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# INDIGENOUS PLANT USES AND USE VALUES IN ULUGURU MOUNTAINS, MOROGORO, TANZANIA

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## ABSTRACT

To assess plant uses and use values in Uluguru Mountains a study was carried out using household surveys and interviews on various uses of the plants. Descriptive statistics and use-value analysis techniques were used in data analysis. Of the plant species identified, 92% were used for fuel wood and 83% were used for construction materials. A significant difference in use values among the species was realized. *Newtonia buchananii* had the highest use value of 2.81 where as *Piper capense* had the lowest use value of 0.08. Villagers know which tree species are best for building poles or good as fuel wood, which wild fruits are edible and which are good for medicine. This knowledge is an important ingredient in the ongoing effort to reverse the trend of environmental degradation in the area.

## INTRODUCTION

The Eastern Arc Mountains comprise the ancient crystalline mountains that run from the Taita Hills in Kenya to the Makambako Gap just to the south west of the Udzungwa Mountains in Tanzania. These mountains are widely recognized for their unique biodiversity values (Lovett & Wasser, 1993). The Uluguru Mountains are among the three most important Eastern Arc Mountains in Tanzania; others are Usambara and Udzungwa Mountains (Bhatia & Ringia, 1996).

The Uluguru Mountains are said to be extremely important both locally and internationally. Locally they support the livelihoods of indigenous people who depend on forest plants for food, medicines, income and ecosystem services (Lulandala, 1998). However, it is certain that the Uluguru Mountain's indigenous forest has increasingly been

subjected to tremendous resource use pressures, which seriously threaten its sustainability and even its existence (Lulandala, 1998). For example, the mountains were once densely forested but to date due to human influence, most of the forests are gone and only about 279 $km^2$ of the forests are thought to remain (Fjeldsa *et al.*, 1995).

Although the fate of tropical forests and indigenous people has recently attracted considerable popular interest, yet paradoxically the pace of research into the indigenous plant uses has received less attention (Phillips & Gentry, 1993). As a result the uses and ethnobotanical aspects of plants in Tanzania have not been adequately documented and in terms of conservation, it is important to determine which species are used and whether over-utilization may be occurring (Luoga *et al.,* 2000). Therefore, this study aimed at ascertaining the local people's knowledge of and reliance on plant species as an important step towards sustainable environmental conservation.

## MATERIAL AND METHODS

### Sampling and data collection

Structured questionnaire interviews were administered to the heads of 94 randomly chosen households representing a sampling intensity of 5% in the four villages. The villages were purposively selected basing on proximity to the forest reserve and accessibility.

With regard to the uses of various plant species, data were collected from Catholic Mission Forest Reserve. Thirty 400 $m^2$ plots (20 x 20 m) were surveyed. In each plot a group of four villagers from the four study villages were involved in identifying and providing ethnobotanical information on arborescent species (trees and shrubs). Each act of interviewing a local person on one day about the local name and uses of one species was classified as an event. If the species was encountered more than once in a single day, the person's responses were combined (Phillips & Gentry, 1993).

### Data analysis

Data from the households' interviews were analyzed using descriptive statistics generated by Statistical Package for Social Sciences (SPSS) computer software. The use values were defined as: $UV_{is} = \sum U_{is} / n_{is}$ where $UV_{is}$ stands for the use-value attributed to a particular species (s) by one informant (i), n stands for total number of informants and $\sum$ stands for summation. In order to estimate the overall use value of each species, the following definition was adopted: $UV_s = \sum_i UV_{is} / n_s$ where $n_s$ equals the number of informants interviewed for species and $UV_s$ equals the overall use value (Phillips & Gentry, 1993). Species' use values were ranked according to their magnitudes. However, in case of species with similar use values, their use values were tied (Zar, 1999). The non-parametric Kruskal-Wallis test was employed to ascertain whether or not there was any significant difference among the overall species use values.

## RESULTS AND DISCUSSION

Table 1 represents data on tree and shrub species with their respective use values, ranks and main uses. Of the identified plant species, 92% were used for fuel wood. About 84% of the

respondents used firewood as the main source of energy. The source of fuel wood was found to be from both general land and forest reserve. This dependency on firewood as the main source of fuel energy has brought about the removal of too much vegetation cover in the area. Kaale (1994) reported that removal of too much vegetation cover to meet wood fuel demands threatens the very land, water base and food production, consequently locks local people into soil deterioration and environmental degradation.

*Table 1. The trees and shrubs commonly used by the local communities in Uluguru Mountains and their corresponding use values, ranks of their preferences and their various uses (Fi=Firewood; Me=Medicine; Wp=Wall pole; Rp=Roof pole; Ti=Timber; Fr=Frame; Th=Thatch; Ro=Rope; Do=Domestic; Fo=Food).*

| Species | Local name | Use value | Rank | Main uses |
|---|---|---|---|---|
| *Piper capense* L. | Ludaha | 0.08 | 1.0 | Me |
| *Anthocleista grandiflora* Gilg. | Mngua | 0.17 | 2.5 | Fi, Ro |
| *Oxyanthus speciosus* DC. | Mbuni mwitu | 0.17 | 2.5 | Fi, Wp, Do |
| *Lasiodiscus usambarensis* Engl. | Mkole/mkamate | 0.19 | 4.0 | Fi, Rp |
| *Alchornea cordata* (A.Juss.) Mŭll.Arg | Kibandu | 0.23 | 5.0 | Fi, Wp, Th |
| *Mesogyne insignis* Engl. | Kibagamwivi | 0.38 | 6.5 | Fi, Rp, Ro |
| *Quassia undulata* (Guill. & Perr.) D.Dietr. | Mbwendele | 0.38 | 6.5 | Fi, Rp, Me |
| *Dodonaea angustifolia* L.f. | Mhangehange | 0.42 | 8.5 | Fi, Me, Do |
| *Syzygium guineense* (Willd.) DC. | Msalazi | 0.42 | 8.5 | Fi, Wp, Rp, Fr, Ti |
| *Sapium ellipticum* (Krauss) Pax | Chilengolengo | 0.46 | 10.0 | Fi, Wp, Rp |
| *Uvaria welwitschii* (Hiern) Engl. & Diels | Msambwa mwitu | 0.53 | 11.0 | Fi, Wp, Ti |
| *Rauvolfia mannii* Stapf | Chisungumili | 0.58 | 13.0 | Fi, Me, Fo |
| *Trilepisium madagascariensis* DC. | Mzugu | 0.58 | 13.0 | Fi, Me, Rp |
| *Voacanga africana* Stapf | Mlengwelengwe | 0.58 | 13.0 | Fi, Me, Fo |
| *Alangium platanifolium* (Siebold & Zucc) Harms | Msenze | 0.75 | 16.5 | Fi, Wp, Rp, |
| *Combretum molle* G.Don | Mlama | 0.75 | 16.5 | Fi, Rp, Ti, Fr, Do |
| *Ocotea usambarensis* Engl. | Mseli | 0.75 | 16.5 | Fi, Wp, Rp, Ti |
| *Rothmannia longiflora* Salisb. | Msewe | 0.75 | 16.5 | Fi, Me, Wp, Fr, Ro |
| *Allanblackia ulugurensis* Engl. | Mkani | 0.79 | 19.0 | Me, Wp, Fo, Do |
| *Alsodeiopsis schumannii* Engl. | Mkalanga mwitu | 0.88 | 20.0 | Fi, Me, Wp, Rp, |
| *Strombosia scheffleri* Engl. | Msangana | 0.92 | 21.0 | Fi, Wp, Rp, Ti |
| *Cephalosphaera usambarensis* (Warb.) Warb. | Mtambara | 1.0 | 22.0 | Fi, Wp, Rp, Ti, Fr |
| *Synsepalum dulcificum* (A.DC..) Daniell | Mkumburu | 1.01 | 23.0 | Fi, Me, Wp, Ro, Fo |
| *Rauvolfia volkensii* (K.Schum.) Stapf | Mlolo | 1.11 | 24.0 | Fi, Wp, Rp, Ti |
| *Myrianthus arboreus* P.Beauv. | Mkwagaya | 1.19 | 25.0 | Fi, Me, Do |
| *Lasianthus kilimandscharicus* K.Schum | Mbambalamwezi | 1.24 | 26.0 | Fi, Wp, Me, Ro |
| *Podocarpus usambarensis* Pilg. | Muanziri | 1.31 | 27.0 | Fi, Rp, Ti, Ro, Do |
| *Macaranga capensis* (Baill.) Sim | Mkaranga/Mgila | 1.55 | 28.0 | Fi, Wp, Rp, Ti, Do |
| *Harungana madagascariensis* (Lam. ex Poir.) | Mtunu | 1.64 | 29.0 | Fi, Rp, Me, Ro, Do |
| *Parinari excelsa* Sabine | Mngama | 1.67 | 30.0 | Fi, Wp, Rp, Ti, Fr |
| *Trichilia jubensis* Chiov. | Mdulu | 1.83 | 31.0 | Fi, Wp, Rp, Ti, Fr, Th |
| *Vitex micrantha* Gŭrke | Mfuru | 2.10 | 32.0 | Wp, Rp, Th, Ro, Fr |
| *Albizia gummifera* (J.F.Gmel.) C.A.Sm. | Mkenge | 2.22 | 33.0 | Fi, Rp, Ti, Fr, Ro |
| *Bridelia micrantha* (Hochst.) Baill. | Mwiza | 2.25 | 34.5 | Fi, Wp, Rp, Fr, Th, Ro |
| *Isoberlinia scheffleri* (Harms) Greenway | Mtondoro | 2.25 | 34.5 | Fi, Wp, Rp, Ti, Fr, Th |
| *Newtonia buchananii* (Baker f.) G.C.C.Gilbert & Boutique | Mkuvi | 2.81 | 36.0 | Fi, Wp, Ti, Ro, Do, Fo |

In case of the constructional purposes, plant species which a part from having other uses, were also found being used for construction constituted about 83% of all the identified species. Some of these plants include *Newtonia buchananii, Albizia gummifera, Trichilia jubensis* and *Macaranga capensis* which were famous in timber and building poles production. Other observations also showed that the Eastern Arc Mountains provide building materials to the surrounding communities (Ruffo, 1989).

Some of indigenous tree species that produce edible fruits and fat in the area include *Allanblackia uluguruensis*, *Alsodeiopsis schumannii, Rauvolfia mannii* and *Voacanga africana*. Results from a number of studies (Campbell, 1987; Juma, 1989; Ngulube, 1995) show that rural dwellers depend on wild fruits for food. Iddi (1998) reported that fruits are an important source of essential vitamins and minerals for the rural communities.

About 39% of the identified plants were used for traditional healing. The common tree species mentioned include *Anthocleista grandiflora* whose roots were used for diarrhoea and leaves for malaria, whereas the leaves of *Harungana madagascariensis* were applied to stomach-aches and the barks of *Sapium ellipticum* were used as anti-virals. In Mwanza, Makonda *et al.* (1999) reported that 49.3% of all species identified in Geita were used as medicine. Hamilton & Bensted-Smith (1989) reported that 34% of all plant species in the East Usambara were used as medicine.

Villagers in the study area could hardly access few modern medical services available at Kinole (Tandai village) and Tegetero village due to the distance and financial implication. The policy of cost sharing in medical services has made many people to refrain from visiting hospitals (Makonda *et al.,* 1999). This is a suggestive evidence for high dependency on trees and shrubs for medicinal purposes in the area. Otieno *et al.* (2001) argued that forest plants have been a good source of products with medicinal values (leaves, roots, fruits, etc.).

About 25% of the plant species surveyed in the study area were used for domestic items. Among them, *Uvaria welwitschii* catered for hair combs, *Syzygium guineense* for pestles and *Newtonia buchananii* for drums, chairs, beds and tables and *Oxyanthus speciosus* for spoons and tool handles.

The identified useful plant species were ranked for their use values. *Newtonia buchananii* ranked the highest with a rank of 36 and use value of 2.81 followed by *Isoberlinia scheffleri* and *Bridelia micrantha* both having the rank of 34.5 and use value of 2.25. *Piper capense* was ranked the least with a rank of 1 and use value of 0.08.

The use value ranks correspond to the number of uses and perceived value of a particular plant species. However, it is difficult to judge which species was the most useful because of the users' subjectivity. When using a criterion of use value, some species which actually are used frequently might fall out or be under-ranked simply because they have few uses relative to others (Makonda *et al.,* 1999).

The study showed the significant difference in use values among the species ($X^2 = 7.815$, $p < 0.05$ and $H_c = 16.585$). This reflects the respondents' degree of knowledge of different plant uses (Phillips and Gentry, 1993). Generally, local people know which tree species are best for building poles or good as fuel wood, which fruits are edible and which are good for medicine.

Since most of the identified plant species were observed to be exceptionally useful, their levels of utilization may far exceed their regeneration and production (Luoga *et al.*, 2000), thereby perpetuating further environmental devastation in the area.

Initiatives to curb environmental degradation should therefore take into consideration the local people's knowledge and use of different tree species in order to ensure their smooth adoption and fruitful output.

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