

FINAL REPORT OF
PROJECT MOUNT NILO '95

A BIRD CONSERVATION PROJECT TO
THE EAST USAMBARA AND NGUU MOUNTAINS,
NORTHERN TANZANIA



MSITU NI UHAI

N. Seddon (ed.), D. R. Capper, J. M. Ekstrom, I. S. Isherwood,
R. Muna, R. G. Pople, E. Tarimo and J. Timothy.

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Forest is life

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November 1995

Cover illustration: Moreau's Sunbird *Nectarinia moreaui*

All illustrations by Christine Isherwood

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1.1 Summary

In July-October 1995, Project Mount Nilo '95, a conservation expedition organised from the University of Cambridge, U.K., surveyed forest birds and mammals in northern Tanzania. The project assessed the ecological requirements and threats to the survival of restricted-range and globally Threatened bird species in remnant patches of submontane forest. Four sites were surveyed: Lutindi and Kilanga in Mount Nilo Catchment Forest Reserve in the East Usambara Mountains, and Gombero and Luago in Nguru North Catchment Forest Reserve in the Nguru Mountains. The project was formulated and carried out in close consultation with the East Usambara Catchment Forestry Project and the Wildlife Conservation Society of Tanzania.

In the East Usambara Mountains, a total of 91 species of birds and nine species of mammals were recorded. The birds recorded included four globally Threatened species (Usambara Eagle Owl *Bubo vosseleri*, Banded Green Sunbird *Anthreptes rubritorques*, Amani Sunbird *Anthreptes pallidigaster*, and Usambara Weaver *Ploceus nicolli*), and two Near-threatened species (Southern Banded Snake Eagle *Circaetus fasciolatus* and Fischer's Turaco *Tauraco fischeri*). Of the mammals, two are considered to be globally Threatened (Black-and-Rufous Elephant Shrew *Rhynchocyon cirnei* and Tree Hyrax *Dendrohyrax validus*).

In the Nguru Mountains, 97 species of birds and 20 species of mammals were recorded. Of the birds, two species are globally Threatened (East Coast Akalat *Sheppardia gunningi* and Banded Green Sunbird), and two are Near-threatened (Southern Banded Snake Eagle and Moreau's Sunbird *Nectarinia moreaui*). The mammal records included two globally Threatened species (Black-and-Rufous Elephant Shrew and Tree Hyrax).

The presence of such species highlights the importance of the reserves to the national and international scientific and conservation communities. However, in both mountain ranges, much submontane forest remains unprotected and even that within the reserves is subject to degradation. There is an urgent need for an effective long-term conservation programme, not only to help secure the survival of these Threatened species, but also to preserve the catchment forest on which many local people ultimately depend for water. We recommend that Mount Nilo and Nguru North Catchment Forest Reserves should be considered for designation as Important Bird Areas, and suggestions for their future management are presented in this report.

1.2 Kiswahili summary

Katika kipindi cha kati ya Julai hadi Oktober 1995, mradi wa hifadhi ya mlima Nilo 1995, unaoongozwa na chuo kikuu cha Cambridge - Uingereza, ulifanya uchunguzi kuhusu ndege na wanyama katika maeneo ya kaskazini mwa Tanzania. Mradi ulifanya tathmini ya mahitaji ya kimazingira na tishio la kutoweka kwa jamii za ndege wachache zaidi ulimwenguni, waliobakia katika baadhi ya sehemu za mapori na msitu ya milimani. Maeneo manne yalitembelewa. Lutindi na Kilanga katika hifadhi ya vyanzo vya maji ya Mlima Nilo iliyopo mashariki ya milima ya usambara, na maeneo ya Gombero na Luago yaliyopo hifadhi ya Nguru kaskazini katika milima ya Nguu. Mradi huu ulibuniwa na kufanya kazi kwa ushirikiano wa karibu sana na mradi wa hifadhi vyanzo vya maji na misitu wa Usambara mashariki na chama cha kuhifadhi wanyamapori, mimea na mazingira - Tanzania.

Katika milima ya Usambara mashariki, jumla ya jamii 91 za ndege na 9 za wanyama zilirekodiwa. Katika hizo, jamii nne za ndege zinakabiliwa na tishio la kutoweka kabisa ulimwenguni (Usambara Eagle Owl *Bubo vosseleri*, Banded Green Sunbird *Anthreptes rubritorques*, Amani Sunbird *Anthreptes pallidigaster*, and Usambara Weaver *Ploceus nicolli*), na jamii mbili nyingine zinakaribia kukabiliwa na (Southern Banded Snake Eagle *Circaetus fasciolatus* and Fischer's Turaco *Tauraco fischeri*) tishio hilo. Jamii mbili za wanyama (jamii ya mbelele *Dendrohyrax validus* na jamii ya sungura msitu *Rhynchocyon cirnei*) pia zinakabiliwa na tishio la kutoweka.

Katika milima ya Nguu, jamii 97 za ndege na jamii 20 za wanyama zilirekodiwa. Mbili kati ya jamii ya ndege (East Coast Akalat *Sheppardia gunningi* and Banded Green Sunbird *Anthreptes rubritorques*) zinakabiliwa na tishio la kutoweka, na mbili (Southern Banded Snake Eagle *Circaetus fasciolatus* and Moreau's Sunbird *Nectarinia moreaui*) zinakaribia kukabiliwa na tishio hilo. Katika wanyama, jamii mbili (jamii ya mbelele *Dendrohyrax validus* na jamii ya sungura msitu *Rhynchocyon cirnei*) zinakabiliwa na tishio la kutoweka.

Kuwepo kwa jamii kama hizo kunaonyesha umuhimu wa hifadhi hizo kwa taifa, jumuiya ya kisayansi ya kimataifa na jumuiya nzima ya mashirika ya hifadhi. Hata hivyo, sehemu kubwa ya mapori katika misitu ya milima yote rniwili haina ulinzi, na hata maeneo yaliyopo chini ya hifadhi bado yanakabiliwa na uharibifu. Kuna umuhimu wa lazima kuwa na mpango mzuri wa muda mrefu sio tu kwa kulinda jamii za ndege na wanyama zinazokabiliwa na tishio la kutoweka, bali hata kulinda na kutunza vyanzo vya maji katika misitu hiyo, vyanzo ambavyo ni mategemeo ya wananchi wengi wa maeneo hayo.

Tunapendekeza miradi ya hifadhi vyanzo vya maji katika mlima Nilo na milima Nguru kaskazini ifikiriwe kama maeneo ya ndege muhimu. Mapendekezo ya utawala wa siku za usoni yameambatanishwa katika taarifa hii.

2. Conventions

Nomenclature and taxonomy for birds follows Britton (1980), and systematic order is taken from Dowset and Dowset-Lemaire (1993). For species of conservation interest, Collar *et al.* (1994) and Stattersfield *et al.* (in prep.) is followed. Nomenclature and taxonomy follow Kingdon (1971-82) for mammals.

Terminology

The following terms are used to describe status and range of the bird species discussed.

Threatened: defined by Collar *et al.* (1994) as species considered to be in danger of extinction.

Near-threatened: defined by Collar *et al.* (1994) as species which are apparently not (yet) seriously in danger of global extinction, but whose status gives cause for concern.

Critical: defined by IUCN (Mace and Stuart 1994) as taxa facing an extremely high risk of extinction in the wild in the immediate future.

Vulnerable: defined by IUCN (Mace and Stuart 1994) as taxa which, while not Critical or Endangered, face a high risk of extinction in the wild in the medium-term future.

The following terms are used to describe status of the mammal species discussed.

Rare: defined by IUCN (Groombridge 1993) as a taxa with small world populations that are at risk of extinction. These taxa are usually localised within restricted geographical areas or habitats, or are thinly scattered over a more extensive range.

Indeterminate: defined by IUCN (Groombridge 1993) as a taxa which are known to be at risk of extinction, but where there is not enough information to say what the degree of threat is.

CITES Appendix I: lists species currently threatened with extinction and in which virtually all international trade is banned.

CITES Appendix II: lists species that are not currently threatened with extinction but may become so unless trade is strictly regulated.

CITES Appendix III: lists species that are subject to regulation within the jurisdiction of a Party and for which the cooperation of Parties is needed to restrict or prevent their exploitation.

Endemic: describes a species which is restricted to a defined geographic area.

Endemic Bird Area (EBA): defined by ICBP (1992) as an area to which two or more restricted-range species (*qv*) are confined.

Restricted-range species: defined by ICBP (1992) as a species with a total global range of 50,000 km² or less.

Eastern Arc Mountains EBA: comprises the chain of isolated mountain ranges, rising to over 2000 m, which runs southwards from the Usambara Mountains in north-east Tanzania to north and central Malawi, north Mozambique and extreme north-east Zambia (Stattersfield *et al.* in prep.).

Field-hour: one hour of field observation carried out either by one person or a group working together.

Net-hour: the operation one 18 m four-panel mist-net for one hour.

Estimates of abundance

The following subjective estimates of abundance were made for all bird species. They offer some guide to the relative status of a species in a given area.

Abundant: regularly recorded in large numbers.
Common: recorded fairly regularly in small numbers.
Uncommon: recorded on several occasions, but not regularly.
Rare: recorded on very few occasions.

Habitat description

Table 1: Classification of forest types following Lovett (1993)

Forest type	Altitude (m)	Rainfall (mm rain year ⁻¹)
Dry lowland:	< 800	1000-1500
Lowland:	<800	>1500
Submontane:	800-1400	>1500
Montane:	1200-1800	>1200
Upper montane:	>1800	>1200
Dry montane:	>1500	1000-1200

Intact forest: habitat not recently influenced significantly by human activity.

Secondary forest: habitat in which vegetation has regrown after heavy disturbance, either natural (eg. landslides) or unnatural (eg. clearance by man). It is characterised by a dense herbaceous cover and fast growing, light demanding species such as *Macaranga* spp.

Degraded forest: habitat which has been subject to human interference through logging, burning, livestock grazing or crop cultivation.

Miombo woodland: fairly arid habitat subject to long dry seasons, comprising small, well-spaced trees including *Brachystegia* spp., *Julbernardia globiflora* and *Pterocarpus angolensis*.

Public land: unprotected land outside the Catchment Forest Reserves which belongs to no-one specifically, and in which cultivation, livestock grazing, logging, and pole collecting are permitted.

The following terms were used to describe the abundance of important components of the floral community.

Abundant: >20% of the total vegetation	Rare: <1% of the total vegetation
Frequent: 5-20% of the total vegetation	Absent: 0% of the total vegetation
Occasional: 1-5% of the total vegetation	

Abbreviations

CFP: Catchment Forest Project.

CFR: Catchment Forest Reserve.

CITES: Convention on International Trade in Endangered Species.

COSTECH: Tanzanian Commission for Science and Technology.

dbh: diameter at breast height.

ICBP: International Council for Bird Preservation (now BirdLife International).

IUCN: International Union for the Conservation of Nature and Natural Resources.

Tsh: Tanzanian Shilling (\$1= Tsh 612).

WCST: Wildlife Conservation Society of Tanzania.

3. Introduction

The Eastern Arc Mountains

The montane forests of East Africa harbour a rich and unique biological community. The Eastern Arc Mountains are thought to have been a refugium for the forest during the driest periods of the Pleistocene (Stattersfield *et al.* in prep.). They comprise an archipelago of isolated habitats, and hence represent an evolutionary situation analagous to that of oceanic islands such as the Galapagos: their isolation and relative stability over a long period of evolutionary time has enabled the persistence and differentiation of relict populations, leading to high levels of endemism. This has been well demonstrated in birds, and these areas have been identified as biodiversity "hot-spots", known as Endemic Bird Areas (ICBP 1992). As well as supporting a rich endemic flora and fauna which represent a unique genetic resource, the Eastern Arc Mountains provide refuge for less restricted species which are nonetheless globally threatened with extinction. Thus, not only are the Eastern Arc Mountains of great importance in terms of African biogeography, but they are also of immense global scientific and conservation significance.

Conservation of forest in Tanzania

The forests of the Eastern Arc Mountains have been exploited by man for 2000 years, but since the mid-1960s there has been a major assault on the submontane forests through a big expansion of subsistence agriculture, and large-scale logging operations for sawmills and pit-sawyers (Hamilton 1989). Therefore there has been rapid deforestation and habitat degradation. While great emphasis has been placed on the conservation of large mammals and their lowland savanna habitat in Tanzania, the protection of montane forest has been relatively limited. However, these forests are of fundamental importance, not only in terms of their biodiversity and their value as a genetic resource, but as environmental buffers, as catchments for water, and as sources of timber and other forest products on which local people depend.

There is only one National Park protecting submontane forest in eastern Tanzania: Udzungwa National Park, which was only established in 1992. The critically important forests of, for example, the Usambara, Uluguru and Nguru Mountains only have Catchment Forest Reserve status. While the setting up of these reserves has arguably made the most significant contribution to forest conservation in Tanzania, CFR status does not sufficiently protect the forest from resource exploitation and manipulation (Rodgers 1993).

The Nguu and East Usambara mountains and their avifauna

The Nguus and East Usambaras are two semi-isolated ranges in the Eastern Arc Mountains. The biological importance of the East Usambaras is well documented, having first been brought to international attention by the works of Barbour and Loveridge (1928), Moreau (1935) and more recently by Stuart and van der Willigen (1979). They possess one of the most diversified floras and faunas in the world, and together with the West Usambaras, levels of endemism found are 85% in millipedes, 70% in chameleons, 30% in amphibians (the highest level in Africa), and 5% in birds (Homewood and Rodgers 1982).

Birds are good indicators of biodiversity because they are widely distributed, and have diversified in most areas and habitats in the world, and their taxonomy and distribution are well known. It has been demonstrated that there is a high degree of congruence between patterns of endemism for birds and for other taxa (ICBP 1992).

The Eastern Arc Mountains EBA (C24), supports 29 restricted-range bird species of which 25 are endemic to the EBA, including the monotypic endemic genera *Modulatrix* and *Scepomycter* (Stattersfield *et al.* in prep.) Collar *et al.* (1994) list nine of these restricted-range species as Threatened and two as Near-threatened. Of those species listed as Threatened, five are known from the East Usambaras.

While the avifauna of the East Usambara lowlands was recently surveyed by the Cambridge Tanzanian Rainforest Project (1994), that of the highlands is poorly known. At 1506 m, Mount Nilo is the highest peak in the East Usambaras, and Mount Nilo CFR contains the least-studied submontane forest in the range: Moreau visited the area briefly in 1931 (Sclater and Moreau 1932-33), and Cordeiro and Kiure (in prep.) conducted a ten day survey in 1994. For the Nguu Mountains, prior to our visit in 1995, there was no avifaunal information (N. Baker *in litt.* 1994).

Project Mount Nilo '95

Project Mount Nilo '95, an undergraduate conservation project from the University of Cambridge, U.K., spent July-October 1995, surveying the birds and mammals of two CFRs in northern Tanzania: Mount Nilo CFR in the East Usambara Mountains and Nguru North CFR in the Nguu Mountains. The project focused on assessing the conservation status and ecological requirements of restricted-range bird species (ICBP 1992) and those listed as globally Threatened and Near-threatened by Collar *et al.* (1994) in these two areas.

The project comprised the following members:

- Nathalie Seddon (Leader)
Newnham College, Cambridge CB3 9DF, U.K.
- David Capper (Treasurer)
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- Jonathan Ekstrom (Food and equipment officer)
Selwyn College, Cambridge CB3 9DQ, U.K.
- Isabel Isherwood (Logistics and sound recordist)
Queens' College, Cambridge CB3 9ET, U.K.
- Raymond Muna
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- Robert Pople (Medical officer and photographer)
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- Jonas Timothy
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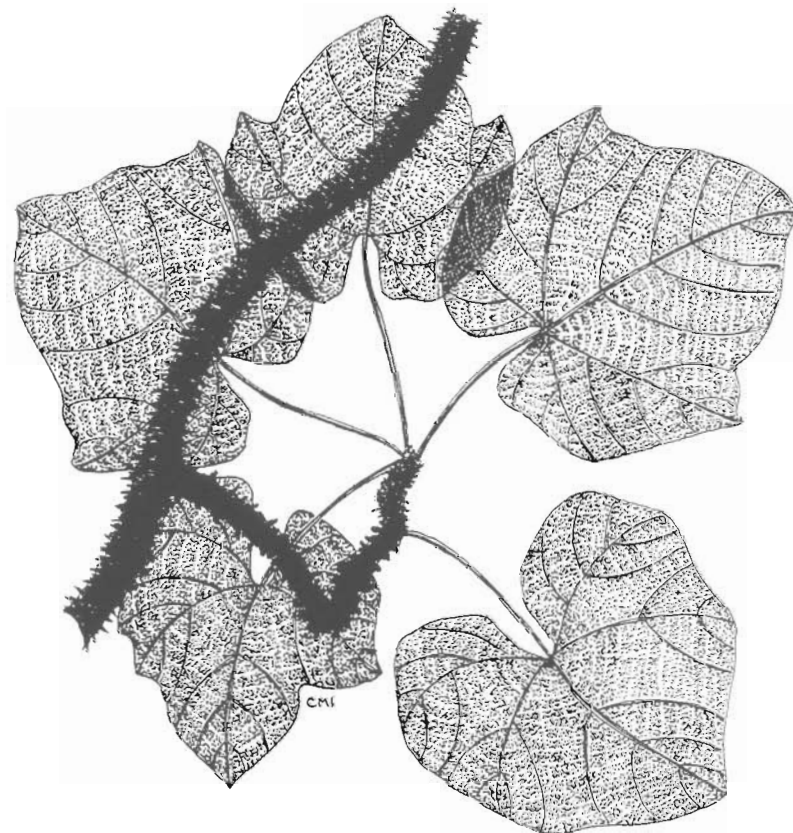
The fieldwork was conducted with the assistance and support of WCST, the East Usambara CFP and the Tanga CFP. The former will be including the data collected in the Important Bird Area project over the next two years, and the latter two will be considering the project's recommendations for incorporation into their management plans.

Sites surveyed in 1995

Table 1 gives the sites, dates, habitats (following Lovett 1993) and altitudes at which fieldwork was carried out. Detailed descriptions of the study sites are given in section 5, the locations of these sites are given in figures 1-3, and the fieldwork effort at each site is given in Table 2.

Table 1. Summary of study sites

Site	Dates	Habitat	Altitude (m)	
East Usambaras:	Lutindi	4 July-19 July	Submontane forest	1200-1500
			Forest edge/cultivated land	700-1200
	Kilanga	20 July-31 July	Submontane forest	800-1030
			Forest edge/secondary forest	700-800
Nguus:	Gombero	11 August-25 August	Submontane forest	1000-1550
			Forest edge/cultivated land	1000
	Luago	28 August-8 September	Submontane forest	1140-1300
			Forest edge/secondary forest	1000-1100



4. Methodology

Field observations

Intensive field observation of birds was the primary bird survey method at each study site. Nocturnal observations were performed using Petzl headlamps and a Maglite torch. For each observation data collected included: species, number of individuals, age, sex, flocking behaviour, foraging behaviour, altitude, location and habitat. All this information was systematically documented. Field observations were used to provide an encounter rate (number of birds recorded per field-hour), which can be used to compare bird population densities. Appendix I gives the encounter rates in forest and in forest-edge for species recorded at each site. Species-discovery curves were plotted as fieldwork progressed to provide an indication of the completeness of the avifaunal inventory at each site.

Identification was facilitated through the use of *African Handbook of Birds: the birds of Eastern and North-eastern Africa* (Mackworth-Praed and Grant 1962); *Birds of East Africa* (Britton 1980); *The Birds of Africa* (Brown *et al.* 1982, Urban *et al.* 1986, Fry *et al.* 1988, Keith *et al.* 1992), *Birds of Southern Africa* (Sinclair *et al.* 1993), and *East African Mammals: An Atlas of Evolution in Africa* (Kingdon 1971-1982). The location of many species was enabled by knowledge of songs and calls, which were learnt quickly at the start of fieldwork, aided by the use of pre-recorded tapes such as *Birds of the African Rainforests* (recorded by S. Keith).

Various supplementary techniques were used in addition to field observations. Breaks in the canopy were used to provide observation points for birds such as raptors and hornbills, while fruiting and flowering trees were located and visited frequently for observation of birds such as turacos and sunbirds. Mixed-species flocks were located and observed for as long as possible, and details on their composition and the behaviour of their members were systematically recorded.

During informal conversations with local people, using illustrated field guides and notebook sketches, the distribution and status bird and mammal species was discussed.

Mist-netting

Ten 18 m mist-nets were placed in a variety of micro-habitats at each of the four sites, to help to locate elusive, ground-dwelling and nocturnal species.

Standard biometric data (age, sex, weight, wing, bill and tarsus lengths) and photographs were taken of all birds caught. All measurements were taken using butt-ended rulers and spring balances to the nearest 0.5 mm and 0.5 g respectively. Wing-lengths were measured by maximum chord, and bill measurements were taken from the bill tip to the skull. Sexing and ageing of birds was based on plumage where possible, but it should be noted that the majority of birds were in fresh plumage and no attempt was made to age birds using moult data, nor to sex birds by cloacal protuberance. Birds were marked either by clipping c.5 mm off a tail feather, or by ringing, using rings supplied by WCST. Full in-hand descriptions were also taken for many birds.

A total of 604 birds representing 40 species were caught, of which 74 were retraps. Mist-net data are given in Appendix III, and biometric data are given in Appendix IV.

Photography

Photographs were taken of birds in the hand, and where possible, of birds and mammals in the field, for publicity and identification purposes. Appendix V lists all species photographed. In addition, vegetation was photographed to help with plant identification and to permit more accurate descriptions of the micro-habitats found at each site.

Sound-recording

Sound-recording and playback were carried out using a Marantz CP430 tape recorder and a Sennheiser ME66 directional microphone, on loan from British Library of Wildlife Sounds (BLOWS). Special effort was made to record species of conservation interest. At each site several recordings of the entire dawn chorus were made and subsequently analysed. The species recorded thus were systematically documented. The 35 species recorded are listed in Appendix VI and the tapes have been deposited at BLOWS. Using both pre-recorded tapes and recordings made in the field, playback was also used to locate shy species.

Timed species counts

Timed species counts (following J. Fjeldså *in litt.* 1995) were used to survey bird populations in the Nguu Mountains. The procedure is suitable for use in montane forest habitats with steep slopes and dense undergrowth in which it is difficult to move quietly, and bird detectability decreases sharply at 30-50 m from the observer. Counts were carried out for 10 mins in 25 independent 1 ha plots at each of the two Nguu sites. Counts were conducted in the mornings, and only birds within the predefined area were recorded. This data is still being analysed and the results will be presented elsewhere.

Site descriptions

Altitude was measured using a Thommen Classic pocket altimeter. Basic vegetation descriptions were made by estimating percentage cover for the canopy, sub-canopy, mid-storey, and field-layer. In addition, canopy height, average and maximum dbh, slope and aspect were also estimated. Plant samples were collected from the forest, taken to villages and local tribal names were obtained. These were later translated at the Tanga CFP office. Particular attention was paid to those plants on which birds were seen feeding. The abundance of plant species, genera and floral groups such as epiphytes, lianes, bamboo, moss and lichen, were described as abundant, frequent, occasional, rare or absent (see section 2 for the quantification of these terms). Where it was not possible to identify an important plant, samples and photographs were taken for later identification at the Tanga CFP office. People inhabiting the settlements close to the reserves were informally interviewed about the value of the forest to them (for supply of timber, poles, fuel and water), about how much forest they perceived to be remaining, and about the problems they recognized. In this way, the pressures being placed upon the forest were identified.

Effort

The fieldwork effort is summarised in Table 2.

Table 2. Fieldwork effort at each site

Site	Diurnal field-hours:	Nocturnal field-hours:	Diurnal net-hours:	Nocturnal net-hours:	Timed species counts (mins):
Lutindi	329	11	440.5	26	-
Kilanga	268.5	12	202.5	12	-
Gombero	369	22	443	12	250
Luago	316.5	18	180	18	500

5. Site descriptions

Table 2 gives a summary of the sites visited and figures 1-5 show maps of the sites.

5.1 Mount Nilo Catchment Forest Reserve, East Usambara Mountains

Year of establishment: Mid-1930s

Location of reserve: 38°39'-38°40'S, 4°52'-4°55'E

Area: 2720 ha

Governing authority: East Usambara Catchment Forest Project (Tanga)

The Usambara Mountains are located in the the Tanga region of north-eastern Tanzania. Separated by the Lwengera valley, they divide into the East Usambaras and the considerably larger West Usambaras. The East Usambaras are a steeply scarped, deeply dissected plateau between 900 m and 1050 m with a peak (Mount Nilo) at 1506 m, while the more dissected and rugged West Usambaras lie mainly between 1200 and 2200 m with a peak (Hambayo) at 2250 m.

Mount Nilo CFR comprises three areas of sub-montane forest in the East Usambara mountains, Lutindi, Kilanga and Nkombola, which were themselves individual CFRs until 1995. The forested areas are located mainly on the flanking ridges of Bombo valley where the villages of Kwemkole and Kizara are found (see fig. 3); both Lutindi and Kilanga were surveyed during this study.

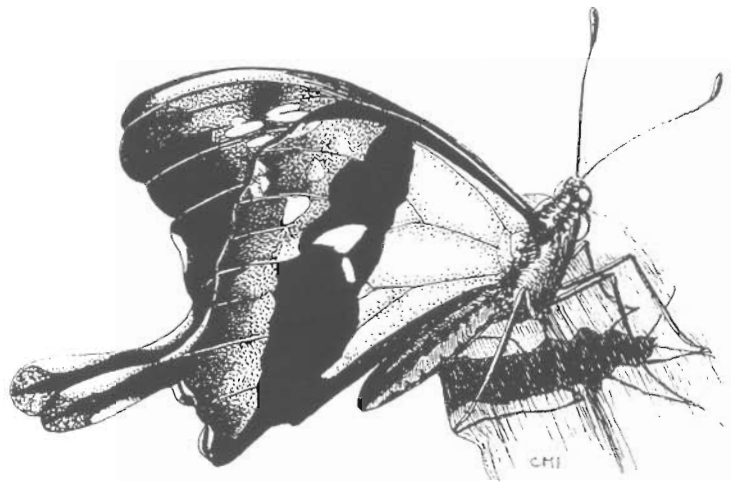


Figure 1. Map of Tanzania

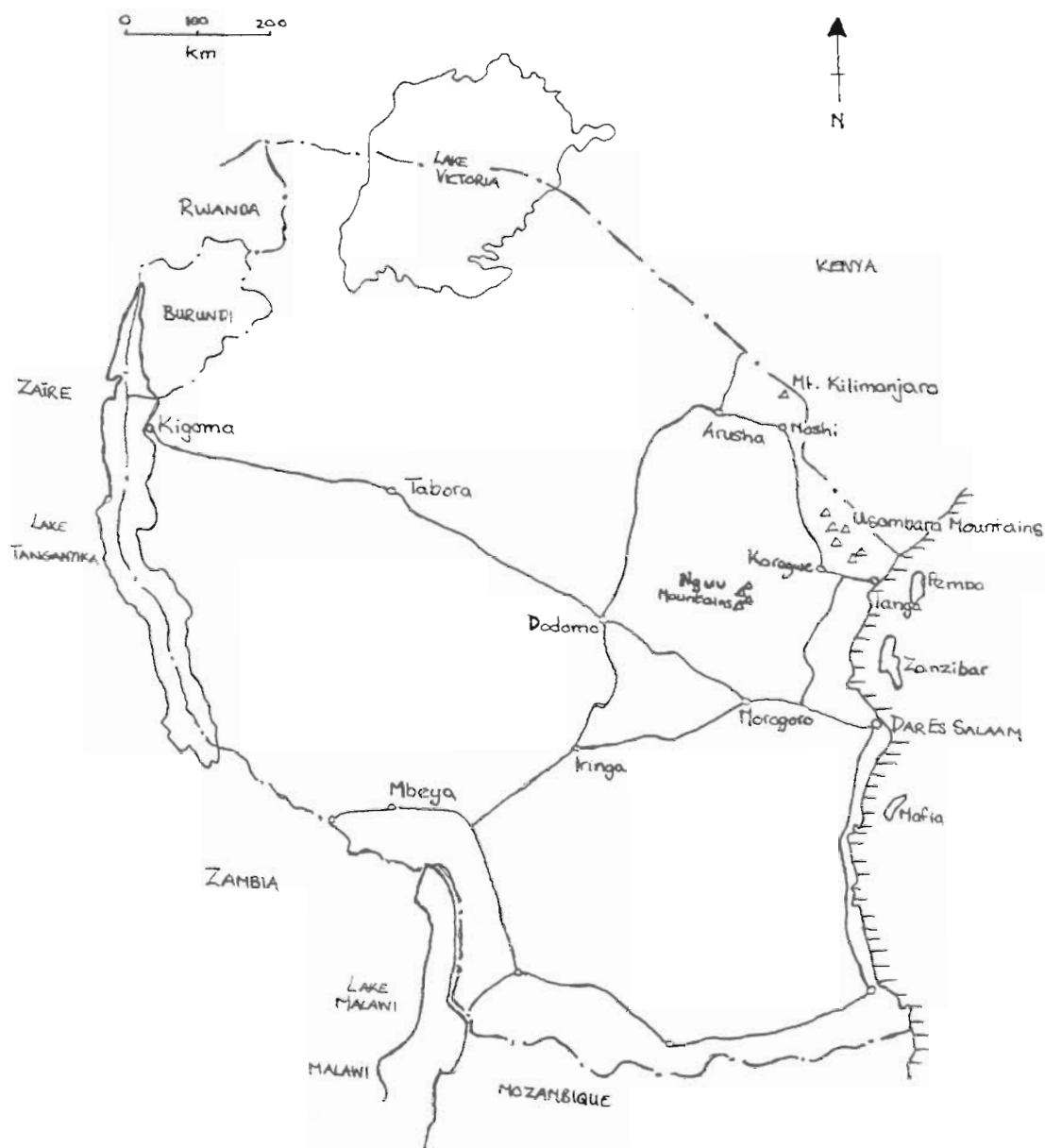
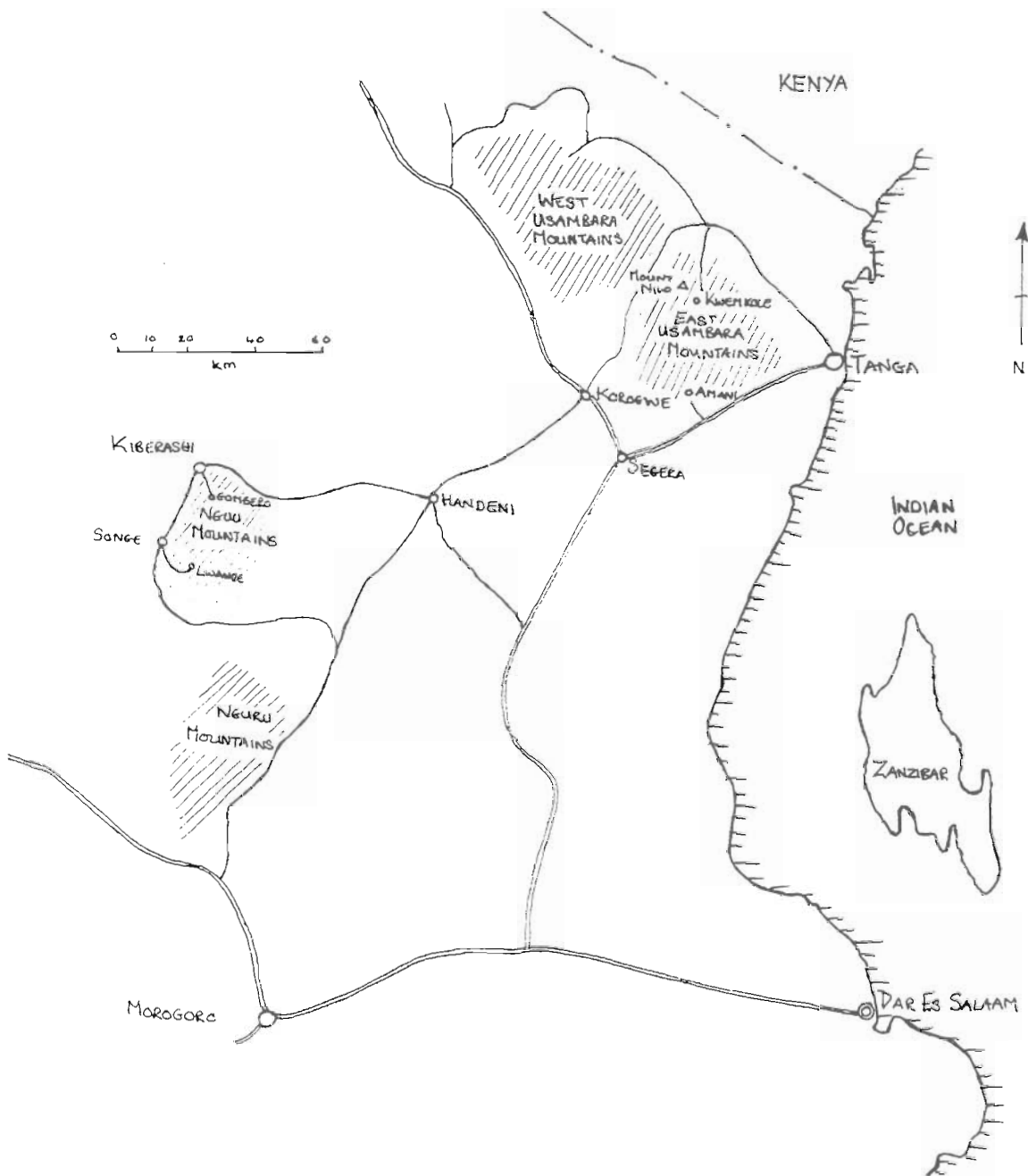


Figure 2. Map showing the location of the East Usambara and Nguu Mountains in Tanzania.



Site one: Lutindi

Access: from Kwemkole village

Precise location of study site: 4°42'S, 38°39'E (see fig. 3)

Previous fieldwork: 10 days (2-12 August 1994): Cordeiro and Kiure (in prep.)

Fieldwork: 15 days (5-19 July 1995)

Altitude at which fieldwork was carried out: 800-1200 m (public land); 1200-1506 m (intact submontane forest)

Days with rain: 4

Mean daytime temperature: c.17° C

Forest description

Most of the intact submontane forest was selectively logged approximately 20 years ago, according to the local foresters, and many of the large and valuable trees (especially *Newtonia* spp.) were removed. However, in more inaccessible regions such as near the tops of ridges at c.1300 m far from the CFR boundary and from paths, there appears to be patches of true primary forest.

The forest is characterised by:

Canopy	70% cover at 25-35 m, with emergents to 40 m
Sub-canopy	40% cover
Mid-storey	50% cover
Field layer	50% cover
Leaf litter	90% cover (at least 6 cm thick)
Average dbh	30 cm
Max. dbh	160 cm

Vegetation types identified were classed as:

Abundant: *Newtonia buchananii*, *Albizia gummifera* (constituting up to 50% of the canopy trees); lianas; *Dracaena* sp. (in the field layer, often forming monospecific clumps); *Trinchilliaroca* sp. and *Cryptomeria* sp. (along streams); *Macaranga* sp. (in natural forest gaps); and dead wood

Frequent: *Coniferinga holistii*, *Allanblackia* sp., *Rauvolfia inebrians* (in the canopy and sub-canopy); *Trema orientalis* (in gaps); *Ficus* sp. (along streams); climbers, occurring on many mature trees; fungi, pteridiophytes, epiphytes and bromeliads.

Occasional: *Loranthus* sp., as a parasite of some trees; and tree ferns.

Rare: Bamboo, as small saplings in deep shade, and Orchidaceae.

The topography is often quite steep, with slopes of 10-50°. There are numerous small streams, with mean width of 30 cm and mean depth of 5 cm. Two ponds with areas of approximately 250 m² and 750 m² were also found and contained much water hyacinth.

Human activities in the forest

Logging: The old Lutindi CFR (part of Mount Nilo CFR since 1995) was established in the mid-1930s, but most of the forest was selectively logged in the 1970s, with the exception of a narrow band of primary forest near the ridge top. Approximately 70% of the CFR is of the type described above, the rest being secondary forest which largely consisted of *Macaranga* spp. and *Trema* spp., with substantial areas of grass and herbs. Such habitat has come about both naturally and unnaturally due to plantations and fire. On the path from Kwemkole up to the reserve (see fig. 3), approximately 400 newly cut planks were found on one occasion, presumably taken from the public land where good numbers of *Newtonia* spp. and *Albizia*

spp. still exist. No pit-sawing was observed within the forest reserve presumably because large trees still exist in the public land, but people carrying dead wood and freshly cut poles were seen on several occasions on the forest paths. According to a local forester, collection of dead wood is permitted on two days of each week, although such a system is open to abuse.

Cultivation: Two cardamom plantations were found well within the CFR, one of approximately 0.8 ha, the other 1.5 ha. Scattered banana and coffee plants were also discovered, the cultivation of which seemed largely opportunistic.

Hunting: The lack of pig, duiker or cane rat observations suggested heavy hunting pressure. On one occasion five men with dogs were observed, apparently hunting duiker and other mammals. In addition, fire is sometimes used to flush such animals, causing damage to the forest. Seven old traps were found in the forest, which took the form of deep pits for trapping duikers. Several small baited traps for catching cane rats and other small mammals were found on the forest edge and in the public land forest, reportedly set by the pit-sawers. Doves are hunted using catapults, and men carrying these were observed on two occasions.

Locals occasionally use lime to trap birds such as turacos for the cage-bird trade. The ponds were apparently created by the villagers 10-15 years ago, to provide fish; however this was prevented by the East Usambara CFP, and the ponds now seem to be silting up.

Public land

The public land extends up to the CFR boundary at 1200 m. The boundary is very well marked with a cleared ride 5 m wide, planted with *Eucalyptus* sp. and *Cedrella odorata*. Logging of the larger trees in the public land goes on continually, there still being good numbers of the valuable timber species *Newtonia buchananii* and *Albizia gummifera*. Cultivation takes the form of large cardamom plantations as well as smaller plots of maize, beans, sour tomatoes, sugar cane, bananas, cassava and some coffee. Other cleared areas resulting from felling and burning were covered with grasses, herbs and bracken. There is some grazing by local cattle which are also sometimes taken through the reserve itself to reach new areas for grazing.

Pressures on the forest

Above Kwemkole village there are many hamlets on the slopes up to the CFR boundary. These settlements are expanding all the time: the average number of children in each household is between six and eight, so the future pressures on the forest in terms of the requirements for cultivated land and building materials will intensify. The houses are simple pole-and-mud constructions with a lifespan of only about three years, so demand for poles can be very high. Similarly the demand for dead firewood can be expected to increase rapidly in the future. However, the village of Kwemkole itself is said to largely derive its requirements for poles and firewood from a small forested site on the valley floor. Local people voiced concern about the increasing distances they had to cover to collect poles and deadwood; one village elder talked of how 20 years ago there was still much good forest around his hamlet on the lower slopes. Suggestions of pole plantations in the public land were well received by the villagers.

Logging is likely to accelerate in the future for several reasons: increased development of communities in much of north-eastern Tanzania will require large numbers of planks, especially if these areas are some of the most promising for the extraction of timber. The rapidly increasing population is likely to cause higher unemployment, which may lead to the issuing of more pit-saw licenses. The planks are sold for Tsh 1500 (c.\$2.5), although the workers gain only Tsh 500 (c.\$1) for each plank carried down to Kwemkole. Almost all of the pit-sawing is usually carried out by workers from the Iringa area to the south. Thus, when public land is exhausted, the cessation of this activity may not have significant effects on the local economy.

Recommendations

- The current rate of pit-sawing in the public land, and its future sustainability should be investigated. Alternative uses of the public land forest that might provide sustainable products to the community need to be found.
- The forest in the public land provides habitat for threatened species such as the Usambara Weaver *Ploceus nicolli* and also acts as a buffer to reduce edge effects in the CFR forest, hence helping species such as White-chested Alethe *Alethe fulleborni*. Gazetting of the forest outside the CFR, as suggested by Cordiero and Kiure (in prep.), would thus constitute a move of great conservation significance. However, the intense use of this public land forest by local people would mean that a scheme of sustainable forest product use is required: poles and firewood may be taken in a controlled manner but pit-sawing of the large *Newtonia* spp. trees should be prohibited.
- Concomitant with the gazetting of public land forest into the CFR must come an investigation into the potential for enhanced farming efficiency in the region. For example, the maize yield is low because the varieties grown often bear only one cob (A. Perkin verbally 1995). Improved farming techniques are undoubtedly a better alternative to using larger areas of poor agricultural land that could otherwise provide forest products and provide habitat for species of conservation importance.
- Present cultivation within the forest reserve, particularly the cardamom plantations, should be prevented.
- General forest disturbance, such as the lighting of fires to flush small mammals, should be discouraged in the public land and prevented in the CFR.
- Environmental education activities in the villages, such as Kwemkole and Kizara, should be initiated so as to both protect the reserve and provide a basis for sustainable development in the future.

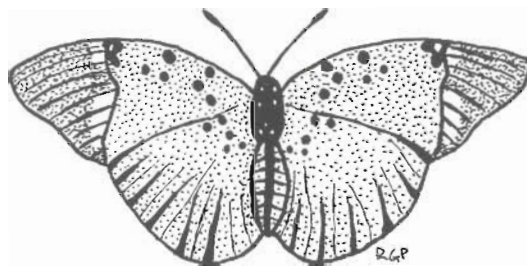
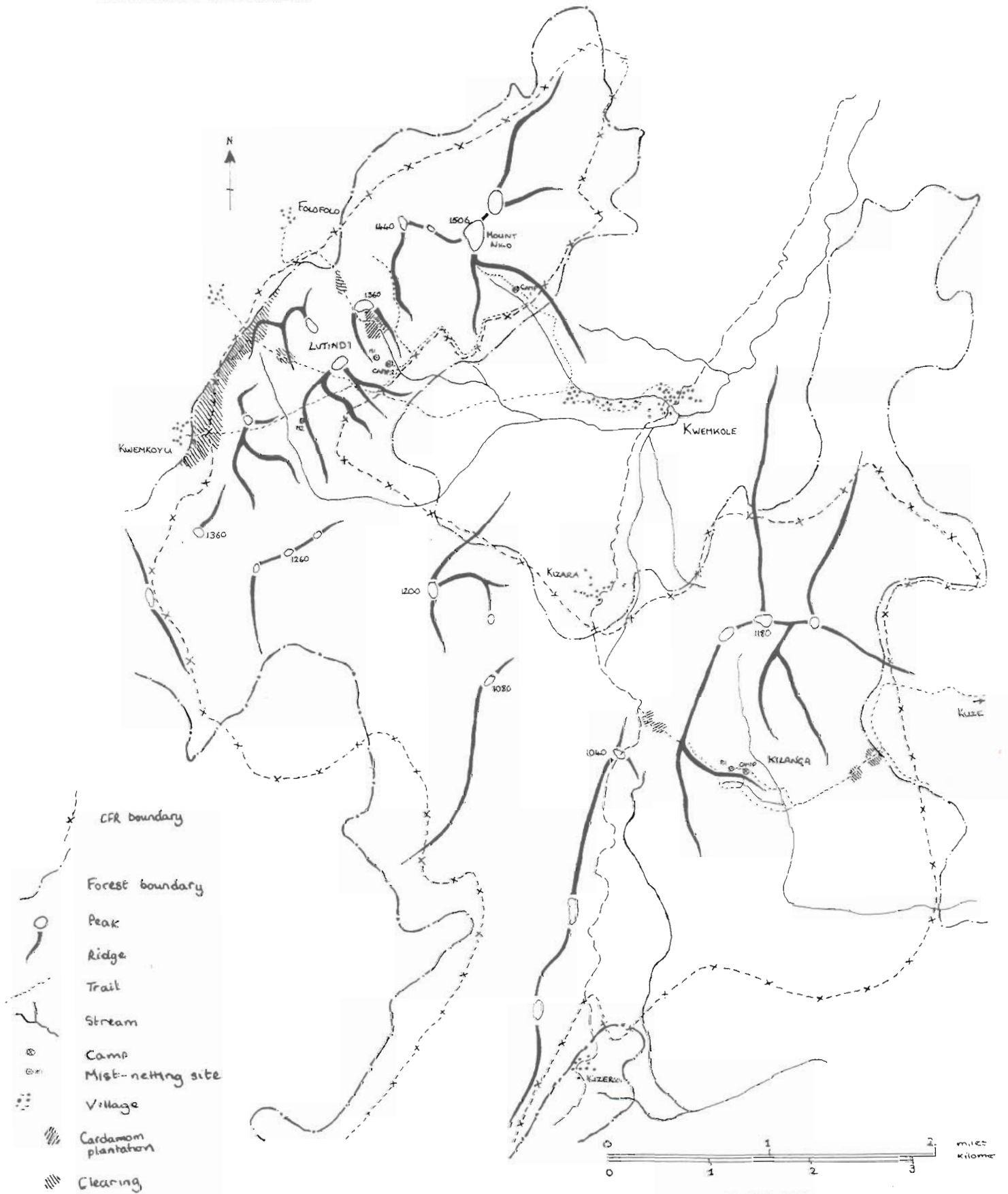


Figure 3. Map showing the location of Lutindi and Kilanga (sites one and two) in Mount Nilo Catchment Forest Reserve.



Site two: Kilanga

Access: from Kizara village

Precise location of study site: 4°55'S, 38°40'E (see fig. 3)

Previous fieldwork: none

Fieldwork: 10 days (21-30 July 1995)

Altitude at which fieldwork was carried out: 700-800 m (public land), 750-1030 m (intact submontane forest).

Days with rain: 7

Mean daytime temperature: c.15°C

Forest description

Two major types of forest structure were identified. The first is that within the area from the road up to the highest surveyed ridge at 1030 m and is characterised by:

Canopy	45% cover at 30-40 m, with emergents to 50 m
Sub-canopy	50% cover
Mid-storey	40% cover
Field layer	30% cover
Leaf litter	80% cover
Average dbh	30 cm
Max. dbh	150 cm

The second is that within the area from the ridge at 1030 m down to the edge near Kuze village, and is characterised by:

Canopy	70% cover at 30-40 m, with emergents to 50 m
Sub-canopy	50% cover
Mid-storey	60% cover
Field layer	15% cover
Leaf litter	80% cover
Average dbh	40 cm
Max. dbh	160 cm

Vegetation types identified were classed as:

Abundant: No single tree species constitutes more than 20% of the flora, however tree ferns *Cyathea* spp. are abundant (along the watercourses); climber and pteridiophytes (on mature trees); dead wood, fungi, epiphytes, and bromeliads.

Frequent: *Ocotea usambarensis*, *Cephalosphaera usambarensis*, *Macaranga* spp. and *Trema* spp. (in gaps); *Ficus* spp. (along the watercourses); and orchids.

Occasional: *Croton* sp., *Rauvolfia inebrians*, *Albizia gummifera*, *Newtonia buchananni*, although the latter had a very different life history stage distribution in that the trees were rarely encountered in the canopy, but more commonly as saplings and poles in the field layer and mid-storey; *Cussonia* spp. (along watercourses); and *Drachaena* sp.

Rare: *Allanblackia stuhlmanii*, *Antiaris usambarensis*, *Cryptomeria* sp.

Topography is similar to that of Lutindi, with slopes of 10-50°. The forest is dissected by numerous small streams of mean width 25 cm and mean depth 5 cm; there is one river with a width of 3 m and depth of 20 cm.

Human activities in the forest

Logging: The old Kilanga CFR was established in the mid-1930s, yet there were obvious signs of serious logging from the past 15 years. There is an infrequently used path joining the villages of Kizara and Kuze, and at approximately 800 m (see fig. 3) the path enters an open area that is treeless and covered with tall herbs. This is the remains of a logging camp for selective pit-sawing of the larger trees in the local forest, and it appears that the path was in fact larger in the past, used as a road to transport the planks out. At the forest edge 1 km above Kuze village, the rusted remains of a vehicle, once used in the logging operations, were also found. Present day pit-sawing seems much less intense than in Lutindi, none being observed within the forest itself and very little was seen in the public land beyond the CFR boundary. A large, freshly cut pile of poles was found on one occasion on the Kizara-Kuze path, but again such pressures seem to be slightly less than in Lutindi due to the greater distance to the nearest settlement. Approximately 80% of the CFR is estimated to be intact forest, other areas having large amounts of herbs for example *Pipe capensis*, as well as *Macaranga* spp., *Trema* spp., and *Cussonia* sp.

Cultivation: Three cardamom plantations were found within the CFR. On the Kizara side at 850 m, there is a poorly managed area of about 2.3 ha which is strewn with boulders and contains only scattered clumps of cardamom. About 20 m above this exists a dense cardamom plantation about 0.8 ha in size. At 820 m on the Kuze side of the forest, another plantation of about 1.0 ha was found around the path.

Hunting: The lack of wild pig or duiker suggest that hunting has been quite intense in the past and still occurs now. Four old pit traps for duiker and other medium sized mammals were noted along the river at 900 m, and on two occasions a man carrying a catapult was seen on the forest path.

Public land

The differentiation between public land and CFR was more confused than in Lutindi. The forest reserve ends at a steep scarp, still forested, at the top of which runs a path down to Kuze village. The forested slope seems to hold good numbers of *Newtonia* spp. and *Albizia* spp., and pit-sawing may occur further down. Maize, beans, sugar cane, bananas, oranges, jackfruit, papaya and coffee are all cultivated in the public land near Kuze village.

Pressures on the forest

The pressures on Kilanga are much the same as those on Lutindi, with fast increasing demands for poles and firewood from rapidly decreasing areas of available forest. A point of extra concern is the growing size of Kuze village (approximately 400 inhabitants), in view of its location close to the CFR, and the lack of any lowland 'buffer' forest site to provide poles and firewood. Demand for planks through Kuze was minimal at least in short time we were present, although heavy pit-sawing could be occurring in public land in nearby areas.

Recommendations

- The extent of pit-sawing activities in the public land forest above Kuze village should be investigated and perhaps limited.
- The use of forest products such as poles and firewood should be managed in a sustainable way, and the potential for gazettement some of the public land forest should be investigated.
- The position of the CFR boundary should be clarified, particularly on the Kuze side where the "Mount Nilo CFR" sign exists within an area of cultivation. This could be achieved by clearing and planting a non-invasive exotic species such as *Eucalyptus* sp. along the boundary, as in Lutindi.
- The cardamom plantations observed in the forest should be removed. These have obviously lead to habitat degradation and edge effects in the immediate vicinity.
- Hunting is having significant detrimental effects on the forest community and must be monitored and controlled.



5.2 Nguru North Catchment Forest Reserve, Nguru Mountains

Year of establishment: 1934

Location of reserve: 5°27'-5°38'S, 37°36'-37°32'E

Area: 14042 ha

Governing Authority: CFP (Tanga)

The Nguru mountains are located in the Tanga region of north-eastern Tanzania, are mainly found between 860 m and 1550 m and comprise several peaks and north-south ridges on the eastern edge of the Maasai steppe.

Nguru North CFR is the largest of nine reserves that cover the forest of the Nguru mountains. It acts as an important catchment for eastern Maasailand, especially the settlement of Kiberashi. To the west, Gombero village also relies on the forest for water. Survey work was carried out in both the northern and southern regions of the reserve.

Site three: Gombero

Access: from Gombero village

Precise location of study site: 5°29'S, 37°28'E (see fig. 4)

Previous fieldwork: none

Fieldwork: 14 days (12-25 August 1995)

Altitude at which fieldwork was carried out: 1000-1100 m (public land); 1100-1550 m (intact submontane forest).

Days of rain: 4

Mean daytime temperature: c.17°C

Forest description

Much of the forest in the study area is noticeably drier than that in the East Usambaras, which can largely be attributed to the more inland location of these mountains. Furthermore, the Ngurus may cause a slight rain shadow, and in our westerly location within the mountain range this effect may be more pronounced (as noted in Collar and Stuart 1988).

The forest is characterised by:

Canopy	60% cover at 25-30 m, with emergents to 40 m
Sub-canopy	50% cover
Mid-storey	60% cover
Field layer	40% cover (dropping to 20% on steeper slopes)
Leaf litter	70% cover (dropping to 60% on steeper slopes)
Average dbh	20 cm
Max. dbh	130 cm

Vegetation types identified were classed as:

Abundant: dead wood, lianas, fruiting trees.

Frequent: within intact forest: *Albizia gummifera*, *Olea* sp. (both noticeably more common on some ridges), *Teclea simplicifolia*, *Zeyherella natalense*, *Celtis zenkeri*, and *Cissus adenocaulis* on ridges. In riverine forest: *Ficus* spp., *Cussonia* spp., and *Cylicomorpha parviflora* (in natural gaps); *Macaranga* spp., *Cylicomorpha parviflora*; and *Pipe capensis*. Throughout: climbers, pteridiophytes and fungi.

Occasional: *Pterocarpus angolensis*, *Cissus adenocaulis*, *Dracaena laxissima*, *Dracaena* sp., bamboo, and moss.

Rare: *Myrianthus holstii*, epiphytes, bromeliads and tree ferns *Cyathea* spp.

Rare: *Myrianthus holstii*, epiphytes, bromeliads and tree ferns *Cyathea* spp.

However, there is one small area of quite different forest with good numbers of large *Newtonia* sp. trees and a very different mid-storey flora. This forest is characterised by:

Canopy	70% cover at 30-40 m, with emergents to 50 m
Sub-canopy	50% cover
Mid-storey	50% cover
Field layer	20% cover
Leaf litter	70% cover
Average dbh	30 cm
Max. dbh	160 cm

In addition, the forest has abundant climbers and fungi, frequent dead wood, lianas, epiphytes and moss; occasional tree ferns and bromeliads, and orchids were rare. The area as a whole has a complicated topography, comprising many inter-digitating ridges. Slopes range from 10° to 40°. Between ridges there are numerous streams, of mean width 30 cm and mean depth 5 cm, although these are quite often within very large stream beds (up to 20 m width) that may only be active in wet seasons flash floods.

Human activities in the forest

Human activity in these forests was much less than that in the Mount Nilo CFR; there are no forest paths and no local people were seen within the CFR.

Logging: According to the local forester and villagers, pit-saw licenses were no longer issued after 1991, and now there is very little logging on the western side of the reserve. Prior to this, six licenses were issued to allow the selective logging of large trees, mainly *Newtonia buccananii*, *Khaya anthotheca* and *Entandophragma excelsum*. Within the forest several stumps were observed where large trees had been removed, but just two old planks were seen. Poles and dead wood are occasionally collected, though the distance between settlements and the forest, combined with areas of Miombo woodland nearby means that these pressures are still very low.

Cultivation: As a result of confusion over the position of the CFR boundary it is unclear whether some plantations of beans along watercourses out of the forest are breaching the CFR. In any case, this kind of riparian cultivation is illegal.

Hunting: The local people rarely hunt in the forest, and believe that the best sites for pig and duiker were on the eastern slopes. Old wire mesh from a wild pig trap was found on one occasion, but no pit traps were observed. There are no hunting licenses available for CFRs, so any activity of this kind is illegal. The high numbers of large mammals in the forest suggests that hunting is still only a minor pressure.

Public land

Between Gombero village and the forest there is a large area of bush savanna, with more cultivation land nearer to the forest streams. The main crops were beans, maize, sugar cane, spinach, cassava and coconuts. Bean fields were usually about 1 ha in size, and closer to the CFR boundary than other crops. Maize fields were located slightly further away and were larger, up to 2.5 ha. This cultivation along watercourses deprives the villages of water. Some trees have certainly been cut to allow the growth of bean plantations, and there are plans for further felling to allow more light onto the plants. The amount of forest left in the public land is unclear due to confusion over the CFR boundary, but the villagers believe there is still submontane forest left outside the CFR.

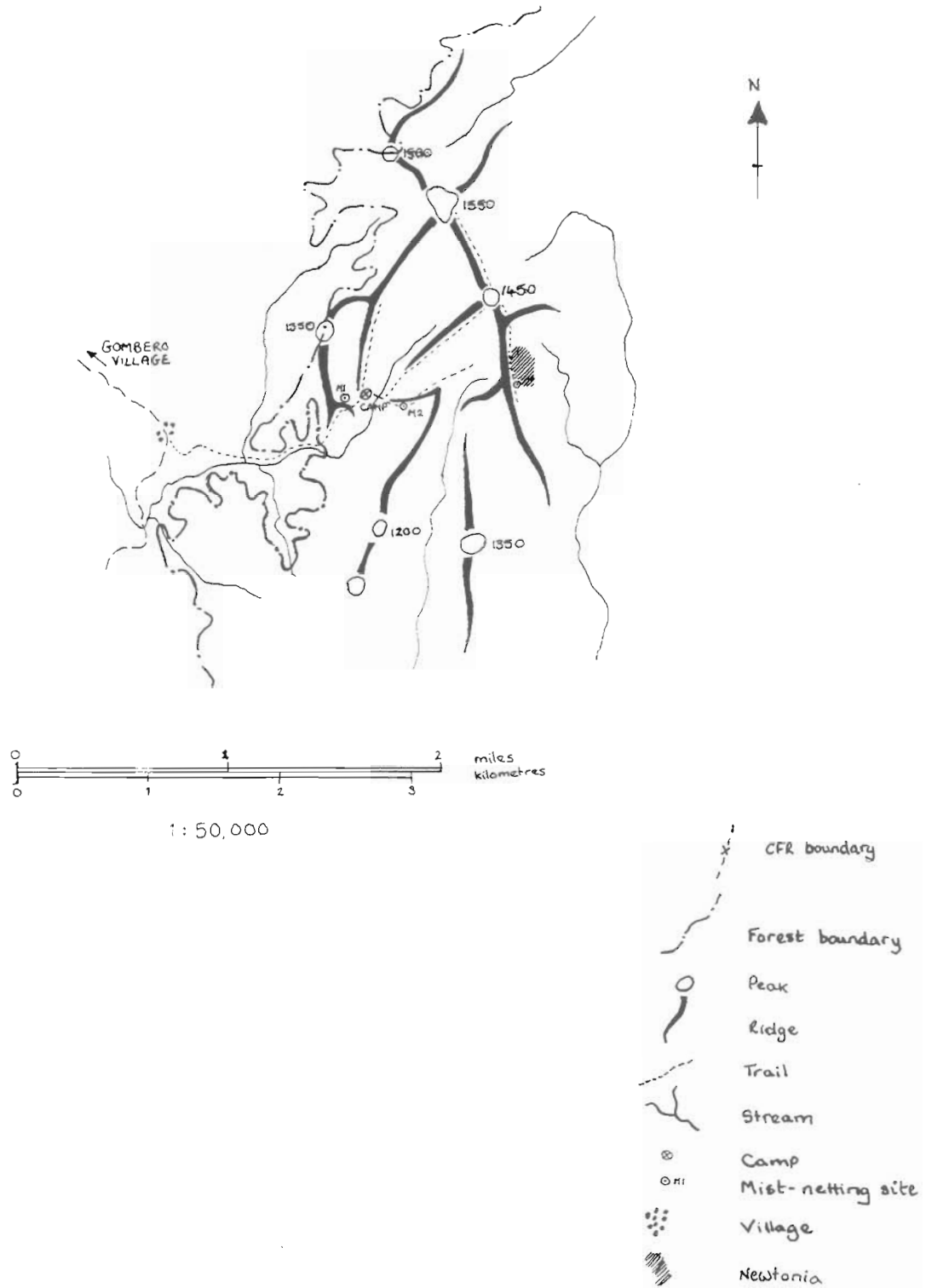
Pressures on the forest

Pressures in the north of the Nguus seem to be relatively low at present, which can largely be explained by the lower population density and the greater distances between intact forest and the major settlements. The most immediate dangers are the possible encroachment of bean plantations into the CFR, and the effects of such cultivation on water supplies to the villages. Hunting may be more intense on the eastern slopes of this reserve.

Recommendations

- The position of the CFR boundary should be clarified, for example by clearing and planting of a fast growing, non-invasive exotic species, such as *Eucalyptus* sp.
- There should be an investigation into the extent and status of cultivations along water courses near the forest boundary. Fruit trees may be planted along streams with minimal detrimental effects, as recommended by Bensted-Smith and Msangi (1989).
- Management of pole cutting and collection of firewood on a sustainable basis should be improved, in both submontane forest and Miombo woodland.

Figure 4. Map showing the location of Gombero (site three) in Nguru North Catchment Forest Reserve.



Site four: Luago

Access: from Lwande village

Precise location of study site: 5°36'S, 37°28'E (see fig. 5)

Previous fieldwork: none

Fieldwork: 11 days (28 August - 6 September 1995)

Altitude at which fieldwork was carried out: 900-1000 m (public land); 1100-1300 m (forest).

Days with rain: none

Mean daily temperature: c. 18°C

Forest description

Most of the forest in which work was carried out is quite similar to that of Gombero, and is characterised by:

Canopy	65-70% cover at 30-40 m, with emergents to 45 m
Sub-canopy	60% cover
Mid-storey	40% cover
Field layer	30% cover
Leaf litter	40% cover
Average dbh	30 cm
Max. dbh	120 cm

Vegetation types identified were classed as:

Frequent: *Albizia gummifera*, *Newtonia buchananii*, *Vernonia cinerea*, *Antiaris usambarensis* in the intact forest; *Diospyros abyssinica* (frequent on the highest dry ridges, abundant in patches); *Cylicomorpha parviflora* and *Pipe capensis* (in natural gaps and riverine forest); elephant grass and *Pipe capensis* (in the moist river valleys); climbers, lianas, fungi and Pteridiophytes.

Occasional: *Ficus* spp., *Dracaena* spp., *Myrianthus arboreus* (all in intact forest); epiphytes, and bromeliads.

Rare: *Olea welwitschia*, *Khaya anotheca*, *Milicia excelsa*, and moss.

Both *Albizia* sp. and *Olea* sp. were noticeably more common on ridges, which seemed significantly drier.

The topography at this site is complicated, though notably less steep than other areas, with slopes of 10-30°. Streams have a mean width and depth of 30 cm and 5 cm respectively.

The heterogeneity of forest types within the region suggests that different parts of the forest may have been subject to different pressures in the past. The lack of *Milicia excelsa* within the reserve, and extreme rarity of *Khaya anotheca* suggests these may have once been targeted. The southernmost extension of the reserve, a narrow ridge extending from Muhago to Luago, has a very different structure to the forest described above, in which most fieldwork was conducted.

This forest is characterised by:

Canopy	50-60% cover at 50 m, with emergents to 55 m
Sub-canopy	70-80% cover
Mid-storey	30% cover
Field layer	20% cover
Leaf litter	80% cover
Average dbh	40 cm
Max. dbh	220 cm

Large specimens of *Albizia gummifera* are found in this forest, and they make up approximately 20% of the trees in some areas. There were also several large *Khaya anthotheca*.

Human activities in the forest

The situation at this site is at present similar to the north, with minor human activity, although this may soon change as a result of the construction of a road.

Logging: Despite the fact that pit-saw licenses were locally reported as being banned, approximately 200 planks were observed on the path up to the first patch of forest on 27 August 1995 (see fig. 5), and 100 more freshly cut planks were seen on the valley path between Luago and Lwande villages on 7 September 1995. It appeared that less than 1% of the public land is forested, and the only forest outside the CFR is in a large plot of land once owned by a European missionary. The timber is allegedly coming from this forest, but the quality and number of fresh planks suggests this is not the case. Pit-sawyers come into the area from Iringa, and teams cut mainly *Newtonia buchananii* and *Khaya anthotheca*. The only benefit locals gain is a small fee for carrying the planks, reportedly just Tsh 20. From Lwande, the planks then go on to Handeni. Poles and firewood are commonly collected in the forest, large bundles of poles being observed on several occasions. These pressures seem especially great in the thin ridge of forest between Muhaga and Luago villages. In this area, several freshly cut 10-15 year old trees were found, seemingly left to collect later as firewood. The people of Luago village responded very well to the suggestion of a plantation to provide poles and firewood.

Cultivation: There was some coffee cultivation within the CFR in one small area close to the boundary. No cardamom plantations were observed in the forest.

Hunting: While locals from Luago told us they hunted duiker, hunting within the CFR seemed minimal: no hunters were seen in the forest, and no hunting trails were found. Wild pigs *Potamochoerus porcus* are not hunted for religious reasons and Blue Monkeys *Cercopithecus mitis* are not hunted despite the damage they do to crops.

Public land

The public land is cultivated right up to the CFR boundary in this area, the staple crops being maize, cassava and beans. Several crops are also grown for cash, notably cardamom, coffee and beans. The average size for maize and cassava fields is about 1.5 ha. Much cultivation occurs along streams because they are more fertile and moist, though as yet no water shortages have been reported. Papaya, mango, coconut and oranges were also relatively common. The village elders in Luago spoke of several farming problems they were experiencing: the land available for cultivation is diminishing rapidly, mainly as a result of population growth and cultivation of the land by people from other hamlets. Those crops that are grown are sometimes destroyed and eaten by wild pigs *Potamochoerus porcus*, often overnight. Protective measures include fencing and guarding the fields throughout the day and night.

Pressures on the forest

Pressures from humans seem greater in the south than in the north of this reserve. There is a severe lack of land presently available for cultivation. Hence the people have applied to the Forestry Division several times for more CFR land to be granted for cultivation; this has been denied. Even greater and more immediate pressures exist in the potential for increased pit-sawing in the area: the villagers are presently constructing a dirt road from Luago to Lwande, which will facilitate the transport of planks. They aim to charge a toll for each plank that is transported along the road, thereby creating extra income. Pit-sawing may escalate rapidly once such infrastructure is in place. Village elders claimed the road would be completed within a month, but we estimate that completion will take at least one year.

Recommendations

- The CFR boundary needs to be well marked by planting an fast-growing, non-invasive exotic species such as *Cedrella* sp. or *Eucalyptus* sp. As well as providing temporary work, community integration into this scheme would generate an awareness about the limited extent of the forest in the public land.
- The extent of pit-sawing activities in the area is urgently needed, in order to ascertain the scale of the logging operation and the status of the forest being logged.
- The collection of poles and firewood must be managed such that it has minimal effects on forest regeneration. The feasibility of setting up plantations in the public land needs to be investigated.
- A thorough investigation of the possible effects of the construction of a road between Lwande and Luago is urgently needed. Such development is likely to have serious detrimental effects and substantially increase the exploitation of the forest.

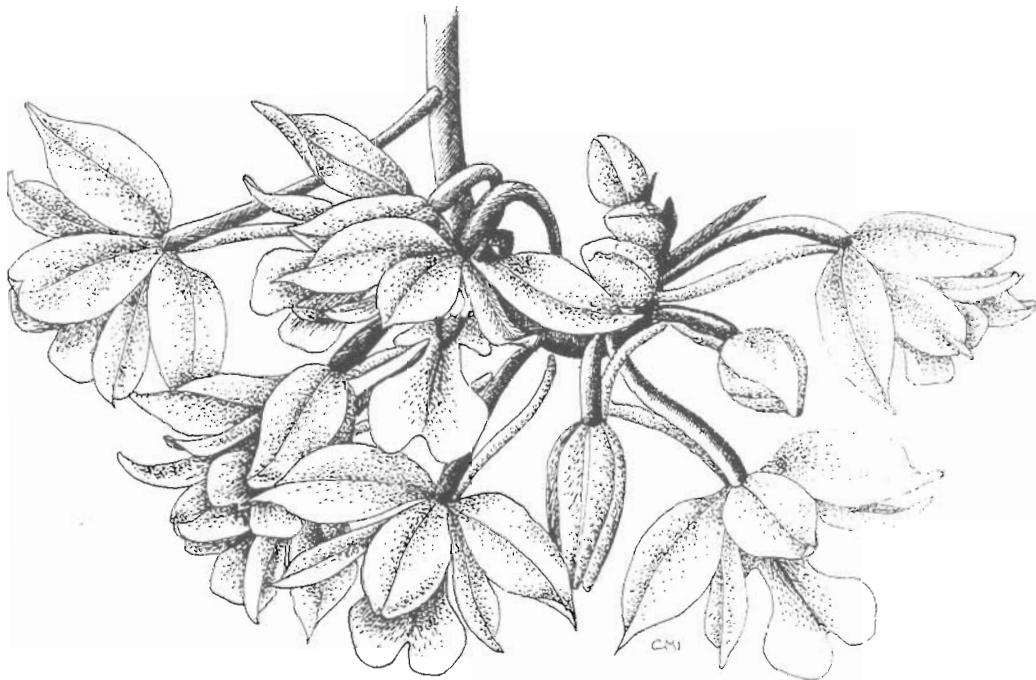


Figure 5. Map showing the location of Luago (site four) in North Nguru Catchment Forest Reserve



6. Results: Birds

A total of 130 bird species were recorded during fieldwork, including 91 in the East Usambara Mountains and 97 in the Nguu Mountains. Of those bird species recorded in the East Usambaras, four are listed as Threatened, two as Near-threatened and eight in total as restricted-range (Collar *et al.* 1994, Stattersfield *et al.* in prep.). In the Nguu Mountains, of the birds recorded two are listed as Threatened, two as Near-threatened and four in total as restricted-range. These results are summarised in Appendix II.

6.1 Species of conservation interest recorded

Green Ibis *Bostrychia olivacea*

Status: This seldom-recorded forest species was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed by Collar *et al.* (1994). It is an uncommon and local resident in dense, highland forest known from 160-1100 m in the East Usambaras and from 2000-3700 m on the Aberdares, Mount Kenya, the Nyambensis and Mount Kilimanjaro (Britton 1980). It is also known from some lowland forests in western Africa: Sierra Leone, Liberia, Ivory Coast, Principe Island, Sao Tome, Cameroon, Gabon and Congo (Brown *et al.* 1982).

Project records:

Two birds were observed at Kilanga at 11h50 in intact submontane forest at 900 m on 24 September 1955.

Not recorded in Nguru North CFR.

Observations and ecology: The birds were flushed from relatively open undergrowth, and flew into a tree where they perched at 15 m. After 1 min, one bird flew away, whilst the second remained perched motionless for a further 5 mins.

Conservation status: This is a shy, scarcely known, forest-dependent species, which preferentially roosts in large trees with dead branches in the canopy (Brown *et al.* 1982). It is thus likely to be sensitive to habitat degradation. It is the only resident species in Africa which is found in both the lowland forests of West Africa and the montane forests of East Africa (Brown *et al.* 1982) and both these habitats are currently under threat (ICBP 1992). This species therefore merits conservation attention, but given its large range it is probably not under threat of extinction.

Southern-banded Snake Eagle *Circaetus fasciolatus*

Status: Near-threatened with a wide but localized distribution (Collar *et al.* 1994). Resident in the coastal woodlands and forests of East Africa from south Somalia and north Kenyan border south to Natal and Zululand (Brown *et al.* 1982). Although seldom recorded more than 20 km inland, it has previously been recorded in the East Usambaras to near Amani (Moreau 1935, Collar and Stuart 1985, Tye 1993, Cordeiro and Kiure in prep.), and there are recent reports of breeding in the lowlands (Hipkiss *et al.* 1994).

Project Records:

Lutindi: one adult was observed for approximately 10 mins in intact submontane forest at 10h30 at 1100 m on 5 July 1995.

Gombero: one adult was observed in intact submontane forest at 11h20 at 1200 m on 11 August 1995.

Luago: a pair was observed for 6 mins from 10h20 at 1360 m on 24 August 1995.

Observations and ecology: The Lutindi bird drifted out of the mist above the canopy before perching 20 m high in the sub-canopy, and the Gombero individual was observed soaring over intact submontane forest and perched for 3 mins in the canopy at 30 m, before flying north over the canopy. The Luago record was of a pair soaring up the side of a forested ridge on thermals, tending to keep 10 m apart for 5 mins before gaining more height and flying west.

Brown *et al.* (1982) describe this species as a secretive and retiring bird of heavy woodland and forest which is not often seen in the open. Our observations support this, or imply that the species is very rare. Very little is known of the diet and breeding habits (Brown *et al.* 1982), and if there were resident birds near any of our fieldwork sites they were extremely elusive.

Brown *et al.* (1982) note that this species rarely soars high in the air, but two of the records refer to birds soaring. These might be migrants, particularly since Brown *et al.* (1982) state that there is probably a south-north migration in the austral winter (July to October 1995), based upon numbers in northern coastal Kenya at that time. However, the breeding population documented in the East Usambaras suggests that it is quite possible that there is a resident population in the Nguus as well.

Conservation status: Brown *et al.* (1982) note that this species is probably commoner than supposed, as it is hard to locate and see. Very little is known of this bird, but proven breeding records in Kenya, Mozambique, Zimbabwe and Tanzania suggest a preference for lowland, and in particular coastal, woodland. Therefore, protection of such habitats is probably more important for the survival of this species than submontane rainforest. However, these records for the East Usambaras and the Nguus are all from high-altitude intact submontane forest, including two records of birds perched in this type of habitat. It is thus very difficult to assess the conservation status of this species, and Near-threatened is probably the most appropriate classification until more is known of this species' breeding ecology.

Fischer's Turaco *Tauraco fischeri*

Status: Near-threatened (Collar *et al.* 1994). This species forms a superspecies with Black-billed Turaco *T. schuetti* and Green Turaco *T. persa* (Fry *et al.* 1988). Its range stretches from Somalia to Zanzibar and north-east Tanzania, incorporating the coastal lowlands from Boni to Tanga, stretching inland to the Shimba Hills, the East and West Usambara Mountains and Mafi Mountain up to 1500 m (Britton 1980). It is widespread and locally common in forest and woodland.

Project records:

Common in Lutindi: there were 17 records in July 1995, with a maximum group size of five, mainly within intact submontane forest but also in degraded forest along the CFR boundary at 1200-1300 m.

Common in Kilanga: there were 12 records in July 1995, with a maximum group size of three, all within intact submontane forest within the CFR at 900-1030 m.

Not recorded in Nguru North CFR.

Observations and ecology: This species was mainly observed in intact submontane forest both within the CFR and the public land at 950-1250 m; only three individuals were seen on the forest edge near cultivated land at 1200 m. The birds tended to inhabit the canopy and sub-canopy of mature fruiting trees between 15 m and 35 m high. They were mainly encountered in pairs, although a flock of at least five individuals was observed on one occasion. Birds were frequently observed feeding alongside other frugivorous birds such as Green Barbet *Buccanodon olivaceum*, Olive Pigeon *Columba arquatrix*, and Striped-cheeked Greenbul *Andropadus milanjensis*.

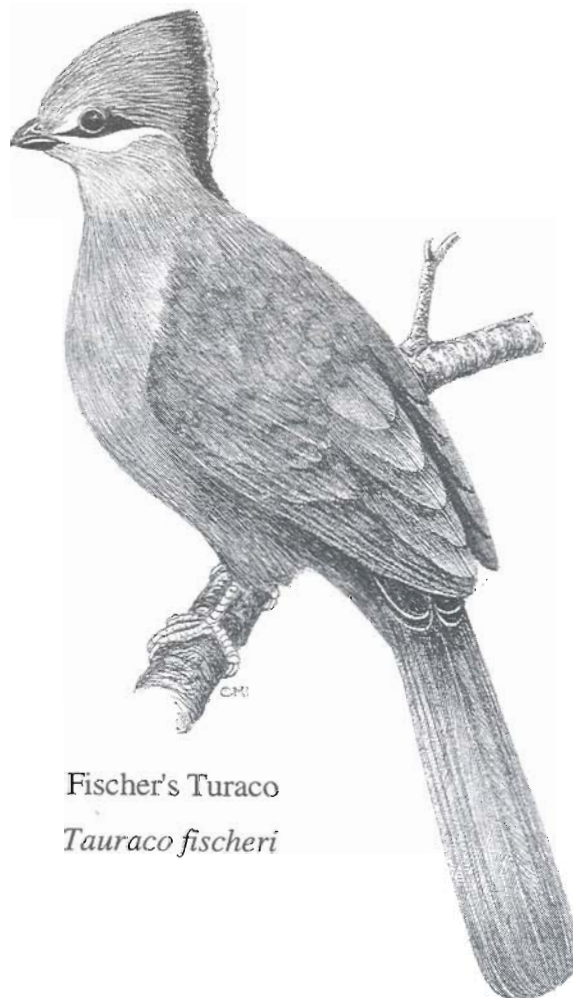
However, on four occasions individuals were observed as part of a coherent mixed-species flock comprising both insectivorous and frugivorous species such as: Grey Cuckooshrike *Coracina caesia*, Olive Woodpecker *Mesopicos griseocephalus*, Shelley's Greenbul *Andropadus masukuensis*, Square-tailed Drongo *Dicrurus ludwigii*, White-tailed Crested Flycatcher *Trochocercus albonotatus* and Dark-backed Weaver *Ploceus bicolor*.

Birds were frequently seen running along branches chasing each other or other species (e.g. Square-tailed Drongo *Dicrurus ludwigii*), usually emitting a loud, very distinctive 'chacking' call at the same time. This call was also given in flight. Other calls included a soft, resonant chuckle and a loud, grating bark similar to that given by *T. livingstonii*. This bark was commonly heard at dusk, around 18h30, when individuals in pairs called successively, then simultaneously. Recordings were made of these and other calls.

Conservation status

Other workers have noted that this species survives well in formerly forested areas which retain some trees, and in thickets and wooded gardens (Fry *et al.* 1988). While this may be true in the short term, our observations strongly indicate that it is primarily dependent upon relatively intact submontane forest. While its range may be large, it is likely to be threatened within this range by deforestation and strongly merits its Near-threatened status.

In Mount Nilo CFR, not only are the pit-sawing, pole cutting and cardamom plantations putting this turaco at risk, but it was locally reported to be hunted for the bird trade where the main method of capture involved liming branches (A. Perkin verbally 1995).



Fischer's Turaco
Tauraco fischeri

Usambara Eagle Owl *Bubo vosseleri*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This elusive owl was discovered in 1906 (Reichenow 1908) and was not recorded again until 1962 (Moreau 1964). Between 1962 and 1985 there were a mere 19 records from submontane forest at 900-1300 m mostly from the Amani area of the East Usambaras and Mazumbai in the West Usambaras (Collar and Stuart 1985), with a possible sighting in the Nguru Mountains (Moreau 1964). The taxonomy of the bird is not yet clear. While some authors treat it as a separate species, *Bubo vosseleri* (Collar and Stuart 1985, Turner *et al.* 1991, Sibley and Monroe 1993, Collar *et al.* 1994), others consider it to be an isolated subspecies of Fraser's Eagle Owl *Bubo poensis*, found in west and central Africa (White 1965, Britton 1980, Brown *et al.* 1982). Nevertheless, Stattersfield *et al.* (in prep.) classify it as a species with a restricted range in the Eastern Arc Mountains EBA where it is only known from a few sites in the Usambara Mountains (Collar *et al.* 1994). This species was believed to be montane but its recent discovery in three East Usambara lowland sites indicate that the range and hence population of this species may be larger than previously thought (Evans *et al.* 1994).

Project records:

Absent, but possibly overlooked at Lutindi.

Rare at Kilanga with four heard records in intact submontane forest at 1000 m:

26 August 1995	A single call was heard at 24h00.
27 August 1995	Calls were heard at 02h00, 02h50 and 21h00.
28 August 1995	Two calls were heard at 00h25 and 03h15.

Not recorded in Nguru North CFR.

Observations and ecology: The call, believed to belong to this species, lasted 5-7 secs and comprised a low-pitched, weak 'po-a-po-a-po-a-po-a', accelerating and then decelerating, lowering in pitch at the end. Each phrase was repeated at intervals of 30-60 secs, up to four times. It matched a recording believed to belong to this species that was made on Mount Mtai in July 1991 (Evans and Anderson 1993). However, as the previous workers have stated, there must remain some doubt that the call belongs to this species until a calling bird is observed and recorded simultaneously (Evans *et al.* 1994).

Conservation Status: The population size has been estimated at 200-1000 individuals (Collar and Stuart 1985), but the discovery of the owl in three East Usambara lowland sites (Evans *et al.* 1994) suggests that it may be more common. However, as this lowland habitat is limited in extent and is under even greater pressures than the montane forest (Collar *et al.* 1994), we agree with Evans *et al.* (1994) that the species still merits Threatened status. Our records in Kilanga, together with those of Cordiero and Kiure (in prep.) in Lutindi, indicate that Mount Nilo CFR represents an important site for the conservation of this species. While the species is thought to tolerate a degree of forest degradation (Olney 1984), unsustainable pit-sawing and pole cutting activities both in the public land and in the CFR must cease if the future of this owl is to be secured.

Mombassa Woodpecker *Campethera mombassica*

Status: This species has a restricted range in the Kenyan and Tanzanian coastal forests EBA and it was not previously known from the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.). It is fairly common in coastal forest and woodland in southernmost Somalia, and coastal Kenya from Lamu south to NE Tanzania; inland it was previously only recorded in the Arubuko-Sokoke Forest, the West Usambara Mountains, and Mount Kilimanjaro (Winkler *et al.* 1995).

Project records:

Rare in Lutindi: there were three records of single males on three successive days.

- 12 July 1995 one male was observed in a mixed-species flock in forest edge in the public land at 1100 m.
13 July 1995 one male was observed in the sub-canopy in degraded forest and cultivated public land at 900 m.
14 July 1995 one male was observed in the sub-canopy of a mature tree in cultivated public land at 850 m.

Rare in Kilanga: there was one record of a male in intact submontane forest at 1020 m on 28 July 1995.

Our records of this species represent a new locality. As this species was previously only known from the lowlands, our records also represent an altitude extension. This species is very similar to Golden-tailed woodpecker *C. abingoni*, and until recently was considered conspecific (Winkler *et al.* 1995). However, *C. mombassica* has bright green upperparts with fine, yellow-white spots, as opposed to olive-green upperparts with yellowish bars. Good views were obtained, and these distinguishing features were noted, enabling positive identification.

Observations and ecology: Our observations support Winkler *et al.* (1995) who note that this species is quiet, generally lives singly or in pairs, and visits rather isolated trees. The record of this species in a mixed-species flock is unusual for an essentially solitary species, but it is likely that the bird is merely an opportunistic flocker. The call, apparently distinctly different from that of *C. abingoni*, was not heard. As this species is mainly known from coastal forests, it is possible that the birds observed were non-breeding visitors.

Conservation status: Our records of this species in forest edge and cultivated land suggest a degree of adaptability to habitat degradation. Also, as this species is common in coastal forest and woodland, it is not threatened by degradation of submontane forest. However, this species has a small geographical range, and habitat clearance within this makes the species worthy of conservation interest.

Tiny Greenbul *Phyllastrephus debilis albigula*

Status: This greenbul was considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed by Collar *et al.* (1994). It is an endemic resident in coastal Kenya and Tanzania south from the Tana River to the Rufiji River, inland to the Rabai and Shimba Hills, Usambara, Uluguru and Nguru Mountains. It is also known from Ndungidi and Liwale in south-east Tanzania, Mozambique south to Limpopo and from the Haroni-Lusitu area in Zimbabwe (Keith *et al.* 1992). There are three races, one of which, *albigula*, occurs in montane areas in the East and West Usambara and Nguru Mountains. A common but easily overlooked bird, this small greenbul inhabits forest undergrowth up to 1500 m.

Project records:

Common at Lutindi: there were 39 records in intact and secondary forest at 1200-1300 m in the CFR and public land in July 1995.

Common at Kilanga: there were 44 records in intact submontane forest at 900-1030 m within the CFR in July 1995.

Rare at Gombero: there was one field record and three net records in intact submontane forest within the CFR at 1300 m in August 1995.

Rare at Luago: there were two records in a forest clearing in intact submontane forest within the CFR at 1270 m in September 1995.

The birds observed and netted in the Nguu Mountains appeared to belong to the same race (*albigula*) as those observed in the East Usambara Mountains.

Observations and ecology: This species was mainly observed in the low to mid-storey of relatively intact submontane forest within both CFRs. It is insectivorous and was commonly observed in mixed-species flocks, usually in groups of 3-5. Individuals were noted to wing-flick and, when foraging in a flock, to emit a soft yet explosive 'tut' contact call.

Conservation status: Other authors (Newmark 1991) have classed this as a forest-dependent species, and our records confirm this: it was mainly recorded in intact submontane forest, only occasionally being observed in forest edge, and never in heavily degraded forest or cultivated land. There was no evidence to suggest that this species can adapt to habitat degradation. It is likely that numbers of this species will decline as both its lowland and highland forest habitat is progressively cleared, but given its relatively large range, it is not presently under any threat of extinction.

White-chested Alethe *Alethe fuelleborni*

Status: This large alethe has a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep). It was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). Its range stretches across Tanzania from the south Pares and Usambaras in the north-east to the Livingstone Mountains in the south-west, extending into the extreme north-east of Zambia, and north Malawi south to the south Viphya Plateau, as well as isolated populations on Mount Gorongoza and the coast around Beira, in central Mozambique (Britton 1980, Keith *et al.* 1992). Though some authors (Mackworth-Praed and Grant 1962, Britton 1980) consider the northern birds a separate race *usambarae*, based on plumage variation and larger size, others consider the species monotypic (Keith *et al.* 1992). This thrush is common in the undergrowth of certain highland forests of eastern Tanzania at 900-2600 m (Britton 1980), although it is known to be common down to 450 m in the East Usambaras (T. Evans *in litt.* 1995), and in Malawi it has a population density in continuous forest of 2 pairs/10 ha (Dowsett-Lemaire 1989).

Project records:

Uncommon at Lutindi: there were five records in intact submontane forest at 1200-1250 m, and four birds were netted in intact submontane forest at 1170 m and 1230 m in July 1995.

Uncommon at Kilanga: there were five records in intact submontane forest and in forest clearings at 820-1020 m, and three individuals were netted in intact submontane forest at 1030 m in July 1995.

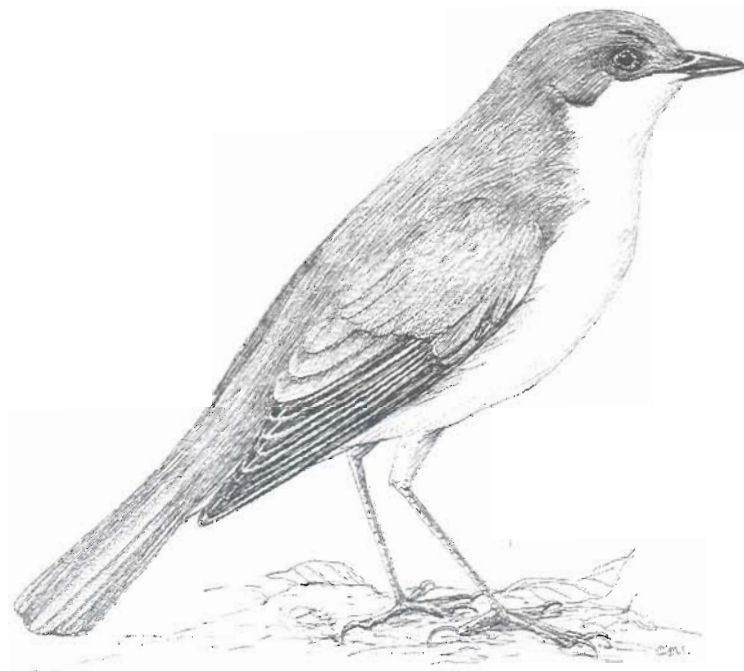
Uncommon at Gombero: only one sight record, flying along a ridge-top path in pristine forest at 1300 m, but six birds were netted at three mist-net sites, at 1300 m, 1350 m and 1450 m, all in intact submontane forest with fairly open understorey in August 1995.

Uncommon at Luago: a single sight record and seven netted individuals in intact submontane forest at 1150 m in August and September 1995.

Observations and ecology: This species was generally seen on the ground or in the understorey in areas of intact submontane forest with little undergrowth and herb layer. Most sightings were brief views of single birds flying low, and briefly perching at 1-4 m. However, on a few occasions individuals were observed foraging: on 7 July 1995 a pair were observed for about an hour foraging amongst the leaf litter, very rarely venturing more than 1 m above the forest floor.

The only other sighting of more than one individual was on 24 July 1995 when two were observed briefly perched 1 m up at the edge of an area of forest that had been cleared for a cardamom plantation. The dearth of sightings of the species feeding, and the preponderance of views of flying birds, particularly in more open areas such as forest clearings and paths, suggests that this species is probably very elusive and was probably under-recorded. This is further supported by the mist-netting data which shows a high ratio of birds netted to those observed in the field, particularly noticeable in the Nguus where all but two of the fifteen records were of netted birds.

Conservation status: Although this thrush has a restricted range in the montane forests of the Eastern Arc Mountains EBA, it is considered common within its range (Keith *et al.* 1992). Taking into account the elusive nature of the species and the high ratio of net records to field sightings, our observations support this idea, and the species may be fairly common at all four sites. However the species' preferred habitat is being disturbed within the CFRs, particularly at the boundaries. Pit-sawing and forest clearance must be stopped in both areas to prevent the destruction of the habitat of important populations of *A. fuelleborni* in the East Usambaras and Nguus.



White-chested Alethe *Alethe fuelleborni*

Sharpe's Akalat *Sheppardia sharpei usambarae*

Status: This elusive and little-known akalat was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). It has a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.) where it is a common resident in the undergrowth of highland forest at 900-2600 m (Britton 1980). It is restricted to northern Malawi, and areas of east and south-west Tanzania. Two races occur: the nominate *sharpei*, found on the eastern edge of the Nyika Plateau, Malawi, at 1500-2100 m, and in some of the highlands of south-west Tanzania from the Dabaga Highlands south-west down to the Poroto mountains; and the race *usambarae*, which is restricted to the Usambara, Nguru and Uluguru mountain ranges of Tanzania (Keith *et al.* 1992, Britton 1980).

Project records:

Common at Lutindi: there were 12 sight records, and 12 net records, all of which were in intact submontane forest at 1150-1250 m in July 1995.

Common at Kilanga: there were nine sight records, and eight net records in intact submontane forest at 850-1030 m in July 1995.

Not recorded in Nguru North CFR.

Observations and ecology: This bird was generally sighted foraging alone in the understorey of intact submontane forest. Though usually gleaning or probing in the leaf litter, it was occasionally observed making short flycatching sallies of 1-3 m, returning to the same, or a nearby, perch. Most birds were silent, but on one occasion an individual was observed perched giving a buzzing call, which was accompanied by considerable wing-flicking and tail-cocking. Most observations were of single individuals, but on 7 July 1995 a pair were observed foraging together for over an hour in the understorey, though at no point was any co-operative foraging observed (*contra* Sclater and Moreau 1933). Another pair was observed near a forest stream with one individual approaching a perched conspecific from behind, with the ensuing fluttering suggesting a possible attempted mating. Association with a mixed-species flock was observed on one occasion when a bird was noted flycatching in the understorey, seemingly associating with a flock comprising Square-tailed Drongo *Dicrurus ludwigi*, Dark-backed Weaver *Ploceus bicolor*, and Tiny Greenbul *Phyllastrephus debilis*.



Sharpe's Akalat *Sheppardia sharpei*

Fifteen individuals were mist-netted, and five of these were subsequently retrapped. As with the sight observations, the vast majority of individuals netted were single birds. However, on 14 July 1995 two birds were caught together in the same net panel, and both birds had already been netted, so may have represented a pair with a territory nearby.

Conservation status: Despite our data supporting the observation that this species is a common resident in areas where it is found (Britton 1980) the status of this akalat is far from secure. The species showed a preference for intact, relatively undisturbed forest with a reasonably dense understorey, and so it is probably fairly susceptible to forest degradation. The race *usambarae* is only found in three disjunct forest populations in the Ulugurus, Ngurus and Usambaras, and so is likely to be more threatened than the nominate race which has a wider range. Given the intense human pressures on the forest in the East Usambaras, it is vital that the remaining suitable forest is fully protected to ensure the survival of these few isolated populations.

East Coast Akalat *Sheppardia gunningi*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This thrush is endemic to three separate areas. The nominate race *gunningi* is found in small, mostly coastal lowland forests around Beira in Mozambique; the race *sokokensis* is found in lowland forest up to 300 m in Kenya (Tana River forests, the Arabuko-Sokoke forest, and the Shimba Hills) and up to 800 m in north-east Tanzania (East Usambaras, Puga Hills, Rondo Plateau, Dondwe forest, Zanzibar); and the race *bensoni*, is found in seven mountains at 475-1750 m in northern Malawi (Keith *et al.* 1992, Collar *et al.* 1994).

Project records:

Not recorded in Mount Nilo CFR.

Common at Gombero: there were 23 field records, and 16 net records, of which five were retraps, all in intact submontane forest at 1200-1500 m in August 1995.

Common at Luago: there were 28 field records and five net records, of which two were retraps, all in intact submontane forest at 1140-1200 m in August and September 1995.

Our records of this species represent a new locality and an altitudinal range extension of 700 m in Tanzania. Identification photographs and a detailed in-hand description of the Nguu bird were taken. The description is as follows. Upperparts: forehead, crown, nape, mantle and rump olive-brown with a slight bronzy wash; deeper bronze on upper tail-coverts, upper tail grey-brown. Lores and supercilium slate grey, with a white, usually concealed, supra-loral spot; ear-coverts olive-brown. Remiges grey-brown with outer webs olive, inner webs creamy white, broader on secondaries and tertiaries; upper wing-coverts slate-grey. Underparts: chin yellow-orange; throat, upper breast and flanks golden orange; lower breast and belly pale yellow becoming white on the central belly; under tail-coverts yellow-orange; under wing-coverts pale buff-orange; axillaries almost white. Bare parts: bill uniform dark brown; iris brown; legs pink-grey, soles bright yellow.

The biometrics are closer to those given for *bensoni*, which is slightly larger than either *gunningi* or *sokokensis* (see Table 3). Given that *bensoni* occurs 800 km to the south in Malawi, it seems likely that an undescribed subspecies is found in the Nguus.

Table 3: Comparison of the biometrics of the races of *S. gunnungi*

		Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)
Nguru North CFR	males and females	14.5-20 (17.3) n=20	66-79 (73.4) n=20	13-15 (14) n=20	21-24 (22.6) n=20
<i>S. g. gunnungi</i> *	male	17-19 (18.0) n=8	72-76 (74.1) n=13	15-17 (16.0) n =4	21,22 n=2
	female	16-17 (16.7) n=3	65-68 (67.2) n=4	15-16 15.2 (3)	20,20 n=2
<i>S.g. sokokensis</i> *	males	13,17 n=2	67-72 (70.5) n=11		
	females	12-15 (13.5) n=4	63-72 (65.6) n=7		
<i>S. g. bensoni</i> *	males		72-78 (74.8) n=8		
	female		68-70 (69) n=3		

* Data taken from Keith *et al.* (1992)

Observations and ecology: This skulking, largely ground-haunting thrush was recorded in intact submontane forest at 1140-1500 m, along streams, on fallen logs, and in areas with very tangled vegetation. It was mainly observed either on the ground or flitting between perches at 0.2-1.5 m. Birds were observed probing amongst leaf litter, turning over leaves to reveal and eat small arthropods, berries and seeds (*contra* Keith *et al.* (1992) who note this species as purely being insectivorous). It was seen sallying for flying insects, often flycatching from logs at 0.5-2 m. This species was noted as being solitary, with 85% of records referring to single birds. Pairs were recorded only on three occasions, and three birds were netted simultaneously on 14 August 1995. The birds mainly foraged alone (*contra* Clancy 1969 who notes that this species commonly forages with Red-capped Robin Chat *Cossypha natalensis* and Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata*). However, on 1 September 1995, an individual was observed loosely associated with a mixed-species flock which comprised two Square-tailed Drongos *Dicrurus ludwigii*, one Dark-backed Weaver *Ploceus bicolor*, and three Olive Mountain Greenbuls *Phyllastrephus placidus*. However, this is the only record of such behaviour and its presence in the flock is likely to have been largely opportunistic.

The species emitted a variety of calls, most frequently a far-carrying, soft, siren-like call comprising two notes, a guttural whirring call usually accompanied by tail-pumping, and a song comprising a soft, plaintive oscillating whistle. The siren-like call is possibly a long-distance contact call, and two individuals were often heard calling to each other.

White-starred Forest Robin *Pogonocichla stellata* was also recorded in the Nguus. This questions the notion whether there is much competition between this species and *S. gunnungi* (cf. Collar and Stuart 1985) and suggests that allopatry elsewhere in these species' ranges may be a function of their preferred altitudinal ranges: in Tanzania *P. stellata* usually inhabits forest above 500 m and *S. gunnungi* inhabits forest below 300 m.

Conservation status: Our observations of this species indicate a dependence upon intact, moist forest with a relatively dense undergrowth. Therefore, this thrush is likely to be highly sensitive to habitat destruction and the clearance of undergrowth for cardamom plantations. While *S. gunningi* has a wide range, the pressures being placed upon its lowland coastal forest habitat in Tanzania and Kenya are especially severe, and in Malawi much suitable forest has already been cleared (Collar and Stuart 1985). Indeed, the sites in Tanzania are small (eg. Rondo Plateau and Pugu Hills each have <10 km² of suitable forest) or have a tiny populations (T. Evans *in litt.* 1995). The East Usambaras have c.90 km² of suitable forest and were thought to have the largest population of this species (Evans *et al.* 1994), but the Nguu Mountains, which represent a new site for *S. gunningi*, may well hold the largest population. This suggests that this species is less threatened with extinction than previously thought. Accurate population estimates in the Nguu Mountains are required, but this species may be better classified as Near-threatened.

Red-capped Forest Warbler
Orthotomus metopais

Status: This poorly known warbler was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). It inhabits dense understorey, primarily at the edge of moist forest at 1000-2500 m. It has a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.) where it is only known from the Uluguru, Ukaguru, Nguru and the East and West Usambara Mountains (Britton 1980). Records from the East Usambaras are few, the most recent being those of Newmark (1991) and Cordeiro and Kiure (in prep.), possibly due to the lack of suitable habitat in the Amani area where most work has been done.



Red-capped Forest Warbler *Orthotomus metopais*

Project records:

Common in Lutindi: there was a total of 37 records, including one net record, in dense low-storey and forest edge in the CFR and public land at 1200-1250 m in July 1995.

Rare in Kilanga: there was one net record and three field records, of which all were in intact submontane forest in the CFR at 900 m in July 1995.

Not recorded in Nguru North CFR.

Observations and ecology: This species was observed in intact submontane forest and forest-edge in the CFR and the public land at 900-1250 m. It tended to be seen foraging in dense low-storey vegetation at 0.1-1.5 m, and was twice observed in climbers at 3 m. Birds were often encountered foraging in groups of 2-3 with Bar-throated Apalis *Apalis thoracica* and Evergreen Forest Warbler *Bradypterus barratti*, and were observed in mixed-species flocks on two occasions. While in such flocks, this warbler gave an alarm call, a high pitched 'chirrup', to which the nearby birds responded. The birds were generally extremely vocal and emitted a loud series of 'chirups' while flitting between branches in the undergrowth.

Conservation status: Although observed uncommonly in forest-edge vegetation, this species was only once observed in degraded forest and never in cultivated land. The species has been classed as forest-dependent by some workers (Newmark 1991) and it is probably sensitive to forest degradation. Not only does this species have a restricted range, but there have been few records from the East Usambaras in recent years. Therefore, while this species is not currently under any threat, it should continue to be monitored.

Spot-throat *Modulatrix stictigula stictigula*

Status: This shy, retiring bird was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). It has a restricted range within the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.), and is a resident of the montane forests of north-eastern, eastern and southern Tanzania and northern Malawi, at 900-2700 m, though primarily above 1200 m (Keith *et al.* 1992). Two races occur: the nominate *stictigula* which is found in the Ngurus, Ukagurus and Usambaras, north-east Tanzania; and *pressa* which ranges from the Ulugurus south-westwards through to Songea, Njombe and Mt Rungwe in south-west Tanzania, and also in the Misuku Hills of north Malawi (Britton 1980, Keith *et al.* 1992). Although abundant in the West Usambaras and reasonably common in the Ukagurus, the nominate race is scarce and possibly declining in the other two areas of its range, in the Ngurus and East Usambaras (Britton 1980). Whilst it has been suggested that this is a result of competition with *M. orostruthus* (Stuart and Hutton 1978), the decline in the Amani area since the 1930s is probably at least partly due to forest degradation and loss of habitat.

Project records:

Common at Lutindi: there were no sight records here, although the distinctive call was commonly heard. However, four individuals were netted in tracts of intact submontane forest at 1170-1230 m in July 1995.

Common at Kilanga: birds were commonly heard calling, and two pairs were also observed on 26 July and 29 July 1995, and three birds were netted on 28 July 1995. All records were from intact submontane forest at 1030 m.

Not recorded in Nguru North CFR.

Observations and ecology: The high-pitched, two note whistling call of this species was a ubiquitous noise in the undergrowth at both sites in the East Usambaras. The lack of field sightings is testimony to the extremely secretive nature of this species and its tendency to stay close to the forest floor deep within dense undergrowth. On 26 July 1995 a pair of individuals at 920 m were heard calling to each other for several minutes from either side of a small stream valley, and were then observed in a patch of dense field layer, where they both calling 1 m apart. Calls were given from perches just off the ground on small branches or stems, and whilst calling the birds were observed turning sharply from side to side, frequently wing-flicking and tail-jerking. One individual then flew away, leaving the second to continue calling for several minutes. All birds were netted in the bottom panel, apart from two exceptions in the second lowest panel. In the hand, the birds were seen to have the less distinct spotting on the throat that is characteristic of the race *stictigula* (Keith *et al.* 1992).

Conservation status: Our data, and other recent fieldwork in Lutindi CFR (Cordeiro and Kiure in prep.), suggest that this species is reasonably common in intact submontane forest. However, in 1994, two birds were netted in the public land (Cordeiro and Kiure in prep.). This supports the suggestion that the species is not tied to intact submontane forest, being found in nearby dense secondary habitats, degraded forest and even gardens (Britton 1980, Keith *et al.* 1992). However, the overall decline of the scarce nominate race in the Ngurus and East Usambaras (Britton 1980) indicates that the species is possibly not as tolerant to human disturbance as its range of habitats might suggest. To help halt the decline in the East Usambaras, one of the three population strongholds of the nominate race, action should be taken to prevent further encroachment and disturbance of the remaining areas of suitable forest, in both the Lutindi and Kilanga areas on Mount Nilo CFR.

Uluguru Violet-backed Sunbird *Anthreptes neglectus*

Status: This species was previously classified as Near-threatened (Collar and Stuart 1985), but is not listed by Collar *et al.* (1994). It inhabits forest and forest edge and is known from several forest sites in eastern Tanzania (up to 1800 m in the Ulugurus) and northern Mozambique, although there are a few records of it occurring in coastal Kenya (Hall and Moreau 1970, Britton 1980).

Project records:

Rare at Lutindi: there were five records in cultivated public land at 1000 m in July 1995.

Rare at Kilanga: a pair was observed in forest edge, adjacent to a cardamom plantation, within the CFR at 900 m in July 1995.

Uncommon at Gombero: there were 18 records in intact submontane forest and along a river valley at 1300-1350 m in August 1995.

Uncommon at Luago: there were 13 records along a river valley at 1140 m in September 1995.

In addition, there were two records in Kilanga of sunbirds that differed from *A. neglectus* in that they were brown above, with a bold white supercilium, and pale yellow on the belly and vent. The birds fitted the descriptions given in Mackworth-Praed and Grant (1962) for female Violet-backed Sunbird *A. longumarei*. However, Evans (in prep.) notes that the juvenile plumage of *A. neglectus* is misleadingly described in Mackworth-Praed and Grant (1962), and that immature *A. neglectus* actually have a bold white supercilium, a dusky brown crown, mantle and wing-coverts, and lemon yellow on the belly and vent. Given that *A. neglectus* and *A. longumarei* are largely allopatric, with different ranges and habitat preferences (Britton 1980), it is likely that these two records refer to juvenile *A. neglectus*.

Observations and ecology: This sunbird was observed in both intact and heavily degraded forest in the CFRs and in the public land. It was also seen in cultivated areas: adjacent to a maize plantation at Lutindi (see comments under Banded Green Sunbird *A. rubritorques*) and adjacent to a cardamom plantation at Kilanga. It tended to forage at 1-5 m in the undergrowth and mid-storey, and on several occasions was observed probing amongst *Loranthus* spp. and other flowering plants. In addition, it was commonly observed in mixed-species flocks, but it is likely that it is an occasional flocker, its appearance in such flocks being largely opportunistic.

Conservation status: It is clear from our observations that while this species is found in intact submontane forest, it is essentially a forest edge bird, it is adaptable and can withstand fairly high levels of habitat degradation. For this reason it is in no immediate danger of extinction, but the fact that it is known from only a few sites make it a species of conservation importance.

Amani Sunbird *Anthreptes pallidigaster*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This sunbird is confined to one site in Kenya (67 km² of coastal *Brachysteiga* woodland in the Arabuko-Sokoke forest), and three sites in Tanzania: the Ndundulu Mountains at 1500-1550 m, the Nyumbanitu Mountains at 1350-1400 m, and in the East Usambaras previously only up to 900 m (Collar and Stuart 1985, Dinesen *et al.* 1993, Hipkiss *et al.* 1994, Evans in press)

Project records:

Rare at Lutindi: there were 20 records, thought to refer to the same pair, all in a clearing in secondary forest along the CFR boundary at 1250 m in July 1995.

Rare at Kilanga: there were 12 records, thought to refer to at least three individuals, in intact submontane forest within the CFR in intact submontane forest at 1030 m in July 1995.

Not recorded in Nguru North CFR.

This species has not been recorded above 900 m in the East Usambara Mountains, and our records therefore represent an altitude extension of 350 m in this mountain range.

Observations and ecology: This species is mainly referred to as a canopy specialist preferring primary forest (Collar *et al.* 1994). The Kilanga observations support this: all individuals were observed at 20-30 m in the sub-canopy and canopy of mature trees within intact submontane forest. In Lutindi, however, the birds were also observed at 1-6 m in the mid-storey in a clearing in heavily degraded forest along the CFR boundary. It is possible, therefore, that this species may tolerate more habitat degradation than previously thought.

This species is noted as being mainly nectivorous (Collar and Stuart 1985), however it was mainly observed gleaning for insects, probing underneath leaves or amongst lichens and mosses. It regularly foraged alongside Yellow White-eyes *Zosterops senegalensis* and other sunbirds, commonly Collared Sunbird *Anthreptes collaris* and on two occasions with Banded Green Sunbird *Anthreptes rubritorques*. Aggressive interactions were observed between *A. pallidigaster* and *A. collaris*. These involved the former chasing the latter, while giving a series of loud, angry 'chips'. Fighting between these species has been noted by other workers and it is possible that competition between these species is partly responsible for the decline of *A. pallidigaster* (Collar and Stuart 1985). On six occasions, this species was encountered in mixed-species flocks, typically comprising Grey Cuckooshrike *Coracina caesia*, Olive Sunbird *Nectarinia olivacea*, Olive Woodpecker *Mesopicos griseocephalus*, Shelley's Greenbul *Andropadus masukuensis* Square-tailed Drongo *Dicrurus ludwigii*, Tiny Greenbul *Phyllastrephus debilis* and White-tailed Crested Flycatcher *Trochocercus albonotatus*.

Most of the records refer to pairs (26 out of the 34 records). Only males were observed alone, and on one occasion a group comprising two males and one female were seen. In this instance, aggression was observed between the two males.

Conservation status: Our records of this species indicate that within the East Usambaras the altitudinal range and hence the population of this sunbird is larger than previously thought. However, the possibility that the birds observed were non-breeding visitors should not be over-looked. In the short term, it is possible that the species is able to tolerate some degree of habitat destruction. However, it has a low population density, it may be essentially dependent upon forest and the pressures upon its habitat are great. It thus still merits its Threatened status, and improving protection of the forest in and adjacent to the Mount Nilo CFR, in the ways outlined in sections 5 and 8, would help to secure the future of this rare sunbird.

Banded Green Sunbird *Anthreptes rubritorques*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This sunbird has a restricted range in the Eastern Arc Mountain EBA (Stattersfield *et al.* in prep.) where it was previously only known from four forest areas: the Usambara, Nguru, Uluguru and Udzungwa Mountains (Britton 1980). It is known to inhabit the canopy in forest and at the forest-edge mainly at 750-1500 m, but it was recently recorded at 200 m in the East Usambaras (Hipkiss *et al.* 1994, Cambridge Tanzanian Rainforest Project 1994), with breeding records at 300 m (Evans in press). While common in the East Usambaras and in the south-western region of the West Usambaras it is generally considered to be scarce throughout the rest of its range (Collar and Stuart 1985, Collar *et al.* 1994).

Project records:

Rare at Lutindi: there were eight records (including a group comprising three males and two females) in cultivated land at 900 m and one record of a male on the forest edge at 1220 m in July 1995.

Rare at Kilanga: a pair and group consisting of two males and a female were observed in intact submontane forest at 1030 m in July 1995.

Rare in Gombero: there were eleven records, probably referring to seven individuals, in forest clearings at 1350 m and 1500 m in August 1995.

Rare in Luago: there were 13 records, almost certainly referring to the same two males and one female, at 1280 m at the ecotone between submontane forest and degraded Miombo woodland in September 1995.

Observations and ecology: This sunbird was mainly observed in the sub-canopy and canopy at 15-35 m in mature trees either in forest clearings within the CFR or on the forest edge. However, seven of the nine Lutindi records refer to individuals foraging in the mid-storey, in scrub vegetation adjacent to a small maize plantation in the public land.

At Luago, one *A. rubritorques*, along with a pair of Collared Sunbirds *A. elatior* and one Amethyst sunbird *Nectarinia amethystina* was observed feeding on the nectar of *Erythrina abyssinica*, previously noted to be a food plant of this species (Collar and Stuart 1985). The bird was observed feeding intermittently on this flower between about 08h00 and 16h00 on seven consecutive days. On all other occasions, it was seen gleaning for insects amongst mosses, leaves and lichen, and was often seen foraging with other sunbirds. On 15 August 1995, three male and two female *A. rubritorques* were observed foraging with three Uluguru Violet-backed Sunbirds *A. neglectus* and two Olive Sunbirds *Nectarinia olivacea*. On 24 August 1995, two males and a female were observed foraging with two Amani Sunbirds *A. pallidigaster* and three *A. collaris*. On another occasion, three *A. rubritorques* were observed within a large mixed-species flock comprising regular flocking insectivorous species: Square-tailed Drongo *Dicrurus ludwigii*, Dark-backed Weaver *Ploceus bicolor*, Olive Woodpecker *Mesopicos griseocephalus*, Grey Cuckooshrike *Coracina caesia*, White-tailed Crested Flycatcher *Trochocercus albonotatus* and Olive Sunbird *Nectarinia olivacea*.



Banded Green Sunbird
Anthreptes rubritorques

At Gombero, in a clearing at 1500 m, a pair of sunbirds seemed to be constructing a nest. On 25 August 1995, the female was observed gathering both lichen and the feathery bracts of a flowering climber which she then took to the sub-canopy of a mature tree *Newtonia* sp. From 09h10 to 10h45, she flew regularly between this tree and trees from which she collected nesting material. The male was not observed gathering material, but followed the female, and perched nearby, scanning constantly, and possibly mate-guarding. This pattern of active female and watching male was also observed by Moreau and Moreau (1937) and Evans (in press).

In Luago, similar behaviour was observed at the forest-edge at 1280 m. From 30 August 1995 to 6 September 1995, a female was observed flying between the sub-canopy of a tree from which she collected probable nesting material (twigs, lichen, moss) and a tree within the forest 20 m away. Again the male followed her, but did not appear to collect material himself. On several occasions, while the female was gathering, the male was observed perching in the canopy, giving a high pitched plaintive 'chip' or 'teuu' at a frequency of one per second for 30 to 60 seconds at a time. Again, it is possible that the male was mate-guarding and acting as lookout.

Conservation status: Our observations suggest that this species may be able to adapt to fairly degraded environments and may well be less of a forest-dependent species than other authors have suggested (eg. van der Willigen and Lovett 1981). However, even in the cultivated public land in Lutindi, it was recorded in the vicinity of a few remaining mature trees and the nests seemed to be being constructed in mature trees. Thus, while it may be able to survive in partly degraded secondary habitats in the short term, its long term survival is not assured (Collar and Stuart 1985), and Vulnerable remains the most appropriate classification of its status.

Fuller protection of Mount Nilo CFR, including the incorporation of the forested public land into the reserve, would help to secure this species' survival. Likewise, in the Nguu Mountains, where our observations suggest there is a healthy population, ending all pit-sawing would greatly improve this sunbird's chances of long term survival.

Moreau's Sunbird *Nectarinia moreaui*

Status: Near-threatened (Collar *et al.* 1994). Regarded as a canopy and mid-storey specialist (Britton 1980), this sunbird has a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.). It was previously only known from above 1300 m in the Nguru, Ukaguru and Uvinda Mountains, and is considered to be a possible hybrid between Loveridge's Sunbird *N. loveridgei* and Eastern Double-collared Sunbird *N. mediocris* by Sibley and Monroe (1990), but as a full species by Britton (1980), Collar and Stuart (1985) and Collar *et al.* (1994).

Project records:

Not recorded in Mount Nilo CFR.

Rare in Gombero: there were five records, thought to refer to at least three individuals.

19 August 1995	one net-record in intact submontane forest within the CFR at 1360 m.
24 August 1995	a pair, and later a single male only, were observed in a clearing in intact submontane forest at 1500 m.
25 August 1995	single male observed in a clearing in intact submontane forest at 1500 m.

Not recorded, but probably overlooked at Luago.

Observations and ecology: The birds were observed in a forest clearing at 1500 m, foraging mainly in the mid-storey at 1-3 m. They were observed in the mornings, between 07h00 and 10h40, feeding upon the nectar of flowering climbers. The male appeared to be completing a regular circuit between three such climbers, remaining on each plant in full sun for 2-5 minutes. The male was also observed collecting water from the surface of lichen in the canopy of a leafless *Albizia* sp. at 20 m. While the female did not seem to give any call, the male regularly sat on an exposed branch and emitted a long series of sharp 'chirps' at a frequency of one every two seconds. The birds were observed foraging in the vicinity of Banded Green Sunbirds *Anthreptes rubritorques*, but no interactions were noted.

Conservation status: Our observations of this poorly known sunbird indicate that it is primarily a forest-dependent species which is likely to be highly sensitive to habitat destruction. It is very likely to occur in other parts of the Nguu Mountains as well, and further searches should be made in reserves such as Derema and Kilindi CFRs. It is likely that the Nguus support a healthy population of this species, as do the Ukagurus (Evans and Anderson 1993), and Near-threatened thus seems the most appropriate status. Improved protection of Nguru North CFR would significantly contribute to this sunbird's survival.

Green-headed Oriole *Oriolus chlorocephalus*

Status: This species was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). A resident in woodland, intact and secondary forest, this oriole occurs in eastern Tanzania and south-east Kenya. While it is common throughout the lowlands of the East Usambaras and in the Nguru Mountains, it is generally considered to be uncommon throughout its range. The species has been recorded up to 1800 m in the Ulugurus, but it is more usually found below 1000 m (Britton 1980).

Project records:

Uncommon at Lutindi: there were eight records in intact submontane forest and forest edge at 1150-1220 m in the CFR and public land in July 1995.

Uncommon at Kilanga: there was one record in intact submontane forest at 1030 m, and four records in forest edge at 900 m in July 1995.

Abundant at Gombero: there were 57 records in intact submontane forest and forest edge within the CFR at 1200-1500 m in August 1995.

Abundant at Luago: there were 44 records in intact submontane forest, riverine forest and forest edge within the CFR at 1100-1300 m in August and September 1995.

Observations: This oriole was observed in the canopy and sub-canopy at 15-35 m in intact submontane forest and forest-edge habitats at 1000-1200 m in the East Usambara and at 1100-1400 m in the Nguus. The birds were regularly observed feeding on fruit, usually in pairs, and were occasionally seen in mixed-species flocks with insectivores and other frugivores. The bird gave a clear liquid song, very similar to that of Black-headed Oriole *O. larvatus*, but it was clearer and consisted of shorter phrases. It also had a distinctive nasal whining or creaking call, not heard from any other oriole species.

Conservation status: Observations of this oriole in forest edge habitats imply that it may tolerate a degree of habitat degradation. However, in the long-term, clearance of evergreen montane forest is likely to have detrimental effects on this species. The bird's rarity in the East Usambaras implies that it is not common throughout its range, but its abundance in the Nguu Mountains enable us to conclude that it is in no immediate danger of extinction.

Kenrick's Starling *Poeptera kenricki*

Status: This exclusively arboreal starling was previously considered as a candidate for Threatened status by Collar and Stuart (1985), but is not listed in Collar *et al.* (1994). Classified as having a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.), this species is found in highland forest at 900-2500 m in central Kenya and eastern Tanzania where it is usually common (Britton 1980), and is known down to 300 m in the non-breeding periods (T. Evans *in litt.* 1995).

Project records:

Uncommon in Lutindi: there are nine records in intact and degraded forest in the CFR and public land at 900-1280 m in July 1995.

Rare in Kilanga: five individuals were observed at 750 m on the forest edge on 24 July 1995.

Uncommon in Gombero: there were 18 records, thought to refer to seven individuals, in forest edge at 1500 m in August 1995.

Rare in Luago: a pair was observed in intact submontane forest adjacent to a river valley at 1140 m on 31 August 1995.

This species is a canopy specialist, it can only be seen well from clearings or at the forest edge and good views are necessary to distinguish it from other starling species. It is very likely, therefore, that this bird was overlooked and under-recorded at all study sites.

Observations and ecology: This species was observed in intact and degraded forest-edge, predominantly in the canopy of mature trees at 20-40 m, where they were commonly seen gleaning for insects amongst lichen, epiphytes and mosses. Birds perched for long periods of time (a maximum of 45 minutes) in the outermost dead branches. While pairs were usually recorded, a flock of seven individuals was observed on one occasion.

In Gombero there was evidence of breeding: on the mornings of 24 and 25 August 1995, both the male and the female of a pair were observed bringing nesting material to a hole in a dead tree at 1500 m, approximately 10 m above the ground. When not collecting material, the male was observed perched on top of this dead tree for up to 45 mins, occasionally descending from the perch to inspect the nest hole.

Conservation status: While certainly overlooked and under-recorded, this species was uncommon in both Mount Nilo CFR and in Nguru North CFR. It was nearly always observed in the canopy of mature forest trees such as *Newtonia* spp. and *Albizia* spp. and it is very likely to be sensitive to forest degradation. Thus, while currently not classified as Threatened or Near-threatened, deforestation, especially the removal of mature trees, within its restricted range, make this species worthy of conservation attention. Conservation efforts in Mount Nilo and Nguru North CFRs would help secure the future of this species.

Usambara Weaver *Ploceus nicolli*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This very low population density forest weaver has a restricted range in the Eastern Arc Mountain EBA (Stattersfield *et al.* in prep.). The bird mainly inhabits the canopy of evergreen montane forest, but has also been noted on forest edge and in isolated trees in cultivated areas (Sclater and Moreau 1933, Stuart and Hutton 1978, van der Willigen and Lovett 1981, Britton 1980). The nominate race *nicolli* is endemic to the East and West Usambara Mountains and occurs at 900-2200 m, while the race *anderseni* is known from the Uluguru and Udzungwa Mountains at 1100-2150 m (Collar and Stuart 1985, Stuart *et al.* 1987, Jenson and Brøgger-Jensen 1992, Dinesen *et al.* 1993).

Project records:

Rare at Lutindi: there were 11 records in total, of which eight were in cultivated public land between 900 and 1200 m, and three were of birds in intact CFR forest at 1200 m in July 1995.

Rare at Kilanga: one bird was observed in a mixed-species flock in the sub-canopy of a mature tree in intact CFR forest at 1030 m in July 1995.

Not recorded in Nguru North CFR.

The birds were noted as being slightly slimmer than Dark-backed Weaver *P. bicolor*, with a black bill, throat, head and upperparts, a dark red breast, and yellow underparts. The colour of the forehead appeared to vary between individuals from yellow-green to yellow washed with chestnut. The extent of forehead colouration also seemed to vary: in some birds the yellow was indistinct, in others it was very conspicuous. These differences are possibly age-related. Other individuals had no yellow on the forehead, and these were presumably females.

Observations and ecology: Birds were observed in the canopy and sub-canopy at 20-40 m in mature trees such as *Albizia* spp. and *Newtonia* spp. These observations were made either in clearings in otherwise intact submontane forest or in cultivated public land where mature trees still stood. Single males or pairs of birds were usually observed gleaning for insects amongst moss, lichens and epiphytes. On three occasions, the weavers were encountered in mixed-species flocks. The composition of these was as follows:

- 7 July 1995 two Usambara Weavers *Ploceus nicollii*, one Grey Cuckooshrike *Coracina caesia*, one Square-tailed Drongo *Dicrurus ludwigii*, and three Yellow-throated Woodland Warblers *Phylloscopus ruficapilla*.
- 7 July 1995 one Usambara Weaver *Ploceus nicollii*, two Many-coloured Bush-shrikes *Malaconotus multicolor*, one Yellow-throated Woodland Warbler *Phylloscopus ruficapilla* and two Grey Cuckooshrikes *Coracina caesia*.
- 28 July 1995 one Usambara Weaver *Ploceus nicollii*, one Square-tailed Drongo *Dicrurus ludwigii*, one Grey Cuckooshrike *Coracina caesia*, one White-tailed Crested Flycatcher *Trochocercus albonotatus* and two Olive Sunbirds *Nectarinia olivacea*.

Such association with flocks has been noted by previous workers (Turner 1978, Stuart and Van der Willigen 1979, Britton *et al.* 1984), but was not observed by Cordeiro and Kiure (in prep.). It is likely that this species is an occasional flocker, its appearance in flocks being largely opportunistic.

Conservation status: Until it was observed just outside what was then Lutindi CFR in 1994 (Cordeiro and Kiure in prep.), *P. nicollii* had not been recorded in the East Usambaras since 1932 when it was last seen at Amani (Sclater and Moreau 1932-33). The lack of sightings since 1932 lead various authors to suggest that the species was locally extinct (Stuart and van der Willigen 1979, Collar and Stuart 1985, Evans and Anderson 1993, Tye 1993). Mount Nilo CFR is thus very likely to represent the last remaining stronghold in the East Usambaras for the nominate race. High levels of forest degradation were found here and although individuals have been observed in cultivated land, it was always in areas where mature trees still stood. The small remaining population of this weaver is undoubtedly threatened by the deforestation taking place and the species should retain its Threatened status. It is vital that the remaining intact submontane forest, including that found at Lutindi and Kilanga and if possible the adjacent public land, is fully protected.

6.2 Species of conservation interest not recorded

Four species of conservation interest which are known from the East Usambaras were not recorded in either Mount Nilo or Nguru North CFRs.

Swynnerton's Forest Robin *Swynnertonia swynnertoni*

Status: Threatened: Vulnerable (Collar *et al.* 1994). This terrestrial robin has a restricted range in the Eastern Arc Mountains and south-east African Mountains EBAs (Stattersfield *et al.* in prep.) where it is limited to a few tiny forest patches, including Chirinda in Zimbabwe (*swynnertonii*), Mount Gorongosa in Mozambique (*umbratica*) and the Udzungwa Mountains (*rodgersi*) and East Usambara Mountains in Tanzania (probably *rodgersi* T. Evans *in litt.* 1995). It inhabits mid-altitude and montane wet forests at 130-550 m in the East Usambaras, and at 850-1750 m elsewhere.

While this species is known to inhabit montane forest up to 1750 m in Zimbabwe, it is only known from below 550 m in the East Usambara lowland forests (Tye 1993, Evans *et al.* 1994, Hipkiss *et al.* 1994, Evans *in press*). Its absence from Mount Nilo CFR is therefore not entirely surprising. In addition, Sharpe's Akalat *Sheppardia sharpei* is very similar in behaviour and ecology to this forest robin and is thus a likely competitor (Collar and Stuart 1985). *S. sharpei* was common in Mount Nilo CFR and it is possible that it has displaced *Swynnertonia swynnertoni*. The lack of records in the Nguu Mountains possibly relates to the drier habitat (see section 5.2). It is however possible that *S. swynnertonii* does occur here, possibly in Derema CFR which contains moister submontane forest up to 1600 m. Further searches are needed to confirm this.

Conservation status: This poorly known, forest-dependent species is only known from a few tiny and disjunct patches of forest. In the East Usambaras it is fairly common in the lowland patches, but these are heavily exploited (see Cambridge Tanzanian Rainforest Project 1994 for conservation measures being taken to protect this species), and thus the species should remain classified as Threatened.

Dappled Mountain Robin *Modulatrix orostruthus amani*

Status: Threatened: Vulnerable (Collar *et al.* 1994). Classified as having a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.), this highly elusive, low population density species inhabits wet montane forest mainly at 1300-1700 m. It is known from three isolated populations with subspecific status: *orostruthus* on Mount Namuli in Mozambique, *sanjei* on the Udzungwa escarpment, and *amani* in the East Usambaras. It is only known from 900 m in the vicinity of Amani in the East Usambaras, where, following its discovery in 1935 (Sclater and Moreau 1935) it was not recorded again until 1962 (Britton 1980, Keith *et al.* 1992).

While it is possible that this species was overlooked, the lack of records both in 1994 (Cordeiro and Kiure *in prep.*) and 1995 indicate that despite the presence of suitable habitat, this species is genuinely absent from Mount Nilo CFR. The absence of records from the Nguu Mountains possibly relates to the dryness of the forest, but further surveys should be carried out at higher altitudes and on the wetter eastern slopes to ascertain whether this is the case.

Conservation status: The lack of records, despite much ornithological effort (eg. Evans *et al.* 1994), imply that the range of this species within the East Usambaras is limited, and the birds may well be restricted to the Amani area. The population of *M. orostruthus* may therefore be as low as 85-200 individuals in the East Usambaras, as estimated by Stuart and Hutton (1978). The species is dependent upon evergreen forest at mid-altitudes, and requires a dense understorey (Collar and Stuart 1985). While the population on Namuli Mountain is thought not to be under threat, clearance of the understorey for cardamom cultivation poses a very serious threat to the survival of this species in the East Usambaras.

Long-billed Tailorbird *Orthotomus moreaui*

Status: Threatened: Critical (Collar *et al.* 1994). This warbler has a restricted range in the Eastern Arc Mountains EBA (Stattersfield *et al.* in prep.) where it is only known from two disjunct populations representing two races: *moreaui* occurs in the East Usambaras in Tanzania at 900-1050 m, and *sousae* occurs on the Njesi Plateau in northern Mozambique at 1650 m (Collar and Stuart 1985, Collar *et al.* 1994). It inhabits dense undergrowth in forest, at the forest edge and in clearings and occurs at low densities.

Conservation status: Two individuals of this species were observed just outside the Mount Nilo CFR in degraded public land at 1200-1250 m by Cordeiro and Kiure (in prep.). The bird had not been recorded during other recent fieldwork in the Usambaras by Evans and Anderson (1992), nor by Tye (in Collar *et al.* 1994) in two years at Amani. Indeed, despite being a species of forest clearings and edges, it is extremely scarce, it is absent from large areas of apparently suitable habitat and it remains vulnerable to forest clearance (Collar and Stuart 1985, Collar *et al.* 1994).

Plain-backed Sunbird *Anthreptes reichenowi*

Status: Near-threatened (Collar *et al.* 1994). This sunbird tends to inhabit both intact and secondary forest in coastal Kenya and north-east Tanzania from Sokoke Forest to Moa, Tanga and Muheza, inland to the Shimba Hills and the East Usambaras (Britton 1980). It also occurs in southern Tanzania, eastern Zimbabwe and north-central Mozambique. It is only known from below 500 m in the East Usambaras, and thus the lack of records both in 1994 (Cordeiro and Kiure in prep.) and 1995 is not surprising.

Conservation status: This poorly known bird is largely confined to intact lowland forest, the clearance of which increasingly threatens this species. Indeed, its range and habitat requirements are similar to those of the widespread but Threatened East Coast Akalat *Sheppardia gunningi*. This sunbird warrants close conservation attention and fully merits its Near-threatened status.

6.3 Annotated checklist of all birds recorded at study sites

Green Ibis *Bostrychia olivacea*

See Section 6.1

Hooded Vulture *Neophron monachus*

Two records from Gombero. One of two birds on 25 July 1995, and one on 12 August 1995; all were observed over cultivated land.

Southern Banded Snake Eagle *Circaetus fasciolatus*

See Section 6.1.

Bateleur *Terathopius ecaudatus*

Recorded rarely at all sites apart from Kilanga: single records from Lutindi at 1000 m and Gombero at 1400 m, and three sightings in Luago up to 1300 m. All birds were observed over cultivated land. The absence of suitable viewpoints over this type of habitat may explain the lack of records for Kilanga. This species was observed much more frequently at lower altitudes over savannas and semi-desert thornbush.

African Harrier Hawk *Polyboroides radiatus*

Recorded at all sites except for Luago. Most commonly observed in Lutindi up to 1500 m, but sightings probably referred to a minimum of three adults and an immature. The low number of records from Kilanga (one observation of two adults), is almost certainly due to the absence of good raptor watchpoints. Three records from Gombero probably refer to just two birds. Observed over forest and cultivated land at all sites where recorded, and also perched in the interior of primary forest in Lutindi. This is a particularly interesting record because Brown *et al.* (1982) note that this is a habitat type avoided by this species.

Great Sparrowhawk *Accipiter melanoleucus*

Two records from the Nguus: one over forest on 19 August 1995 and another flying rapidly through the sub-canopy at 1250 m on 5 September 1995.

Little Sparrowhawk *Accipiter minullus*

One record of an individual observed flying through and perching in the subcanopy in intact submontane forest at 1250 m at Luago on 30 August 1995. Brown *et al.* (1982) note that this species occurs more typically in savannas and thornbush.

African Goshawk *Accipiter tachiro*

There were only four records. Two were seen at Lutindi, both adult males in the same area of forest interior at 1200 m, and therefore possibly referring to the same individual. Also recorded twice in the Nguus, one netted in Gombero at 1300 m on 15 August 1995 and another in interior forest at 1400 m in Luago.

Mountain Buzzard *Buteo tachardus*

Commonly observed in Lutindi and Kilanga over both forest and cultivated land up to 1500 m. This species' loud, clear 'mew' was heard daily. There were only four records from Gombero, probably referring to just two birds.

Augur Buzzard *Buteo augur*

Recorded commonly in Lutindi and once in Kilanga, but not in the Nguus. All observations were over cultivated land and lowland forest up to 1200 m. Although only one individual was recorded in Kilanga on 24 July 1995 at 850 m, this species was probably under-recorded at this site due to a lack of suitable viewing positions.

Long-crested Eagle *Lophaetus occipitalis*

Recorded at all sites with three records at each of Kilanga, Gombero and Luago, and two records at Lutindi; but only in Kilanga was there definitely more than one bird present. Observed up to 1400 m over cultivated land and forest, and often perched on the forest edge.

Crowned Eagle *Stephanoaetus coronatus*

Observed regularly at all sites. Sightings probably refer to just two adults at each site with single immatures present at Lutindi and Luago. All observations were over forest or below the canopy, up to 1500 m in the East Usambaras and Nguus. Birds were observed displaying and calling at all sites, and preying on Blue Monkeys *Cercopithecus mitis* in Lutindi.

Martial Eagle *Polemaetus bellicosus*

Only one record of an individual over cultivated land in Luago on 5 September 1995. This species is more common on savannas (Brown *et al.* 1982).

Kenyan Crested Guineafowl *Guttera pucherani*

Seen and heard commonly in the Nguus, but absent in the East Usambaras. Sightings in Gombero refer to a minimum of 11 birds and in Luago to a minimum of twelve birds (largest single flock), but usually seen in small flocks of three or four. All observations were in intact submontane forest up to 1400 m.

Buff-spotted Pygmy Crake *Sarothrura elegans*

Rare in the Nguus in forest up to 1400 m. All records were of birds giving a distinctive deep, far carrying 'moan'. Three records from Gombero (21-23 August 1995), including two individuals heard simultaneously on 22 August 1995. Only one record for Luago of an individual calling on 3 September 1995.

Olive Pigeon *Columba arquatrix*

Uncommon at three sites. Two records for Kilanga at 1200 m, five for Gombero and three for Luago up to 1500 m. Normally observed in pairs in the canopy.

Bronze-naped Pigeon *Columba delegorguei*

Recorded at all sites, and very common in Kilanga and the Nguus. A shy, canopy species, therefore most were only heard, with a seen-heard ratio of 1:15. Recorded up to 1350 m in the East Usambaras and up to 1500 m in the Nguus.

Lemon Dove *Aplopelia larvata larvata*

Only one record from Lutindi and four from Kilanga, including one bird netted on 28 July 1995, all below 1200 m. More commonly observed in the Nguus up to 1500 m with eight sight records and nine heard records from Gombero, and seven sight records and fifty-three heard records from Luago. However, this bird was almost certainly under-recorded: a large number records of unidentified doves disturbed from the forest floor and not relocated probably referred to this species.

Red-eyed Dove *Streptopelia semitorquata*

One record from Lutindi at 1000 m on 17 July 1995. Uncommonly recorded in the Nguus up to 1400 m with five sight records and six heard records from Gombero, and two heard records from Luago. All observations were in cultivated land up to the forest boundary.

Tambourine Dove *Turtur tympanistria*

Common in the East Usambaras to 1300 m and abundant in the Nguus to 1500 m, although the vast majority were heard rather than seen. Most sightings were fleeting glimpses of solitary birds flying fast and direct when flushed from dense undergrowth.

Fischer's Turaco *Tauraco fischeri*

See Section 6.1

Livingstone's Turaco *Tauraco livingstonii*

Abundant in the Nguus. Observed in middle and upper storeys of forest and in forest edge up to 1500 m. Often seen in groups of up to ten. Not recorded in the East Usambaras.

Barred Long-tailed Cuckoo *Cercococcyx montanus*

Uncommon in the Nguus with nine heard records from Gombero in intact submontane forest up to 1300 m.

Emerald Cuckoo *Chrysococcyx cupreus*

Very rare with only one record of a male from Lutindi and two records of a female from Kilanga. All observations were in forest edge at 1100 m.

Yellowbill *Ceuthomochares aereus*

Uncommon in the Nguus with six records from Gombero and two records from Luago. All were in intact submontane forest up to 1300 m. Contrary to Fry *et al.* (1988) who note this species as being a solitary bird, all records refer to singles in mixed-species foraging flocks.

White-browed Coucal *Ceutropus superciliosus*

Uncommonly observed with three records from Lutindi, with three records from Gombero, and five records from Luago. All were seen on cultivated land up to 1200 m.

Usambara Eagle Owl *Bubo vosseleri*

See Section 6.1

African Wood Owl *Ciccaba woodfordii*

Recorded only in the Nguus below 1300 m with 31 heard records from Gombero and 25 heard records from Luago, referring to a minimum of three birds at each site.

Mottled Spinetail *Telacanthura ussheri*

Uncommon at all sites with 25 records from Lutindi, four from Kilanga, and seven from Gombero. These records refer to a minimum of two, three and four birds respectively. Usually seen in pairs over forest up to 1500 m in the East Usambaras and 1400 m in the Nguus.

African Palm Swift *Cypsiurus parvus*

Recorded in Kilanga and Gombero, always over cultivated land below 750 m. One notable flock of 30 was seen in Gombero at 1250 m on 16 August 1995.

Speckled Mousebird *Colius striatus*

Only recorded in Luago, where two flocks of three and ten birds were noted. Both sightings were in forest edge and cultivated land at 1300 m. More common in lowland bush and thorn scrub, and near human habitation. These records may refer to erratic local movements of birds (Fry *et al.* 1988).

Narina's Trogon *Apaloderma narina*

Recorded at all sites except Lutindi. Rare in Kilanga with one observation of a male in forest edge at 800 m on 29 July 1995. More common in the Nguus with 13 records from Gombero and two from Luago all in intact submontane forest up to 1400 m.

Bar-tailed Trogon *Apaloderma vittatum*

Uncommon at all sites except Luago, where it was absent. Always noted in the mid-storey and canopy in both intact and degraded submontane forest up to 1200 m in the East Usambaras and up to 1400 m in the Nguus. Frequently observed in mixed-species foraging flocks.

Pygmy Kingfisher *Ispidina picta*

Very rare, with only one record from Luago of a bird perched 2 m high in a small river valley at 1250 m on 3 September 1995.

Cinnamon-chested Bee-eater *Merops oreobates*

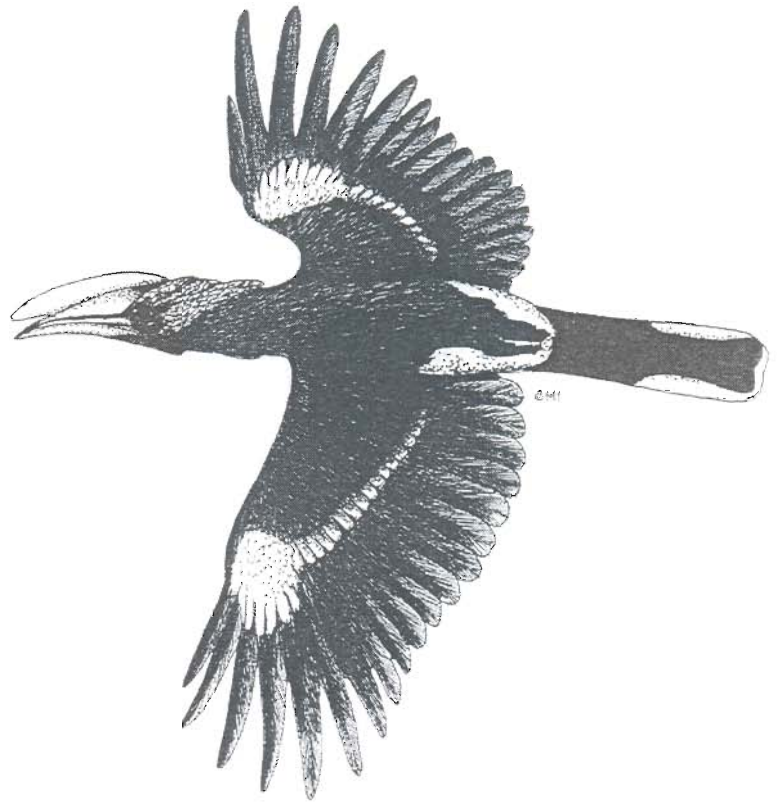
Rare, with only one record for Luago in forest edge at 1300 m on 4 September 1995.

Crowned Hornbill *Tockus alboterminatus*

Rare in Lutindi with one record of two birds flying into a ravine on the forest boundary at 1200 m. This represents an altitude extension of 100 m for the East Usambaras (Cordeiro and Kiure, in prep.) Common in the Nguus up to 1500 m with a minimum of eight birds in Gombero and four in Luago. Birds were often noted in pairs, and occasionally seen in mixed-species flocks.

Trumpeter Hornbill *Bycanistes bucinator*

Recorded at all sites. Abundant in Gombero with a minimum of 27 birds present (the largest single flock). Common in Lutindi and Luago with a minimum of seven and eight birds respectively. More uncommon in Kilanga with a minimum of two birds. Observed in forest and Miombo woodland up to 1300 m in the East Usambaras and 1500 m in the Nguus. Often noted in flocks with Silvery-cheeked Hornbill *B. brevis* in which it was usually out-numbered by the latter species.



Silvery-cheeked Hornbill *Bycanistes brevis*

Silvery-cheeked Hornbill *Bycanistes brevis*

Recorded at all sites. Recorded in the East Usambaras to 1300 m: common in Kilanga with a minimum of four birds, but uncommon in Lutindi with a minimum of only two birds. Abundant in the Nguus up to 1500 m, with a minimum of 21 birds in Gombero and 30 in Luago. Always recorded in forest and often in flocks with Trumpeter Hornbill *B. bucinator*. Possible breeding behaviour was noted at Luago on 31 August 1995 when a pair was seen investigating a possible nest site.

White-eared Barbet *Buccanodon leucotis*

Only observed in the East Usambaras, where it was abundant in Lutindi on cultivated land and forest edge up to 1200 m, normally in small flocks of between two and eight birds.

Green Barbet *Buccanodon olivacea*

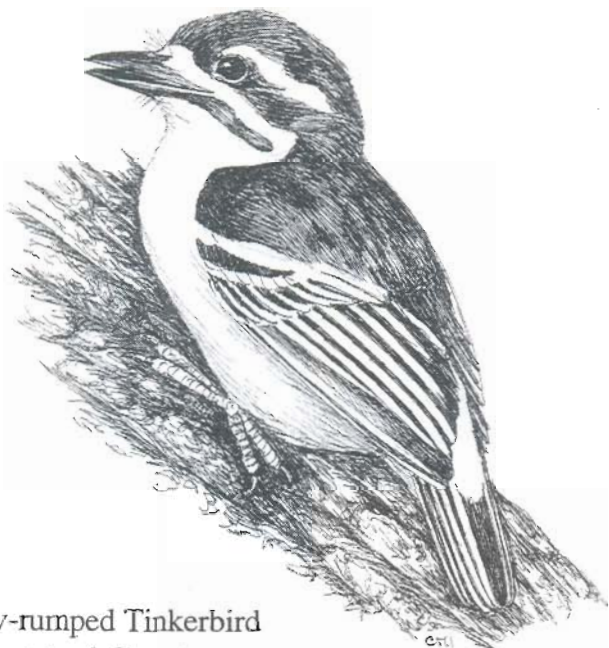
Common in the East Usambaras at 1100-1300 m abundant in the Nguus at 1000-1500 m. More often heard rather than seen, primarily in forest but very occasionally on cultivated land.

Moustached Green Tinkerbird *Pogoniulus leucomystax*

Three records from Lutindi, but rarer in Kilanga and Luago with only one record each. Observed at 900-1200 m, generally in forest edge, although the Luago record refers to a bird inside forest.

Red-fronted Tinkerbird *Pogonialus pusillus*

Rare, with only two records at Gombero in intact submontane forest at 1450 m on 24-25 August 1995.



Yellow-rumped Tinkerbird
Pogoniulus bilineatus

Yellow-rumped Tinkerbird
Pogoniulus bilineatus

Abundant in the Nguus with a seen-heard ratio of 1:7. Observed in forest edge and cultivated land at 1000-1400 m. Observed in mixed-species flocks, but possibly just an opportunistic flocker.

Scaly-throated Honeyguide
Indicator variegatus

Rare: one record of a bird netted at 1200 m in Lutindi on 13 July 1995 and another observed in forest at Gombero at 1250 m on 22 August 1995. This species is either very rare or very secretive and unobtrusive.

Mombassa Woodpecker *Campethera mombassica*

See section 6.1

Cardinal Woodpecker *Dendropicos fuscescens*

Uncommon in Lutindi with ten records, and rare in Kilanga with only one record. All were in forest edge at 1200 m.

Olive Woodpecker *Mesopicus griseocephalus*

Common in Lutindi, uncommon in Kilanga, and rare in Gombero. Records are from both intact and partly degraded submontane forest, at 1000-1300 m in the East Usambaras and at 1200 m in the Nguus. Generally observed in pairs in the mid-storey as part of mixed-species foraging flocks.

African Broadbill *Smithornis capensis*

Common in the Nguus in intact submontane forest at 1100-1500 m, usually in the mid-storey or sub-canopy. The highly distinctive wing-whirring and the clear, soft 'mew' of this species were heard more frequently than the bird was seen, giving seen-heard ratios of 1:4 for Gombero and 1:6 for Luago.

Black Rough-wing *Psalidoprocne pristoptera*

Common, particularly in Lutindi and Luago, over forest and edge up to 1400 m. Normally seen in flocks comprising 3-18 individuals.

Lesser Striped Swallow *Hirundo abyssinica*

Rare in Lutindi with one record of three birds over forest edge at 1200 m on 8 July 1995. Common in Luago with flocks of 2-20 individuals observed, and uncommon in Gombero with only two records totalling eight birds. All birds were recorded over forest edge and Miombo woodland up to 1250 m. This species was much more common in lowland habitats, and therefore these records probably all refer to birds that drifted to higher elevations.

Red-rumped Swallow *Hirundo daurica*

Only one record from Luago of two birds hawking with *H. abyssinica* over Miombo woodland at 1300 m.

Mountain Wagtail *Motacilla clara*

Rare, with one record from Kilanga of two birds at 900 m, and 11 records from Luago at 1140 m, including one netted, which almost certainly refer to the same pair. All were recorded on fast-flowing streams.

Black Cuckoo-Shrike *Campephaga flava*

Uncommon in the Nguus: seven records from Gombero and four from Luago in intact and degraded forest at 1100-1200 m. Usually seen singly in the canopy or sub-canopy as part of mixed-species flocks.

Grey Cuckoo-Shrike *Coracina caesia*

Common in the East Usambaras in forest at 900-1300 m, always singly or in pairs, and regularly in mixed-species flocks.

Shelley's Greenbul *Andropadus masukuensis roehli*

Abundant at all sites except for Gombero where it was common. Observed at 850-1300 m in the East Usambaras, and at 900-1500 m in the Nguus. Recorded singly, in pairs or in small flocks in fruiting trees, and regularly in mixed-species flocks. Birds were observed nesting in the Nguus (late August-early September 1995), and wing flicking was commonly recorded. Although Keith *et al.* (1992) note only one record of *roehli* calling, this subspecies was heard to call relatively frequently and was tape-recorded.

Stripe-cheeked Greenbul *Andropadus milanjensis*

Common in Lutindi, uncommon Kilanga and Gombero. Observed in forest and forest edge at 900-1300 m in the East Usambaras and at 1100-1450 m in the Nguus. Seen in small flocks of up to four birds in fruiting trees and occasionally observed in mixed-species flocks.

Little Greenbul *Andropadus virens zombensis*

Rare in Lutindi with one mist-netted at 1170 m on 13 July 1995, and another tape-recorded. Abundant in the Nguus in forest, forest edge and riverine forest at 1000-1500 m. Highly vociferous but elusive. Generally seen in groups of two to five, often in mixed-species flocks.

Yellow-bellied Greenbul *Chlorocichla flaviventris*

Uncommon in the Nguus with 24 records in Gombero and 11 in Luago. All were in forest and riverine vegetation at 1100-1400 m. Occasionally seen in mixed-species flocks.

Olive Mountain Greenbul *Phyllastrephus placidus*

Common at all sites. Forages predominantly at low levels, normally below 5 m. Often seen in small groups of three to five, and noted in mixed-species flocks. Occurred alongside Yellow-streaked Bulbul *P. flavostriatus* although Keith *et al.* (1992) specifically note that *P. placidus* is absent where its presumed competitor *P. flavostriatus* is recorded (but see below).

Yellow-streaked Greenbul *Phyllastrephus flavostriatus*

Common in Luago but uncommon elsewhere. Recorded at 1200-1300 m in the East Usambaras and at 1100-1450 m in the Nguus, often in mixed-species flocks. This species was mainly observed in the mid-storey and sub-canopy, and it therefore seems to occupy a different niche from Olive Mountain Greenbul *P. placidus* and is not in direct competition (*contra* Keith *et al.* 1992). That *P. flavostriatus* is a mid-storey bird has been noted by other workers (T. Evans *in litt.* 1995). Possible courtship behaviour was noted on 5 September 1995: while facing each other, two birds were observed vigorously flicking their wings, puffing out their breast feathers and hopping along a branch in the sub-canopy, while giving loud coarse 'tut' calls.

Tiny Greenbul *Phyllastrephus debilis albigula*

See Section 6.1

Common Bulbul *Pycnonotus barbatus*

Common: recorded at all sites in forest edge, cultivated land and Miombo woodland at 800-1200 m in the East Usambaras and at 1250 m in the Nguus.

Red-tailed Ant-thrush *Neocossyphus rufus*

Common in the Nguus in intact submontane forest at 1100-1400 m, with three net records in Gombero. Occasionally observed in the canopy in mixed-species foraging flocks.

Northern Olive Thrush *Turdus abyssinicus*

Uncommon in the East Usambaras in forest up to 1250 m. The majority of birds were netted, suggesting that this elusive species was under-recorded.

Orange Thrush *Turdus gurneyi*

Uncommon at all sites. All observations of this typically elusive ground-dwelling thrush were in forest at 1200-1300 m in the East Usambaras and at 1200-1400 m in the Nguus.

White-chested Alethe *Alethe fuelleborni*

See Section 6.1

White-starred Forest Robin *Pogonocichla stellata*

Uncommon in Gombero with five field observations and three net records. All were in intact submontane forest at 1200-1450 m.

Sharpe's Akalat *Sheppardi sharpei*

See Section 6.1

East Coast Akalat *Sheppardi gunningi*

See Section 6.1

Stonechat *Saxicola torquata*

Recorded only in Lutindi on cultivated land below 800 m. All four records probably refer to the same individual.

Evergreen Forest Warbler *Bradypterus barratti usambarae*

Abundant in the East Usambaras in forest up to 1500 m, and common in the Nguus in intact and degraded submontane forest at 1100-1450 m. Most were heard calling from dense undergrowth.

Yellow-throated Woodland Warbler *Phylloscopus ruficapilla*

Recorded at all sites. Abundant in Lutindi, but uncommon in Kilanga and Gombero, and rare in Luago. All records were in forest at 1200-1300 m in the East Usambaras and 1100-1400 m in the Nguus. Generally observed in mixed-species foraging flocks.

Southern Hylia *Hylia australis usambarae*

Only recorded rarely in the East Usambaras in forest edge up to 1200 m. Two records for Lutindi: an individual on 15 July 1995, and two individuals on 18 July 1995. One record of two individuals in a mixed-species foraging flock at Kilanga. Some authors have raised the possibility that *usambarae* is a separate species on a basis of the female having identical black dorsal plumage to that of the male (Evans in press). In the other races, the female's upperparts are dark brown. All individuals observed in 1995 were as follows: upperparts: head, mantle, uppertail coverts and tail matt black; wing black with white lesser wing coverts; underparts: throat and upper breast dark tawny, lower breast, belly, flanks, and undertail coverts paler tawny, becoming white towards vent. Bill and legs black. It was not possible to be sure that the individuals observed associating in twos were male and female. If further work confirms that *usambarae* deserves specific status then it will merit conservation attention as a result of its small range and low population density (Evans in press).

Tawny-flanked Prinia *Prinia subflava*

Uncommon in the East Usambaras on cultivated land at 800-1200 m. Also, six birds were recorded in Miombo woodland at Luago at 1280 m on 2 September 1995.

Bar-throated Apalis *Apalis thoracica murina*

Common at Lutindi in intact submontane forest and edge at 1100-1400 m. This species was probably not recorded in Kilanga as its preferred altitude range is above 900 m. This species is absent in the rest of the East Usambaras (Cordeiro and Kiure in prep.), and it is one of several East African montane species that is shared between the West Usambaras and the Lutindi area (Moreau 1935).

Black-headed Apalis *Apalis melanocephala*

Common: observed in intact and degraded submontane forest and forest edge at all sites, at 900-1300 m in the East Usambaras and at 1100-1300 m in the Nguus. It appeared more common in the river valleys. Often seen in pairs, and regularly in mixed-species flocks.

Red-capped Forest Warbler *Orthotomus metopias*

See Section 6.1

Grey-backed Cameroptera *Cameroptera brachyura*

Uncommon in Kilanga in forest edge at 700 m. Common in the Nguus in intact and degraded submontane forest and forest edge at 1100-1450 m. Sometimes observed in small groups of up to four. All records refer to the grey-backed colour phase, as opposed to the green-backed colour phase.

Dusky Flycatcher *Muscicapa adusta*

Common in Lutindi but uncommon in Kilanga and Gombero in forest edge, often in clearings in the vicinity of fallen trees. Recorded at 1000-1250 m in the East Usambaras and at 1100-1400 m in the Nguus.

Ashy Flycatcher *Muscicapa caerulescens*

Rare, with two records for Gombero in riverine forest at 1200 m on 16-17 August 1995.

Black-and-white Flycatcher *Bias musicus*

Uncommon with only three records from Gombero in intact submontane forest and forest edge at 1250 m.

Forest Batis *Batis mixta*

Uncommon in Lutindi and Kilanga, and common in Gombero and Luago. All records were in intact submontane forest and forest edge at 1000-1300 m in the East Usambaras and at 1100-1450 m in the Nguus. Occasionally seen in mixed-species flocks, and frequently observed in pairs in the mid-storey.

Chinspot Batis *Batis molitor*

Uncommon in Lutindi and Gombero, rare in Kilanga and Luago. Recorded in intact submontane forest and forest edge at 1200-1300 m in the East Usambaras and at 1100-1400 m in the Nguus. It is extremely difficult to distinguish between males of this species and those of Forest Batis *B. mixta*, and identification was only confirmed when a female was observed with the male, as females of *B. mixta* are chestnut-brown above and those of *B. molitor* are grey above. It is therefore likely that both these species have been under-recorded.

Black-throated Wattle-eye *Platysteira peltata*

Rare, with only one record of an individual from Gombero in intact submontane forest at 1250 m on 13 August 1995.

White-tailed Crested Flycatcher *Trochocercus albonotatus*

Abundant in Lutindi and common in Kilanga, predominantly in the mid-storey and undergrowth of intact submontane forest above 1200 m.

Crested Flycatcher *Trochocercus cyanomelas*

Recorded commonly in the Nguus in the mid-storey and undergrowth of intact submontane forest at 1100-1450 m.

Paradise Flycatcher *Terpsiphone viridis*

Only recorded in the Nguus at 1100-1400 m. Uncommon in Gombero with six records and rare in Luago, with one record. All records referred to single birds.

Spot-throat *Modulatrix stictigula stictigula*

See Section 6.1

Pale-breasted Illadopsis *Illadopsis rufipennis*

One record for Lutindi of a bird netted in forest at 1250 m on 13 July 1995.

African Hill Babbler *Alcippe abyssinica abyssinica*

Only recorded in Lutindi in forest and forest edge up to 1200 m. Very rare with three sight records, and one net record on 7 July 1995. This was a species unknown in the East Usambaras until 1994 (Cordeiro and Kiure in prep.).

Uluguru Violet-backed Sunbird *Anthreptes neglectus*

See Section 6.1

Amani Sunbird *Anthreptes pallidigaster*

See Section 6.1

Banded Green Sunbird *Anthreptes rubritorques*

See Section 6.1.

Collared Sunbird *Anthreptes collaris*

Common at all sites apart from Kilanga, where it was uncommon. Observed in intact submontane forest and forest edge at 1000-1250 m in the East Usambaras and at 1100-1500 m in the Nguus. Often seen associating with mixed-species flocks and regularly observed feeding with other sunbirds such as Banded Green Sunbird *A. rubritorques*.



Crested Flycatcher *Trochocercus cyanomelas*

Olive Sunbird *Nectarinia olivacea*

Abundant at all sites. Observed in intact submontane forest and forest edge at 1000-1300 m in the East Usambaras and at 1100-1500 m in the Nguus. Frequently seen in mixed-species flocks.

Amethyst Sunbird *Nectarinia amethystina*

Only recorded rarely in Luago with five records, including two records of pairs. Observed in forest edge and Miombo woodland up to 1300 m.

Hunter's Sunbird *Nectarinia hunteri*

Rare at Luago: one record of a pair in forest edge and cultivated land at 1280 m on 5 September 1995.

Eastern Double-collared Sunbird *Nectarinia mediocris*

Common in Lutindi in intact submontane forest and forest edge above 1200 m. Often observed in pairs in mixed-species flocks, or sometimes in monospecific flocks of up to 12 individuals. There seemed to be significant variation in the width of the crimson breast band. As with Bar-throated Apalis *A. thoracica*, this sunbird is uncommon in the rest of the East Usambaras (Cordeiro and Kiure in prep.), and it is one of several East African montane species that is shared between the West Usambaras and the Lutindi area (Moreau 1935).

Moreaus' Sunbird *Nectarinea moreaui*

See section 6.1

Yellow White-eye *Zosterops senegalensis*

Common at all sites, except Kilanga where it was uncommon. Observed in intact submontane forest and forest edge at 900-1300 m in the East Usambaras and at 1100-1400 m in the Nguus. It was commonly recorded in mixed-species flocks, sometimes in pairs, but mainly in groups of up to 12 individuals.

African Golden Oriole *Oriolus auratus*

Rare in the Nguus, with only three records from Gombero and two from Luago. Observed in intact submontane forest, forest edge and riverine habitat below 1250 m.

Black-headed Oriole *Oriolus larvatus*

Only recorded in the Nguus, where it was common in Gombero but uncommon in Luago in intact submontane forest at 1100-1400 m.

Green-headed Oriole *Oriolus chlorocephalus*

See Section 6.1

Black-backed Puffback *Dryoscopus cubla*

Uncommon at all sites except Kilanga, from where there was only one record. Observed in intact submontane forest and forest edge below 1250 m in the East Usambaras, and below 1300 m in the Nguus. Often seen in mixed-species flocks.

Brown-headed Tchagra *Tchagra australis*

Only one record for Lutindi in forest edge at 1200 m on 18 July 1995.

Tropical Boubou *Laniarius ferrugineus*

Recorded at all sites. Uncommon in Lutindi with four records, and rare in Kilanga with one record, but more common in the Nguus. This species tended to be heard more than it was seen, with seen-heard ratios of 1:16 in Gombero and 1:9 in Luago. All were observed in Miombo woodland and cultivated land below 1250 m.

Many-coloured Bush Shrike *Malaconotus multicolor*

Recorded at all sites, in forest below 1300 m in the East Usambaras and at 1100-1400 m in the Nguus. Normally observed in pairs as part of mixed-species flocks. This species is known to have at least four colour phases: scarlet, orange, apricot and blackish-green (Mackworth-Praed and Grant 1962). At all sites we noted two phases: yellow and orange-buff, but it is not entirely clear to which of the above phases ours refer.

Table 4. Proportion of observations of the two colour phases recorded in *Malaconotus multicolor*.

Site	% observations referring to the yellow phase	% observations referring to the orange-buff phase	sample size (n)
Lutindi	73	27	60
Kilanga	80	20	20
Gombero	74	26	22
Luago	20	80	5

The discrepancy for Luago is most likely explained by the small sample size.

Nicator *Nicator chloris*

Rare in Luago with two observations in intact submontane forest: one in a dry river valley at 1100 m, and one in a wet river valley at 1140 m on 3 and 4 September 1995 respectively.

Square-tailed Drongo *Dicrurus ludwigii*

Common in the East Usambaras at 1200-1500 m, and abundant in the Nguus below 1500 m. Observed in intact submontane forest and forest edge. It was usually observed in mixed-species flocks acting as a sentinel, giving alarm calls, and it appeared to be responsible for group cohesion within the flock.

White-necked Raven *Corvus albicollis*

Uncommon at all sites. Usually recorded as pairs over intact submontane forest and cultivated land. Observed up to 1500 m in the East Usambaras, and up to 1550 m in the Nguus. However, all sightings possibly refer to only two birds at each of the four sites.

Kenrick's Starling *Poeoptera kenricki*

See Section 6.1

Waller's Red-winged Starling *Onychognathus walleri*

Uncommon in the East Usambaras in intact submontane forest and forest edge up to 1200 m. Usually seen in pairs or in monospecific flocks of up to 40 birds.

Red-winged Starling *Onychognathus morio*

Uncommon in Lutindi, Kilanga and Luago, but common in Gombero. Observed in forest edge and cultivated land above 1200 m in the East Usambaras and at 1100-1500 m in the Nguus. Often seen in monospecific flocks comprising up to eight individuals.

Violet-backed Starling *Cinnyricinthus leucogaster*

Rare in Lutindi with one recorded in intact submontane forest at 1200 m on 13 July 1995.

Spectacled Weaver *Ploceus ocularis*

Rare in the East Usambaras with three records from Lutindi and one record from Kilanga. All were observed in cultivated land and forest edge below 1150 m.

Golden Weaver *Ploceus subaureus*

Rare, with one record from Luago in forest edge and cultivated land at 1200 m on 5 September 1995.

Speke's Weaver *Ploceus spekei*

Uncommon in Lutindi, with five records in cultivated land and forest edge below 1000 m.

Dark-backed Weaver *Ploceus bicolor*

Common in the East Usambaras below 1300 m, and abundant in the Nguus below 1500 m. Usually observed in groups of two or three in mixed-species flocks. This species appeared to closely associate with Square-tailed Drongo *D. ludwiggi*. An individual was observed building a nest in the sub-canopy in Luago at 1200 m on 5th September 1995.

Usambara Weaver *Ploceus nicoli*

See Section 6.1

Red-billed Quelea *Quelea quelea*

Rare, with only one record of six birds in forest edge from Lutindi at 1250 m on 8 July 1995.

Orange-winged Pytilia *Pytilia afra*

Rare, with only one record of a female observed on cultivated land at 1100 m at Lutindi on 9 July 1995.

Red-faced Crimsonwing *Cryptospiza reichenovii australis*

Common in Lutindi but uncommon at all other sites. Mainly observed on cultivated land but observed in intact submontane forest, forest edge and riverine habitat up to 1250 m in both the East Usambaras and the Nguus. Occasionally observed in mixed-species flocks.

Red-throated Twinspot *Hypargos niveoguttatus*

Uncommon in Gombero with eight records, and rare in Luago with two records. Recorded in intact submontane forest and forest edge below 1250 m.

Green Twinspot *Mandingoa nitidula chubbi*

Rare in Luago with three field records and two net records. All were observed in forest at approximately 1200 m. This species is described as local or rare, and seldom seen (Clement *et al.* 1993) and is likely to have been overlooked at all study sites.

Common Waxbill *Estrilda astrild*

Two records of small flocks from Lutindi each totalling 13 birds, in cultivated land at 1150 m on 14 July 1995. These observations possibly refer to erratic local movements.

Bronze Mannikin *Lonchura cucullata*

Recorded rarely at all sites except Gombero, always on cultivated land below 1200 m.

Red-backed Mannikin *Lonchura bicolor*

Observed uncommonly at all sites except Gombero, usually in flocks of up to 12 birds. Recorded on cultivated land at 800-1200 m in the East Usambaras and in riverine forest at 1100 m in the Nguus.

Yellow-fronted Canary *Serinus mozambicus*

Rare, with only one observed on cultivated land at 700 m in Kilanga on 22 July 1995.

Bully Serin *Serinus sulphuratus*

Common in Lutindi at 800-1200 m, and uncommon in Luago below 1200 m on cultivated or cleared land.

Oriole Finch *Linurgus olivaceus*

Rare, with one record from Gombero in intact sumontane forest at 1000 m on 28 July 1995.

8. Results: Mammals

A total of 22 mammal species were recorded during fieldwork, including nine in the East Usambara Mountains and 20 in the Nguu Mountains. Of these one is listed as Rare, one as Indeterminate, one is listed in CITES Appendix I, and three in each of Appendices II and III (Groombridge 1993).

All mammal species recorded are detailed below, together with their status in our study areas and any threats to them as described by local people. Scientific names are followed by Kiswahili names.

Black-and-Rufous Elephant shrew *Rhynchocyon cirnei* (Panyabuku)

Status: Listed as Rare (Groombridge 1993). Not listed in CITES. This species occurs in coastal, lowland and montane forest, open woodland and long grass savannah throughout middle and east Africa (Haltenorth and Diller 1988). The race *petersi* from Eastern Tanzania and the south Kenya coast is an ancient isolate and is thought by some to be an incipient species (Kingdon 1974).

Project records:

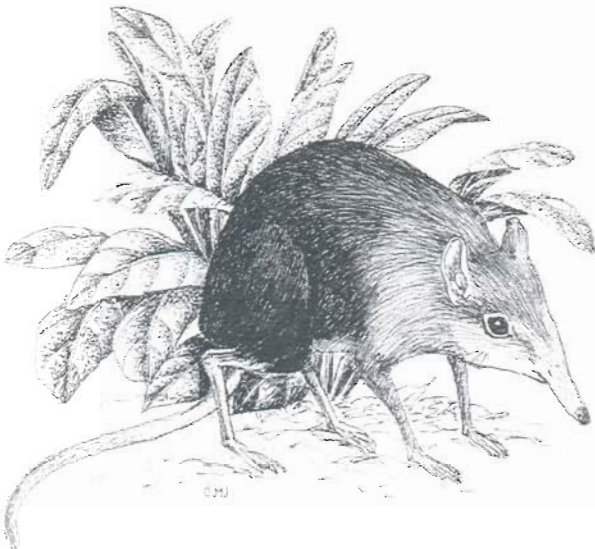
Rare in Lutindi: with four records, all from intact submontane forest at 1200-1250 m in July 1995.

Rare in Gombero: with three records, all from intact submontane forest at 1100-1250 m in August 1995.

Uncommon in Luago: with nine records all from intact submontane forest at 1150-1300 m in September 1995.

Observations and ecology: Individuals of this species were often seen briefly, moving rapidly through the undergrowth in a highly distinctive bounding fashion. They were frequently observed foraging in leaf litter and between buttress roots and dead logs. On 3 September 1995 a pair was watched foraging between 08h20 and 08h40, in an area covered in dry leaf litter and fallen logs, with no field layer. One was slightly smaller than the other and followed the larger individual when foraging. On one occasion the larger individual was digging beside a tree, while the other approached rapidly and ousted the first after a brief tussle, and continued to dig in search of food. Both individuals were observed scent-marking logs, possibly at the edge of their territory.

Conservation status: This species is not hunted specifically, but is affected by the hunting methods used for other species, such as duiker pits, cane rat traps, and the use of dogs. The race *petersi* is confined to forest (Kingdon 1974), and our observations support this: all records were in intact submontane forest. This species is likely to be sensitive to habitat degradation and deforestation, and merits its Rare status.



Galagos

There are at present only three species of galago listed for Tanzania, but at least three more have been discovered recently and it is highly likely that there are many more undescribed species (S. Bearder verbally 1995). The most reliable way of identifying galagos is by call, and our recordings of three species are currently being analysed. Positive identifications will not be possible until the results of these analyses are available.

Demidoff's Galago *Galagoides demidoff* ? (Komba kidogo)

Status: Listed in CITES Appendix II. Common throughout equatorial Africa, this species inhabits lowland, montane, bamboo, swamp and gallery forest (Kingdon 1971).

Project records:

Uncommon at Lutindi: with four records all in intact submontane forest at 1000-1200 m in July 1995.

Rare in Kilanga: with one record in intact submontane forest at 1010 m in July 1995.

Rare in Gombero: with one record in intact submontane forest at 1200 m in August 1995.

Uncommon in Luago: with four records in intact submontane forest at 1100-1300 m in August and September 1995.

All these individuals resembled *G. demidoff* in that they were very small, approximately 30 cm from snout to tail, with the thin, wiry tail being approximately 60% of the total body length; the ears were large, and the eyes were large and closely set. The upperparts were grey-brown and the underparts were paler brown.

Observations and ecology: All observations were made between 18h00 and 22h00 in the canopy and sub-canopy of mature trees. This species appeared to be afraid of torchlight, tending to run away into the canopy when approached. On several occasions this galago gave a very high-pitched call, which enabled location.

Conservation status: Local people claimed not to hunt galagos. However, as all our records were from intact submontane forest, and as Nowak (1991) notes that dwarf galagos live in primary forests, usually where there is dense foliage, it is likely that this species is susceptible to habitat degradation.

Galago *Galago* sp (Komba)

Project records:

Not recorded in Mount Nilo CFR.

Uncommon in Gombero: with five records all from intact submontane forest at 1250-1350 m.

Rare in Luago: with one record from intact submontane forest at 1140 m.

This species was fairly large, approximately 40-50 cm from snout to tail. It was pale brown above with dirty white underparts and had two prominent vertical black facial stripes extending from the forehead, between the eyes to the tip of the snout. The tail was medium-thick and had no black tip.

Observations and ecology: All records were in the evening between 21h00 and 22h00 or in the morning between 05h00 and 06h00. The species was apparently not afraid of torchlight. On several occasions it was observed to make an alarm call: a series of short breathy whistles.

Conservation status: Local people reportedly did not hunt galagos, but as all records were from intact submontane forest it is possible that this species is susceptible to habitat degradation.

Garnett's Galago *Otolemur garnetti* ? (Komba)

Status: Listed in CITES Appendix III. This species is found in forests, thickets and woodlands from Somalia to southeastern Tanzania (Nowak 1991, Kingdon 1971).

Project records:

Not recorded in Mount Nilo CFR.

Uncommon in Gombero: with four records from intact submontane forest at 1100-1200 m.

Rare in Luago: with two records from intact submontane forest at 1300 m.

These individuals resembled *O. garnetti*: they were large, approximately 65 cm long from snout to tail, with the bushy tail being 60% of the body length. The head appeared small in comparison to the body. The pelage appeared very dense and woolly, and was mouse-brown above, and slightly paler on the hind legs. The underparts were white from the snout to the base of the tail, including the insides of the legs. The distal third of the tail was black merging into the brown with no clear cutoff. The hands and feet were dark brown. The ears were pink inside, with black edges and the iris was chestnut.

Observations and ecology: All sightings were between 21h00 and 22h40. This species seemed unafraid of torchlight and appeared quite clumsy in its movements.

Conservation status: This bushbaby was not locally reported to be hunted. All our records are from intact submontane forest, however, Nowak (1991) notes that greater bushbabies *Otolemur* spp. can inhabit urban areas if there are sufficient trees for shelter, which suggests that they are able to withstand habitat degradation.

Black-and-White Colobus *Colobus polycomos* (Mbega)

Status: Not listed by CITES. This monkey is found in a wide range of savannah, woodland and forest habitats at 0-3000 m. The race *palliatu*s is restricted to the coast and the Usambara and Uluguru mountains (Kingdon 1971).

Project records:

Uncommon at Lutindi: there were eight records in intact submontane forest on the forest edge, at 900-1500 m in July 1995.

Rare in Kilanga: with one record in intact submontane forest at 1000 m on 20 July 1995.

Not recorded and probably overlooked in Nguru North CFR.

Observations and ecology: This species was observed in the canopy and sub-canopy of mature trees, mainly on the forest edge, although this resulted from greater visibility. On two occasions, a group of three individuals was seen quietly basking and occasionally eating leaves.

Conservation status: This species is said to be hunted for its fur (Kingdon 1971), but there were no local reports of hunting. However, as all sightings were in intact submontane forest, habitat destruction is likely to be a threat in Mount Nilo CFR.

Blue Monkey *Cercopithecus mitis* (Kima, Tumbili)

Status: Not listed by CITES. This guenon is very widely distributed in southern and eastern African in lowland and montane forest (Kingdon 1971).

Project records:

Common at Lutindi: with 52 records in intact submontane forest and forest edge at 1000-1300 m in July 1995.

Common at Kilanga: with 22 records in intact submontane forest, forest clearings and forest edge at 800-1030 m in July 1995.

Common at Gombero: with 50 records in intact submontane forest at 1200-1400 m in August 1995.

Common at Luago: with 39 records in intact submontane forest at 1100-1300 m August and September 1995.

We noted that there was great variation in pelage colour and markings. Individuals in the Nguu mountains generally had a white-grey hood, white ear tufts and eyebrows, very dark limbs and tail. Some animals also appeared to have a very rufous mantle, a feature usually present in monkeys from higher wetter areas (Kingdon 1971). Such characteristics were either absent or considerably less pronounced in the individuals recorded in the East Usambaras.

Observations and ecology: Troups comprising up to 15 individuals in Mount Nilo CFR, and up to 10 individuals in Nguru North CFR were observed, although single individuals or pairs were also seen in both reserves. Troups tended to move noisily through the canopy or sub-canopy. When disturbed by observers, it was the juveniles that usually gave the alarm calls. Several different types of call were heard: a deep booming call that may have been used for communication between troupes, a more common bark that seemed to be used within the troupe, and the alarm call which usually consisted of a series of loud 'cheeps'.

On one occasion at Gombero, at 08h15 on 22 August 1995, a deep booming call was heard from a troupe. A Crowned Eagle *Stephanoaetus coronatus* flew towards the troupe and perched nearby, but no attack was observed.

Foraging and feeding was observed, and the main foods seemed to be fruit (including figs) and leaves of mature trees and climbers. Literature on this species documents the diet to be mainly fruit (Cords 1986), and our observations support this. However, there are records of cercopithecines, including *C. mitis*, opportunistically feeding on vertebrates (Butynski 1982, Wahome *et al.* 1988). Furthermore, Cordeiro (1994) observed this species taking birds caught in mist-nets in Mount Kilimanjaro CFR. In the East Usambaras and the Nguu Mountains, interesting behaviour towards birds was frequently recorded. For example, at 11h20 on 12 July 1995, two adults were observed close to a mixed-species bird flock in the mid-storey at 15 m. One animal seemed to be intently watching certain birds, in particular the sunbirds. It then began to move very carefully through the sub-canopy, apparently stalking an individual within the flock. After 20 secs, the monkey launched towards an Olive Sunbird *Nectarinia olivacea*. The attack was unsuccessful and the birds flocked more tightly and moved away. Other observations suggested that many birds were alarmed by the presence of *C. mitis* nearby: for example, on several occasions Square-tailed Drongos *D. ludwigii* and Eastern Double-collared Sunbirds *Nectarinia mediocris* gave loud alarm calls when near monkeys. However this may simply be a response to disturbance rather than anti-predator behaviour.

At Luago on 6 September 1995, a decapitated sunbird was found in the second panel of a mist-net on the floor of a valley at 1100 m. There was no evidence of a raptor having taken the bird, and no feathers were found below the mist-net. Cordeiro (1994) found that netted birds were often decapitated by *C. mitis*: a feature rarely noted in raptor kills. Furthermore, a troupe of the monkeys had been observed in close proximity to the nets earlier in the morning. Such predatory activity would obviously be opportunistic, but it may indicate a tendency for Blue Monkeys in this area to take vertebrates as part of their natural diet.

All these observations suggest that *C. mitis* may actively prey upon forest birds. This may have important implications for activity budgets and social organization in this species.

Conservation Status: Blue monkeys were not locally reported to be hunted specifically for food. However, they are reported to raid crops and are therefore shot in the cultivated land adjacent to the forest. Such threats do not seem severe, and the only major danger to this species is that of habitat degradation and destruction: the large home ranges of the species might make them particularly prone to habitat fragmentation.

Yellow Baboon *Papio cyanocephalus* (Nyani)

Status: Listed in CITES Appendix II. This species inhabits a wide range of habitats from lightly wooded savannah to montane forest. The race *cyanocephalus* is common throughout Tanzania and southern and coastal Kenya (Kingdon 1971).

Project records:

Not recorded in Mount Nilo CFR.

Uncommon in Luago: there were four sightings in intact submontane forest at 1190 m in August 1995.

Observations and ecology: There were two sightings, one of a group of at least three individuals, the other of a single individual. The observations were made in the same area, and hence they probably refer to the same group. Baboons were also observed outside the forest in the surrounding Miombo woodland and agricultural land outside the study sites.

Conservation status: There were no reports of hunting, and sightings of this species in Miombo woodland and agricultural land imply that it can tolerate a degree habitat destruction.

Tanganyika Mountain Squirrel *Funisciurus lucifer byatti* (Kichakuro)

Status: Not listed by CITES. This is a montane forest species, occurring in scattered isolated montane forests from south Kenya to Malawi. The race *byatti* is known from Kilimanjaro and the Eastern Arc Mountains of Tanzania (Kingdon 1974).

Project records:

Uncommon in Lutindi: with four records all from intact submontane forest at 1000-1200 m in July 1995.

Uncommon in Kilanga: with three records all from intact submontane forest at 1000-1050 m in July 1995.

Uncommon in Gombero: with four records from intact submontane forest at 1100-1300 m in August 1995.

Rare in Luago: with one sighting from intact submontane forest at 1240 m on 4 September 1995.

Observations and ecology: Views of this species tended to be brief and rather poor, in agreement with Loveridge (1993) that within their habitat they are numerous but shy. They were recorded throughout the day mainly in the sub-canopy.

Conservation Status: There were no records of hunting, but as all records were in intact submontane forest this species may be unable to tolerate much habitat degradation. This species does not currently appear to be under any severe threat of extinction.

Red-bellied Coast Squirrel *Funisciurus palliatus* (Kichakuro)

Status: Not listed by CITES. This species inhabits forests and thickets at 0-1800 m in coastal Kenya and Tanzania (Kingdon 1974).

Project records:

Absent in Mount Nilo CFR.

Common in Gombero: with 15 records mainly from intact submontane forest at 1100-1350 m in August 1995.

Uncommon in Luago: with five records from intact submontane forest at 1200-1300 m in August and September 1995.

Observations and ecology: This species was seen throughout the day, often in pairs. Aggression, taking the form of a sharp, barking call accompanied by tail flicking, was frequently observed, both to conspecifics and towards observers.

Conservation status: As for *F. lucifer*.

***Funisciurus* sp.**

Project records:

Not recorded in Mount Nilo CFR.

Uncommon in Luago: six sightings all in intact submontane forest at 1100-1250 m in August and September 1995.

The squirrel observed does not fit any description given in the current literature. It was the same size as *F. palliatus* with a long, bushy tail; cinnamon rufous above with slightly olive pelage on the head and dark brown along the spine; uniform creamy-white below.

Observations and ecology: As for *F. palliatus*

Conservation status: As for *F. lucifer*

Red-Legged Sun Squirrel *Heliosciurus rufobrachium* (Kichakuro)

Status: Not listed by CITES. This squirrel is common in forested or heavily wooded areas from Senegal to Kenya and south to Mozambique. The race *undulatus* occurs in Northern Tanzania and Eastern Kenya (Kingdon 1974).

Project records:

Common at Lutindi: with 29 records from intact submontane forest and forest edge at 1200-1300 m in July 1995.

Common at Kilanga: with 21 records from intact submontane forest and forest edge at 800-1000 m in July 1995.

Common at Gombero: with 16 records from intact submontane forest at 1200-1300 m in August 1995.

Common at Luago: with 11 sightings from intact submontane forest at 1100-1300 m in August and September 1995.

Observations and ecology: This species was frequently observed loosely associating with mixed-species bird flocks in the sub-canopy and mid-storey. It was often seen in pairs, and on one occasion an individual was observed collecting mosses and ferns for bedding or nesting material which it carried back to a hole in a tree trunk. Aggressive barking and tail-flicking was displayed towards both observers and other members of the same species.

Conservation status: This species appears abundant, and sightings both in the forest and on the forest edge imply that it is able to adapt to some degree of degradation of its habitat.

Lord Derby's Flying Squirrel *Anomalurus derbianus* (Kipepeo)

Status: Listed in CITES Appendix III. This species has a wide distribution from Sierra Leone to western Kenya, and from Angola and Zambia to Tanzania. It inhabits woodland and forest, wherever there are large trees with holes suitable for nests. The race *orientalis* occurs in the Usambara and Uluguru Mountains and the Southern Highlands of Tanzania (Kingdon 1974).

Project records: One was observed briefly in the canopy on the forest edge, in Kilanga on 22 July 1995. It was thought to have been disturbed by a Long-crested Eagle *Lophaetus occipitalis*.

Conservation status: There was no record of hunting. However, this species is likely to be threatened by activities such as pit-sawing which remove large trees and so reduce the number of available nest sites.

Porcupine *Hystrix* sp.

This could be one of two species: *Hystrix cristata* and *H. africae-australis*, which are sympatric in East Africa.

Status: *H. cristata* is listed in CITES Appendix III and is widespread throughout much of Africa north of the Congo and in southern Europe. *H. africae-australis* occurs from East Africa to the Cape, but is rare in East Africa. Both species are commonest in hilly, rocky country, but are adaptable and occur in almost all habitats up to 3500 m (Kingdon 1974).

Project records: There were no field observations of this animal, but a quill was found in intact submontane forest beside a trail in Gombero at 1230 m in on 16th August 1995.

Conservation status: There is no record of hunting, and as both these species are able to adapt to a wide variety of habitats (Kingdon 1974) they are unlikely to be threatened by habitat degradation.

Blotched Genet *Genetta tigrina* (Kanu)

Status: Not listed by CITES. This genet is widely distributed in a variety of habitats throughout tropical Africa, including gardens and cultivation, savannah, woodland, gallery, lowland and montane forest (Kingdon 1977).

Project records: One individual was observed in Kilanga at 09h00 at 1000 m on 29 July 1995.

Observations and ecology: This species was seen in an area of intact submontane forest, with abundant *Dracaena* sp., about 30 m from the bank of a major river. It was observed for several minutes sitting on a log 5 m from the main path apparently not afraid of torchlight, before walking away into thicker undergrowth.

Conservation status: There was no report of hunting. As a result of the wide range of habitats this species tolerates, it is likely to be able to adapt to some degree of habitat degradation.

Palm Civet *Nandinia binotata*

Status: Not listed by CITES. This species occurs in lowland and montane forest from Sierra Leone to Kenya, Tanzania and Mozambique (Haltenorth and Diller 1988).

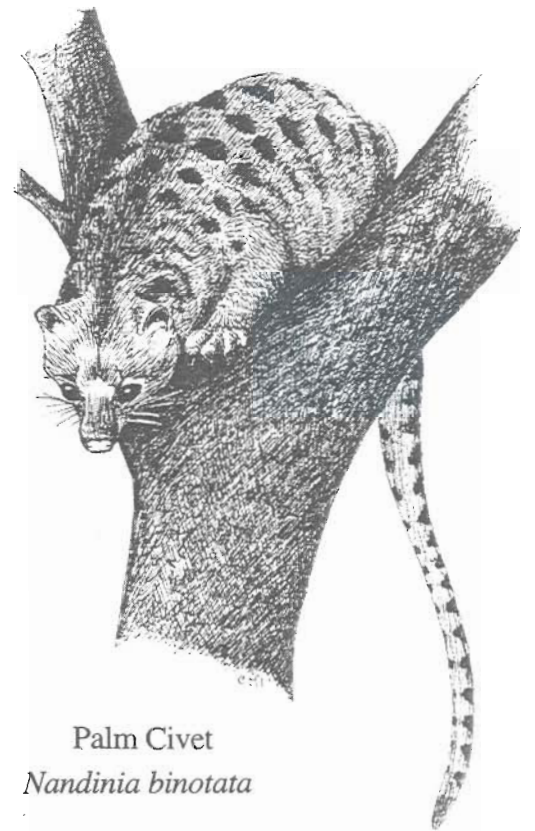
Project records:
Not recorded in Mount Nilo CFR.

Gombero: there were five sightings of at least two individuals, all in intact submontane forest at 1200-1350 m in August 1995.

Luago: there were four sightings of at least three individuals including one juvenile, in intact montane rainforest at 1140 m in August and September 1995.

Observations and ecology: Almost all observations were of individuals or groups in fig trees *Ficus* sp., between 22h00 and 23h00. This species was apparently unafraid of individual observers, who were able to approach sometimes to within 4 m, but tended to retreat from groups of observers. This species did not seem afraid of torchlight, and appeared inquisitive. On one occasion three individuals (two adults and a juvenile) were observed together, and the adults were heard to make a mewling contact call (which was recorded). Individuals of this species were observed eating figs on several occasions.

Conservation status: This species was reportedly not hunted, but as all records were in intact submontane forest, this species could be threatened by degradation of suitable habitat.



Palm Civet
Nandinia binotata

Leopard *Panthera pardus* (Chui)

Status: Listed in CITES Appendix I. This species has a wide distribution throughout sub-Saharan Africa, the Middle East and southern Asia, occurring in almost all habitats from desert to rainforest at 0-4500 m (Haltenorth and Diller 1988).

Project records: Prints were found by streams in intact submontane forest in both Gombero and Luago at 1250 m and 1140 m respectively. The forest in the Nguu Mountains is undisturbed with good numbers of prey species such as pig and duiker, and may support an important population of leopards.

Conservation status: According to local people, this species was not hunted. It is able to adapt to a wide variety of habitats (Haltenorth and Diller 1988) and so is unlikely to be directly threatened by habitat degradation. However, deforestation may be an indirect threat as this would lead to a reduction in numbers of prey.

Tree Hyrax *Dendrohyrax validus* (Perere, Pimbi)

Status: Indeterminate (Groombridge 1993). This little-known, elusive species is found in forest on the eastern mainland of Tanzania, Zanzibar, Pemba and Tumbatu (Nowak 1991).

Project records:

Common in Mount Nilo CFR: with up to six individuals heard calling each night in intact submontane forest at 1100-1250 m in July 1995.

Common in Nguru North CFR: with 2-3 individuals heard each night in intact submontane forest at 1100-1300 m in August and September 1995.

Observations and ecology: Hyraxes called most frequently in the evening and the early hours of the morning, though they were heard occasionally during the day when disturbed by Blue monkeys *Cercopithecus mitis*. They appeared to call less frequently on nights with a full moon and clear skies. Fewer calls were heard in Nguru North CFR than in Mount Nilo CFR. This is possibly connected with tree size; the trees in Nguru North being generally smaller than those in the East Usambaras and so less likely to have large enough holes for hyraxes to live in.

Conservation status: There is no record of hunting locally, but this species is dependent on mature trees for holes to live in and is thus likely to be threatened by pit-sawing activities.

Red River Hog *Potamochoerus porcus* (Nguruwe)

Status: Not listed by CITES. This species is widespread throughout tropical Africa. The race *porcus* is numerous in all forest, riverine and montane habitats and swamps (Kingdon 1979).

Project records:

Not recorded in Mount Nilo CFR.

Rare in Gombero: with three records in intact submontane forest at 1100-1350 m in August 1995.

Rare in Luago: with three records in intact submontane forest at 1100-1200 m in August and September 1995.

Observations and ecology: This species appeared to be very timid. Individuals were only seen in the first two days of fieldwork at each site, implying that they became more secretive once they were aware of our presence. In the Nguru North CFR, spoor was often found, and there were numerous pig trails and flattened wallowing areas, from which pigs were flushed on several occasions. Sightings were usually in the early morning, 07h00-08h00, or evening, 16h30-18h30. This agrees with Kingdon's (1979) observation that they are primarily nocturnal, but active during the morning and evening in forest and undisturbed habitats. A skull was found in Luago close to the river at 1100 m.

Conservation status: No trails or spoor were found in Mount Nilo CFR, and there were no reports of pigs locally. It is likely that they have been hunted out in this area. They are occasionally hunted in Nguru North CFR, but infrequently as the locals will not eat them for religious reasons. However, they are frequently regarded as a pest because they are known to raid crops, and are sometimes shot as a result of this.

African Buffalo *Syncerus caffer* (Nyati, Mbogo)

Status: Not listed by CITES. This species is widespread throughout tropical Africa in savannah or forest where there is sufficient low-level browse (Kingdon 1982).

Project records: Prints and droppings were found in Gombero on a ridge-top at 1450 m, in intact submontane forest in August 1995.

Observations and ecology: Both our observations and local reports implied that these animals were roaming or passing through.

Conservation status: There were no reports of hunting locally. As this is primarily a savannah species, forest degradation is unlikely to present a threat.

Duiker sp.

The species seen possibly could be either Suni *Neotragus maschatus* or Blue Duiker *Cephalophus monticola schusteri*, both of which are in range and are known to inhabit montane and submontane forests (Kingdon 1982).

Status: *C. monticola* is listed in CITES Appendix II and is widespread throughout tropical Africa and in coastal areas from Tanzania south to the Cape. It inhabits coastal, lowland and montane forest up to 3000 m. *N. maschatus* inhabits coastal forests, thickets and montane forest up to 2700 m from Somalia south to Zululand.

Project records: Two individuals were very briefly observed together at 22h30 at 1340 m in a river valley in intact submontane forest at 1140 m in Gombero on 31st August 1995.

They were generally pale brown in colour, darker on the back and paler below, with large rounded ears, and were estimated to have a head and body length of 50-60 cm, and a height of 30-40 cm. The two species are difficult to distinguish, and adequate views to allow a definite identification were not obtained.

Observations and ecology: They were apparently very shy, moving off quietly when approached.

Conservation status: Duikers are hunted at both sites. As they are strictly forest-dwelling species, they are likely to be threatened by any habitat degradation.

Harvey's Red Duiker *Cephalophus harveyi* (Pala)

Status: Not listed by CITES. In East Africa, this is the most widespread of the red duikers, inhabiting coastal, riverine and montane forest from Gabon and Cameroon to Somalia, Kenya and Tanzania (Haltenorth and Diller 1988, Kingdon 1982).

Project records:

Not recorded in Mount Nilo CFR.

Uncommon in Gombero: with five sightings in intact submontane forest at 1150-1350 m in August 1995.

Uncommon in Luago: with four sightings in intact submontane forest at 1140-1250 m in September 1995.

Observations and ecology: Not recorded in the East Usambaras, but droppings of *Cephalophus* sp. were found in intact submontane forest in Lutindi at 1300 m on 7th July 1995. All records in Nguru North CFR were in intact submontane forest and in full daylight, between 1150 m and 1350 m. Tracks and droppings were found daily, implying that this species was quite common. This species was occasionally heard giving a soft, barking contact call.

Conservation status: There were reports of hunting at both sites. Duikers are hunted with dogs (often after being flushed by fire) and sometimes by using pit-traps. They are still relatively common in the Nguru North CFR, although hunting and habitat destruction pose a threat. They are likely to be rare in Mount Nilo CFR due to hunting pressure and human interference. Those remaining in Mount Nilo are severely threatened by destruction of the forest and hunting pressure.

8. Conclusions and recommendations for conservation

8.1 Conclusions

In July-September 1995, we surveyed submontane forest in the East Usambara and Nguu Mountains. Our aim was to gain an understanding of the ecological requirements and the threats to the survival of the birds and mammals, with a view to promoting their conservation. We recorded a total of 130 bird species, including five Threatened and three Near-threatened species, and ten bird species endemic to the forests of the Eastern Arc Mountains. We also recorded 22 mammal species, two of which are considered Threatened.

The forests of the Eastern Arc Mountains comprise immensely rich and unique biological communities, and our results are testimony to this. However, the project confirmed the fact that these forests are subject to intense degradation and that there is an urgent need for an effective, long-term conservation programme. Such a conservation programme must include three main components: protection of habitat, improvements in current farming practices, and environmental education and publicity.

Central to the success of any conservation scheme is community involvement. In 1995 we found that there is a growing realisation within the local communities that that forest is an essential resource, and there is much concern over the fact that this resource is diminishing. The local people seemed willing to get involved with sustainable forest management, and to start alternative schemes such as pole plantations. Any conservation plans must take advantage of the opportunities afforded by local interest and willingness.

Sections 8.2 and 8.3 summarise our specific recommendations for effective conservation of *Mount Nilo and Nguru North CFRs*.

8.2 Recommendations for Mount Nilo Catchment Forest Reserve

This CFR supports 18 bird species of conservation interest, of which four are Threatened, two are Near-threatened, and nine have restricted ranges. We therefore recommend that the entire reserve be considered for designation as an Important Bird Area. Furthermore, in order to safeguard the future of these species and to protect the catchment forest upon which the local community ultimately depend for water, we recommend that following measures be incorporated into its management plan.

- 1) The boundary between the CFR and the public land near Kizara village in the Kilanga region of the reserve needs to be more effectively demarcated.
- 2) Any pit-sawing in the reserve should be completely stopped. The future sustainability of this practice should be investigated. Local people do not benefit substantially from this activity which is carried out by outsiders (see section 5), so halting all pit-sawing in the area is unlikely to have major detrimental effects on the local economy.
- 3) Pole cutting in the reserve should be more closely monitored and restricted to public land forest. The possibilities for providing alternative sources of poles, such as plantations in the village, needs to be investigated. The forestry division should provide advice on appropriate tree species and suitable sites for plantations. Pole cutting in the public land forest should only continue if it is managed on a sustainable basis, involving rotations and replanting.

- 4) An investigation into the potential for enhanced farming efficiency in the region is vital and would alleviate the pressure on the forested public land. Such schemes might involve crop rotation, improved fertilization techniques, and higher-yield crop varieties.
- 5) Cultivation of crops, especially cardamom, within the forest must be closely monitored. Encroachment of cardamom into the CFR from the public land should be stopped. This is a problem which needs careful investigation in Kilanga.
- 6) Environmental education activities in the villages (eg. Kwemkole and Kizara) should be initiated so as to protect the reserve and lay the basis for sustainable development in the future.
- 7) The forested public land below and adjacent to Mount Nilo CFR should be incorporated into the reserve. This will protect the habitat of globally Threatened species such as Usambara Weaver *Ploceus nicolli*, while providing a buffer zone for the more extensive submontane forest, thus helping to protect Threatened forest-dependant species such as Usambara Eagle Owl *Bubo vosseleri*.
- 8) An enlarged reserve incorporating adjacent forested public land should be divided into three zones (following Rodgers 1993), and the local community should be involved in the management of these zones:

Zone 1: Catchment Zone. This zone would protect the natural catchment properties of the forest, and prevent erosion. Forest on slopes of >40% and areas 50 m either side of the streams, and watershed ridges in both the Lutindi and Kilanga areas should remain unexploited and undisturbed.

Zone 2: Biodiversity Zone. This zone would protect areas of high biodiversity. Any form of exploitation or disturbance of the forest would be prohibited. Intact submontane forest above 1200 m in the Lutindi area and at 1000-1200 m in the Kilanga area should be placed in this zone.

Zone 3: Productive Zone. Within this zone sustainable production of poles, wood for fuel, medicinal plants, fodder, and other forest products would be permitted. Some of the forested public land, but mainly the cultivated public land at 800-1200 m in Lutindi and at 700-900 m in Kilanga should be placed in this zone.

8.3 Recommendations for Nguru North Catchment Forest Reserve

This CFR supports nine bird species of conservation interest, including two Threatened, two Near-threatened, and four restricted-range species, as well as two Threatened mammal species. We therefore recommend that the reserve be considered for designation as an Important Bird Area and that following measures be taken.

- 1) The boundary between the CFR and the public land requires demarcation, possibly involving the clearing of a narrow path and the planting of a quick-growing, non-invasive exotic tree species.
- 2) Pit-sawing activities which are currently occurring in the area need closer monitoring; and the foresters need to take action to prevent any occurring within the CFR.
- 3) Pole collection from the CFR, especially from the narrow band of submontane forest in the southernmost extension of the CFR must stop, and the possibilities for introducing alternative sources of poles, such as plantations, needs to be investigated.

- 4) A thorough investigation of the possible effects of the construction of a road between Lwande and Luago is urgently needed. Such development is likely to have serious detrimental effects and substantially increase the exploitation of the forest.
- 5) Cultivation (e.g. beans) along the waterways within and adjacent to the CFR (in particular, near Gombero) should be prevented, thereby securing future water supplies to villages such as Gombero where water is in short supply.
- 6) Senior staff should be appointed to live and work in the Lwande/Luago area. In addition, a forester should be appointed to work on a permanent basis in the village of Luago in order to monitor pole collection, fuel wood collection and, in particular, pit-sawing and road construction.
- 7) Environmental education activities in the villages of Lwande and Luago should be initiated so as to protect the reserve and lay the basis for sustainable development in the future.
- 8) Biological research is needed in the adjacent CFRs (especially Derema and Kilindi CFRs) which are likely to hold further populations of Threatened animals and plants. It is very likely that the Nguu Mountains hold many new subspecies and possibly even species. Considerably more publicity should be given to this important area, both within Tanzania and internationally.
- 9) The forested public land adjacent to Derema CFR should be gazetted into the reserve. This enlarged reserve should then be joined to Nguru North CFR, forming one large CFR, thereby reducing the edge-effects.
- 10) Such an amalgamated reserve should be divided into three zones (following Rodgers 1993), and the local community should be involved in the management of these zones:

Zone 1: Catchment Zone. This zone would protect the natural catchment properties of the forest, and prevent erosion. Forest on slopes of >40% and areas 50 m either side of the streams, and watershed ridges should remain unexploited and undisturbed.

Zone 2: Biodiversity Zone. This zone would protect areas of high biodiversity. Any form of exploitation or disturbance of the forest would be prohibited. Intact submontane forest at 1100-1600 m should be placed in this zone.

Zone 3: Productive Zone. Within this zone sustainable production of poles, wood for fuel, medicinal plants, fodder, and other forest products would be permitted. Some of the degraded forest at 900-1100 m near Luago within the CFR, should be placed in this zone.

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10. Budget

INCOME		£	EXPENDITURE		£
Mary Euphrasia Mosley Fund		1375	International flights		2500
BirdLife International and Flora and Fauna International BP Award	1000		Counterpart allowances		1100
Shell International Petroleum Co Ltd.	1000		Research permits		1000
Anonymous donations	780		Equipment		1000
Cambridge Expeditions Committee	700		Insurance		750
British Ecological Society	625		Local travel		600
Royal Geographical Society	600		Photographic equipment		590
Seddon Group Ltd.	500		Administration		480
Selwyn College	400		Local labour		350
British Ornithologists' Union	350		Food		300
Worts Travelling Scholar Grant	300		Accommodation		260
Gilchrist Charitable Trust	300		Medical		250
Nicol-Young Foundation	300		Counterparts' equipment		250
John Rushkin School	250		Residency permits		200
3D International	250				
Meyer International	250		TOTAL		9630
Dorothy Mandall-Strong Memorial Fund	250				
Queens' College	220				
Kings' College	200				
Gilbert Adair Trust	200				
Laings Charitable Trust	100				
Bird Exploration Fund	100				
Ms. L. A. Cadbury	100				
Trustees of McManus/Russell Award	100				
Russell and Mary Foreman Charitable Trust	75				
Mrs Gill Monrow	30				
Laura Simmons	25				
Mr W. S. Lymath	25				
Miss A. Swales-Orlandani	20				
TOTAL		10425			

The balance (£795) will be spent on post-expedition administration, film development and report production.

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Appendix I: Encounter rates for birds recorded

Table 5 gives the relative encounter rates for all of the species encountered at the four study sites. The values given take into account the varying totals of fieldwork carried out at each site, and are the number of individuals encountered per 100 field-hours. The first number listed is a relative encounter rate for the sightings alone, whilst the second, bracketed number is for a total of sight records and aural records. For each site the records have been separated into 'a' (forest edge, surrounding cultivated land, Miombo woodland; and 'b' (intact submontane forest, forest clearings and river valleys).

The use of relative encounter rates enables comparisons between sites to judge relative abundances, without distortion of records by variations in fieldwork effort. However, whilst overall rates may be compared for a species at different sites, allowances must be made for variations in species observability, and for the large difference in visibility between areas 'a' and 'b'. The ease of visibility and low numbers of field-hours has led to disproportionately high values for 'a' in many species.

+ denotes species for which an encounter rate is deemed inappropriate, as a result of their ecology, (birds of prey, hirundines etc).

* denotes species with loud far-carrying calls, which are likely to have distorted encounter rates.

n denotes species for which there were no sight records, only net records.

Table 5. Encounter rates for birds recorded.

	Lutindi CFR		Kilanga CFR		Nguru North CFR Gombero		Nguru North CFR Luago	
	Total	a b	Total	a b	Total	a b	Total	a b
Field-hours	328.75	120.75 208	268.5	38.5 230	369	12.5 356.5	316.5	31.5 285
Green Ibis			0.7	0.9				
<i>Bostrychia olivacea</i>								
Hooded Vulture					+			
<i>Neophron monachus</i>					+			
Southern Banded Snake Eagle	+							
<i>Circaetus fasciolatus</i>					+			
Bateleur								
<i>Terathopius ecaudatus</i>								
African Harrier Hawk	+		+					
<i>Polyboroides radiatus</i>								
Great Sparrowhawk								
<i>Accipiter melanoleucus</i>								
Little Sparrowhawk								
<i>Accipiter minullus</i>								
African Goshawk	+				+			
<i>Accipiter tachiro</i>								
Mountain Buzzard	+				+			
<i>Buteo tachardus</i>								
Augur Buzzard	+		+					
<i>Buteo augur</i>								
Long-crested Eagle	+		+					
<i>Lopheatus occipitalis</i>								
Crowned Eagle	+		+					
<i>Stephanoaetus coronatus</i>								
Martial Eagle	+							
<i>Polemaetus bellicosus</i>								

Sharpe's Akalat	3.6	1.0	8.3	3.4	3.9	6.2	6.4	8.8	9.8
<i>Sheppardia sharpei</i>									
East Coast Akalat									
<i>Sheppardia gunningi</i>	1.5	2.4							
Stonechat									
<i>Saxicola torquata</i>	5.5	3.8	8.3	9.3	8.3	3.5	3.6		
Evergreen Forest Warbler *	(15.2)	(11.1)	(22.4)	(48.8)	(57.1)	(26.3)	(27.2)	(19.0)	(21.0)
<i>Bradypterus barratti</i>	29.8	26.0	36.4	9.3	18.2	4.6	4.8	0.3	0.4
Yellow-throated Woodland Warbler									
<i>Phylloscopus ruficapilla</i>	(31.3)	(28.4)		(11.6)	(10.4)	(5.7)	(5.9)	(2.2)	(2.5)
Southern Hyliota	0.9	1.4		0.7	5.2				
<i>Hyliota australis</i>									
Tawny-flanked Prinia	6.1	9.6		1.9	13.0			1.9	19.0
<i>Prinia subflava</i>	9.1	10.6		(4.1)	(28.6)				
Bar-throated Apalis									
<i>Apalis thoracica</i>	15.5	22.6	3.3	9.7	62.3	0.9	9.8	15.2	16.8
Black-headed Apalis								(33.2)	(36.8)
<i>Apalis melanocephala</i>									
Red-capped Forest Warbler	8.2	7.2	9.9	1.1	2.6	0.9			
<i>Orthotomus metopias</i>	(9.1)	(8.2)	(10.8)	2.6	18.2			3.5	12.7
Grey-backed Cameroptera								(5.4)	(4.6)
<i>Cameroptera brachyura</i>	18.2	26.9	3.3	3.7	13.0	2.2	1.7		
Dusky Flycatcher									
<i>Muscicapā adusta</i>									
Ashy Flycatcher									
<i>Muscicapā caerulescens</i>									
Black-and-white Flycatcher									
<i>Bias musicus</i>									
Forest Batis	1.2		1.9	4.1	28.2	5.9	6.2	11	10
<i>Batis mixta</i>									
Chinspot Batis	6.4		10.1	0.37	2.6	1.4	3.1	0.32	3.13
<i>Batis molitor</i>									
Black-throated Wattle-eye									
<i>Platysteira peltata</i>									

White-tailed Crested Flycatcher	45.3	37.0	59.6	18.6	46.8	13.9	7.9	8.1	15.8	17.5
<i>Trochocercus albonotatus</i>	(80.0)	(57.7)	(118.4)	(46.9)	(67.5)	(44.8)	(9.5)	(9.8)	(38.2)	(42.5)
Crested Flycatcher *							1.1	1.1	0.3	0.4
<i>Trochocercus cyanomelas</i>							(1.6)	(1.7)		
Paradise Flycatcher										
<i>Terpsiphone viridis</i>										
Spot-throat *				1.1		1.3				
<i>Modulatrix stictigula</i>	(12.5)	(6.7)	(22.4)	(40.2)	(13.0)	(44.8)				
Pale-breasted Illadopsis	n									
<i>Illadopsis rufipennis</i>	0.6	0.5	0.8							
African Hill Babbler										
<i>Acippe abyssinica</i>	1.5	2.4		0.7	5.2		2.2	2.2	3.2	3.5
Uluguru Violet-backed Sunbird										
<i>Anthreptes neglectus</i>	5.8	9.1		4.5	5.2	4.4				
Amani Sunbird	2.4	3.8		1.9		2.2		3.1	4.1	41.3
<i>Anthreptes pallidigaster</i>										
Banded Green Sunbird										
<i>Anthreptes rubritorques</i>	21.0	25.0	14.1	10.4	62.3	1.7	19.0	19.6	23.1	19.3
Collared Sunbird				(11.2)	(67.5)		(23.3)	(24.1)	(34.4)	(31.6)
<i>Anthreptes collaris</i>	35.3	43.3	21.5	51.8	101.3	43.5	27.1	28.0	48.3	53.7
Olive Sunbird	(58.4)	(66.8)	(43.9)	(122.0)	(189.6)	(112.6)	(72.1)	(74.6)	(117.8)	(130.9)
<i>Nectarinia olivacea</i>									2.2	22.2
Amethyst Sunbird										
<i>Nectarinia amethystina</i>									0.6	6.4
Hunter's Sunbird										
<i>Nectarinia hunteri</i>										
Eastern Double-collared Sunbird	28.3	36.5	14.1				0.8	0.8		
<i>Nectarinia mediocris</i>										
Moreau's Sunbird										
<i>Nectarinia moreaui</i>										
Yellow White-eye	17.0	20.7	10.8	3.7	13.0	2.2	29.0	30.0	18.0	19.3
<i>Zosterops senegalensis</i>	(17.6)	(21.6)								
African Golden Oriole *										
<i>Oriolus auratus</i>								0.8	0.6	0.7

Usambara Weaver	3.4	5.3	0.4	0.4	1.7	5.1	12.7	4.2
<i>Ploceus nicolli</i>	1.8	2.9						
Red-billed Quelea	0.3	0.5						
<i>Quelea quelea</i>								
Orange-winged Pytilia	12.5	19.7	1.9	5.2	1.3	1.6		
<i>Pytilia afra</i>								
Red-faced Crimsonwing						2.2	64.0	0.7
<i>Cryptospiza reichenovii</i>								
Red-throated Twinspot								
<i>Hypargos niveoguttatus</i>								
Green Twinspot								0.7
<i>Mandingoa nitidula</i>								
Common Waxbill	4.0	6.2						
<i>Estrilda astrild</i>								
Bronze Mannikin	0.6	1.0	3.0	20.8				9.5
<i>Lonchura cucullata</i>								
Red-backed Mannikin	2.7	4.3	3.4	23.4				28.1
<i>Lonchura bicolor</i>								
Yellow-fronted Canary			1.1	2.6				
<i>Serinus mozambicus</i>								
Bully Serin	8.8	13.9						34.9
<i>Serinus sulphuratus</i>								
Oriole Finch			0.4		0.4			
<i>Linurgus olivaceus</i>								

Appendix II: Table 6. Species of conservation interest recorded.

Species	Conservation status ¹	Status at study sites ²			
		Mount Nilo CFR Lutindi	Kilanga	North Nguu CFR Gombero	Lulago
Olive Ibis			R		
Southern Banded Snake Eagle	NT	R		R	
Fischer's Turaco	NT	C			
Usambara Eagle Owl	T(V)		R		
Mombassa Woodpecker	RR ⁺	U	U		
Tiny Greenbul		C	C	R	R
White-chested Alethe		C	C	U	U
Sharpe's Akalat	RR	C	C		
East Coast Akalat	RR	C	C		
Long-billed Tailorbird	T(V)			C	C
Red-capped Forest Warbler	T(C)	RR	*		
Spot-throat		RR	C		
Uluguru Violet-backed Sunbird	RR	U	U		
Amani Sunbird		R	R	U	U
Banded Green Sunbird	T(V)	R	R	R	R
Moreau's Sunbird	T(V)	R	R	R	R
Green-headed Oriole	NT			U	A
Kenrick's Starling		RR	U	U	R
Usambara Weaver	T(V)	RR	R	R	R
<i>Bostrychia olivacea</i>					
<i>Circaetus fasciolatus</i>					
<i>Tauraco fischeri</i>					
<i>Bubo vosseleri</i>					
<i>Campethera mombassica</i>					
<i>Phyllastrephus debilis</i>					
<i>Alethe fuelleborni</i>					
<i>Sheppardia sharpei</i>					
<i>Sheppardia gunningi</i>					
<i>Orthotomus moreaui</i>					
<i>Orthotomus metopais</i>					
<i>Modulatrix stictigula</i>					
<i>Anihreptes neglectus</i>					
<i>Anihreptes pallidigaster</i>					
<i>Anihreptes rubritorques</i>					
<i>Nectarinea moreaui</i>					
<i>Oriolus chlorocephalus</i>					
<i>Poeptera kenricki</i>					
<i>Ploceus nicoli</i>					

¹ Conservation status according to Collar *et al.* (1994): T=threatened, N=near-threatened, (C)=critical, (V)=vulnerable and Stattersfield *et al.* (in prep.): RR=restricted-range in the Eastern Arc Mountains EBA (C24).

² Subjective estimate of abundance: A=abundant, C=common, U=uncommon, R=rare

* Recorded in 1994 by Cordeiro and Kiure (in prep.)

† Also restricted-range in the Kenyan and Tanzanian coastal forests EBA (C23)

Appendix III: Mist-net data

Mist-netting was carried out at all four sites. From an overall net effort of 1332 hours, a total of 604 individuals representing 40 species were captured.

Table 6. Altitude and net-hours for each mist-net site.

Site	Altitude (m)	Total net-hours	Diurnal net-hours	Nocturnal net-hours
Lutindi I	1230	221	221	0
Lutindi II	1170	243.5	217.5	26
Kilanga I	1030	214.5	202.5	12
Gombero I	1360	198	186	12
Gombero II	1330	209	186	12
Gombero III	1460	48	48	0
Luago I	1180	159	159	0
Luago II	1140	39	39	0

Table 7. Capture rates, recapture rates, and total species productivity for each mist-net site.

Site	Total captures	Capture rate (birds per mist-net hr)	Total recaptures	% recaptures	Total spp.	Species per net hour
Lutindi I	92	0.42	13	14	21	0.10
Lutindi II	86	0.35	16	19	18	0.07
Kilangal	141	0.66	15	11	17	0.08
Gombero I	74	0.37	10	14	18	0.09
Gombero II	65	0.31	7	11	16	0.08
Gombero III	29	0.60	2	7	13	0.27
Luago I	104	0.65	11	11	16	0.10
Luago II	13	0.33	0	0	6	0.15

Table 8. Individual species productivity for mist-nets at each site. For each species, the first figure gives the actual number of captures, the second (in brackets) gives the relative capture rate (number of individuals captured per 100 net-hours), and the third figure gives the percentage of recaptures.

Species	Lutindi I	Lutindi II	Kilanga I	Gombero I	Gombero II	Gombero III	Luago I	Luago II
<i>Accipiter tachiro</i>			1 (0.5)					
<i>Aplopelia larvata</i>			1 (0.5)					
<i>Turtur typanistra</i>				2 (1.0)			1 (0.6)	
<i>Buccanodon leucotis</i>			1 (0.5)	1 (0.5)				
<i>Pogoniulus bilineatus</i>			3 (1.5)	2 (1.0)			1 (0.6)	
<i>Indicator variegatus</i>		1 (0.4)						
<i>Mesopicus griseocephalus</i>	1 (0.5)	1 (0.4)		1 (0.5)			1 (0.6)	1 (2.6)
<i>Smithornis capensis</i>								
<i>Motacilla clara</i>								
<i>Andropadus masukuensis</i>	8 (3.6) 25%	19 (7.8) 26%	15 (7) 7%	7 (3.5)	2 (4.2)		12 (7.5)	
<i>Andropadus milanjensis</i>	1 (0.5)	2 (0.8)	2 (0.9) 50%		1 (2.1)			
<i>Andropadus virens</i>		1 (0.4)		4 (2.0)	5 (2.4) 20%		25 (15.7) 8%	2 (5.1)
<i>Phyllastreptus placidus</i>	13 (5.9) 15%	2 (0.8) 50%	7 (3.3)	4 (2.0)	6 (2.9) 33%	5 (10.4) 20%	6 (3.8)	2 (5.1)
<i>Phyllastreptus flavostriatus</i>	2 (0.9)	1 (0.4)	3 (1.4)	2 (1.0)	4 (1.9)	1 (2.1)	5 (3.1)	
<i>Phyllastreptus debilis</i>	15 (6.8) 13%	14 (5.7) 14%	9 (4.2)				3 (1.9) 33%	
<i>Neocossyphus rufus</i>	2 (0.9) 50%	5 (2.1) 40%	2 (0.9) 50%	2 (1.0)	2 (1.0) 50%			
<i>Turdus abyssinicus</i>		1 (0.4)	4 (1.9)	1 (0.5)	2 (1.0) 50%	1 (2.1)	1 (0.6)	
<i>Turdus gurneyi</i>	1 (0.5)	4 (1.6) 25%	3 (1.4)	2 (1.0)	5 (2.4) 20%	1 (2.1)	11 (6.9) 36%	1 (2.6)
<i>Aethea fuehleborni</i>								
<i>Pogonochila stellata</i>		6 (2.5) 33%	12 (5.6) 25%	2 (1.0)		1 (2.1)		
<i>Sheppardia sharpei usambarae</i>	8 (3.6)							

<i>Sheppardia gunningi</i>				11 (5.6) 18%	9 (4.3) 22%	2 (4.2)	5 (3.1) 40%	1 (2.6)
<i>Bradypterus barrati</i>	1 (0.5)							
<i>Phylloscopus ruficapilla</i>	9 (4.1) 11%	4 (1.6)	3 (1.4) 1 (0.5)	2 (1.0) 50%	2 (4.2)			
<i>Apalis thoracica</i>	1 (0.5)							
<i>Orthotomus metopalis</i>	1 (0.5)	1 (0.4)	1 (0.5)					
<i>Cameroptera brachyura</i>						1 (2.1)		
<i>Batis mixta</i>	2 (0.9)	1 (0.4)	2 (0.9) 50%	12 (6.1) 42%	4 (1.9)	2 (4.2)	2 (4.2)	5 (3.1)
<i>Trochocercus albonotatus</i>	6 (2.7) 50%	1 (0.4)						
<i>Trochocercus cyanomelas</i>								
<i>Modulatrix stictigula stictigula</i>	1 (0.5)	6 (2.5) 50%	3 (1.4)	2 (1.0)	6 (2.9)		2 (1.2)	
<i>Illadopsis rufipennis</i>	1 (0.5)							
<i>Alcippe abyssinica</i>	1 (0.5)							
<i>Nectarinia olivacea</i>	12 (5.4) 8%	15 (6.2)	70 (32.6) 13%	13 (6.6) 8%	14 (6.7)	8 (16.7) 12%	22 (13.8) 9%	6 (15.4)
<i>Nectarinia mediocris</i>	1 (0.5)							
<i>Nectarinia moreauxi</i>								
<i>Dierurus ludwigii</i>				1 (0.5)	1 (0.5)			
<i>Ploceus bicolor</i>				4 (2.0)				
<i>Cryptospiza reichenovii</i>	5 (2.3)		2 (0.9)					
<i>austalis</i>								
<i>Mandingoa nitidula rubbi</i>								2 (1.2)

Appendix IV: Biometric data for species mist-netted

Table 9 gives a summary of the biometrics collected for species captured in the mist-nets. The data have been divided into those collected in the East Usambara Mountains (EU) and those collected from the Nguu Mountains (Ng) where appropriate, and are given as a range of measurements observed, with the mean value in brackets. The sample size is indicated in the last column. In most cases no attempt has been made to sex species solely on the biometric data. However, results for sexually dimorphic species have been split, as have those for Yellow-streaked Greenbul *Phyllastrephus flavostriatus*, which shows a marked bimodal distribution of data.

Table 9. Biometric data for species mist-netted.

Species		Weight (g)	Wing (mm)	Bill (mm)	Tarsus (mm)	n
<i>Accipiter tachiro</i>	Ng	225	219	25	68	1
<i>Aplopelia larvata</i>	EU	67	149	19	30	1
<i>Buccanodon olivaceum</i>	Ng	50-53 (51.5)	92-93 (92.5)	18-20 (19.0)	24 (24.0)	2
<i>Pogoniulus bilineatus</i>	Ng	12-15 (13.4)	52-55 (53.0)	12-12.5 (12.1)	15-17 (15.9)	6
<i>Indicator variegatus</i>	EU	48	116	14	16	1
<i>Mesopicus griseocephalus</i> (subad. male)	EU	45	108	25	19	1
<i>Mesopicus griseocephalus</i> (female)	EU	53	106	27	19	1
<i>Motacilla clara</i>	Ng	19	80	16	22	1
<i>Andropadus masukuensis</i>	EU	25-34 (28.2)	79-88 (83.2)	13-16 (14.3)	21-24 (22.2)	27
	Ng	25.5-36 (29.0)	80-87 (83.3)	13-15 (14.4)	19-23 (21.1)	21
<i>Andropadus milanjensis</i>	EU	44-48 (45.3)	98-101 (98.8)		25-27 (26.0)	4
<i>Andropadus virens</i>	EU	27	78	14	20	1
	Ng	23-28 (25.2)	78-88 (83.0)	12-14 (13.3)	19-22 (20.6)	32
<i>Phyllastrephus placidus</i>	EU	19-29 (24.7)	75-85 (78.8)	17-20 (18.4)	22-25 (23.1)	18
	Ng	20-29 (26.1)	75-87 (82.1)	17-20 (18.4)	21-24 (22.4)	15
<i>Phyllastrephus flavostriatus</i> (male)	EU	33-40 (36.8)	98-103 (99.8)	21-23 (22.4)	24-26 (24.7)	5
	Ng	27-39 (33.0)	97-101 (99.0)	22.5-24.5 (23.4)	23-24 (23.5)	6
<i>Phyllastrephus flavostriatus</i> (female)	Ng	26-31 (27.7)	82-87 (84.2)	19-20 (19.6)	21-22 (21.3)	6
<i>Phyllastrephus debilis</i>	EU	13-17 (15.1)	64-72 (68.0)	14-16 (14.9)	17-20 (19.1)	31
	Ng	16-18 (17.3)	65-70 (68.3)	14-16 (15.0)	19-21 (19.7)	3
<i>Neocossyphus rufus</i>	Ng	55-69 (64.0)	118-119 (118.7)	17-18 (17.3)	28 (28.0)	3
<i>Turdus abyssinicus</i>	EU	60-70 (64.8)	107-114 (111.0)	23-25 (24.0)	31-32 (31.2)	5
<i>Turdus gurneyi</i>	EU	58-70 (62.8)	111-113 (111.5)	22-24 (22.9)	35-36 (35.8)	4

	Ng	58-66 (62.0)	108-114 (111.3)	22-22.5 (22.2)	35-37 (36.3)	3
<i>Alethe fuelleborni</i>	EU	56-62 (58.6)	109-113 (111.7)	22-24 (22.7)	33-36 (34.7)	7
	Ng	48-60 (54.1)	105-116 (110.6)	21-24 (22.2)	33-36 (34.4)	15
<i>Pogonocichla stellata</i>	Ng	18-20 (19.0)	82 (82.0)	15-16 (15.5)	25 (25.0)	2
<i>Sheppardia sharpei</i>	EU	13-16 (14.1)	64-73 (68.6)	12-14 (13.1)	21-23 (22.2)	17
<i>Sheppardia gunningi</i>	Ng	14.5-20 (17.3)	66-79 (73.4)	13-15 (14)	21-24 (22.6)	20
<i>Bradypterus barratti</i>	EU	17-18 (17.3)	56-64 (59.8)	13-15 (14.5)	23-25 (23.8)	4
<i>Phylloscopus ruficapilla</i>	EU	7-10 (8.4)	50-56 (53.6)	10-12 (10.6)	17-20 (18.9)	10
	Ng	7.5-9 (8.2)	53-54 (53.5)	10-11 (10.5)	18-19.5 (18.8)	2
<i>Orthotomus metopias</i>	EU	18-20 (19.0)	82 (82.0)	15-16 (15.5)	25 (25.0)	2
<i>Cameroptera brachyura</i>	Ng	11.5	55	15	22	1
<i>Batis mixta</i> (male)	EU	12-13 (12.5)	61 (61.0)	13-15 (14.0)	18-19 (18.5)	2
	Ng	12-14 (13.2)	61-65 (63.9)	14-15 (14.5)	18-19 (18.5)	7
<i>Batis mixta</i> (female)	EU	9-13 (11.0)	59-62 (62.2)	13-15 (13.7)	17-18 (17.5)	3
	Ng	11-17 (13.3)	57-64 (60.6)	13-15 (14.0)	17-19 (18.2)	12
<i>Trochocercus albonotata</i>	EU	8-10 (9.0)	59-64 (62.2)	11 (11.0)	17-19 (18.0)	4
<i>Trochocercus cyanomelas</i> (male)	Ng	11-12 (11.7)	66-70 (68.5)	12-13 (12.8)	16-17 (16.8)	4
<i>Trochocercus cyanomelas</i> (female)	Ng	11-11.5 (11.2)	65-67 (66.4)	12-14 (13.1)	16-18 (17.0)	5
<i>Modulatrix stictigula</i>	EU	32-36 (33.3)	77-85 (80.6)	16-18 (16.9)	31-33 (31.7)	7
<i>Illadopsis rufipennis</i>	EU	29	76	17	26	1
<i>Alcippe abyssinica</i>	EU	16	68	13	22	1
<i>Nectarinia olivacea</i>	EU	7-12 (10.4)	53-65 (59.8)	23-26 (24.4)	14-17 (15.5)	74
	Ng	8-12 (9.7)	55-65 (60.2)	23-26 (24.5)	14-17 (15.7)	55
<i>Nectarinia mediocris</i>	EU		74	16	29	1
<i>Nectarinia moreaui</i>	Ng	8	53	23	18	1
<i>Dicrurus ludwigii</i>	Ng	26	104	18.5	17	1
<i>Ploceus bicolor</i>	Ng	36-42 (39.0)	92-96 (93.8)	18-20 (18.8)	23-25 (23.5)	
<i>Cryptospiza reichenovii</i> (male)	EU	11-15 (12.4)	51-57 (54.2)	11-13 (11.9)	17-20 (18.2)	6
	Ng	13 (13.0)	51-52 (51.5)	10-11 (10.5)		2
<i>Cryptospiza reichenovii</i> (female)	EU	6	53	9	18	1
	Ng	13.5	50	9	20	1
<i>Mandingoa nitidula</i>	Ng	8-9 (8.5)	49-51 (50.0)	8-10 (9.0)	13.5-14 (13.8)	2

Appendix V: Species photographed

Slides of the following species in the hand are available:

Accipiter tachiro (male)
Columba larvata larvata
Buccanodon olivaceum
Pogoniulus bilineatus
Indicator variegatus
Mesopicus griseocephalus (subad. male)
Smithornis capensis (male)
Motacilla clara
Andropadus masukuensis
Andropadus milanjensis
Andropadus virens
Phyllastrephus placidus
Phyllastrephus flavostriatus
Phyllastrephus debilis albigula
Neocossyphus rufus
Turdus abyssinicus
Turdus gurneyi
Alethe fuelleborni
Pogonocichla stellata
Sheppardia sharpei usambarae
Sheppardia gunningi
Bradypterus barratti
Orthotomus metopias
Cameroptera brachyura
Batis mixta (male)
B. mixta (female)
Trochocercus albonotataus
Trochocercus cyanomelas (male)
T. cyanomelas (female)
Modulatrix stictigula stictigula
Illadopsis rufipennis
Alcippe abyssinica
Nectarinia olivacea
Nectarinia moreaui
Dicrurus ludwigii
Ploceus bicolor
Cryptospiza reichenovii australis
Mandingoa nitidula chubbi

Photographs of the following species in the field are also available:

Stepanoaetus coronatus
Bycanistes bucinator
Bycanistes brevis
Anthreptes rubritorques (male)
A. rubritorques (female)
Anthreptes collaris (male)
A. collaris (female)
Nectarinia olivacea
Nectarinia amethystina (male)
Malaconotus multicolor

Appendix VI: Species sound-recorded

Birds

Stephanoaetus coronatus
Guttera pucherani
Sarothrura elegans
Columba delagorguei
Aplopelia larvata
Turtur typanistra
Tauraco fischeri
Tauraco livingstonii
Ciccaba woodfordii
Apladoderma vittatum
Tockus alboterminatus
Bycanistes bucinator
Bycanistes brevis
Buccanodon leucotis
Pogoniulus bilineatus
Smithornis capensis
Andropadus masukuensis
Andropadus virens
Phyllastrephus placidus
Phyllastrephus flavostriatus
Neocossyphus rufus
Sheppardia gunningi
Bradypterus barratti
Apalis melanocephala
Cameroptera brachyura
Trochocercus albonotatus
Trochocercus cyanomelas
Modulatrix stictigula
Anthreptes collaris
Nectarinia olivacea
Nectarinia mediocris
Oriolus chlorocephalus
Laniarius ferrugineus
Dicrurus ludwigii
Ploceus bicolor
Cryptospiza reichenovii

Mammals

Cercopithecus mitis
Funisciurus palliatus
Heliosciurus rufobrachium
Dendrohyrax validus
Nandinia binotata