

# **Four Biodiversity Assessments of Lolldaiga Hills Ranch by the National Museums of Kenya (2014)**

By

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## OVERVIEW

Lolldaiga Hills Ranch is part of the larger Lolldaiga Hills Conservation Landscape. Located between the Mt. Kenya Ecosystem to the east and south, and semi-arid areas to the west and north, the Lolldaiga Hills support a high biodiversity. The variety of taxa expected here is, therefore, a combination of these two ecological zones. Like any conservation area, comprehensive documentation of the biodiversity is necessary for establishing priorities for conservation actions, with a view towards applying relevant management interventions.

The specific tasks of this research included assessment of:

- i) Reptiles and amphibians
- ii) Insects
- iii) Fauna in the skeletal remains
- iv) Plants

## REPTILES AND AMPHIBIANS

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### Abstract

Prior to this survey, 131 reptiles and 10 amphibians were known for Lolldaiga Hills Ranch (Roberts *et al.* 2015). During this survey, one lizard and two amphibians were added to the checklist. The new species are Prince Ruspoli's gecko (*Hemidactylus ruspolii*), Peter's reed frog (*Hyperolius glandicolor*), and Kinangop dainty frog (*Cacosternum kinangopensis*). More surveys covering different seasons are recommended towards achieving a comprehensive species checklist of reptiles and amphibians for Lolldaiga Hills Ranch.

### Introduction

The occurrence data on reptiles and amphibians in Kenya is patchy, making them some of the least understood fauna in terms of their distribution, ecology, and conservation status. However, the significance of various herpetofauna species in the environment cannot be over-emphasized. In general, they play a key role in maintenance of the ecosystem balance, while amphibians are crucial biological indicators due their sensitivity to environmental changes. Due to a combination of factors, including environmental degradation, the survival of many species is under severe threat. Protected areas, like the Lolldaiga Hills Conservation Landscape (LHCL), are critical in the long term conservation of remnant populations of such species. Recent efforts have identified 31 species of reptile and 10 species of amphibian on Lolldaiga Hills Ranch (Roberts *et al.* 2015). The purpose of this study was to contribute to the development of an exhaustive checklist of reptiles and amphibians of Lolldaiga Hills Ranch.

## Methods

Lolldaiga Hills Ranch (LHR) consists of 200 km<sup>2</sup> of livestock ranching and wildlife conservation land. It is located 20 km northwest of Mount Kenya at an altitude of 1,700 – 2,300 m. The area is an ancient land form in terms of geology, comprised of high folding hills. The vegetation is heterogeneous, ranging from cedar forests to open grassland and wooded valleys.

### *Reptile and amphibians sampling*

Field work was conducted for 4 days from 30 October to 3 November 2014. Six sites representing different habitats were surveyed including *Euphorbia* thicket, grassland, *Acacia drepanolobium* woodland, dryland rocky outcrop, hillside bush and thicket, riverine forest, and red cedar and olive forest. The ‘Visual Encounter Survey’ (Heyer *et. al.*, 1994) protocol was employed.

To supplement the search efforts, night sampling was also carried out, mainly targeting amphibians and other nocturnal herpetofauna in dams and other wetlands. This was conducted between 18.00 – 20.00 h. Other opportunistic records were obtained from areas not covered by the sampling transects but within the study area.

The species added to the list during this survey were identified according to Channing & Howell (2006; amphibians) and Spawls *et al.* (2002; reptiles). The taxonomy applied here follows *Amphibian Species of the World* (Frost 2014) and *The Reptile Database* ([www.reptile-database.org](http://www.reptile-database.org)). Where necessary, specimens were euthanized and the vouchers deposited at the National Museums of Kenya. Collections also included tissue samples for possible genetic studies.

## Results

During this survey, one lizard and two amphibians were added to the LHR reptile and amphibian list (Roberts *et al.* 2015). These are Prince Ruspoli’s gecko (*Hemidactylus ruspolii*), Peter’s reed frog (*Hyperolius glandicolor*), and Kinangop dainty frog (*Cacosternum kinangopensis*). These bring the total number of reptile and amphibian species known for LHR to 44 (Table 1).

**Images of some reptiles and amphibians on Lolldaiga Hills Ranch.**

Photos courtesy of Paul Benson



*Agama lionotus*, Kenya red-headed rock agama



*Mochlus afer*, Peter's writhing skink



*Crotaphopeltis hotamboeia*, White-lipped snake



*Bitis arietans*, Puff adder



*Cacosternum kinangopensis*, Kinangop dainty frog



*Hyperolius viridiflavus*, Common reed frog

**Table 1. Additions to the list of reptiles and amphibians of Lolldaiga Hills Ranch compiled by Roberts *et al.* (2015). The three species added during the present survey are in yellow highlight.**

Higher taxon and species name	Common name	Obs. Nov. 2014	Altitude (m)	Conservation status <sup>1</sup>	Comments
<b>REPTILIA</b>	<b>Reptiles</b>				
<b>Testudinidae</b>	<b>Land Tortoises</b>				
<i>Stigmochelys pardalis</i>	Leopard tortoise	√	1750-2150	NE	Upper altitudinal record.
<b>Pelomedusidae</b>	<b>Helmeted Terrapins</b>				
<i>Pelomedusa subrufa</i>	Helmeted terrapin		1840	NE	
<b>Gekkonidae</b>	<b>Geckoes</b>				
<i>Hemidactylus angulatus</i>	Angulate gecko	√	1876–2290	NE	Low altitude record Nov. 2014. Ngainitu.
<i>Hemidactylus ruspolii</i>	Prince Ruspoli's gecko	√	1901	NE	New record Nov. 2014. Maili Sita.
<i>Lygodactylus keniensis</i>	Kenya dwarf gecko	√	2140	NE	
<i>Cnemaspis</i> sp.	Forest gecko	√	2084 - 2140	NE	Farm House.
<b>Scincidae</b>	<b>Skinks</b>				
<i>Mochlus afer</i>	Peter's writhing skink	√	1880–2154	NE	High altitude record Nov. 2014. Yellow-bellied and grey phases both observed.
<i>Trachylepis striata</i>	Striped skink	√	1880–2140	NE	
<i>Trachylepis varia</i>	Variable skink	√	1880	NE	
<i>Trachylepis megalura</i>	Grass-top skink	√	2150-2074	NE	Near Farm House
<i>Trachylepis quinquetaeniata</i>	Five-lined skink		1850	NE	
<b>Lacertidae</b>	<b>Typical Lizards</b>				
<i>Adolfus jacksoni</i>	Jackson's forest lizard		2090	NE	
<i>Nucras boulengeri</i>	Boulenger's scrub lizard		1870		
<i>Heliobolus spekii</i>	Speke's sand lizard		1860		

<b>Agamidae</b>	<b>Agamas</b>				
<i>Acanthocercus atricollis</i>	Blue-headed tree agama		1900–2140	LC	
<i>Agama lionotus</i>	Kenya red-headed rock agama	√	1850–1880	LC	
<i>Agama caudospinosa spawlsi</i>	Elementeita rock agama	√	1800–2290	NE	Endemic to Kenya.
<b>Chamaeleonidae</b>	<b>Chameleons</b>				
<i>Trioceros bitaeniatus</i>	Two-striped chameleon		1940-2200	NE	Species' Latin and vernacular names deviate here from Spawls <i>et al.</i> (2002).
<b>Boidae</b>	<b>Pythons &amp; Boas</b>				
<i>Python natalensis</i>	Rock python			NE	
<b>Colubridae</b>	<b>Typical Snakes</b>				
<i>Lycophidion capense</i>	Cape wolf snake		2150		
<i>Dasyeltis scabra</i>	Common egg-eater		2100		
<i>Dispholidus typus</i>	Boomslang		1820		
<i>Crotaphopeltis hotamboeia</i>	Herald / White-lipped snake	√	2290	NE	
<i>Duberria lutrix</i>	Slug-eater		2150		
<i>Lamprophis fuliginosus</i>	Brown house snake		2150		
<i>Philothamnus battersbyi</i>	Battersby's green snake		2150		
<i>Philothamnus semivariiegatus</i>	Spotted bush snake		1880 – 2150	NE	Range extension and altitudinal record.
<i>Psammophylax multisquamis</i>	Kenyan striped skaapsteker		2060	NE	
<i>Psammophis mossambicus</i>	Olive sand snake		2230	NE	
<i>Psammophis sudanensis</i>	Northern stripe-bellied sand snake		1860		
<b>Viperidae</b>	<b>Vipers</b>				
<i>Bitis arietans</i>	Puff adder	√	2042–2140	NE	Lower altitude Nov 2014.
<b>Elapidae</b>	<b>Cobras &amp; Mambas</b>				
<i>Naja nigricollis</i>	Black-necked spitting cobra		1880		



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**AMPHIBIA**

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**Anura****Bufonidae****Toads****Pipidae****Clawed Frogs***Xenopus borealis*

Northern clawed frog

√

1930-2230

LC

*Amietophrynus garmani*

Garman's toad

√

1810–2174

LC

High altitude range Nov 2014.

**Hyperoliidae****Tree Frogs***Hyperolius glandicolor*

Peter's reed frog

√

1930-2230

LC

New record Nov. 2014.

*Hyperolius viridiflavus*

Common reed frog

√

1930-2230

LC

*Hyperolius montanus*

Montane reed frog

1930 – 2230

LC

*Kassina senegalensis*

Senegal kassina

√

1930-2230

LC

**Ranidae****True Frogs***Ptychadena mascareniensis*

Mascarene rocket frog

√

1930

LC

*Ptychadena anchietae*

Anchieta's rocket frog

√

1930-2230

LC

*Phrynobatrachus cf. scheffleri*

Scheffler's puddle frog

√

1840-1930

NE

*Afrana angolensis*

Angolan river frog

1930

LC

**Pyxicephalidae****Bullfrogs and Allies***Tomopterna gallmanni*

Gallmann's sand frog

2100

NE

Wasonga &amp; Channing (2013)

*Cacosternum kinangopensis*

Kinangop dainty frog

√

2063

LC

New record Nov. 2014. Channing &amp; Schmitz (2008). Range extension from South Kinangop

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<sup>1</sup> Conservation status for the species, and the abbreviations, taken from: IUCN. 2013. *2013 IUCN Red List of Threatened Species*. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

Abbreviations: CR: Critically Endangered; EN: Endangered; VU: Vulnerable; DD: Data Deficient; LC: Least Concern; NE: Not Evaluated; NT: Near Threatened

## Discussion

### *Species assemblage*

There is a diverse mix of Afromontane and semi-arid species of reptiles and amphibians in LHR.

### *Range extensions*

*Cacosternum kinangopensis*, whose type locality is Kinangop, was recorded in Lolldaiga for the first time. This record represents a large range extension and the most northern record for the species.

### *Species complexes*

LHR has a number of natural and man-made water points. During night sampling on 1 and 3 October, several amphibians were observed and heard. Among these were *Hyperolius* spp. The *Hyperolius viridiflavus* spp. complex comprises a number of highly variable and wide ranging forms. One of the members of this group, Peter's reed frog *H. glandicolor*, comprising of *H. v. ferniquei* and *H. v. pantherinus*, among others (Channing & Howell 2006), was abundant at most water points.

## Conclusion and Recommendations

The biodiversity profile of LHR is still growing, with new records being added with every new sampling effort. To establish a baseline for future monitoring, more surveys need to be conducted during the dry and wet seasons.

## Acknowledgements

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## **Abstract**

This preliminary survey of the insects of Lolldaiga Hills Ranch was conducted between 30 October and 3 November 2014. Six sites representing distinct habitat types were surveyed. These included euphorbia thicket, grassland, *Acacia drepanolobium* woodland, rocky outcrop, marshy ground, riverine forest, and red cedar and olive forest. Three colours of pan traps, sweep netting, and ground searching techniques were used to survey invertebrates. Of the three orders of insects that have been processed, the Lepidoptera had 21 species from four families, while Hymenoptera and Coleoptera each had 12 species from three and six families, respectively. Among the Lepidoptera, the Pieridae had the highest number of species (8) while Nymphalidae had the smallest number (2). At 55%, dipterans were the most abundant of the pollinators followed by hymenopterans (35%). Yellow was the most visited pan trap colour at 58%, followed by white (24%), then blue (18%). All pollinator groups visited yellow traps as their preferred colour, while Coleopterans mostly visited white traps. The four pollinator groups, however, visited all colours. Given its relevance in biodiversity conservation and land use management, biodiversity inventories should be carried on in both dry and wet seasons.

## **Methodology**

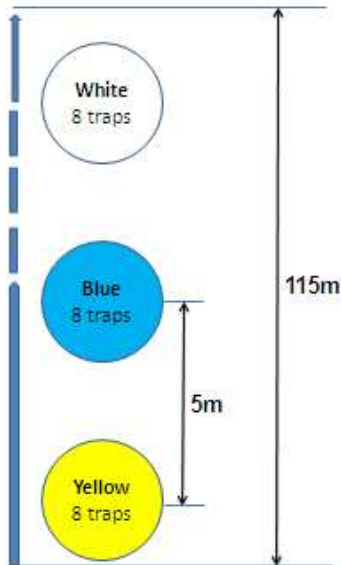
Invertebrates were surveyed using the following techniques and materials. Three techniques (pan traps, sweep nets, and ground searching) were used due to constraints in personnel, time, and field logistics.

### ***Pan traps***

The objective of this technique is to investigate the composition (species diversity) and abundance of arthropod pollinator groups visiting different flowers. Plants have certain characteristics that attract certain pollinators (pollinator syndromes). One of these characteristics is flower colour; lowers of a certain colour tend to receive certain pollinators. Although a 2-day sampling period per site is recommended, this was not achieved for all five sites visited except for the Farm House.

Bowl traps (also called ‘pan’ or ‘Moericke’ traps) are gaining popularity as a useful method for sampling bees and other flower visiting arthropods (Gonçalves & Oliveira 2013). This is a popular technique used in most surveys (e.g., Popic *et al* 2013). Three colours (yellow, blue, and white) pan traps were used as flower models. The bowls had a rim and bottom diameter of 69 mm and 54 mm, respectively, and a depth of 35 mm. A total of 24 bowls (i.e., eight of each colour) were used in in each transect. These were placed alternately (yellow-blue-white) in a single row on the ground in an open area at a distance of 5 m between any two traps (Figure 1). They were filled up to two-thirds of the volume with a soap-and-water solution, the soap being used for breaking the surface tension so that the insects drown. Traps were placed out before 9:00 AM and picked-up after 3:00 PM each day in relatively open areas or at a distance from the edge of vegetation. Captured arthropods were extracted with a strainer and all contents placed in 70%

ethanol for preservation. The contents of all bowls of the same colour from any one site were combined into a single sample.



**Figure 1. Layout of pan traps used to sample pollinators. Three colours were used (yellow, blue & white). Each colour had eight traps giving a total of 24 traps. Distance between any two traps was 5 m.**

Table 1 shows the dates, sites, and duration of sampling. A brief description of each habitat is included. A typical day refers to the period between 9:00 AM and 3:00 PM. In addition to the six sites shown in the table, we made an afternoon visit to Boma ya Goigoi where pan traps were not used.

**Table 1. Sampling sites, habitats, and duration of sampling.**

Date	Site Name	Habitat Type	No. days/hrs.
30.x.2014	Farm House	Bushland, euphorbia, grass lawn at a human residence	2 days
31.x.2014	Sinyai Lugga	Rocky outcrop surrounded by open to wooded grassland	1 day
1.xi.2014	Corner ya Kamau	Rocky outcrop with cliff face, bushland, and wooded to open grassland	1 day
2.xi.2014	Mugumo Campsite	Spring valley with bushes, rocky outcrop, open areas with short grass	1 day
3.xi.2014	Mlango ya Ndovu	Cedar woodland, edge with bushes and short grass	1 day
3.xi.2014	Mlima Macho	Rocky outcrop with bushes beneath it, sandy openings	2 hours

***Sweep net***

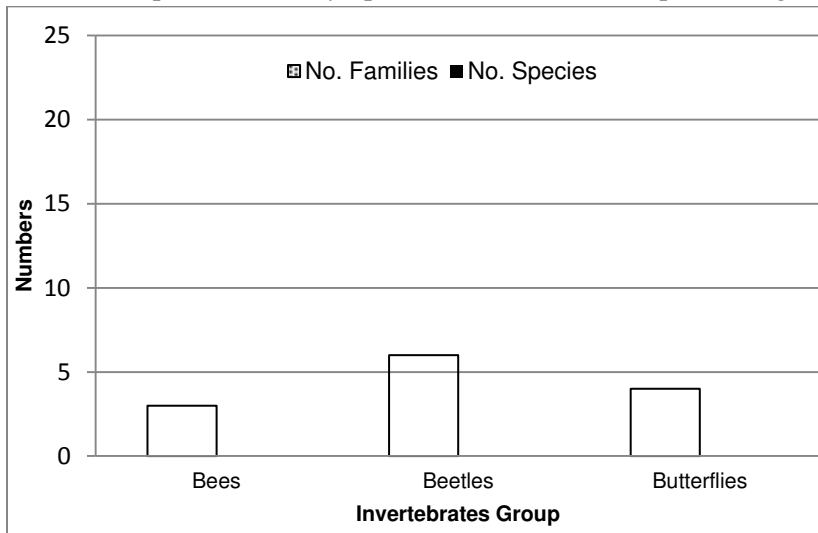
A handheld net was used for sampling flying insects such as butterflies and those on plant and other surfaces. This was conducted between the waiting period of setting and ‘harvesting’ of the pan traps, with the two sites being adjacent but mutually exclusive. Groups that were targeted included beetles, butterflies, flies, and grasshoppers.

**Ground searching**

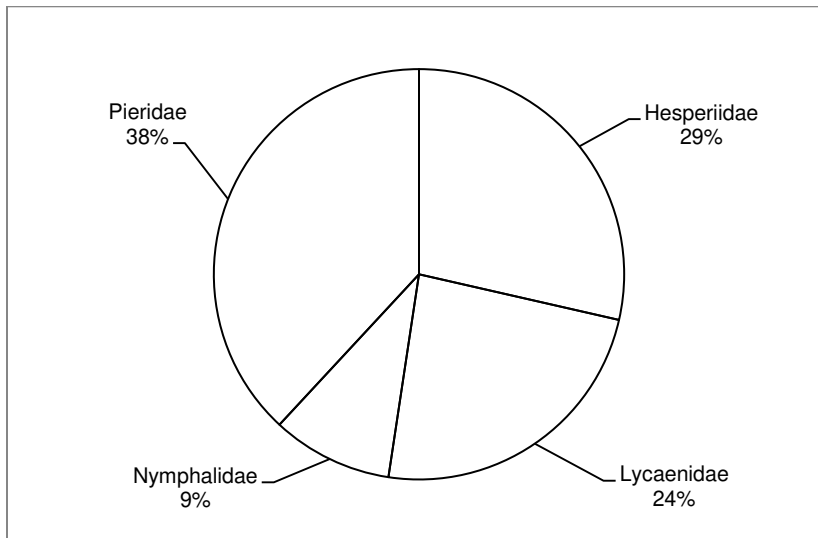
This involved turning-over rocks and logs within a given habitat. These efforts were supplemented by the herpetology team. Groups sampled using this technique were scorpions, millipedes, ants, centipedes, ground beetles, spiders, and cockroaches. For both sweep net and ground searching, specimens were pinched on the thorax (butterflies), preserved directly in 70% ethanol, or placed in a killing jar containing ethyl acetate. Some were pinned later that day.

**Results**

Three Orders of Insecta have been processed thus far. These are Hymenoptera (bees), Coleoptera (beetles), and Lepidoptera (butterflies). Butterflies were the most diverse order with 21 species in four families. The beetles and bees each had 12 species. Among the butterflies, Pieridae was the most diverse in terms of species while Nymphalidae had the fewest species (Figure 2).



**Figure 2. Number of families and species in three orders of insects.**



**Figure 3: Proportions (number of species) in four families of butterflies.**

Tables 2, 3 and 4 show the families and species of Lepidoptera, Hymenoptera, and Coleoptera, respectively.

**Table 2. List of species (Lepidoptera).**

	<b>Family</b>	<b>Genus</b>	<b>Species</b>
1.	<b>Hesperiidae</b>	<i>Borbo</i>	<i>sp.</i>
		<i>Borbo</i>	<i>borbonica</i>
		<i>Eretis</i>	<i>sp.</i>
		<i>Geneges</i>	<i>hottentosa</i>
		<i>Spialia</i>	<i>diomus</i>
		<i>Spialia</i>	<i>sp.</i>
2.	<b>Lycaenidae</b>	<i>Actizera</i>	<i>stellata</i>
		<i>Azanus</i>	<i>jesous</i>
		<i>Freyeria</i>	<i>trochylus</i>
		<i>Lepidochrysops</i>	<i>sp.</i>
		<i>Leptotes</i>	<i>sp.</i>
3.	<b>Nymphalidae</b>	<i>Neocoenyra</i>	<i>sp.</i>
		<i>Neocoenyra</i>	<i>greogorii</i>
4.	<b>Pieridae</b>	<i>Belenois</i>	<i>aurota</i>
		<i>Belenois</i>	<i>sp.</i>
		<i>Belenois</i>	<i>creona</i>
		<i>Colotis</i>	<i>antevippe</i>
		<i>Colotis</i>	<i>rogersi</i>
		<i>Colotis</i>	<i>hetaera</i>
		<i>Eurema</i>	<i>brigitta</i>
<i>Mylothris</i>	<i>sp.</i>		

**Table 3. List of species (Hymenoptera).**

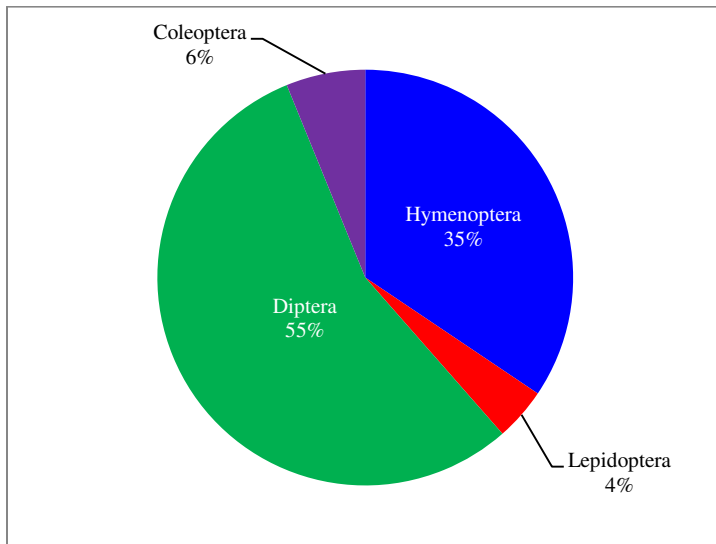
	<b>Family</b>	<b>Genus</b>	<b>Species</b>
1.	<b>Apidae</b>	<i>Apis</i>	<i>mellifera</i>
		<i>Macrogalea</i>	<i>candida</i>
		<i>Ceratina</i>	<i>sp.</i>
		<i>Braunsapis</i>	<i>sp.</i>
		<i>Tetralonia</i>	<i>sp. (1)</i>
		<i>Tetralonia</i>	<i>sp. (2)</i>
		<i>Melliponula</i>	<i>sp.</i>
2.	<b>Halictidae</b>	<i>Lasioglossum</i>	<i>sp. (1)</i>
		<i>Lasioglossum</i>	<i>sp. (2)</i>
		<i>Seladonia</i>	<i>sp.</i>
		<i>Steganomus</i>	<i>sp.</i>
3.	<b>Megachilidae</b>	<i>Heriades</i>	<i>sp.</i>

**Table 4. List of species (Coleoptera).**

	<b>Family (sub-family)</b>	<b>Genus</b>	<b>Species</b>
1.	<b>Scarabaeidae</b> (Cetoniinae)	<i>Leucocelis</i>	<i>elegans</i>
		<i>Pachnoda</i>	<i>ephippiata</i>
	<b>Scarabaeidae</b> (Aphodiinae)	<i>Aphodius</i>	<i>sp.</i>
	<b>Scarabaeidae</b> (Coprinae)	<i>Onitis</i>	<i>intermedius</i>
		<i>Onthophagus</i>	<i>sp.</i>
2.	<b>Lagariidae</b>	<i>Crysolagria</i>	<i>sp.</i>
3.	<b>Melyridae</b>	<i>Lusingattalus</i>	<i>sp.</i>
4.	<b>Carabidae</b> (Panagaeinae)	<i>Tefflus</i>	<i>kilimanus</i>
5.	<b>Carabidae</b> (Anthiinae)	<i>Cypholoba</i>	<i>tenuicollis</i>
6.	<b>Meloidae</b> (Meloinae)	<i>Corna</i>	<i>apicicornis</i>
7.	<b>Tenebrionidae</b>	<i>Micranterus</i>	<i>sp.</i>
		<i>Rytinota</i>	<i>sp.</i>

***‘Flower visits’ by potential pollinators***

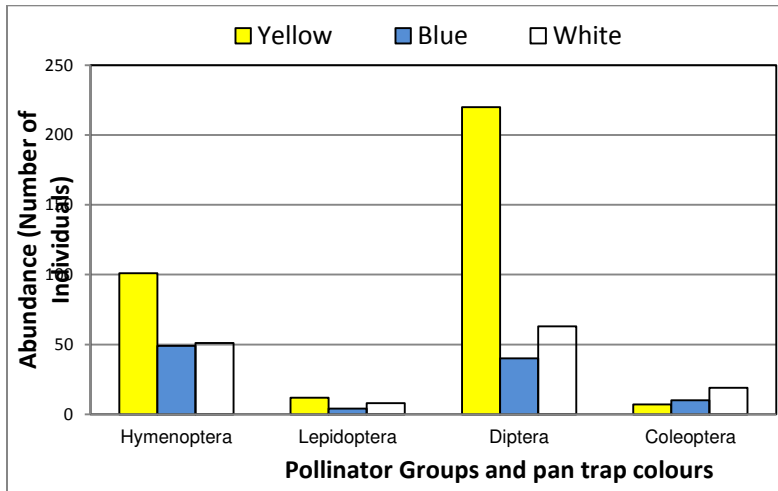
In three of the study areas, the pan trap samples were counted for each trap. These areas were Corner ya Kamau, Mugumo Campsite, and Mlango ya Ndovu. This was done to access the abundance of each of the four groups considered as potential pollinators [i.e., Hymenoptera (bees/wasps), Diptera (flies), Lepidoptera (butterflies) and Coleoptera (beetles)]. The bowls in the three study areas obtained 584 specimens. Figure 3 shows the four pollinator groups by abundance. The Dipterans accounted for >50% of the total visits followed by Hymenopterans.



**Figure 3: Abundance of the main pollinator groups in three study areas.**

### *Preference for flower colours*

In this survey, three colours of pan traps were used to simulate natural flowers. The number of individuals in each pan trap colour (yellow, blue, and white) was counted to show preference for flower colours by various pollinators. Again, this data were obtained from three study areas (i.e., Kamau’s Corner, Mugumo Campsite, and Mlango ya Ndovu). Yellow attracted the highest number of pollinators (58%) followed by blue (18%), then white (24%). Figure 4 illustrates the number of individuals for each pollinator group that visited the three pan trap colours.



**Figure 4: Number of pollinators visiting each colour pan trap.**

### **Discussion and Conclusions**

The low number of invertebrates species collected during the survey could be attributed to the dry season when most of the plants were not flowering and the environmental conditions not conducive for invertebrate breeding

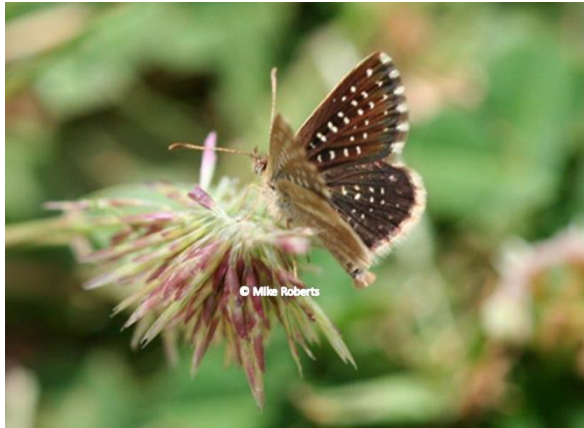
Dipterans are the most common pollinator group, followed by hymenopterans. Except for coleopterans that visited white flowers more than any other colour, the other groups’ colour of choice was yellow. This suggests that yellow flowers have more chance of being pollinated than blue or white flowers. It is important to note, however, that all three colours are visited by all three pollinator groups.

The Lolldaiga Hills biodiversity inventory is a key step in conservation of its natural resources. It is recommended that additional invertebrate surveys are undertaken in the future...during dry and wet seasons.



**Images of some butterflies on Lolldaiga Hills Ranch.**

Photos courtesy of Mike Roberts



*Actizera stellata*, clover blue



*Freyeria trochylus*, grass jewel



*Colotis euippe*, round winged orange tip



*Colotis hetaera*, coast purple tip



*Belenois aurota*, brown veined white



*Eurema brigitta*, small grass yellow

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## FAUNA REPRESENTED BY SKELETAL REMAINS

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### Introduction

Documentation of faunal diversity and the related ecological dynamics is mostly based on direct observation of live organisms. Sightings of small and some migratory vertebrates can be difficult and unpredictable. This is particularly so where thick vegetation and lack of appropriate equipment hampers visibility and the timing of the field survey is wrong. Thus, direct observation alone will not provide comprehensive information of the fauna of an area. Bone remains of such animals can indicate their occurrence in the area. Faunal remains analysis can, therefore, fill-in the faunal diversity knowledge gaps in an ecosystem. Besides the expense and time, standard surveys only focus on animals that are currently present in an area and may not be able to detect recent local extinctions. Detection of local extinctions is important in reconstructing environmental changes.

Caves and rock shelters that serve as carnivore lairs and roosting sites for nocturnal birds of prey can be centres for documenting an area's faunal diversity. This is because bones and other indigestible materials accumulate at these sites (Shaw 1979). Not only do these assemblages reveal the identity and behaviours of the predators, they provide information on their diet, population dynamics of the prey species, and environmental conditions (Behrensmeyer & Miller 2012; Kerbis 1990; Klein & Cruz-Urbe 1984). Bones may indicate mortality due to natural causes or hunting by humans. The level of bone destruction by predators may indicate the level of food availability (Faith *et al* 2007). Studies in Amboseli show a strong correlation between bone assemblages and the living vertebrate community (Behrensmeyer 1978; Behrensmeyer & Boaz 1980).

It is against this background that we conducted a survey and collected bones from five mammal dens and raptor roost sites (Boma Ya Goigoi, Sinyai Rocks, Mlima Kaloki, Kamau's Corner, Mnanda wa Oljogi, and Mlima Nugu) to document faunal diversity on Lolldaiga Hills Ranch.

### Results & Discussion

A total of 339 bones were collected from three (Mlima Kaloki, Mlima Nugu and Mnanda wa Oljogi) spotted hyaena den sites, two carnivore scats (spotted hyaena from Kamau's corner and black-backed jackal from Boma ya Goigoi), and an unidentified owl roost (a large fig tree at the base of a high cliff) at Kamau's Corner. 94% (N = 316) of the bones were identifiable (representing 26 species) while the rest were fragments that could not be identified. Spotted hyaena and black-backed jackal were identified from their scat. Identified species and number of identified specimens (NIS) are indicated in Table 1.

During this survey one species of mammal, *Mastomys natalensis*, was added to the Lolldaiga list based on bones collected.

**Table 1. Species and number of identified specimens (NIS) from Lollidaiga Hills Ranch (N = 339).**

<b>Family</b>	<b>Species</b>	<b>Common name</b>	<b>NIS (%)</b>
<b>Bovidae</b>	<i>Taurotragus oryx</i>	Eland	11.8
	<i>Bos taurus</i>	Domestic cow	7.8
	<i>Alcelaphus buselaphus</i>	Hartebeest	2.0
	<i>Syncerus caffer</i>	Buffalo	7.8
	<i>Kobus ellipsiprymnus</i>	Waterbuck	1.0
	<i>Aepyceros melampus</i>	Impala	9.8
	<i>Litocarnius walleri</i>	Gerenuk	2.0
	<i>Gazella thomsoni</i>	Thomson's gazelle	1.0
	<i>Gazella brighti</i>	Bright's gazelle	4.9
	<i>Caprini</i>	Domestic sheep/goat	1.0
	<i>Redunca fulvorfula</i>	Mountain reedbuck	1.0
	<i>Raphicerus campestris</i>	Steenbok	2.9
	<i>Modaqua guentheri</i>	Guenther's dik dik	1.0
	<b>Giraffidae</b>	<i>Giraffa camelopardalis</i>	Giraffe
<b>Equidae</b>	<i>Equus quagga</i>	Plains zebra	37.3
	<i>Equus grevyi</i>	Grevy's zebra	2.0
<b>Suidae</b>	<i>Phacochoerus africanus</i>	Common warthog	5.9
<b>Cercopithecidae</b>	<i>Papio anubis</i>	Olive baboon	4.0*
<b>Hyracoidea</b>	<i>Procavia capensis</i>	Rock hyrax	4.0*
<b>Soricidae</b>	<i>Crocidura sp.</i>	White-toothed shrew	83*
<b>Chiroptera</b>	<i>Hipposideros caffer</i>	Sunevall's leaf-nosed bat	1.0*
	<i>Nycteris sp.</i>	Slit-faced bat	4.0*
	<i>Tadarida sp.</i>	Free tailed bat	10.0*
<b>Herpes</b>	<i>Agama sp.</i>	Agama	1.0*
<b>Rodentia</b>	<i>Mastomys natalensis</i>	Multimammate mouse	105*
<b>Aves</b>	<i>Francolinus sephaena</i>	Crested francolin	2.0*
<b>Carnivora</b>	<i>Canis mesomelas</i>	Black-backed jackal	Scat
	<i>Crocuta crocuta</i>	Spotted hyaena	Scat

Based on the NIS (102 specimens) of ungulates; the plains zebra was the most abundant, followed by eland, impala, domestic cattle and buffalo (equally represented), warthog, and Bright's gazelle. The ungulate representations in Table 1 are given as a percentage of the total ungulate NIS, while the other species are raw counts (starred \*).

While the ungulate percentages may give a general trend of their relative abundance in the area, this should be interpreted with caution as den representation may be biased against prey not brought to the den or completely consumed at the kill/scavenging site. Besides this, spotted hyaenas bring very few bones to their dens since they rarely provision their cubs. Unlike spotted hyaenas, striped hyaenas provision their cubs from an early age and tend to accumulate many bones at their dens. Bone assemblages generally

reflect the species diversity of the landscape. Therefore, to get species relative abundance and diversity for an area, a combination of landscape bone assemblages and those from different accumulating agents need to be sampled. This was not possible during this short survey. Of note however, is the low representation of livestock (including sheep, goats, and cattle) in the collection. This suggests that livestock predation in the area is low and disposal of their carcasses when they die is properly done.

The importance of owls and other raptors' roost sites in the documenting of the microfauna of an area is emphasized by the high concentration of bones found within 1 m of the base of a fig tree. This site had easily identifiable complete specimens. This raptor appeared to specialize on white-toothed shrews and multimammate mice. This might, however, also indicate that these were the most abundant prey available in the landscape. More roost sites need to be located and sampled for a clearer picture.

### **Conclusion & Recommendations**

While this survey was not comprehensive enough to shed light on the ecosystem dynamics of the area, it gives an idea of the species that are currently there and those that were present up to at least 15 years ago (as reflected in the weathering stages of the remains). This is based on a few bones in weathering stages 4 and 5 (Behrensmeier 1978). The majority of the specimens were, however, deposited in recent years (in weathering stages 0 and 1) indicating the species they represent are still present.

While the majority of the bones were carnivore tooth marked, the cause of death cannot be attributed to predation. Scavenging from human butchered remains/discarded bones was not detected in any of the specimens examined. This implies that either there is proper disposal of kitchen refuse, that the butchered specimens were not carried to the dens, or that they were completely consumed by the scavenging carnivore.

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## PLANTS

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### **Abstract**

An inventory of the plants of Lolldaiga Hills Ranch was carried out from 30 October – 3 November 2014. Five transects were sampled, one each at Corner ya Kamau, Mugumo Campsite, Mlango ya Ndovu, Macho Hill, and Ngainitu. These sites represent distinct habitat types such as grassland, acacia woodland, rocky outcrop, euphorbia thicket, riverine forest, and cedar and olive forest. A total of 54 plant species and eight plant families were added to the existing list of 128 plant species and 54 plant families

### **Methodology**

Five transects were laid out in representative habitat types. Herbarium specimens were collected following standard collection procedures (Bridson & Forman 1992). Plant specimens were processed and identified at the East African Herbarium using the reference herbarium collections, literature, and available expertise. Diagnoses and descriptions of each species collected were used to identify the specimens, with reference to the Herbarium's collections, *Flora of Tropical East Africa* (various), Agnew & Agnew (1994), Beentje (1994), FTEA (various), and Ibrahim & Kabuye (1987). A checklist of the species recorder during this survey of Lolldaiga Hills Ranch is provided in Table 1.

### **Results**

#### ***Plant species diversity***

During this survey, 54 plant species were added to the existing list of 128 plant species (Roberts *et al.* 2014), bringing the total to 182 species (Table 1). This survey added eight families to the 55 families recorded by Roberts *et al.* (2014): Adiantaceae, Caryophyllaceae, Commelinaceae, Cyperaceae, Myrothamnaceae, Oxalidaceae, Plumbaginaceae and Portulacaceae.

#### ***Dominant life forms***

The most common plant life forms on Lolldaiga Hills Ranch are herbs, followed by woody shrubs, and trees.

#### ***Vegetation communities***

Lolldaiga Hills Ranch supports four main vegetation communities distinguishable visually: grassland, woodland, shrubland, and forest.

#### ***Threatened species***

None of the species in Table 1 are on the *IUCN Red List* as 'threatened'.



Images of some common dry season flowers of Lolldaiga Hills Ranch.



*Aspilia mossambicensis* (Oliv.) Wild



*Gomphocarpus stenophyllus* Oliv.



*Ipomoea kituiensis* Vatke



*Pentanisia ouranogyne* S. Moore



*Vernonia brachycalyx* O. Hoffm.



*Helichrysum odoratissimum* (L.) Sweet.





*Grewia kakothamnus* K.Schum.



*Indigofera volkensis* Taub.



*Monsonia angustifolia* A.Rich



*Grewia similis* K. Schum.



*Ipomoea tenuirostris* Choisy



*Opuntia ficus-indica* (L.) Mill.





*Podranea brycei*



*Pentas lanceolata* (Forsk.) Deflers



*Abutilon longicuspe* A. Rich.



*Barleria submollis* Lindau



*Justicia diclipteroides* Lindau



*Sida tenuicarpa* Vollesen



*Hypoxis obtusa* Burch



*Plumbago zeylanica* L.



*Crossandra massaica* Mildbr.



*Commelina benghalensis* L.



*Commelina reptans* Brenan





*Hypoestes forskalii* (Vahl) R. Br.



*Pavonia burchellii* (DC.) R.A. Dyer

### **Discussion and Conclusions**

This survey was undertaken during the dry season, hence the low number of plant species recorded, since plant identification is aided by collecting specimens with leaves, flowers, and/or fruits. The most abundant species in flowers were herbs, followed by shrubs. In most areas there was presence of disturbance either from grazing or recent fire. This could be responsible for the abundance of herbaceous plants.

Forest management hinges heavily on policy and conservation. Floristic assessments are important in providing managers and policy practitioners with current information for developing management plans (World Conservation Monitoring Centre [WCMC] 1992). These assessments have direct implications for natural forests where, unlike plantations, vegetation interactions are only remotely conceptualized. On this note, it is relevant to carry out biodiversity inventory both in dry and wet seasons.

**Table 1: Additions to the list of plants on Lolldaiga Hills Ranch compiled by Roberts *et al.* (2014). The 54 species and eight plant families added to this list by the present survey are highlighted in yellow.**

Family and scientific name	Common name	Conservation status	Habit	Uses
<b>Acanthaceae</b>				
<i>Thunbergia gregorii</i> S. Moore		Least concern	Herb	
<i>Blepharis maderaspatensis</i> (L.) Roth		Least concern	Herb	Medicinal and antioxidant
<i>Hypoestes forskoolii</i> (Vahl) R. Br.		Least concern	Herb	properties
<i>Justicia diclipterooides</i> Lindau		Least concern	Herb	
<i>Barleria submollis</i> Lindau		Least concern	Herb	Contraceptive
<i>Justicia calyculata</i> (Deflers) T. Anders.		Least concern	Herb	Food
<i>Crossandra massaica</i> Mildbr.		Least concern	Herb	
<b>Adiantaceae</b>				
<i>Pellaea calomelanos</i> (Sw.) Link	Hard fern	Least Concern	Fern	Medicinal
<b>Amaranthaceae</b>				
<i>Achyranthes aspera</i> L.	Devil's horsewhip	Least concern	Herb	Medicinal
<i>Achyroopsis fruticulosa</i> C. B. Cl.		Least concern	Herb	
<i>Psilotrichum elliotii</i> Bak.		Least concern	Herb	
<b>Anacardiaceae</b>				
<b>Mango family</b>				
<i>Rhus natalensis</i> Krauss	-	Least concern	Shrub/small tree	Fodder, fuel, timber, medicinal, poisonous, ornamental and tannin/dye
<i>Rhus vulgaris</i> Meikle	-	Least concern	Shrub	Medicinal
<i>Schinus molle</i> L.	Pepper tree	Least concern	Tree	Apiculture, fuel, timber, gum/resin, latex/rubber. Tannin/dye, alcohol, medicine, ornamental and poisonous
<i>Lannea rivae</i> (Chiov.) Sacl.		Least concern	Shrub/small tree	Medicinal, food and agroforestry
<b>Apocynaceae</b>				
<b>Oleander family</b>				
<i>Acokanthera schimperi</i> A. DC. Schweinf.	Poison arrow tree	Least concern	Tree	Medicinal and food
<i>Carissa spinarum</i> Linn.	Carissa/jungle karunda	Least concern	Shrub	Medicinal

<i>Caralluma arachnoidea</i> (Bally) M.G. Gilbert		Least concern	Herb	Ornamental
<i>Desmidorchis foetida</i> (E.A. Bruce) Plowes		Least concern	Herb/Shrub	Medicinal
<i>Gomphocarpus stenophyllus</i> Oliv.		Least concern	Shrub	Medicinal
<i>Gomphocarpus integer</i> (N.E.Br.) Bullock		Least concern	Shrub	
<i>Orbea dummeri</i> (N.E.Br.) Bruyns		Least concern	Herb	
<i>Carissa edulis</i> Vahl	Simple-spined num-num	Least concern	Shrub/small tree	Medicinal, fuel, fodder, ornamental, poison and has diuretic effect
<b>Araliaceae</b>				
<i>Cussonia holstii</i> Engl.	Cabbage tree	Least concern	Tree	Medicinal with anti-trichomonas activity, timber, and fuel
<i>Polyscias fulva</i> (Hiern) Harms	Parasol tree	Least concern	Tree	Timber, medicine and agroforestry
<b>Asclepiadaceae</b>				
<i>Huernia keniensis</i> R.E.Fr.		Least concern	Shrub	Medicinal and ornamental
<b>Balanitaceae</b>				
	<b>Desert date family</b>			
<i>Balanites aegyptiaca</i> (L.) Delile	Desert date	Least concern	Shrub/tree	Medicine, fodder, food, timber, firewood and good mulch
<b>Bignoniaceae</b>				
	<b>Jacaranda family</b>			
<i>Jacaranda mimosifolia</i> D. Don	Jacaranda	Least concern	Tree	Ornamental/landscaping
<i>Podranea brycei</i>	Queen of Sheba	Least concern	Twining climber	Ornamental
<b>Boraginaceae</b>				
	<b>Cordia family</b>			
<i>Cordia monoica</i> Roxb.	Sandpaper cordia	Least concern	Shrub/small tree	Food, medicinal, timber, sandpaper
<b>Burseraceae</b>				
	<b>Myrrh family</b>			
<i>Commiphora abyssinnica</i> (Berg.) Engl.	Commiphora myrrh	Least concern	Tree	Medicinal, fragrance, cosmetic, flavouring agent in food and drinks
<b>Cactaceae</b>				
	<b>Cactus family</b>			
<i>Opuntia stricta</i>	Common prickly pear	Least concern	Shrub	Fencing and fodder
<i>Quiabentia chacoensis</i> Backeb.	Thorn cactus	Least concern	Shrub	Hedge
<i>Opuntia ficus-indica</i> (L.) Mill.		Least concern	Shrub	Ingredient of arrow poison, medicine and cosmetic
<b>Canellaceae</b>				
	<b>Warburgia family</b>			
<i>Warburgia ugandensis</i> Sprague	East African green heart	Least concern	Tree	Medicine, food, fuel, fodder, timber, gum/resin, ornamental and poison (antifeedant against armyworm)

<b>Capparaceae</b>	<b>Caper family</b>			
<i>Boscia angustifolia</i> A. Rich	Boscia	Least concern	Shrub/small tree	Food, fodder, apiculture, fuel, timber and medicine
<i>Cadaba farinosa</i> Forssk.	-	Least concern	Shrub	Food, fodder and medicine
<i>Capparis tomentosa</i> Lam.		Least concern	Spiny scrambler /small tree	Food, fodder, fuel, medicine, poison and fence
<i>Maerua triphylla</i> A. Rich	Maerua, Small bead-bean	Least concern	Tree	Medicine, food, fodder, dye, timber and fuel
<i>Cleome monophylla</i> L.		Least concern	Herb	Food
<b>Caricaceae</b>				
<i>Carica papaya</i> L.	Pawpaw, Papaya	Least concern	Herb	Food and medicine
<b>Caryophyllaceae</b>				
<i>Pollichia campestris</i> Ait.		Least concern	Herb	Food
<b>Celastraceae</b>	<b>Miraa family</b>			
<i>Maytenus senegalensis</i> (Lam.) Exell	Confetti tree/spike thorn	Least concern	Shrub/tree	Medicine
<b>Combretaceae</b>	<b>Terminalia family</b>			
<i>Combretum molle</i> R. Br. ex G. Don	Velvet bush willow	Least concern	Tree	Fodder, apiculture, tannin/dye, medicine, timber /fencing (termite proof)
<i>Terminalia mantalay</i> H. Perrier	Terminalia/umbrella tree	Least concern	Tree	Tannin/dye, medicine and ornamental
<b>Commelinaceae</b>				
<i>Commelina benghalensis</i> L.		Least concern	Herb	
<i>Commelina reptans</i> Brenan		Least concern	Herb	
<b>Compositae/Asteraceae</b>				
<i>Aspilia mossambicensis</i> (Oliv.) Wild		Least concern	Herb	Medicinal, has antimalarial activity
<i>Notonia abyssinica</i> A. Rich.		Least concern	Herb	
<i>Notonia petraea</i> R.E.Fr.		Least concern	Herb	
<i>Psiadia punctulata</i> (DC.)Vatke		Least concern	Shrub	Medicinal, fiber and fuel
<i>Vernonia auriculifera</i> Hiern	Veronia	Least concern	Herb	Building, medicinal, fuel, fodder, and toilet paper substitute
<i>Vernonia brachycalyx</i> O. Hoffm.	Veronia	Least concern	Herb	Medicinal with anti-parasitic activity

<i>Sphaeranthus suaveolens</i> (Forsk.) Vahl.		Least concern	Herb	
<i>Helichrysum glumaceum</i> DC.		Least concern	Herb	
<i>Helichrysum odoratissimum</i> (L.) Sweet.		Least concern	Herb	Medicinal
<b>Convolvuceae</b>	<b>Morning glory family</b>			
<i>Ipomoea hildebrandtii</i> Vatke		Least concern	Herb	Invasive
<i>Ipomoea kituensis</i> Vatke		Least concern	Herb	Cosmetic/perfume; notorious weed/invasive
<i>Ipomoea tenuirostris</i> Choisy		Least concern	Herb	
<b>Crassulaceae</b>				
<i>Kalanchoe mitejea</i> Leblanc & Raym.-Hamet		Least concern	Herb	
<i>Crassula granvikii</i> Mildbr.		Least concern	Herb	
<i>Crassula schimperi</i> Fisch. & Mey		Least concern	Herb	
<b>Cucurbitaceae</b>				
<i>Cucumis</i> sp.		Least concern	Herb	
<b>Cupressaceae</b>	<b>Cypress family</b>			
<i>Juniperus procera</i>	African pencil cedar	Least concern	Tree	Timber and horticulture
<b>Cyperaceae</b>	<b>Sedge family</b>			
<i>Cyperus pseudovestitus</i> (C. B. Clarke) Kük		Least concern	Sedge	
<i>Cyperus niveus</i> Retz.		Least concern	Sedge	
<i>Kyllinga comosipes</i> (Mattf. & Kük) Napper		Least concern	Sedge	
<i>Cyperus glaucophyllus</i> Boeckeler		Least concern	Sedge	
<b>Ebenaceae</b>	<b>Ebony family</b>			
<i>Euclea divinorum</i> Hiern	Diamond-leaved euclea/Magic guarri	Least concern	Shrub/small tree	Medicinal, dye, toothbrush, brewing, timber and indicator of gold deposits
<b>Euphorbiaceae</b>	<b>Euphorbia family</b>			
<i>Croton dichogamus</i> Pax	Orange-leaved croton	Least concern	Shrub/tree	Medicinal, food and building
<i>Croton megalocarpus</i> Hutch.	Croton	Least concern	Tree	Fodder, apiculture, timber, medicinal and ornamental

<i>Euphorbia candelabrum</i> Trémanus ex Kotschy	Candelabra euphorbia	Least concern	Tree	Latex poisonous can cause blindness, medicinal, fuel, wood for roofing, table and doors etc.
<i>Euphorbia cotinifolia</i> L.	Red euphorbia	Least concern	Shrub/tree	Medicinal
<i>Euphorbia heterochroma</i> Pax		Least concern	Shrub	Medicinal
<i>Euphorbia magnicapsula</i> S. Carter		Least concern	Shrub	Ornamental
<i>Ricinus communis</i> L.	Castor oil plant	Least concern	Herb/shrub	Ornamental, medicinal, biodiesel,
<i>Synadenium compactum</i>		Least concern	Shrub	
<i>Erythrococca fischeri</i> Pax		Least concern	Tree	Medicinal
<b>Fabaceae</b>				
<i>Acacia abyssinica</i> Hochst. ex Benth.		Least concern	Tree	Medicinal, timber and building
<i>Acacia drepanolobium</i> Harms ex Sjöstedt.		Least concern	Tree	Essential oils, fodder, fuel and medicinal
<i>Acacia kirkii</i> Oliv.		Least concern	Tree	Essential oils, fodder, fuel, medicinal, ornamentals and stimulants
<i>Acacia mellifera</i> (Vahl) Benth.		Least concern	Tree	Toothbrush, fencing (termite resistant), fodder, timber and fuel
<i>Acacia nilotica</i> (L.) Del. (Babul)		Least concern	Shrub/small tree	Medicine, tannins, gums, timber, fuel, fodder
<i>Acacia xanthophloea</i> Benth.	Fever Tree	Least concern	Tree	Timber, fuel, medicinal and bee forage
<i>Albizia gummifera</i> (J.F. Gmel.) C.A. Sm.		Least concern	Tree	Apiculture, timber, gum and resin, medicinal, tannins, fuel and fodder
<i>Cadia purpurea</i>		Least concern	Tree	Medicinal
<i>Crotalaria agatiflora</i> Schweinf.		Least concern	Shrub	Medicinal, dyes and tannins
<i>Crotalaria brevidens</i> Benth.		Least concern	Herb	Fodder, medicinal, green manure and fibre
<i>Erythrina abyssinica</i> Lam. ex DC.		Least concern	Tree	Multipurpose tree: timber, fencing, medicinal
<i>Crotalaria incana</i> L.		Least concern	Herb	Fodder, medicinal
<i>Pterolobium stellatum</i> (Forssk.) Brenan		Least concern	Shrub	
<i>Senna didymobotrya</i>		Least concern	Shrub/small tree	Ornamental
<i>Rhynchosia usambarensis</i> Taub.		Least concern	Herb	Medicinal, timber and tanning



<i>Indigofera volkensii</i> K. Schum.		Least concern	Herb	
<b>Flacourtiaceae</b>	<b>Kei-apple family</b>			
<i>Dovyalis abyssinica</i> (A. Rich) Warb		Least concern	Shrub/small tree	Food, fodder, bee forage and medicinal
<b>Hamamelidaceae</b>				
<i>Trichocladus ellipticus</i> Eckl. & Zeyh		Least concern	Shrub/small tree	Medicinal, wood (termite resistant) and fuel
<b>Labiatae/Lamiaceae</b>				
<i>Ajuga remota</i> Benth.		Least concern	Herb	Medicinal
<i>Leonotis nepetifolia</i> (L.) R. Br.		Least concern	Herb	Medicinal
<i>Ocimum americanum</i> L.		Least concern	Herb	Medicinal
<i>Plectranthus barbatus</i>		Least concern	Herb	Medicinal
<i>Plectranthus canimus</i> Roth		Least concern	Herb	Medicinal
<i>Ocimum filamentosum</i> Forssk.		Least concern	Herb	Medicinal
<b>Lauraceae</b>	<b>Avocado family</b>			
<i>Persea americana</i>	Avocado	Least concern	Tree	Medicinal, food and cosmetics
<b>Liliiflorae/Amarylidaceae</b>				
<i>Asparagus falcatus</i> L.	Large forest asparagus	Least concern	Climbing shrub	Ornamental and medicinal
<i>Aloe lateritia</i> Engl.		Least concern	Herb	Medicinal and beer production
<i>Aloe nyriensis</i> Christian		Least concern	Herb	Medicinal
<i>Aloe secundiflora</i> Engl.		Least concern	Herb	Medicinal, ornamental & cosmetics
<i>Boophone disticha</i> (L. f.) Herb.	Tumbleweed/sore eye flower	Least concern	Herb	Medicinal (bulb very poisonous)
<i>Dracaena ellenbeckiana</i> Engl.	Kedong dracaena	Least concern	Tree	Ornamental
<i>Gloriosa superba</i> L.	Glory lily/Kalihari	Least concern	Creeper herb	Medicinal
<i>Hypoxis obtusa</i> Burch.		Least concern	Herb	
<i>Scadoxus multiflorus</i> (Martyn) Raf.	Blood lily	Least concern	Herb	
<b>Loranthaceae</b>				
<i>Englerina woodfordioides</i> (Schweinf.) Balle ex M.G. Gilbert		Least concern	Herb	Medicinal, dye and tannins
<i>Erianthemum dregei</i> (Eckl. & Zeyh.) Tiegh.		Least concern	Herb	Medicinal
<b>Malvaceae</b>	<b>Hibiscus family</b>			
<i>Abutilon mauritianum</i> (Jacq.) Medic		Least concern	Herb/shrub	Making ropes, basketry, medicinal

<i>Abutilon longicuspe</i> A. Rich		Least concern	Herb/shrub	
<i>Hibiscus aponeurus</i> Sprague & Hutch.		Least concern	Herb/shrub	Medicinal
<i>Hibiscus flavifolius</i> Ulbr.		Least concern	Herb	
<i>Hibiscus fuscus</i> Garcke		Least concern	Herb	Medicinal
<i>Pavonia patens</i> (Andr.) Chiov.		Least concern	Herb	
<i>Sida ovata</i> Forsk.		Least concern	Herb	Medicinal
<i>Sida tenuicarpa</i> Vollesen		Least concern	Herb	
<i>Melhania velutina</i> Forsk.		Least concern	Herb	Food
<i>Pavonia burchellii</i> (DC.) R. A. Dyer		Least concern	Herb	Medicinal
<i>Hibiscus ovalifolius</i> (Forsk.) Vahl.		Least concern	Herb	Medicinal
<i>Hibiscus cannabinus</i> L.		Least concern	Herb	Medicinal, food, dye and fibre
<b>Moraceae</b>	<b>Fig family</b>			
<i>Ficus benjamina</i>	Java fig/weeping fig	Least concern	Tree	Ornamental
<i>Ficus natalensis</i> Hochst.	Bark cloth fig	Least concern	Tree	Making cloths, fodder, food, medicinal, fencing and bonsai plants
<i>Ficus thonningii</i> Blume		Least concern	Tree	Medicinal, food, fodder, fuel, timber, rubber or latex
<i>Morus alba</i>	Mulberry	Least concern	Tree	Medicinal
<b>Myrothamnaceae</b>				
<i>Myrothamnus flabellifolius</i> Welw.	Resurrection plant		shrub	Medicinal
<b>Myrtaceae</b>	<b>Eucalyptus family</b>			
<i>Callistemon citrinus</i> var. <i>splendens</i>	Bottlebrush tree	Least concern	Tree	Ornamental
<i>Eucalyptus saligna</i> Sm.	Sydney blue gum	Least concern	Tree	Timber, ornamental and apiculture
<i>Syzygium cordatum</i> Hochst. ex C. Krauss.	Waterberry	Least concern	Tree	Berries edible, used to make alcohol, medicinal and bark powder used as fish poison
<i>Syzygium guineense</i> (Willd.) DC.	Water pear/Woodland water berry	Least concern	Tree	Timber, food (fruits) and medicinal. Bark can be toxic
<b>Nyctaginaceae</b>				
<i>Bougainvillea glabra</i> C.	Bougainvillea/Glory of the garden	Least concern	Shrub	Ornamental and medicinal (anti-diabetic and anti-bacterial)
<b>Oleaceae</b>	<b>Olive family</b>			
<i>Jasminum fluminense</i>	Jasmine	Least concern	Shrub	

<i>Olea europaea</i> ssp. <i>cuspidata</i> / <i>Olea europaea</i> L. ssp. <i>africana</i> (Mill.) P. Green	Wild olive	Least concern	Tree	Timber, food (tea made from the leaves) and medicinal
<i>Schrebera alata</i> (Hochst.) Welw.	Schrebera/ Wild Jasmine	Least concern	Shrub/tree	Ornamental
<b>Orchidaceae</b>	<b>Orchid family</b>			
<i>Rangaeria amaniensis</i> (Kraenzl.) Summerh.		Least concern	Epiphyte	Ornamental
<b>Oxalidaceae</b>				
<i>Monsonia angustifolia</i> A.Rich		Least concern	Herb	
<b>Plumbaginaceae</b>				
<i>Plumbago auriculata</i> Lam.		Least concern	Herb	Medicinal
<i>Plumbago zeylanica</i> L.		Least concern	Herb	Medicinal with a number of biological activities such as antibacterial, anti-plasmodial, antiviral and anti-carcinogenic
<b>Poaceae</b>	<b>Grasses</b>			
<i>Cynodon plectostachyus</i> (K. Schum.) Pilg.	Star grass	Least concern	Grass	Fodder
<i>Eragrostis superba</i> Peyr.	Saw-tooth love grass	Least concern	Grass	Fodder
<i>Haepachne schimperi</i>	Spear grass			
<i>Pennisetum stramineum</i> Peter		Least concern	Grass	Fodder
<i>Themeda triandra</i> Forssk.	Red grass	Least concern	Grass	Fodder, thatching, basketry and making paper
<b>Podocarpaceae</b>	<b>Podo family</b>			
<i>Podocarpus falcatus</i> (Thunb.) R. Br. ex Mirb.	Podo, East African yellow-wood	Least concern	Tree	Timber, tanning leather and medicinal
<b>Polygonaceae</b>				
<i>Rumex usambarensis</i> (Engl.) Damm.		Least concern	Shrub/straggling climber	Food and medicinal
<b>Portulacaceae</b>				
<i>Portulaca oleracea</i> L.		Least concern	Herb	Food (salads) and medicinal
<b>Proteaceae</b>	<b>Protea family</b>			
<i>Faurea saligna</i> Harv.	Willow beechwood, African beech	Least concern	Tree	Dye, timber and ornamental
<b>Rhamnaceae</b>	<b>Buffalo-thorn family</b>			
<i>Scutia myrtina</i> (Burm. f.) Kurz	Cat-thorn	Least concern	Shrub	Medicinal and agroforestry

<i>Ziziphus mucronata</i> Willd.	Buffalo-thorn	Least concern	Shrub/small tree	Medicinal, food and timber
<b>Rosaceae</b>	<b>Rose family</b>			
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Loquat	Least concern	Tree	Food and medicinal
<i>Malus domestica</i> Borkh.	Apple	Least concern	Tree	Food
<b>Rubiaceae</b>	<b>Coffee family</b>			
<i>Pentanisia ouranogyne</i> S. Moore		Least concern	Shrub	Medicinal
<i>Pentas lanceolata</i> (Forsk.) Deflers		Least concern	Shrub	Ornamental
<i>Psychotria kirkii</i> Hiern.		Least concern	Shrub	
<i>Vangueria volkensii</i> K. Schum		Least concern	Shrub/small tree	Fruits edible and timber
<b>Rutaceae</b>	<b>Citrus family</b>			
<i>Calodendrum capense</i> (L.f.) Thunb.	Cape chestnut	Least concern	Tree	Ornamental and timber
<i>Citrus limon</i> (L.) Burm. f.	Lemon	Least concern	Tree	Medicinal
<i>Teclea simplicifolia</i> (Engl.) Verdoorn	Teclea	Least concern	Tree	Medicinal, timber and fuel
<i>Zanthoxylum chalybeum</i> Engl.	Knobwood	Least concern	Tree	Fuel, fodder, timber and medicinal. Have antibacterial and antifungal properties
<b>Sapindaceae</b>	<b>Lychee family</b>			
<i>Dodonaea viscosa</i> Jacq.	Sand olive/hopbush		Shrub/small tree	Medicinal
<i>Pappea capensis</i> Eckl. & Zeyh.	Pappea/jacket plum	Least concern	Tree	Fruits used to make jelly, vinegar, alcohol, alcohol and also medicinal
<b>Santalaceae</b>				
<i>Osyris lanceolata</i> Hochst. & Steud. ex A. DC.	East African sandalwood	Least concern	Shrub/small tree	Food, medicinal, tannin, fibre, fuel and ornamental
<b>Scrophulariaceae</b>				
<i>Cynium tubulosum</i> (L.f.) Engl.			Herb	
<b>Solanaceae</b>	<b>Potato family</b>			
<i>Datura stramonium</i>	Devil's thorn/Thorn apple	Least concern	Herb	Poisonous due to tropane alkaloids
<i>Solanum incanum</i> L.	Sodom apple	Least concern	Herb/soft wooded shrub	Medicinal. Antibiotic properties
<i>Withania somnifera</i> (L.) Dunal		Least concern		
<b>Sterculiaceae</b>	<b>Cocoa family</b>			
<i>Dombeya torrida</i> (J.F. Gmel.) Bamps.	Forest dombeya	Least concern	Tree	Medicinal and agroforestry

<b>Tiliaceae</b>	<b>Jute family</b>			
<i>Grewia bicolor</i> Juss.		Least concern	Shrub/small tree	Food, fodder, fibre, timber, fuel, alcohol and medicine
<i>Grewia similis</i> K. Schum.		Least concern	Shrub/small tree	Food, medicine and timber
<i>Grewia kakothamnus</i> K. Schum		Least concern	Shrub/small tree	
<b>Turneraceae</b>				
<i>Loewia tanaensis</i> Urb.		Least concern		
<b>Verbenaceae</b>	<b>Meru 'oak' family</b>			
<i>Lantana trifolia</i> L.	Lantana	Least concern	Shrub	Medicinal and Fodder. Have anti-inflammatory and analgesic properties.
<i>Lippia kituiensis</i> Vatke		Least concern	Shrub	Food, Medicinal, fuel and agroforestry uses
<b>Viscaceae</b>				
<i>Viscum fischeri</i> Engl.		Least concern	Shrubby parasite	
<b>Vitaceae</b>				
<i>Cyphostemma serpens</i> (Hochst. Ex A. Rich) Desc.		Least concern	Climber	Medicinal and food

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