

Afromontane Rainforest on Malundwe Hill in Mikumi National Park, Tanzania

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ABSTRACT

On Malundwe Hill (07° 24' S, 37° 18' E) in Mikumi National Park, Tanzania, there is a 450-ha patch of Afromontane rainforest. This is currently the only area of the endemic-rich forests of eastern Tanzania to be protected by national park status.

INTRODUCTION

Mikumi National Park is located about 300 km west of Dar es Salaam in east central Tanzania. The park was established in 1964, primarily to conserve the large mammal populations centred on the Mkata River flood plain. In 1975 the park was extended in the north to include the Tendigo swamp, and southwards to cover a large area of upland, hilly miombo woodland to become continuous with the Selous Game Reserve. Its total area is now about 3300 km² (Fig. 1).

Malundwe Hill reaches 1275 m in altitude and is capped by closed canopy moist forest, its twin peaks clearly visible from the tarmac Tanzania to Zambia road which traverses the park. Access is only possible by foot, the journey taking about 4 h through broken country from the power line maintenance road south-east of Mikumi tourist lodge.

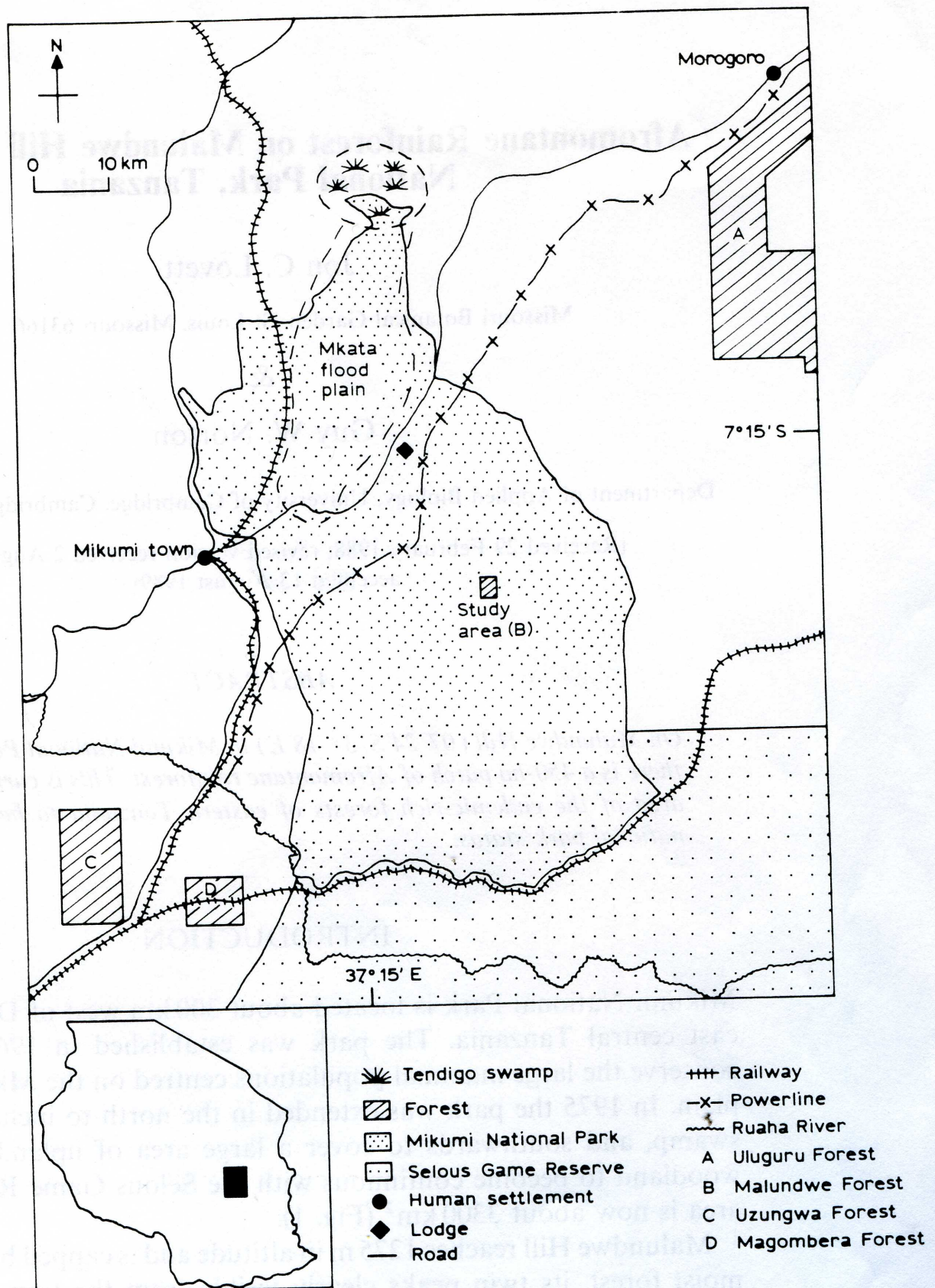


Fig. 1. The location of the Malundwe Hill study area within Mikumi National Park, Tanzania. Locations and park features mentioned in the text are shown. Borders around forests indicate area as estimated from Landsat images. Inset: location of area shown within Tanzania.

The inclusion of Malundwe Hill within the national park boundaries is highly significant as it is currently the only area of the endemic-rich montane forests of eastern Tanzania to be protected by national park status. The purpose of this paper is to draw attention to this fact and to give a brief description of the forest vegetation.

DESCRIPTION OF THE VEGETATION

Throughout this vegetation description the phytogeographic system of African vegetation classification used by White (1983) was followed and was found to work well. The park area has a single rainy season from November to May, peaking in April. At the park headquarters on the edge of the floodplain the 20-year average annual rainfall was 842 mm, with a mean annual temperature of 25.5°C (9-year mean) (Norton *et al.*, 1987). The moist forest cover on Malundwe Hill indicates a local annual rainfall of 1500 to 2000 mm.

Mikumi National Park lies within the Zambezian region, and three types of vegetation can be recognised (White, 1983). The seasonally inundated Mkata flood plain at 430 m above sea level (asl) is open grassland dominated by *Hyparrhenia filipendula* (Hochst.) Stapf with *Heteropogon contortus* (L.) Roem. & Schult., and *Themeda triandra* Forssk. Outside the floodplain there is Zambezian undifferentiated woodland with a rich tree flora including *Azelia quanzensis* Welw., *Kigelia africana* (Lam.) Benth., *Pseudolachnostylis maprouneifolia* Pax, *Pteleopsis mytrifolia* (Welw. ex C. Lawson) Engl. & Diels, *Sclerocarya birrea* (A. Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro, *Terminalia mollis* C. Lawson and *Xerroderris stuhlmannii* (Taub.) Mendonca & E. P. Sousa, with *Tamarindus indica* L. on termite mounds. Along the watercourses the woodland is more dense with large (20–30 m tall) *Cordyla africana* Lour., *Diospyros mespiliformis* Hochst. ex DC., and *Sterculia appendiculata* K. Schum. Smaller watercourse trees include *Strychnos madagascariensis* Poiret and *Tamarindus indica* L. Above about 700 m asl in the hilly country to the south and east of the floodplain the woodland changes to dry Zambezian miombo with the occurrence of *Brachystegia bussei* Harms, *Brachystegia spiciformis* Benth., *Pericopsis angolensis* (Baker) van Meeuwen, *Sterculia africana* (Lour.) Fiori, *Stereospermum kunthianum* Cham., and *Syzygium cordatum* Hochst. by waterholes at higher altitudes. The open nature of both the undifferentiated and miombo woodland (*sensu* White, 1983) may reflect the high density of large mammals. Outside the park boundary similar vegetation is much more dense.

The closed canopy moist forest on Malundwe Hill has a canopy height of 20–30 m with emergents approaching 40 m tall. It is Afromontane rainforest

TABLE 1
Notable Species Observed on Sample Plots

Large trees over 10 m

- Afroseralisia cerasifera* (Welw.) Aubrev.
Aningeria adolfi-friedericii (Engl.) Robyns & Gilbert
Annonaceae sp.
Antidesma vogelianum Muell. Arg.
Bersama abyssinica Fres. subsp. *abyssinica*
Chrysophyllum gorungosanum Engl.
Diospyros amaniensis Guerke
Drypetes usambarica (Pax) Hutch. var. *trichogyna* A. R. Smith
Ficus sur Forssk.
Funtumia africana (Benth.) Stapf
Isoblerlinia scheffleri (Harms) Greenway
Maytenus acuminata (L.f.) Loes
Myrianthus holstii Engl.
Newtonia buchananii (Baker) Gilb. & Bout.
Ochna holstii Engl.
Odyndea zimmermannii Engl.
Parinari excelsa Sabine
Rawsonia reticulata Gilg.
Sorindeia madagascariensis DC
Strombosia scheffleri Engl.
Syzygium guineense (Willd.) DC. subsp. *afromontanum* F. White
Teclea nobilis Del.
Vitex sp.

Small trees and shrubs

- Brucea tenuifolia* Engl.
Carralhoa campanulata K. Schum.
Chionanthus mildbraedii (Gilg. & Schellenb.) Stearn
Clausena anisata (Willd.) Benth.
Clerodendrum schliebenii Mildbr. var. *cephalanthum* (Oliv.) Huber
Dicranolepis usambarica Gilg.
Maytenus undata (Thumb.) Blakelock
Pauridiantha paucinervis (Hiern) Bremek. subsp. *holstii* (K. Schum.) Verdc.
Pavetta = Lynes Fr. 63
Peddiea lanceolata Domke
Rinorea angustifolia (P. Th.) Baill.
Rinorea ferruginea Engl.

Lianes and climbers

- Agelaea heterophylla* Gilg.
Culcasia falcifolia Engl.
Raphiostylis beninensis (Planch.) Benth.
Toddalia asiatica (L.) Lam.

Herbs

- Afraramomum* sp.
Dietes iridioides (L.) Sweet ex Klatt
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TABLE 1—contd.

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|---|
| <i>Dracaena laxissima</i> Engl. |
| <i>Isoglossa</i> sp. |
| <i>Piper capense</i> L.f. |
| <i>Piper umbellatum</i> L. |
| <i>Pseuderathemum tunicatum</i> (Afzel.) Milne-Redh. |
| <i>Polystachya isochiloides</i> Summerh. (epiphyte) |
| <i>Rhipsalis baccifera</i> (J. Mill.) Stearn (epiphyte) |

and is surrounded by dry Zambezian miombo with the present-day forest edge probably maintained by the fires which sweep the park each year. The northern and southern edges of the forest are at 1000–1100 m asl, but extend down to 800–900 m asl on the eastern slopes which face the prevailing rain-bearing winds. There are two main continuous forest patches on the twin peaks of Malundwe with horizontal areas of 3.45 km² and 1.15 km², giving a total of 3.97 km² as estimated from Landsat photography. As much of the forest is on steep slopes its actual area is probably about 4.5 km².

In order to make an estimate of basal area and large tree species diversity in the forest, five objectively placed plots were surveyed, each of twenty trees of greater than or equal to 20 cm diameter at breast height. The total area of the plots was 5.3 ha in which the basal area of the trees enumerated was 21.5 m² or 40.6 m² ha⁻¹. Of the 100 trees assessed, 41 were different species. Notable tree and herb species sampled on the plots are listed in Table 1.

DISCUSSION

The moist forests on the ancient crystalline mountains of eastern Tanzania and south-east Kenya from the Teita Hills to the Uzungwa Mountains are remarkable in that they contain a very high number of endemic species (Lovett, 1988). They are floristically similar, and so have been considered to be part of a group termed the 'Eastern Arc' (Lovett, 1988). The high level of endemism in the forests can be attributed to their isolation from the extensive Guineo–Congolian forests since the Miocene, due to an arid corridor running from the Horn of Africa to the Kalahari desert and currently represented in its northern half by the Somalia–Masai phytogeographic region. This forms an effective barrier to the dispersal of moist forest species from the easternmost extension of the Guineo–Congolian region at Lake Victoria to the Eastern Arc mountains.

Malundwe Hill is half-way between two large mountain areas of the Eastern Arc group with extensive forest cover—the Uluguru to the north (Pocs, 1976), and the Uzungwa to the south (Rogers & Homewood, 1982;

Lovett *et al.*, in press)—and is a similar distance from the lowland moist forest at Magombera (Rogers & Homewood, 1982). Apart from the 450-ha University Forest Reserve at Mazumbai in the West Usambara mountains (Redhead, 1981), it is the only patch of Eastern Arc forest to be strictly protected. Other forest areas within national parks in Tanzania are either on volcanic soils and so relatively recent in origin and comparatively species-poor (Kilimanjaro and Arusha), or of different phytogeographical affinity (Mahali). However, there is a proposal to create a new national park area in the northern Uzungwa mountains specifically for moist forest conservation (Rogers & Homewood, 1982). This is currently being considered by the Tanzania National Parks Authority.

Mikumi National Park must rank as one of the most important of Tanzania's ten superb national parks for many reasons, including its diverse fauna and its accessibility to the public. The presence of the moist forest on Malundwe Hill further demonstrates the importance of the park and contributes to the biotic diversity protected by it.

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