those with high use value. Disturbed and fragmented habitats are at times dominated by a many species compared to the undisturbed sites[19].

Species diversity in the study areas varied. Ikumae had the highest species diversity of (H'2.7) while Koipiriri had the lowest (H'2.45) and Ilchurai (H' 2.5) as in Table 2 below.

Table 2: Species diversity H' and Evenness (H'/Hmax) for Koipirir, Ilchurai and Ikumae (Using Shannon Weiner Index)

No.	**Site**	**Species diversity** (H')	**Evenness**(H'/H max)
1	Nkoipiriri	2.447	0.769
2	Ilchurai	2.511	0.790
3	Ikumae	2.698	0.849

DISCUSSION

The high diversity in Ikumae could be attributed to the fact that the area was slightly nearer to a conservation area (Marigat Forest). While Koipiriri and Ilchurai were far from the effects of micro climate created from the conservation area[20]. Thus this indicates that diversity is affected by various factors such as dispersal, ability, and competition, environmental factors such as solar radiation, temperature and soil geological conditions. These factors may influence the landscape and vegetation structure and would show significant effects on richness and diversity[21].

Species evenness varied in the study areas. Ikumae had evenness of 0.85 which was slightly higher than Ilchurai (0.75) and Koipiriri (0.77). This was attributed to the fact that since the inhabitants were more keen on protecting these medicinal plants hence used them in more conservatory manner by allowing the plants to regenerate during rainy seasons, harvesting only the part of plants that they directly needed and also avoiding by all means harvesting of the whole plant. It was also noted that *Acacia tortilis* was present

in relatively high amounts in all the three study areas 15.45% in Koipiriri, 13.03% in Ilchurai and 11.37% in Ikumae compared to the other medicinal plants. This can be due to the fact that it is a big tree hence it may not be easy or necessary to uproot since one just needs the bark. Also due to its minor uses as an appetite stimulant, it was not in such a high demand.

Some species were totally unavailable in some study sites and they included *Azadirachta indica* and *Vepris simplicifolia* in Ikumae while in Ilchurai. S*olanum aculeastrum* and *Ximenia americana* were unavailable. 5.2% of the IMP species identified in the study sites were rare. These included *Azadirachta indica* and *Cussonia holstii* in the 3 sites while, *Senna didymobotrya* was found to be rare in Ikumae. This study indicates that diverse distribution is the most pervasive pattern in nature distribution and depends on the local habitat, daily and seasonal weather change and reproductive process.

CONCLUSIONS

The study revealed that the composition of IMPs in the study area is varied. Most of the studied medicinal plants were found in all three areas. Except *Solanum incanum* and *Ximenia americana* were absent in Ilchurai while *Azadirachta indica* and *Vepris simplicifolia* were absent in Ikumae. Also the IMPs species in the study area varied in their abundance. *Balanites aegyptiaca* (26.26%) was the most abundant/ dominant species in Koipiriri, while *Acacia nilotica* (17.68%) was the most dominant IMP in Ilchurai and *Balanites aegyptiaca* (15.80%) was the dominant species in Ikumae.

Species diversity and evenness in the study areas varied. Ikumae had the highest species diversity of (H'2.698) while Koipiriri had the lowest (H'2.447) and Ilchurai (H' 2.511). Ikumae had evenness of (0.849) which was slightly higher than Ilchurai (0.7901) and Koipiriri (0.769).

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