



INSTITUTE OF PRIMATE RESEARCH
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The distribution of the Endangered Mt Uarges guereza, the de Brazza's, the Patas, and the Sykes' monkey, the Somali and Senegal lesser galagos in Samburu, northern Kenya



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Samburu Primates Research & Conservation project

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Samburu Primates Survey 2009

Executive Summary

Samburu District is located on the northern interface between the central highlands and the lowlands of Kenya. The district lies within the semi-arid areas of the country, covering approximately 21,126.5 sq. km (including 3,250 square kilometers of gazetted forest).

The goal of this second phase of the primates' survey was to document the distribution of the following rare primates' species in specific parts Samburu where insufficient data was collected during the first phase. The species are; the de Brazza's, the Sykes and the Patas monkeys, the Somali and the Senegal lesser galagos and the Mt Uarges guereza. Very little is known on the status of the six species in the district. Below is a brief summary of the findings of the extensive survey that took twenty months.

De Brazza's monkey

After the first phase of the survey that started in April 2007, six more groups of de Brazza's monkey were recorded on the northern Mathews range, an addition to the 24 groups recorded in the year 2006 during the first survey of this newly discovered population. Between May 2008 and December 2008, two new groups were sighted in Sererit - southern Ndoto.

Patas monkey

Apart from the one stray (from Laikipia) Patas monkey reported by Dr Iain Douglas-Hamilton of Save the Elephants which he saw on the western parts of Samburu National Reserve, no other Patas monkeys were seen in the district. The conclusion is that there are no Patas monkey in Samburu.

Sykes' monkey

Reports about a small population Sykes' monkey on the northern fringes of Leroghi forest – at Ang'ata Nanyuki were found to be unreliable as no monkey was seen in 8 months of intensive survey in that area. Based on this information, our conclusion is that there are no Sykes monkeys in Leroghi forest or any other part of Samburu.

Mt Uarges Guereza

The Endangered Mt Uarges guereza is found in substantial numbers distributed over central and southern parts of Mathews range forest and southern Parts of Ndoto forest. The population in the neighboring Kirisia Hills was last seen by Forest Guards in 2006. Few are believed to have taken refuge in the dense inaccessible part of the forest (Saanata) following two decades of persistent poaching by local people who highly value its skin.

Lesser Galagos

The Senegal lesser galago was found to be widespread in the district. Eight live specimens were collected and released at South Horr (Mt Nyiro) and Mathew range after taking body measurements. However, the Somali lesser galago was not seen though there were reports that it is present especially in the southern drier parts of the district.

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Samburu Primates Survey 2009

1.0 Introduction

1.1 Background

I started studying primates six year ago with the de Brazza's monkey surveys in western Kenya and Samburu. It was in 2006 when I embarked on a study of a newly discovered population in Mathew's range, when overwhelmed by the diversity and presence of rare and endangered primates that the idea of concurrently surveying six rare primates' species was conceived, to make maximum use of the limited time and resources available.

While conducting the first ever field assessment of the status of the Mathews range population in 2006, I was fascinated by the abundance of the endangered Mt Uarges guereza and other rare primates' species whose distribution in the wider Samburu was unknown. This led the expansion of the survey in 2007 to cover the entire district incorporating five additional primates' species i.e. Patas monkey, Sykes' monkey, Mt Uarges guereza, Somali galago and Senegal galago.

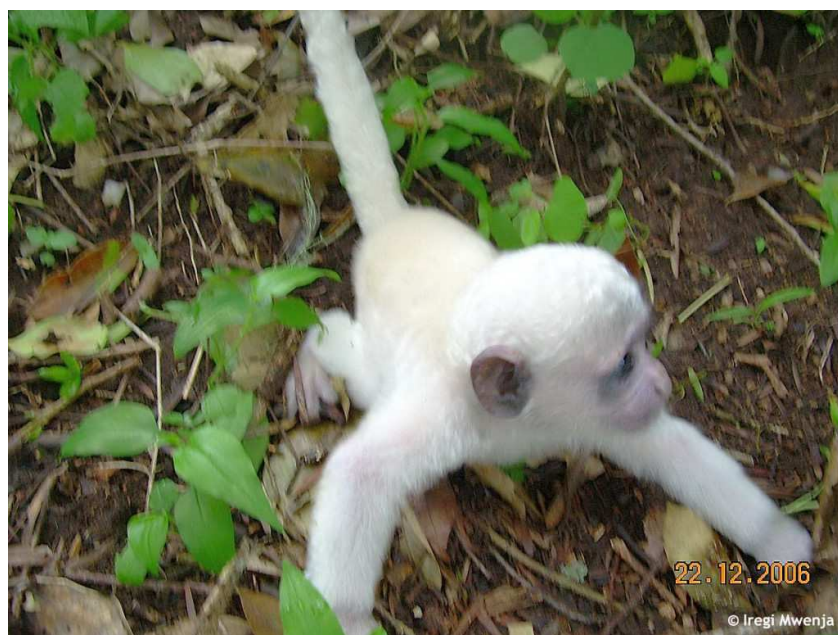


Figure 1: A month old Mt Uarges guereza at Ntukuda in Mathews range

Samburu district is found on the predominantly semi-arid the northern part of Kenya. However, apart from the extensive savannah plains, there are four tropical forests on the higher elevation namely; Mathews range, Kirisia Hills, Ndotto and Mt Nyiro which are rich in biodiversity and receive a substantial amount of rain. These forests have however received marginal attention and the knowledge of their biodiversity is poor. This is even worse for “the lesser species” given that more attention is given to the Big Five- the elephant, lion leopard, buffalo and the rhino and other charismatic species like the cheetah, gray zebra, and wild dogs, among others. Rare and sometimes more seriously endangered species like the Mt Uarges guereza have been overshadowed.

The Mt Uarges guereza (*Colobus guereza percivali*) endemic to Samburu is currently the only sub-species of guereza colobus listed as Endangered in the IUCN Red List. Though classified Endangered on account of its limited Extent of Occurrence, no comprehensive on-the-ground field assessment of the species has been done to determine its distribution and present status, hence the need to include it in this survey.

On-the-other-hand, though Sykes' monkey (*Cercopithecus mitis albogularis*) is not known to occur north of Mt Kenya, there were anecdotal reports of sightings in Leroghi and we found it worth incorporating the species in this survey. Given that these forests were being surveyed for other primates species like de Brazza's monkey and the guereza colobus and there was no in harm in adding this species to our survey list.

In the Samburu plains there were anecdotal reports that Patas monkey *Erythrocebus Patas* inhabits some part of the northern Samburu (whose vegetation offers and ideal habitat for Patas) in the expansive district giving us a good reason to incorporate it in the survey as well.

The distribution and status of the Senegal and Somali lesser galagos (now recognized as separate species) in Samburu has never been documented formally (though anecdotal sighting may have been reported). The two prosimians were believed to be widespread in the semi-arid district whose savannah woodland, thorn bush and scrubland offers the suitable habitat they need.

The survey of the six primates' species including the de Brazza's monkey (surveyed in Mathews in 2006 expanded to neighboring forests) was integrated into one extensive survey with those species occurring in the same habitats e.g. forest species like guereza colobus and Sykes, being surveyed together, while others like Patas monkey that occur exclusively in the plains were surveyed separately.

1.2 Survey Objectives

- 1) To assess the status and distribution the de Brazza's Patas, and Sykes' monkey, Mt Uarges guereza, and lesser galagos in Samburu to help guide future conservation actions.
- 2) To identify local threats and opportunities for conservation of de Brazza's Patas, and Sykes' monkey, Mt Uarges guereza, and lesser galagos in Samburu.
- 3) Build the capacity of 16 local scouts and 4 local research assistants in general primate's ecology and data collection methodologies to ensure continuity of surveillance and monitoring of primates in the region.

1.3 The six primates' species

1.3.1 De Brazza's monkey

The De Brazza's monkey is one of the most unusual species in the group of old world monkeys commonly known as guenons (Nowak 1991; MacDonald 1993). They live in forests along the banks of streams and rivers, at the mid or lower canopy layers of the forest. De Brazza's are arboreal, spending 70% of their time in the understory and 20% on the ground

(Gautier-Hion, 1988). They are diurnal, spending the majority of their time at the lower canopy or on the forest floor feeding. They are omnivores, primarily feeding on fruits and seeds, leaves, arthropods, flowers and mushrooms (Staadén, 1996).

The de Brazza's Monkey, is fairly common in its core range within riverine and swamp forests in the Congo Basin from SE Cameroon, Equatorial Guinea and Angola. It is very rare and found in isolated pockets in some parts of in extreme East and West Uganda, Western Kenya and S.W Ethiopia (Brennan, 1984; Decker, 1985). While large populations of De Brazza's monkey exist in central Africa (Gautier-Hion & Gautier 1978), the population in Kenya is small and under immense anthropogenic pressure (Brennan 1985; Brennan & Else 1984; Decker 1985).



Figure 2: The map of distribution of De Brazza's monkey in Africa showing newly discovered population in Mathews Range Forest Reserve.

In Kenya, the knowledge on the de Brazza's distribution has expanded over the years as more wildlife biologists developed interest in the species. Prior to reports by Booth (1962), the species was believed to be restricted to the western slopes of Mt Elgon. Booth (1962) increased the eastward species range by 60 km to Cherangani Hills. The range of the species was extended northwards to S.W. Ethiopia by Brown and Urban in 1969 (Wahome, 1993). Brennan (1984) added more groups in the western range of the species between Mt Elgon and Cherangani, while Wahome (1989) extended the species southern range to Kisere forest, north of Kakamega forest. Mwenja (2004) added more new sightings in the region increasing the national estimate by 350 per cent. Mwenja (2007) extended the range eastwards to Mathew range where an isolated population of the species had been newly reported. This was the first ever population reported to the east of the Rift Valley.



Figure 3: Photo of a de Brazza's monkey

In western Kenya, the majority of the remaining population is straddled in very thin, increasingly fragmented strips of riparian forest on privately owned farms, usually in small, isolated groups. These pockets maintain populations comprising of a few monkeys, which may not be genetically viable (Brennan, 1984; Mwenja 2004). However, the situation in Mathews range forest reserve is different given that there is very little anthropogenic pressure being exerted on this habitat (Bronner, 1990; Blackett, 1994) as compared to the Western Kenya.

During the study of the satellite population in Mathews Range Forest Reserve it emerged that there are more isolated interesting groups in the neighboring Leroghi and Ndotto forests which this study set out to investigate.

1.3.2 Patas monkey

The Patas Monkey *Erythrocebus Patas*, ranges from West Africa north of the equatorial forests and south of the Sahara (western Senegal) to East Africa (de Jong, 2004; Isbell, 2007). They are easily recognized by their brick red upper parts and heads. Their long limbs are completely and distinctively white, especially in males. The East African Patas Monkey (of western Ethiopia to northern Uganda and southern Kenya) has a blackish face with a white nose and a white moustache, unlike the Patas monkeys found in West Africa and northern Tanzania, which have an all black face (de Jong, 2004).

Patas are terrestrial, preferring savannah-woodland habitats, especially those dominated by Acacia shrubs and trees (de Yong, 2004). Their highly distinct long limbs an adaptation for fast movement (Kingdon, 1997). They are able to reach speeds of 55 km/h, making them the fastest on the ground of all primates. During the day, Patas spend roughly 60 % of their time on the ground, and 40 % in trees. They feed mainly on the ground. When disturbed, Patas usually flee on the ground, even where they are encountered in trees. Patas eat gum, leaves, and arthropods (principally ants), as well as flowers, fruits, small mammals, reptiles, and birds' eggs (de Yong, 2004).

For 10 years, Lynne Isbell carried out a Patas monkey study in Laikipia, Kenya. She found that Patas there are highly dependent on Whistling Thorn (*Acacia drepanolobium*) for both food and sleeping sites. Isbell also found that Patas drink daily, preferring to drink water from holes, ponds, and tanks in open areas, rather than from streams with their dense riparian vegetation (de Jong, 2004).



Figure 2; Patas monkey are highly dependent on Whistling Thorn (*Acacia drepanolobium*) for both food and sleeping sites

Recent studies by de Jong (2004) indicate that Patas are found in Laikipia plateau, Baringo, West Pokot, Turkana, Busia and Chyulu. They have never been reported to occur between north of Uaso Ng'iro River and to the east of the L. Turkana and particularly in the Samburu district, our study area. By their own nature Patas Monkeys are shy and silent – traits that, combining with their speed and cryptic pelage, make them difficult to find, let alone observe and study.

1.3.3 The Lesser Galagos

Lesser bush babies are small nocturnal primates that are well-adapted to living in dry areas. They generally occupy the savannah woodlands south of the Sahara and are excluded only from the southern tip of Africa. The average mass of a lesser galago is 150 grams to 200 grams. The tarsus of galagos is greatly elongated to 1/3 the length of the shinbone, which allows these animals to adopt the hopping gait of a kangaroo. Galagos also have a greatly increased muscle mass in the hind legs, which also enable them to perform large leaps.

Galago gallarum was subsumed to be one of the subspecies of the Senegal Galago for many years but Olson (1979, 1986) elevated the sub-species to full species status (Kingdon, 1997; Butynski and de Jong, 2004). Groves (2001) revision of primate taxonomy recognizes *G. gallarum* as a distinct species, primarily based on ear, hind foot and tail lengths to *G. Senegalensis* (Butynski & de Jong, 2004).

1.3.4 Somali Galago

The Somali Galago is endemic to the semi-arid thorn scrub and thorn scrub/woodland of Eastern Kenya, southern Ethiopian and Somalia, where in most cases, it is the only Galago present (Butynski & de Jong, 2004). Its preferred habitat is *Acacia*, *Commiphora* and *Combretum* deciduous bush land and thickets. The diet of *G. gallarum* remains unknown. Kingdon, 1997 states that the diet is “presumed to be mainly gum and invertebrates”

(Kingdon, 1997). Butynski and de Jong (2004) found *G. gallarum* to be sympatric with *G. senegalensis* in Meru NP.

G. gallarum is a medium sized galago with a whitish face and throat, and contrasting dark brown ears-rings, and black tail. Males and females look alike but males are slightly larger than females (Butynski & de Jong, 2004).

Distinguishing the two



Figure 3 Adult Somali lesser galago. Note the distinctive contrast between the dark and light coloured body parts a pattern that distinguishes it with *G. senegalensis*. Drawing by Stephen Nash, Photo: Mwenja

1.3.5 Senegal Lesser Galago

The Senegal lesser galago (*Galago senegalensis*) is found throughout the forests between Senegal and E. Africa. Kingdon (1997) categorizes the species the *Galago senegalensis* into 3 races - *G. s. senegalensis*, *G. s. braccatus* (E. Africa race) and *G. s. dunnii*. The preferred habitat is the woodland savannah dominated by acacia and montane forest margin elsewhere (Kingdon 1997).

The Senegal lesser galago primarily eats gum, but also eats insects for the protein. This species has not been observed drinking water in the wild, possibly suggesting that it obtains its water from the food it eats. The lesser galago sleeps in either a flat leaf-nest, a tree hollow, or a branch fork in a thorn tree; males sleep alone and females either sleep alone or in groups (Bearder and Martin, 1979). If there is a threat from a predator, the mother will move the infants to a different location, and will transport the infants in their mouth.

Galago senegalensis has thick, woolly, rather long and wavy fur which is silvery grey to brown dorsally and slightly lighter underneath. Ears are large, with four transverse ridges that can be independently or simultaneously bent back and wrinkled downward from the tips toward the base. The ends of the fingers and toes have flat disks of thickened skin, which aid in grasping tree limbs and slippery surfaces.

The basic social group is composed of an adult male and female with offspring. Males' ranges do not overlap. The lesser galago has a polygynous mating system although females

may attract more than one male (Bearder and Martin, 1979). There is a matriarchy amongst the females of the group (Bearder and Martin, 1979). In the lesser galago the males disperse and the females are philopatric.

The pelage of *G. senegalensis* is long, thick and woolly and the dorsum is grey or brownish-grey. Ears are brown or grey on the back and pinkish or flesh-colored on the front. There is a sharp delineation between the lemon yellow of the outer hind limbs and the grey of the upper thigh and dorsum. The tail is grey brown. *G. Senegalensis* is generally in more moist habitats than *G. gallarum*.

On striking difference in the field between the two is that *gallarum* is much more 'confident', less 'shy' species. Upon being located with light of a spotlight, *gallarum* typically remains in place for a few minutes and then moves towards the observer, frequently to within 5 m and sometimes to within 1m. The impression is that this species almost immediately begins to take advantage of the light from the spotlight to locate vertebrates. In contrast, *G senegalensis* usually immediately moves away from the observer (Butynski and de Jong, 2004).

1.3.6 Sykes' monkeys

Sykes' or White-throated guenon (*Cercopithecus (n.) mitis albogularis*) is one of the subspecies of the Gentle monkey *Cercopithecus (nictitans)* superspecies (Kingdon, 1997). This superspecies is characterized by large, long-tailed arboreal monkeys (Swara, 2004; Kingdon 19970). Back and thigh are grizzled while the forearms, feet and terminal half of the tail are black. The Sykes' are identified by their grizzled back and cap and the extensively and sharply contrasted white throated (Dorst, & Dandelot, 1972; Kingdon, 1997).



Figure 4: Photo of a Sykes monkey from the Kenyan coast

Kingdon (1997) prefers to divide the species *mitis* into four 'clusters' each embracing more than one sub-species, arguing that the splitting based on geographic divisions obscures a more complex pattern of distribution among various sub-groups. The White-throated guenons are the easternmost "cluster" of the gentle or diademed 'super specific' complex. He gives the "white throated cluster" eleven sub-species with distribution ranging from Cape Province to Somalia and inland as far as E Zaire basin. The other cluster is, *mitis*

monkey (central Africa), silver monkey (Albertine Rift) and blue monkey (East and central Africa) clusters. In East Africa, they are found to the east of the Rift Valley while the Blue monkeys occur to the west (Swara, 2004).

As a group the white-throated guenons are undoubtedly among east Africa's most adaptable, versatile and successful monkeys whose mixed diet of invertebrates, birds eggs and leaves and fruits and its supreme dexterity, enable the troops to live even in degraded forest environments (Swara, 2004).

1.3.7 Mt Uarges Guereza

The guereza colobus is a large black monkey with a white mantle and a tail tuft (Napier 1985). The body is mostly black, with the white mantle extending from the shoulder to the hip, connecting around the lower torso. The tail has a white tuft at its end which is variable in its extent along the length of the tail (Groves 2001). Subspecies are distinguished from one another by color variations in these features (Napier 1985). The face is surrounded by white hair, with bushy cheek hairs. There is a white stripe on the thigh (Groves 2001). In rare instances, almost entirely white individuals are reported from the west side of Mt. Kenya, with the color not being due to albinism (Hull 1978).

Groves (2005) lists 7 subspecies; *C. g. caudatus*, *C. g. dodingae*, *C. g. guereza*, *C. g. kikuyuensis*, *C. g. matschiei*, *C. g. occidentalis* and *C. g. percivali*. The Mt Uarges guereza *C. g. percivali* has a very long creamy yellow mantle and very long hair, extending longer than 40 cm (15.7 in) on the lower abdomen. The tail is as long as the head and body combined, with the white tuft extending over about two-thirds of its length (Groves 2001).



Figure 5: The Endangered Mt Uarges guereza colobus on Mt Uarges, Mathews range. Photo: Iregi mwenja

Guerezas are tied to habitats that have trees and are present in both deciduous and evergreen forests (Oates 1977b; Oates et al. 1994; Lwanga 2006). They are found in forests and savannah woodlands within and to the north of the moist forests of central Africa, often extending into highland or montane forests (Oates et al. 1994).

Leaves and fruit are the main foods of the guereza but the diet is quite variable as would be expected in a species with such a wide distribution and range of habitat types (Oates 1994; Fashing 2001b). While the species has historically been believed to be exclusively leaf-eaters, they are not obligate folivores (Oates 1994; Fashing 2001b)

The Mt Uarges guereza, *Colobus guereza percivali* endemic to Samburu is currently the only sub-species of guereza colobus listed as Endangered in the IUCN Red List (Butynski, 2008). It was named Mt. Uarges guereza, because it was thought to be endemic to this small mountain but the highest range of the Mathews range found on the southern tip.



Figure 6: Mt Uarges, the highest peak of Mathews ranges which the guereza sub-species is named after

It's extremely small remaining range (less than 500 sq. Km.) and anthropogenic degradation of its habitat is the primary threats contributing to its endangerment (Butynski, 2008). The species distribution is not clearly known not only outside Mt Uarges but even on Mt Uarges where it thought to be confined.

2.0 Study area and Methods

2.1 Study Area

Samburu District is located on the northern interface between the highlands and the lowlands. The district lies between Latitudes 0° 40' north and 2° 50' north of the equator and Longitudes 36° 20' east and 38°10' east of the Prime Meridian. The district lies within the semi-arid areas of the country. The district covers approximately 21,126.5 square kilometers (including 3,250 square kilometers of gazetted forest).

2.1.1 Physiographic and Natural Conditions

To the north of Baragoi and between Tum and South Horr, the area rises to Mount Nyiro. It tapers northwards and falls steeply southwards. The peneplains in the south and east of Mount Nyiro have been eroded to form the Elbart, Sware, Bonyeki and the middle Waso Nyiro plains ranging between 1000m and 1,350m above sea level. These plains are characterized by isolated hills. These hills are most noticeable at Kowopin in Baragoi Division and the area between Lodungokwe and Wamba.

The Mathews Ranges and Ndoto Mountains are located east of the Central plains. The ranges are discontinuous and form a north-south alignment on the eastern side of the district. The rest of the district forms a continuous basin which slopes northwards to Lake Turkana and East of Mathews Range (OP. 2008).

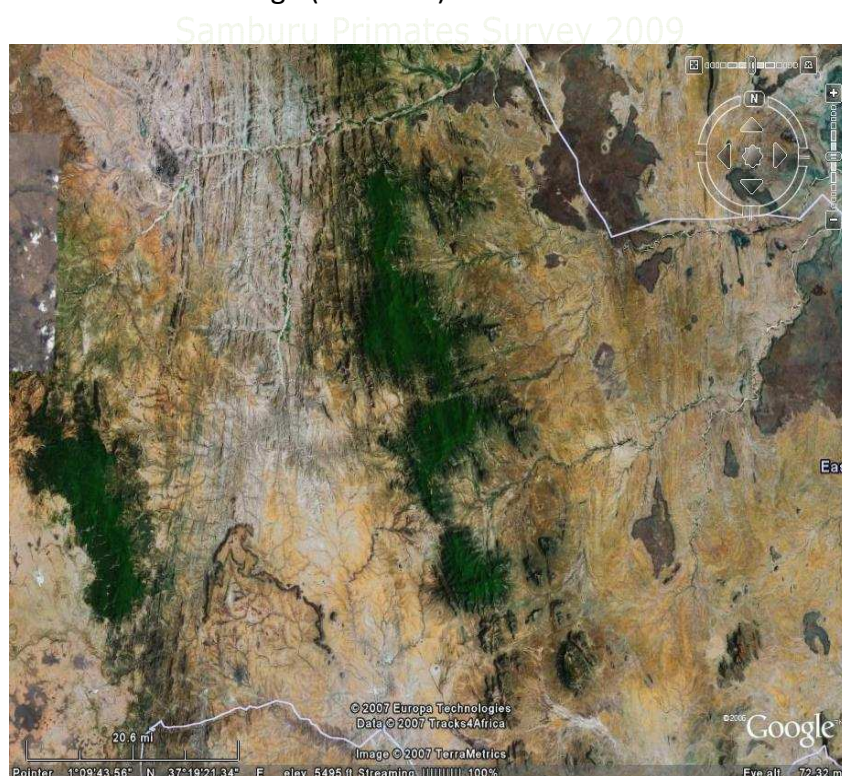


Figure 7: Satellite image of Samburu showing the Milgis River the separates the Ndoto and the Mathews ranges

Rainfall in the district follows a fairly erratic pattern varying significantly both in time and space. The district however, experiences both short and long rains. The driest months are

January and February. The long rainy season fall in the months of March, April and May. Apart from South Horr and Wamba areas, short rains occur during the months of July and August, sometimes extending into September. For Wamba and South Horr areas, the short rainy season is usually delayed, occurring in October and November and sometimes extending into December. This short rainy season succeeds a fairly dry spell during the month of June. The south-western plains and the Lorroki plateau receive between 500 and 700mm of rain annually. The Nyiro and Ndoto Mountains and Mathews Range, however, receive the highest amount of rainfall between 750 and 1250mm per annum. The central basin and the plains east of the Mathews Range are the driest parts of the district with annual rainfall of between 250 and 500 mm (OP. 2008).

Temperatures in the district vary with altitude and are generally between 24°C mean minimum and 33°C mean maximum. The central plains and the region east of the Mathews Range have the highest temperatures while the highland belts in the north and eastern side of Lorroki Plateau are cooler. The district has a mean temperature of 29°C (OP. 2008).

2.1.2 Settlements

The district has a population of approximately 156,125 people. The population density is determined by natural conditions and development infrastructure. Kirisia division has the highest population due to its good climate, fertile soils and many trading centers. During the dry season many people concentrate around the permanent water sources, otherwise most of the people who are pastoralists move with their livestock in search of water and grazing (OP. 2008).

2.1.3 Protected areas *Samburu Primates Survey 2009*

The Leroghi, Mathews range, Ndoto and Mt Nyiro forests reserves are located in the semi-arid, sparsely populated northern Kenya's Samburu District. Forest department manages the four Reserves under the recently enacted Forest Act 2005 though their impact is marginal. On the plains are several community wildlife conservancies stretching the entire district with those on the north and west still on the early stages of formation.

The Mathews Range Forest Reserve was originally gazetted in 1956 as a Crown forest, primarily for water protection as a water catchment area and in 1964 declared a Central forest with an area of 93,765 ha. The mean annual rainfall is 700 mm in lower areas and 1100 mm at the top of the Range with a peak in October and April. The minimum temperatures range from 14°C – 20°C in dry season. Daily maximum temperature exceeds 30°C in dry season. (Blackett, 1994). There are three main forest types found in Mathews range; i.e. *Croton megalocarpus*, *Juniperus/Juniperus-Olea*, and mixed *Podocarpus* forest types.

Leroghi Forest Reserve spans 91,452 ha and lies on the Northern end of the Laikipia Plateau in Northern Kenya. The reserve boundary encompasses approximately 70,000 ha of dry Montane Forest on the Kirisia Hills, and approximately 20,000 ha of arid scrub land, with an altitudinal range of 1,273m-2,625m (Birnie 2005).

The steep Ndoto and Mt. Nyiro Forest Reserves reach up to 2752 m and are covered with humic acrisols over the basement formation and deep humic andosols in volcanic areas. These reserves are located in the mountain areas in Northern Kenya between 36° 40' – 38°

00'E and 01° 40' – 03° 40'N and are covered with evergreen montane forest. Mt. Nyiro Forest Reserve measures a total of 45,496 ha of which barely 7,890 ha are covered with true forest (Busmann 2006).

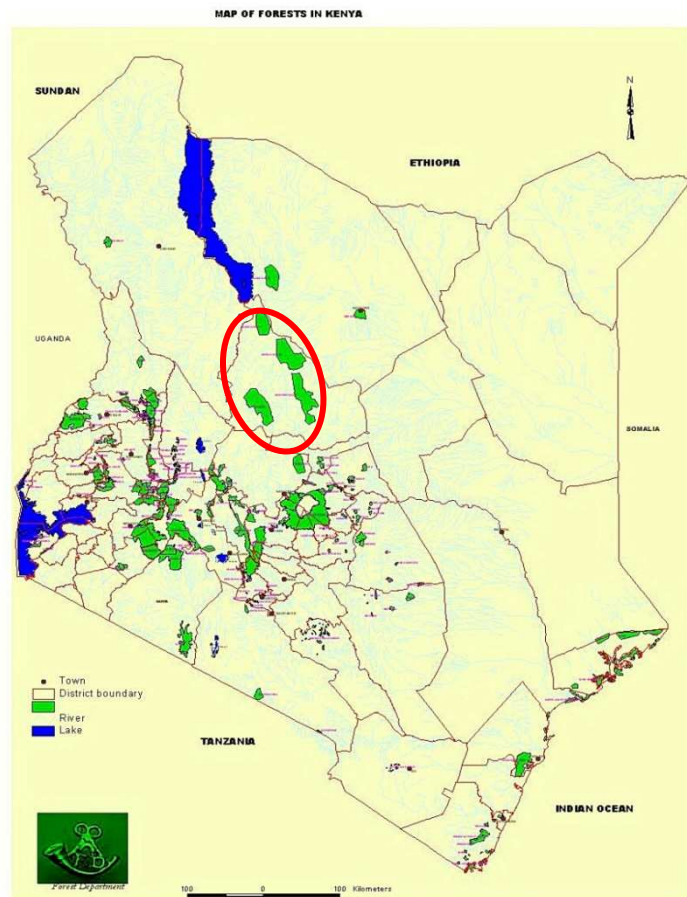


Figure 8; map of Kenya showing the all the gazetted forest reserve in the country the area enclosed in red is the study area covering the entire Samburu region.

The anthropogenic threats and their effects facing most of these forest reserves and the lower savannah plains are similar, which includes fires caused by honey gatherers, hunters and pastoralists who burn the old grass at the start of the wet season to promote regeneration of young grass. Others are overgrazing in the plains and the forest, cultivation in forests and firewood collection to meet the energy demand for the fast-growing human population.

2.2 Methodology

2.2.1 Equipment

1. Notebook
2. Map of Samburu
3. Satellite image of Samburu
4. Data recording data sheet, pencil and pens, pocket files
5. Primates identification pictures and drawing
6. Binoculars
7. Watches
8. Digital Camera

9. GPS
10. Sony Video Handycam
11. 12V rechargeable torch

2.2.2 Survey methods

This was the second phase of a survey that begun 1 April 2007. The decision to do the survey was made in order to verify anecdotal reports of these species in the entire district. The first phase verified information on suspected locations each of the six species in the district. The second phase zeroed on specific areas where further investigation was needed to verify data gathered in the first phase. These areas include, Ndoto, Ang'ata Nanyuki, Ngare Narok (higher altitude), Saanata, Suiyan and Sware plains. Scouts were deployed for weeks with specific instruction on the species to look for. Specifically, were wanted to verify information on Sykes and colobus in Kirisia Hills, De Brazza's and colobus monkeys in Ndoto and Patas monkey in the plains along the Suiyan.

On the first phase, a reconnaissance survey was carried out on 18th April to 21st April 2007, to acquaint ourselves with the entire district and collect vital information from local people through interviews (Glyn, 2002) particularly on area likely to harbor each of the six species. Interviews were conducted in the major Villages trading centers targeting wildlife managers, forester, NGO personnel and knowledgeable local elders. Prominent biologists who have worked in the area were also interviewed. They included Dr Tom Butynski and Yvonne de Jong, John Wreford-Smith who served at the District Forester Officer for Samburu from 1950-1960 and has to date maintained a close contact with the region, current District Forester Officer Mr. Lembara, KWS Warden Kilonzo among others.

The Reconnaissance survey took us to Kisima, Baawa, outskirts of Maralal town, Loosuk, Longeiwan, Poror, Moriyo, Marti, Baragoi, Tum, South Horr, Lesilkan and Parsaloi. The eastern side of Samburu had been covered extensively during the de Brazza's study in Mathews range the previous year and relevant information collected. During this trip, we also managed to interview guides who take tourist through walking safaris to Ndoto and beyond. Data collected during this exercise was recorded in our notebooks and used to plan the detailed field assessments that followed.

After the Reconnaissance survey, detailed assessment was conducted in each of the four forest reserves, the savannah plains and scrub land in the specific areas mentioned during our interviews. Three field trips were conducted in 20th May to 9th June, the second on 12th July to 21st July and the third from 18th August to 18th September, 2007. The last survey was postponed in November-December, 2007 due to rains that made Ndoto forest inaccessible. In January, 2008, the survey teams were deployed to Ndoto and parts of Parsaloi and Suiyan in as post-election insecurity deterred me from heading this last field survey.

General survey methods suitable for collection of data on geographical distribution, estimating densities, assessing habitat and limited information on age and sex composition was used (Struhksaker, 1981). A combination of interviews, roads/vehicle survey, sweep survey, line transects (where a group had been identified) and night walks (for galagos) were used to gather information and collect data. Local scouts were used to assist with the navigation and location of troops within the unexplored forests and savannah, while the

trained research assistants were responsible for field observations and recording of the data.

Natural transects - river valleys, were used as the main data collection in areas identified for verification of information from interviews. Each transect had a team of at least two people i.e. an observer and a recorder. The team walked at a speed of approximately 1 Km/hr with frequent stops to listen and record after every 60 metres for 50 seconds (Butynski, 1984). This method was particularly suitable for (forest species) de Brazza's and Sykes as well as the guereza colobus which prefers riverine vegetation in forest ranges which offers the most diverse mixture of trees.

The data collected from the transects included the date, name of the area, time spent (start and stop time), size and structure of the troop, activity, association with other species of animals, tree species, elevation, GPS coordinates, mode of detection, and any other important remarks. Photographs were taken along transects and 'luggas' to compliment the data recorded.

For the Patas and the bush babies, specific areas where they were reported to be found were visited and searches done. More interviews were done in those areas to verify reports from the reconnaissance survey. Lesser galagos were searched at night from 18:30hrs to 20:30 hrs while Patas searches targeted their water drinking points where the frequent during the day

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3.0 Findings

Several field surveys were conducted to collect data on the six primates' species. However, we changed tact by deploying assistants from the local community who were trained in the earlier surveys to specific parts of the district. These were areas we had zeroed on after information gathered during the first phase proved inconclusive.

The findings below are presented separately for each of the six species based on the data collected and collated from the field expeditions I headed and those headed by my Assistant and scouts.

3.1 De Brazza's monkey

In 2006 de Brazza's survey in Mathews range, 24 groups we found and mapped. During this survey, additional groups were found in Ngare Narok within the same area we had recorded group in 2006, after intensively patrolling that river for two weeks. From here we went for a three day ground truthing mission to Mathews point (via Sumare and Kangulata) to verify reports that there are de Brazza's and colobus there. The altitude here is above 2,000 m asl and there was no evidence of the two species in these areas. De Brazza's seem quite unlikely to inhabit such high elevations though their presence can't be ruled out, especially going by previous survey's findings in Mathews range.

We also went to the northern limit of the ranges and interviewed villagers in Kibartare, Lodosoit and Serolipi. At Lodosoit and Kibartare, knowledgeable 'Dorobos' here confirmed that there are group in northern reaches of Sitin, lower parts of Miwaa range, Serelberi and at Dume the furthest range to the north western of Mathews range. However, we could not visit these areas to record the GPS co-ordinates of these groups for the two days that we were there.

Back to Wamba, we went to the nearby Gogoltim village that lies below the towering Tipito range that borders Mt Uarges to the north. Our interviews with the locals here did not yield much. There was no clear indication as to whether de Brazza's indeed occur in the forest higher up the Tipito hills though they were sure of other primates species.

Three days of searches within the Kirisia hills south of the old Olpiroi road did not yield any sighting of the de Brazza's. Interview with KWS officers at Maralal and Baawa security outpost gave the indication that no de Brazza's have ever been seen in this forest, a view supported by local people including herdsmen who almost permanently reside in the forest.

In Mt Nyiro, none of the local people interviewed had seen the species and two days survey along the forest eastern side from Kurante to Kosikosi and Kurante to Anderi proved the locals right. A third day was spent on the western side of Tum and Ewaso Rongai River near Desert Rose Wilderness Camp. We interviewed residents from the two areas who confirmed that the species doesn't inhabit that part of Mt Nyiro as well.

Reports from northern Leroghi forest particularly at Ang'ata Nanyuki were negative. Only a "strange white throated monkey" which we suspected to be Sykes was reported. With a

team of five, we spent six days on Keskei, Naashoda, Lesatia, Louwaibor, Lorumbei “laggas” and Murui forest searching for any of our target rare primate species without success.

Next we went to Milimani, on what used to be Maralal Sanctuary (much of which was transformed to human settlement) hoping to get some information on the primates that inhabited the forest before allocation and settlement by small-scale farmers who cleared the natural forest. A retired forest guard Moses Leluai who owns a plot here said he never saw any de Brazza’s, Sykes’ or colobus. Kingdon (1974) reported that there were de Brazza’s in Maralal although his later editions of the Fields guide to African mammals didn’t recognize Maralal as being included in the de Brazza’s range.

3.2 Patas Monkey

The only credible sighting of Patas monkey in Samburu came from renowned elephant researcher Dr Iain Douglas-Hamilton, the Executive Office of Save the Elephant, which has its project based in Samburu National Reserve. This is the report he gave me in November, 2007.

“In October 2007 during the course of an elephant collaring operation, I sighted along with Daniel Lentipo a Patas Monkey in the western part of Samburu National Reserve. The animal was running through open bush and we got a good view for a few seconds. Both Daniel and I independently recognised it as a Patas Monkey. I don’t know if this constitutes a rare sighting but I have never come across one in Buffalo, Shaba, and Samburu National Reserves. The nearest ones are those in Laikipia”.

Primatologists Dr Butynski and Yvonne de Jong commenting on this sighting said, *“Looks to be a very nice record, very likely this is a 'wandering adult male'. They do this sort of thing, apparently go off long distances from the range in which groups live in search, I suppose, for new, distant groups and opportunities”.*

However, this was the only confirmed report of the species sighting in Samburu district, though as Dr Butynski suggests, it could just be a wandering male from the Laikipia population and not a resident group in Samburu. Meanwhile, our efforts to confirm reports that there is a troop in the plains between the Ndoto and Leroghi forests did not bear fruits.

Earlier in June and August 2007, we went to two areas where local residents thought the ‘brown vervet monkey’ (Samburu have no name for Patas and Sykes) living there are indeed Patas monkey. We spent a day at Loosuk searching in one large undisturbed area of natural vegetation but found nothing to support their claims that a family of three have been residing there for years.

On our way to Baragoi, we spent a day at Morinjo and Marti trading centres interviewing local people. They led us to Langat valley where residents also claimed to have seen Patas alongside vervet’s monkeys and baboons. We saw none of the three apart from spoor of what seemed to be baboons.



Figure 9; Langat Valley where Patas are suspected to frequent due the permanent source of water

Due to the large territories of Patas and their mobile nature, we could not rule out their presence between Marti, Suiyan and Parsaloi, an area dominated by open acacia woodlands and traversed by three rivers that drain to the Milgis. The vegetation in this area makes it an ideal habitat for Patas and hence I recommend further investigation in this area in future.

3.3 Sykes' monkey

My decision to search for Sykes in Samburu was based on the fact that no such investigation had been done there before despite anecdotal reports on the species sighting in Leroghi forest. The Habitat is also very close to the known northern limit of the sub-species the Aberdare and Mt Kenya with Uaso Ng'iro River connecting Aberdare with Kirisia Hills.

The search for the species started with a survey at Uaso Ng'iro River, at Lodung'okwe where residents had seen a baboon with a white blemish similar the white throat of the Sykes and mistook it for the Sykes monkey that they identified from our photographs. But we spent a total of eight days searching along the riverine vegetation trying to verify the information given by locals and left convinced there has never been Sykes monkeys along this river.



Figure 10; Uaso Ng'iro River near Lodung'okwe

However, while assessing the northern fringes of Leroghi forests, we stumbled on information that there is a “white-throated monkey” that raids crop on the forest edges. This time to avoid being led by photos of the Sykes that we give our respondents; I decided to interview four residents whose farms were raided by this unknown species before giving them the photos. Three of them clearly painted the picture of a Sykes from their own description of the locally unnamed species. When given photos of vervets, baboon, guereza colobus and de Brazza’s monkeys, they categorically said it was not among the four. When I finally produced the Sykes photos, the four clearly identified it as the “white-throated monkey” they referred to.

Assisted by one assistant and four guides, we set out to verify this information and collect tangible evidence of this species great discovery. For six days we searched all the rivers forested river valleys and stream in the area paying particular attention to Keskei, Naashoda, Lesatia, Louwaibor, Lorumbei “laggas” Murui forest. We were not lucky to see the monkey despite the fact that an advance party we had sent a week earlier claimed to have seen only one after combing the area for a week. Still convinced that there is another guenon apart from the vervet monkey in that area, I deployed a local scout from the area armed with a camera and instruction to photograph all monkeys he came across in the area. After six months, he had not photographed any “white throated monkey” and I finally concluded that there reports of Sykes in Leroghi were untrue.



Figure 11; semi-Permanent residence inside Mt. Nyiro Forest Reserve

In Mt Nyiro, some of the forest fauna has been lost in the last fifty years due to encroachment and prolonged duration of settlement inside the forest that was linked to the insecurity that has plagued the region for decades. Cattle rustling between the Samburu and their northern neighbours the Turkana were at times very serious especially during period of drought and Samburu sought refuge in their ‘Holy Mountain’ and even established permanent residence inside the forest. It is the cumulative effect of this human presence over the years that have led to lose of the mountain’s fauna. Some of the species believed to have been lost include the Guereza colobus, whose skin is highly valued by the Samburu for cultural purposes. However, the Sykes is not believed to have ever inhabited this habitat in the last five decades according to John Wreford-Smith who was in charge of the districts’ forests five decades ago.

3.4 Lesser Galagos

The search for these two nocturnal species, the Somali and Senegal lesser galagos was restricted to South Horr and Ngare Narok in Mathews range whereas in other areas, I only interviewed local people. In South Horr and Ngare narok, I conducted night walks for a day in each area and managed to catch those that were residing in old traditional honey hives near homesteads. They all turned out to be *G senegalensis*.

The GPS co-ordinates of the two locations are;

- South Horr 02.09798°N 036.92107°E
- Altitude: 1026 m a.s.l.
- Ngare Narok at the 'manyattas', 2 kilometers from R. Ngare Narok. 01.32175°N 037.19910°E
- Altitude: 1272 m a.s.l

I took body measurements of three members of one family from Ngare Narok. The fourth one, a male on the photo I sent earlier escaped before we could take measurements.



Adult Female

- Tail length 25 cm
- Head plus Body 16 cm
- Ears length 3.5 cm
- Hind foot length 3 cm

Sub-adult male

- Tail length 19 cm
- Head plus Body 11.5 cm
- Ears length 3.3 cm
- Hind foot length 3 cm

Sub-adult Female

- Tail length 19 cm
- Head plus Body 16 cm
- Ears length 3.2 cm
- Hind foot length 3 cm

Body weight was not taken.

Figure 12; Senegal's lesser galago found at Ngare Narok, on Mathews range

Resident in the drier areas of Marti-Baragoi-Parsaloi, Lodung'okwe, Wamba and Lodosoit all easily recognised the Senegal lesser galago as *Lkimoung'* as it is known in Samburu. The community does not differentiate the two lesser galago (by name) and it was difficult to tell if the Somali lesser galago is also found there as we never collected any specimen. The name *Lkimoung'* definitely refers to the two species.

From our interviews with local people and the field verification of the information gathered, there is no doubt that the Senegal lesser galago is one of the most widespread primate in the savannah woodlands of Samburu.

3.5 Mt Uarges guereza

The Mt. Uarges guereza (*Colobus guereza percivali*), is named after Mt Uarges, the highest mountain range of Mathews ranges located on the southern end. In 2006, we found the Mt Uarges guereza along Wamba river valley on Mt Uarges as well as on the upper reaches of River Ng'eng, Ntukuda and Nkii valley while studying de Brazza's monkey there.

During this survey we interviewed Namunyak Wildlife Conservancy Rangers at Sarara Camp who confirmed there were more groups on this eastern side of Mt Uarges. They also confirmed presence of more groups at Tipito, the peak of the mountain range north of Mt. Uarges range.

In Kirisia Hills, Forest guards of the Kenya Forest Service confirmed seeing two colobus monkeys at Bora in November, 2006 while escorting tourist in the forest. I deployed three local guides for three days to the area where they were reportedly seen. Using the old Olpiroi road I also made my way up the Kirisia hills to interview 'resident' herds' men in the forest and personally searched the forest for the species. I interviewed three herds' men who were in three separate groups and all confirmed that they had not seen the species in the last one year but agreed that the species was plenty two decades ago before killings using automatic weapons started. The skin of the colobus is highly valued among the Samburu people.



Figure 13: A Samburu man wearing the Guereza skin to show us how it is worn during traditional ceremonies

We also went to Baawa, the south western part of the Kirisia Hills south of Maralal town where the forest has been left relatively intact compared to the central western and northern parts of Leroghi forest. Interview with KWS officer in charge, a local tour guide and local 'Dorobo' none of them had seen the species in last one year around the Baawa forest.

Meanwhile the team that went to the Kirisia forest from Maralal passing through Narunde to Ol doinyo Nasipa, to Lokujitaa and Leshoro before returning to Maralal never made sightings. It was only at Ol doinyo Nasipa that they were led to a valley where two resident guereza colobus lived until one was killed in 2006. Saanata's (Leroghi Peak) Soldon is also reported to offer a safe sanctuary due to its inaccessibility and inhospitable cold weather. However, a half day visit to area by a PhD student Luca Borghesio on December 2008 didn't yield any positive results.



Figure 14: Lesatia on the way to Saanata, where few remaining guereza monkeys were thought to have taken refuge.

In short, our effort trace any of the groups still remaining in this forest didn't yield any fruits though local people still believe that there are a few remaining but have become shy and elusive due to poaching, avoiding all areas accessible to human beings. There is an urgent need to verify this claim so that those remaining can be rescued or protected before they are completely wiped out of Leroghi forest.

A PhD student from the USA Luca Borghesio who at the Kirisia on December 2008 also reported no sightings of the colobus. He even went to Saanata and spent a day but found no evidence of the species presence. Saanata is the place they are believed to have sought refuge due to persecution and poaching in the lower areas of Kirisia Hills.

In Mt Nyiro, John Wreford-Smith who knew the forest since the 1950s informed us that the guereza colobus were present in this mountain but were wiped out through poaching for their skin and habitat destruction due to human encroachment and prolonged stay in the forest. The Retired Forest Officer also confirmed that there are colobus in Ndoto's Marmanet forest. We were able to confirm this by locating two groups at Sererit.

4.0 Recommendation

1. The Endangered Mt Uarges guereza is extinct in Mt Nyiro and will soon be extinct in the Kirisia Hills. The causes for the extinction is poaching for the skin which the Samburu use in their traditional ceremonies. It is imperative that an aggressive awareness campaign be launched very soon to save the few remaining in Mathew Range and Ndoto forests as poacher now turn to this forest due to scarcity in the other forests. The Samburu communities have to be educated on the need to save the endangered primate which is endemic to the area by discarding cultural beliefs that advocate for the use of the colobus skin in traditional ceremonies.
 2. Further surveys are needed to collect additional information on the six species in Samburu. More surveys are needed in Kirisia Hills, Ndoto and Mathews range forest on the Mt Uarges guereza and de Brazza's monkey while in the plains, more surveys are needed for the lesser galagos and Patas monkey.
 3. The various anthropogenic threat to the environment in Samburu including overgrazing, deforestation, forest fires and bushmeat poaching have to be controlled as they are severely affecting wildlife population of most species from elephant to guereza colobus. Encroachment and establishment of human settlement not only degrade the habitat but also threatens the few sustainable alternative sources of livelihood like eco-tourism.
- Samburu Primates Survey 2009
- 5.0 The Newly formed Kenya Forest Service (KFS) should increase the staffing in the four Reserves to help control the threats to Leroghi, Ndoto, Mt Nyiro and Mathews range forests as well as creating awareness on Participatory Forest Management (PFM) and most importantly, educate the community on the Forest Act 2005 which introduced the new concept of Participatory Forest Management.
 - 6.0 Milgis Trust, a local conservation initiative by the Samburu people living in the area was formed with the aim of protecting their rich biodiversity resources through sustainable management and advocating for sustainable livelihoods. This noble initiative currently requires external support especially on organizational capacity building, alternative livelihood generation, tourism infrastructure development and marketing of the area for sustainable tourism.

7.0 Discussion

Based on the information we gathered during our field survey in Kirisia Hills particularly the northern part from April 2007 to February 2009, we can only conclude that there are no Sykes' monkeys in Leroghi and other Samburu forests. Reports about a small population of Sykes' monkey on the northern fringes of Leroghi forest – at Ang'ata Nanyuki though unreliable need to be investigated further to ascertain the truth about the white-throated monkey resident claim to see.

In Mt Nyiro, some of the forest fauna has been lost in the last fifty years due to encroachment and prolonged duration of settlement inside the forest that was linked to the insecurity that has plagued the region for decades. Cattle rustling between the Samburu and their northern neighbours the Turkana were at times very serious especially during period of drought and Samburu sought refuge in their 'Holy Mountain' and even established permanent residence inside the forest. It is the cumulative effect of this human presence over the years that have led to lose of the mountain's fauna. Some of the species believed to have been lost include the Guereza colobus, whose skin is highly valued by the Samburu for cultural purposes.

This argument was supported by John Wreford-Smith who knew the forest since the 1950s informed us that the guereza colobus was present in this mountain but was wiped out through poaching for their skin and habitat destruction due to human encroachment and prolonged stay in the forest. The Retired Forest Officer also confirmed that there are colobus in Ndoto's Marmanet forest where we were able to locate two groups at Sererit.

The extinction of the endangered guereza sub-species in Mt Nyiro and the near extinction in Leroghi, another key habitat, leave the sub-species with Mathews range and Ndoto as the only remaining viable population for this endemic guereza whose distribution range is now less than 500 sq. Km. and diminishing very fast. It is therefore urgent that these two habitats be protected before we lose another sub-species forever.

The prosimians – the Senegal and Somali lesser galagos which are widespread across the plains of Samburu do not seem to be under any immediate threat though more studies are needed to determine their distribution in the expansive district as no such studies were done prior to this survey.

From the information we gathered throughout this survey, it doesn't seem likely that the Sykes and Patas monkey are found in the district. It is only logical to conclude that the two do not occur in this area unless further studies point to the contrary otherwise.

8.0 Bibliography

1. Blackett, H.L. (1994). Forest Inventory Report of the Mathews Range Forest Reserve, KIFCON, Nairobi, No.8
2. Bearder, S.K. and Martin, R.D. 1979. The Social Organization of a Nocturnal Primate Revealed by Radio Tracking in a Handbook on Biotelemetry and Radio Tracking. eds. C.J. Amlaner Jr. and D.W. Macdonald. Pergamon Press.
3. Brennan, E.J. (1985). De Brazza's Monkeys (*Cercopithecus neglectus*) in Kenya: Census, Distribution and Conservation, *American Journal of Primatology*, 8:271-277.
4. Brennan, E.J (1989). Demographics of Captive De Brazza's Guenons. *Zoo Biology* 8:37-47.
5. Bussmann, R.W. (2006). Ethnobotany of the Samburu of Mt. Nyiro, South Turkana, Kenya. *Journal of Ethnobotany and Ethnomedicine*.
6. Bernie, R. (2005). Creating Sustainable Living in Kenya's Indigenous Forests. Wilderness Foundation, UK.
7. Butynski, T. & members of the Primate Specialist Group 2000. *Colobus guereza* ssp. *Percivali*. In: II 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org
8. Douglas-Dufresne, H. 2005. Proof positive. *Swara Magazine Vol; 28(2)*: pp. 68. East African Wildlife Society (EAWLS), Nairobi.
9. Dorst, J. And Dandelot, P. (1972). *A Field Guide to the Larger Mammals of Africa*. London. Collins press.
10. Estes, R. D. 1991. *The Behavior Guide to African Mammals*. University of California Press. Fashing P. J. 2001b. Feeding ecology of the guerezas in the Kakamega Forest, Kenya: the importance of Moraceae fruit in their diet. *Intl J Primatol* 22(4):579-609.
11. Hull DB. 1978. Aberrations in the coat colour patterns of black and white Colobus monkeys. *E . Afr Wildl J* 16:21-7.
12. Groves C. 2005. Order primates. In: Wilson DE, Reeder DM, editors. *Mammal species of the world: a taxonomic and geographic reference, third edition, volume 1*. Baltimore (MD): Johns Hopkins U Pr. p 111-84.
13. Groves C. 2001. *Primate taxonomy*. Washington DC: Smithsonian Inst Pr. 350 p.
14. Jolly, A. 1972. *The Evolution of Primate Behavior*. Macmillan Publishing Co., NY.
15. Kingdon, J. (1997). *The Kingdon Field guide to African Mammals*, Academic press-London. pp 69-70.

16. Lwanga JS. 2006. Spatial distribution of primates in a mosaic of colonizing and old growth forest at Ngogo, Kibale National Park, Uganda. *Primates* 47(3):230-8.
17. Mwenja, I. (2004). National Rapid Survey on the Status and Distribution of De Brazza's Monkeys in Kenya. *Swara*.
18. Mwenja, I. (2007). A new population of de Brazza's monkey in Kenya. <http://www.primatessg.org/PDF/PC22.neglectus.pdf>
19. Staaden, S. (1996). North American Regional Studbook for de Brazza's monkey, *Cercopithecus neglectus*, First Edition. North Carolina Zoological Park.
20. Grooves, C. (2001). Primate Taxonomy. Smithsonian Institute Press, Washington, DC.
21. Napier PH. 1985. Catalogue of primates in the British museum (natural history) and elsewhere in the British Isles, part III: family Cercopithecidae, subfamily Colobinae. London: British Museum (Natural History). 111 p.
22. Oates JF. (1977b). The guereza and man. In: Rainier III (Grimaldi) Prince of Monaco, Bourne GH, editors. Primate conservation. New York: Academic Pr. p 419-67
23. Oates JF. 1994. The natural history of African colobines. In: Davies AG, Oates JF, editors. Colobine monkeys: their ecology, behaviour and evolution. Cambridge (UK): Cambridge U Pr. p 75-128.
24. Office of the president, 2008. *District's profile, Samburu district profile*. Ministry of States for special programme. Arid lands resources management project II. <http://www.aridland.go.ke/inside.phps?articleid=297>