

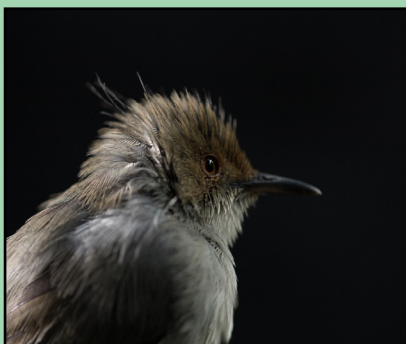


Biodiversity Express Survey

The Njesi Plateau expedition,
Niassa, Mozambique

November 2016

Preliminary report



Biodiversity Inventory for Conservation

Biodiversity Express Survey (BES) 6.0, The Njesi Plateau expedition, Niassa, Mozambique
November 2016

Biodiversity Inventory for Conservation (BINCO)

<http://www.binco.eu>

info@binco.eu

Editors:

Sam Jones, Merlijn Jocque

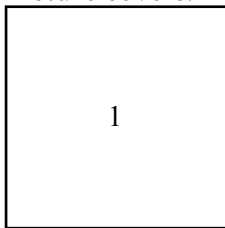
Contributing authors:

Justin Clause, Lore Geeraert, Gabriel Jamie, Pim Niesten, Mac Stone, Emidio Sunbane, Tim van Berkel

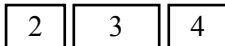
Publication date:

Version 6.0 - 17 December 2016

Picture covers:



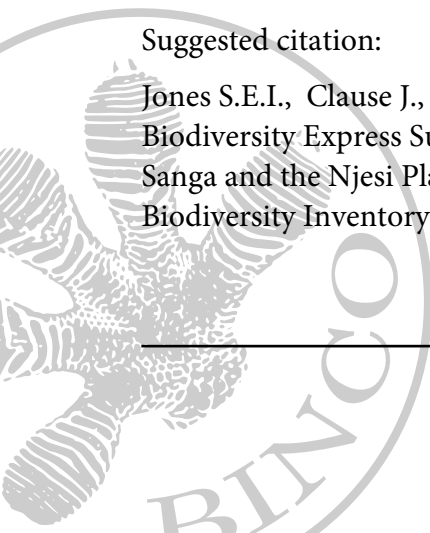
1. Njesi Plateau (Picture: Mac Stone)
2. *Artisornis moreaui* (Picture: Mac Stone)
3. *Afrixalus* sp. (Picture: Justin Clause)
4. *Chameleo dilepis* (Picture: Justin Clause)



Biodiversity Express Surveys (BES) are snapshot biodiversity studies of carefully selected regions. Expeditions typically target understudied and/or threatened areas with an urgent need for more information on the occurring fauna and flora. The results are presented in an Express Report (ER) that is made publicly available online for anybody to use and can be found at www.BINCO.eu. Teams consist of a small number of international specialists and local scientists. Results presented in Express Reports are dynamic and will be updated as new information on identifications from the survey and from observations in the area become available.

Suggested citation:

Jones S.E.I., Clause J., Geeraert L., Jamie G., Sunbane E., van Berkel T. and Jocque M.J. (2016). Biodiversity Express Survey, The Njesi Plateau expedition: a biological assessment of Mt Chitagal, Mt Sanga and the Njesi Plateau in Niassa Province, Mozambique. BES Report 6.0 (17 December 2016). Biodiversity Inventory for Conservation. Glabbeek, Belgium, 30 pp.



Index

Expedition fact sheet	3
Aknowledgements	4
Summary	5
Introduction	6
Goals	9
Biodiversity survey	10
1. Avifauna	10
2. Mammals	22
3. Amphibians and reptiles	28
4. Invertebrates	30
References	33

EXPEDITION FACT SHEET

Location

Three peaks in the Serra Jecci Mountain range (Niassa, Mozambique) were visited:

1. Chitagal - Basecamp at an elevation of 1428m ($12^{\circ}35'49.32''\text{S } 35^{\circ}15'46.74''\text{E}$).
2. Sanga - Basecamp at an elevation of 1702m ($12^{\circ}23'0.72''\text{S } 35^{\circ}20'6.96''\text{E}$).
3. Njesi Plateau - Basecamp at an elevation of 1728m ($\text{S } 12^{\circ}49'56.76''\text{S } 35^{\circ}11'12.00''\text{E}$).

Time in the field

5th- 25th November (21 days)

Expedition Members

Clause, Justin	Herpetologist (USA)
Geeraert, Lore	Entomologist (Belgium)
Jamie Gabriel	Ornithologist (UK)
Jocque, Merlijn, Dr.	Entomologist/Herpetologist (Expedition leader) (Belgium)
Jones, Sam	Ornithologist (Expedition leader) (UK)
Nielsen, Pim	Filmmaker (Belgium)
Patel, Hassam	Botanist (Malawi)
Stone, Mac	Wildlife Photographer (USA)
Sunbane, Emidio	Ornithologist (Mozambique)
van Berkel, Tim	Mammalogist (Netherlands)
Amasse, Tuaibo	Camp manager (Mozambique)
Amide, Tomach	Guide (Mozambique)
Buanar, Basidio	Ranger Bravia (Mozambique)

Financial and logistic support



CRITICAL ECOSYSTEM
PARTNERSHIP FUND

Royal Geographical Society
with IBG

Advancing geography
and geographical learning



Acknowledgements

The organisation of this expedition was the product of over two years of collaborative work, and only made possible through the contributions of many people. We are particularly indebted to Claire Spottiswoode, Jonathan Timberlake and Julian Bayliss for their encouragement and generosity in sharing resources and experiences from previous work in Northern Mozambique. The expedition would also not have gone ahead without the critical support of James Egremont-Lee and his colleagues John Mkumbira and Tonderai Kachale at the Rift Valley Corporation, Lichinga.

We are grateful to the following individuals for providing further resources and informative discussions on various aspects of the expedition throughout planning; Jay McCentee, Lincoln Fishpool, Daniel Portik, Shane Winser, Neville Shulman, Nigel Collar, Colin Congdon and Katrina Cook. We would also like to thank Gary Allport and Tracie Parker for their encouragement, advice, hospitality and for facilitating many interesting discussions during our time in Mozambique. We would also like to thank Oliver Burdekin at burdGIS for his help producing maps for the final report.

For permitting procedures, we would like to thank the Natural History Museum in Maputo, especially Dr. Lucilla Chuquela and Erika Tovela for their help with the application process and collaboration. Special thanks are also due to Gabriela Bittencourt and Hermenegildo Matimele for their help in the earlier stages of the permitting process.

As the expedition leaders (Merlijn Jocque and Sam Jones), we would like to take this opportunity to thank all members of the expedition field team for their universal good nature, hard work and willingness for personal sacrifices that made the whole venture a smooth and affable operation under challenging field conditions. Of particular mention here are Tuaibo Amasse our cook and camp manager, Tomach Amide, Chequini Jiassimtus and Sabadiomar our guides and Basidio Buanar our forest guard, all critical members of this expedition that warrant more thanks than this short mention here affords. While there are too many to individually name here, we also thank the 70+ porters that carried over 500kg of equipment up and down the three mountains. This extends to the local communities in the vicinity for granting us access to the mountains and hospitality during transit.

This expedition was supported by the Critical Ecosystem Partnership Foundation (Afromontane Hotspots fund), Royal Geographical Society (with IBG) with a Neville Shulman Challenge Award, The Rift Valley Corporation and World Wildlife Fund Belgium.

Summary

The mountains of northern Mozambique - scattered granite inselbergs topped with evergreen forests - remain poorly known biologically. Their long geological isolation from the east African rift combined with the conflict-fractured history of Mozambique meant little research effort has been undertaken until recent years. Most recent efforts have focused on the mountains in north-central Mozambique, highlighting their unique biological value, but large highlands in the north-west still remain virtually unexplored. The highlands of Niassa province are one such area and represent a key highland link to the north. To this end, we sought to address this biological knowledge gap by undertaking a rapid multi-disciplinary biological inventory of the Njesi Plateau, Mt Chitagal and Mt Sanga, three distinct highland peaks that harbour 'Afromontane' habitats of likely high biological value. Specifically, we aimed to compile as much information on the biological uniqueness of the mountains in order to inform a conservation management plan currently in preparation.

We undertook fieldwork at our study sites between 5-25 November with the specific aim of crossing the dry-wet season divide. We sampled intensively for the following taxonomic groups within the specialities of our team- birds, mammals, amphibians, reptiles, and selected invertebrate groups.

The initial results of our field surveys yielded valuable discoveries comprising of multiple range extensions, new national records, the presence of highly threatened species and several species likely new to science for the invertebrates. Avifaunal surveys yielded 166 species. We also conducted specific target work on the Long-billed Tailorbird (*Artisornis moreaui*), a highly endangered species known from the region but which few ornithologists have ever seen and are pleased to report its relative abundance here. Mammal surveys yielded at least two significant range extensions, including the Smith's Red Rock Hare and Syke's monkey (*Cercopithecus albogularis*) as did amphibian and reptile surveys, although the full results of the latter are awaiting more analytical work.

These mountain tops are part of the LAGRI initiative from the Rift Valley Corporation and the observations from this brief expedition illustrate the biological value and conservation relevance of these mountain tops and this region.



The Njesi Plateau expedition; A biological assessment of Mt Chitagal, Mt Sanga and the Njesi Plateau in Niassa Province, Mozambique

Introduction

The mountains of the East African Rift, stretching south from Ethiopia to Mozambique, are known to harbour rich biological diversity owing to their unique habitats and long periods of isolation. Typically comprising of evergreen montane forests interspersed with high altitude grassland/moorland habitats, these montane archipelagos have been widely documented to support high levels of endemism across taxonomic groups. Taken together, these unique habitat types and species assemblages represent the distinctive 'Afromontane' ecotype. While certain mountain ranges within this region have been relatively well studied biologically (e.g. the Eastern Arc Mountains of Tanzania), large knowledge-gaps still remain. Perhaps the most substantial geographic area that remains poorly known is the mountains of northern Mozambique. Several early colonial explorers undertook collecting work in the region during the late 19th and early 20th century, such as Jack Vincent on Mt Namuli (e.g. see Vincent 1933a, 1933b), while it is not the purpose of this introduction to review this, comprehensive accounts of the colonial exploratory history of Mozambique's mountains can be found in Timberlake et al. (2009) and Timberlake et al. (2012). A large time-gap since these early exploratory efforts exists owing to the Mozambican civil war that raged in the country until the mid-1990s. Indeed, even until relatively recently access was still limited in parts of the country due to the threat of land-mines.

Since the early 2000's, significant exploratory work addressing this knowledge-gap in biological information has been undertaken in the region however. This initial series of expeditions on Mozambique's mountains, largely funded by the UK's Darwin Initiative, yielded many discoveries. Of particular note was the landmark discovery of Mt Mabu, the largest mid-altitude rainforest in southern Africa (affectionately named the "Google forest" after its discovery via Google Earth) (Bayliss et al. 2014). Several new species to science were described as a result of these expeditions, for example, five new Chameleons (Branch & Tolley 2010; Branch et al. 2014), the forest viper *Atheris mabuensis* (Branch & Bayliss 2009) and the bat *Rhinolophus mabuensis* (Taylor et al. 2012). Despite the increased international attention on Mozambique's mountains, they remain poorly known, with thorough biological survey efforts limited only to certain mountains and certain taxa. Among the better studied groups have been the avifauna, diurnal lepidoptera, plants and herpetofauna, particularly (but not exclusively) on Mts Namuli, Mabu, Inago and Chipirone (see Bayliss et al. 2014; Bayliss et al. 2010; Congdon et al. 2010; Dowsett-Lemaire 2010; Dowsett-Lemaire & Dowsett 2009; Dowsett-Lemaire 2008; Fishpool & Bayliss 2010; Harris et al. 2011; Portik et al. 2013; Ryan et al. 1999; Spottiswoode et al. 2008; Timberlake et al. 2007; Timberlake et al. 2009 & Timberlake et al. 2012). Subsequently, the conservation significance of Mozambique's highlands has been widely acknowledged, both due to their importance in holding substantial populations of many highly threatened Afromontane taxa (e.g. Spottiswoode et al. 2008) and that Mozambique's mountains might represent a distinct eco-region to that of other highlands to the north and west (Bayliss et al. 2014). Mozambique's northernmost highlands and mountains remain little known, however, and consequently there are few biological surveys from which comparative information is available to assess the limits of this purported ecoregion.

One of the key highland areas in the north-west of the country is situated in Niassa province, incorporating the Njesi Plateau (Lichinga plateau), Mt Chitagal and Mt Sanga, north of the provincial capital of Lichinga. These mountains have received little to no biological attention despite their likely biological significance and highland links to the north. To this end, we sought to better understand the biodiversity of these mountains by conducting a biological inventory on all major floral and faunal taxonomic groups. Our expedition directly meets urgent calls made in the literature for a biological assessment to be undertaken here and the region in general (particularly for birdlife, but by extension all biodiversity) (see Collar & Stuart 1988; Parker 2001; Spottiswoode et al. 2008 & Stattersfield et al. 1988).

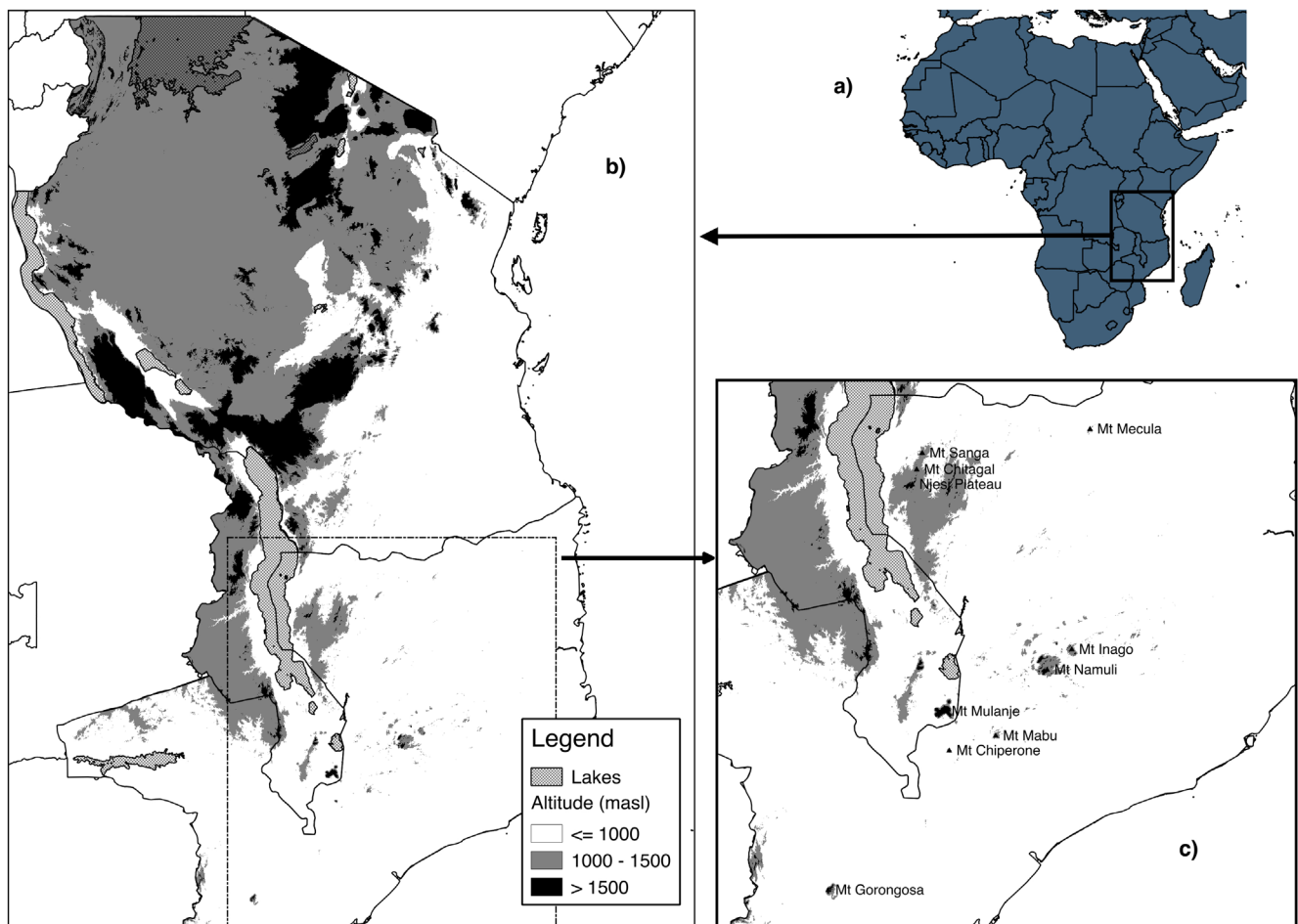


Figure 1. Maps showing a) the relative position of the south-east African highlands on the African continent, b) a topographic profile of the highlands of Tanzania, Mozambique and Malawi, illustrating the disjunct mountains of north and north-central Mozambique from the main highlands further north and west and c) the locations of specific north and north-central Mozambique mountains. The mountains highlighted are those that have been subject to much of the biological assessment work referred to throughout.

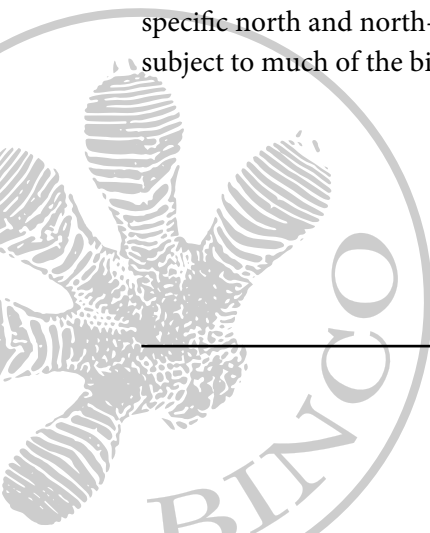


Table 1. Summary of previous survey efforts on the Njesi plateau and Mt Chitagal. Mt Sanga has seen no previous survey effort that we are aware of.

Researchers/collectors	Dates	Taxon focus	Reference
Jali Makawa	1945 (?)	Birds	Benson (1945, 1946)
P. Ryan & C. Spottiswoode	3-5 July 2001	Birds	Ryan & Spottiswoode (2003)
J.Bayliss, C.Congdon, H. Patel	February 2009 (3 days)	Butterflies	Congdon et al. (2010)
D. Portik, E.A Mulungu, D. Sequeira, J. McEntee	29 July- 5 August 2011	Herpetofauna/Birds	Portik et al. (2013)

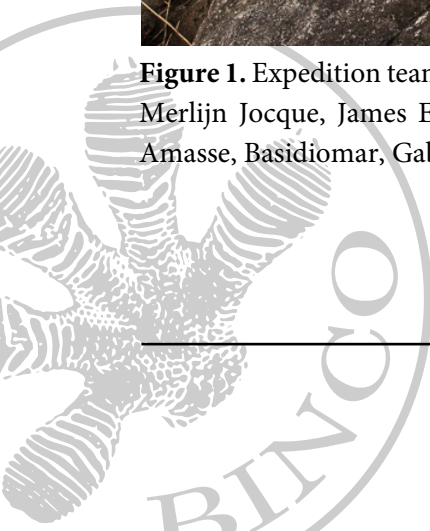
The first work conducted in the region was by Jali Makawa, in 1945, who collected bird skins on behalf of the ornithologist, Constantine Walker Benson. This initial work was important for its discovery of a population of Long-billed Tailorbird *Artisornis moreaui*, a species known only from this isolated mountain range and from the East Usambara mountains in northern Tanzania. The population was subsequently described as a different subspecies (*sousae*) (Benson 1945). The specific location of this visit is not clear, but is presumed to be between the main Njesi plateau and the base of Mt Chitagal. The second visit was motivated by the Tailorbird, the presence of which was confirmed by Ryan & Spottiswoode (2003) during a 3 day visit to the foot of Mt Chitagal in 2001. The third (Congdon et al. 2010) was undertaken as part of the Darwin Initiative funded explorations of Mozambique's afro-montane hotspots. This trip was to the southerly tip of the Njesi Plateau and focussed on collecting butterflies where an apparently undescribed species of *Charaxes* butterfly was discovered. Finally, the most recent visit focussing on herpetofauna and birds was undertaken in 2011. An annotated checklist of the herpetological findings has been published (Portik et al. 2013), but no findings are yet available on avifaunal observations. The Long-billed Tailorbird was reported to be common, however, and apparently few species were encountered that differed from that of the preliminary checklist published by Ryan & Spottiswoode (2003) (J.McEntee pers comm.).

Goals

1. A biological inventory (within the selected study groups) of three highlands (Njesi Plateau, Mt Chitagal, Mt Sanga) in the Serra Jeci during a short field survey.
2. To document the distribution, population taxonomy and behaviour of the critically endangered Long-billed Tailorbird (*Artisornis moreaui*) that is known to occur in the region.
3. To critically assess the areas of greatest immediate threat at the study sites- a combination of biological findings and disturbance/degradation in a recently initiated conservation management plan in the region by the Rift Valley Corporation.
4. To gain insight in the biogeographical linkages of these mountains within the Eastern Africa sky islands.



Figure 1. Expedition team from left to right: Tristan Egremont Lee, Sam Jones, Tim van Berkel, Emidio Sunbane, Merlijn Jocque, James Egremont-Lee, Justin Clause, Pim Niesten, Basidio Buanar, Tomach Amide, Tuaibo Amasse, Basidiomar, Gabriel Jamie, Lore Geeraert, Hassan Patel, Mac Stone (Picture: Mac Stone).



Biodiversity surveys

1. Avifauna

Sam Jones & Gabriel Jamie

Mozambique north of the Zambezi river remains very poorly known ornithologically. The Zambezi river is the northerly limit of the southern African recording region and as a result is not included in important works on southern African avifauna (e.g. Sinclair et al. 2011, Hockey et al. 2005), also lacking inclusion in another guide on East African birds (Stevenson & Fanshawe 2002). Indeed, the only field guide covering the region is that of Sinclair & Ryan (2010), which encompasses the entirety of Africa south of the Sahara. One checklist has been published from the general region, that of Parker (2005) who produced an annotated checklist of the birds of the Niassa game reserve. However, this does not encompass any Afromontane habitats. Despite the paucity of knowledge, in comparison with other taxa, the Njesi Plateau and Mt Chitagal have seen some, albeit very limited, ornithological survey effort. We are aware of no prior ornithological survey efforts on Mt Sanga.

Jali Makawa collected specimens of 29 species during his visit to the Njesi Plateau (Benson 1946). This included the discovery and subsequent description of a new subspecies of the rare Long-billed Tailorbird, a taxon only known from one other locality in north-eastern Tanzania (Benson 1945). The region was not visited again by ornithologists until after the end of the civil war in 2001, when the presence of the Tailorbird was confirmed with a sighting of a pair by P.G.Ryan (Ryan & Spottiswoode 2003). In publishing this finding, Ryan & Spottiswoode (2003) also provided a checklist of birds from the Njesi Plateau including both their and Jali Makawa's findings, giving a preliminary list of 94 species. The majority of the species Jali Makawa collected were also observed by Ryan & Spottiswoode (2003), with the exception of 13 species. On account of the presence of several range-restricted and/or threatened species, the plateau and extended area was designated as an Important Bird Area by BirdLife international in 2001 (BirdLife International 2016). However, at the time of writing, some information presented for the IBA online is incorrect and states that both Spot-throat *Modulatrix stictigula* and Cholo Alethe *Alethe choloensis* are present, despite both not having been recorded from the region.

Prior to our expedition, the Long-billed Tailorbird (alt: Long-billed Forest Warbler) was known from only two localities- the Njesi Plateau/Mt Chitagal, where the subspecies *sousae* was described by Benson (1945), and the Eastern Usambara mountains in Tanzania, some 950km away, where the nominate subspecies occurs. There are no documented occurrences of their presence in between despite much of the area having been surveyed ornithologically (Baker & Baker 2001).

It is currently listed as Critically Endangered (thought to number fewer than 250 individuals), owing to its very small range, low densities and apparent continued declines, although it is openly acknowledged that virtually nothing is known of the Mozambican population (BirdLife international 2015). Ryan & Spottiswoode (2003) speculated that the Njesi area may harbour a substantial population, however, which might result in its threat status being downgraded. Only a single study has ever been published focussing on any aspect of the Long-billed Tailorbird's general ecology (McEntee 2005). Additionally, it has been recently proposed that the two species are distinct (N. Collar pers comms.) and will soon be treated as such at least by the Handbook of the Birds of the World taxonomy, which the IUCN RedList follows.

The ecology of the two populations of Long-billed Tailorbird is thought to differ from each other, with birds in the Usambaras apparently being birds of the forest understorey, whilst the Njesi birds forage in the canopy. It has been hypothesised that the presence/absence of competitive interactions between Long-billed Tailorbirds and similar species mediate this difference in foraging behaviour. Where Long-billed Tailorbirds co-occur with the African Tailorbirds (a closely-related understorey insectivorous species) in northern Mozambique, the Long-billed Tailorbird forages in the canopy. Whereas, in Tanzania, where African Tailorbird does not occur, the Long-billed Tailorbird forages in the understorey. It should be noted, however, that this assumption of solely understorey foraging was largely based on anecdotal evidence. On collecting foraging data to address this, McEntee (2005) observed that, whilst Long-billed Tailorbirds of the Usambaras forage at an average height of 3.9m, they can also go up as high as 24m. Further, the role of these competitive interactions shaping these ecological differences has been challenged (Cordeiro et al. 2001).

Preparatory work

In preparation for the expedition we reviewed all the ornithological literature from the mountains we were visiting (no prior literature existed for Mt Sanga) and of other mountains in northern/central Mozambique (Mount Namuli, Mabu, Chiperone, Inago, Mecula, Gorongosa) and Malawi (Mt Mulanje), that have been subjected to survey effort. From this we produced a table showing presence/absence for bird species on each mountain for comparative purposes. We visited the bird collections at the Natural History Museum in Tring, Hertfordshire, to measure Long-billed (*Artisornis moreaui*) and African Tailorbird (*A. metopias*) specimens and familiarise ourselves with some other species groups likely to be encountered on the mountains. Finally, for comparison to unknown vocalisations encountered we compiled an extensive sound recordings archive from pre-existing recording sets, further augmented with recordings of particular species from the online avian sound repository xeno-canto (www.xeno-canto.org).

Survey methodology

Our methodology for surveying birds on the mountains had three components:

1) Dawn chorus recordings

We followed a methodology proposed by Herzog (2016), using directional shotgun microphones. A given survey site was visited at or soon after first light where a 15 minute, uninterrupted, dawn chorus recording was made. During the first 8 minutes of the recording, the recordist initially points the microphone in the direction of greatest vocal activity and then rotated 90 degrees clockwise every minute until two rotations were completed. For the remaining 7 minutes recordings were made opportunistically/irrespective of direction to document the vocalisations of species not recorded in the previous 8 minutes or to get better recordings of species already recorded. Dawn recording sites were selected arbitrarily owing to occasionally challenging access, but each site was a minimum of 130m from one another (typically 200m+ following recommendations in Herzog 2016).

2) Mist-netting

We erected mist nets in and at the edge of evergreen forest patches on all three mountains. Net lengths used were 6m, 9m and 12m. Nets were opened arbitrarily, but generally from around 7h00am and remained open until around midday to coincide with times of peak activity. In addition to non-selective survey mist-netting we also conducted targeted netting for Long-billed and African Tailorbirds. This involved setting nets in Tailorbird territories and using playback through speakers of their vocalisations to draw them in. Captured birds from both methods were fitted with a small coloured darvic flatband to allow unique identification, checked for moult (body and flight-feather), breeding condition, and measured for the following biometrics—maximum tarsus, maximum (straightened/flattened) wing chord, tail length, bill tip to anterior nares, bill tip to skull, bill width at anterior nares, bill depth at anterior nares and mass. Blood and feather samples were also taken for the majority of captured birds. A standardised set of photographs (head and eye, spread wing, spread tail and the bird in the photographic grip) was also taken for all captured birds.

3) Opportunistic surveying

We also recorded all bird species seen or heard whilst birdwatching on the mountains via non-standardised surveying. Particular effort was made to look for birds in all the main habitat types on the mountain both in the forest and the adjacent grassland. The only habitat type not covered extensively was miombo woodland which only occurred on the lower slopes of the mountains and was largely inaccessible to us, excepting on transfer days to other mountains.

Target work on the Long-billed Tailorbird

Specific effort was made to gain information on the Long-billed Tailorbird in order to facilitate analysis on the validity of its potential full species status and conservation status. To do this we mapped territory localities, minimum territory sizes, collected blood samples through targeted netting and basic habitat attributes of territories and conducted experimental playback trials to understand their territorial interactions.

Daily log

At the end of each day we compiled our sightings into the form of a 'daily log', this comprising of a rough estimate of numbers of all species detected throughout the day. This allowed us to calculate a 'bird-days' total- the number of survey days in which a given taxon was recorded in- which acts as an approximate figure for relative abundance. To reduce the obvious bias in lack of survey effort in some habitat types, we also classify in which habitat types species were recorded so that the 'bird-days' total can be taken in context.

Preliminary inventory

A preliminary inventory is presented below for the region as a whole, broken down into each study site. This includes other work undertaken, as notified in the 'Survey' column, where '1' denotes species recorded by Jali Makawa (Benson 1946) '2' represents species recorded by Ryan & Spottiswoode (2003) and '3' on this survey. Thus species only noted with '3' represent new additions to the areas avifauna (95 species), with a total of 164 species recorded on our surveys (including 9 species first recorded by Jali Makawa but not recorded by Ryan & Spottiswoode 2003). The total avifauna recorded on all surveys totals 188 species. The exact location of Jali Makawa's visit is unclear, but is likely to have been on the northerly end of the Njesi plateau (see Ryan & Spottiswoode 2003), thus all records recorded during this survey are added to the 'Njesi plateau' column.

Table 1.1 Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

N°	Vernacular	Scientific	Survey	C	S	N	Bds/20
1	African Goshawk	<i>Accipiter tachiro</i>	2,3	x		x	4
2	Bateleur	<i>Terathopius ecaudatus</i>	2,3	x			1
3	Crowned Eagle	<i>Stephanoaetus coronatus</i>	3	x	x		6
4	>Aquila sp.	<i>Aquila</i> sp.	3	x	x		2
5	Booted Eagle	<i>Hieraaetus pennatus</i>	3	x	x		2
6	Augur Buzzard	<i>Buteo augur</i>	3		x		3
7	Gymnogone	<i>Polyboroides typus</i>	3		x	x	3
8	European Honey-Buzzard	<i>Pernis apivorus</i>	3		x		1
9	Dark Chanting Goshawk	<i>Melierax metabates</i>	3	x			1
10	Steppe Buzzard	<i>Buteo buteo</i>	3	x	x	x	8
11	Yellow-billed Kite	<i>Milvus aegyptius</i>	3	x			1
12	Dark-capped Yellow Warbler	<i>Iduna natalensis</i>	1,3			x	5
13	Iduna sp.	<i>Iduna</i> sp.	3		x		1
14	Marsh Warbler	<i>Acrocephalus palustris</i>	3		x		1
15	Rufous-naped Lark	<i>Mirafra africana</i>	1,3		x	x	1
16	Red-capped Lark	<i>Calandrella cinerea</i>	1			x	0
17	Flappet Lark	<i>Mirafra rufocinnamomea</i>	3		x		2
18	Striped Kingfisher	<i>Halcyon chelicuti</i>	2	x			0
19	White-rumped Swift	<i>Apus caffer</i>	3		x		1
20	Eurasian Swift	<i>Apus apus</i>	3			x	1
21	Crowned hornbill	<i>Tockus alboterminatus</i>	2,3	x	x	x	3
22	Trumpeter Hornbill	<i>Bycanistes bucinator</i>	3	x	x		9
23	Silvery-cheeked Hornbill	<i>Bycanistes brevis</i>	3		x		1
24	Black Cuckoo-shrike	<i>Campephaga flava</i>	2,3	x			1
25	White-breasted Cuckooshrike	<i>Coracina pectoralis</i>	2,3		x		1
26	Freckled Rock Nightjar	<i>Caprimulgus tristigma</i>	2,3	x	x	x	12

Table 1.1 Cont. Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

N°	Vernacular	Scientific	Survey	C	S	N	Bds/20
27	Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>	3	x			3
28	Square-tailed Nightjar	<i>Caprimulgus fossii</i>	3	x			2
29	Usambara Nightjar	<i>Caprimulgus guttifer</i>	3	x			3
30	Pennant-winged Nightjar	<i>Caprimulgus vexillarius</i>	3	x			1
31	(African) Spotted Creeper	<i>Salpornis spilonotus</i>	1,2,3	x	x	x	2
32	Red-faced cisticola	<i>Cisticola erythrops</i>	2,3		x	x	5
33	Tawny-flanked prinia	<i>Prinia subflava</i>	2,3	x	x	x	10
34	Yellow-breasted apalis	<i>Apalis flavida</i>	2,3	x			2
35	Black-headed apalis	<i>Apalis melanocephala</i>	1,2,3	x	x	x	16
36	Green-backed Camaroptera	<i>Camaroptera brachyura</i>	2,3	x	x	x	9
37	Singing Cisticola	<i>Cisticola cantans</i>	2		?		0
38	Rock-loving (Lazy) Cisticola	<i>Cisticola aberrans</i>	1,2,3	x	x	x	6
39	Long-billed Tailorbird	<i>Artisornis moreaui</i>	1,2,3	x	x	x	17
40	African Tailorbird	<i>Artisornis metopias</i>	1,2,3	x		x	11
41	Stierling's Wren-warbler	<i>Calamonastes stierlingi</i>	2,3	x	x		6
42	Yellow-bellied Eremomela	<i>Eremomela icteropygialis</i>	2,3	x			2
43	Green-capped Eremomela	<i>Eremomela scotops</i>	1,2	x		x	0
44	Red-winged Warbler	<i>Heliolais erythropterus</i>	3	x	x		8
45	Rameron <African Olive> Pigeon	<i>Columba arquatrix</i>	1,3		x	x	8
46	Cape Turtle Dove	<i>Streptopelia capensis</i>	3	x	x	x	4
47	Red-eyed Dove	<i>Streptopelia semitorquata</i>	3	x		x	9
48	Lemon Dove	<i>Aplopelia larvata</i>	3	x	x	x	8
49	Tambourine Dove	<i>Turtur tympanistra</i>	3	x	x	x	14
50	Blue-spotted Wood-Dove	<i>Turtur afer</i>	3		x		1
51	European Roller	<i>Caracias garrulus</i>	3		x		1
52	Pied Crow	<i>Corvus albus</i>	3		x		3
53	Red-chested Cuckoo	<i>Cuculus solitarius</i>	3	x		x	12
54	Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	3	x	x	x	5
55	White-browed/Burchells Coucal	<i>Centropus</i> sp.	3	x	x	x	11
56	African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	3	x	x	x	6
57	>Cuckoo sp. (Cuculus)	<i>Cuculus</i> sp.	3	x	x		3
58	Diderick Cuckoo	<i>Chrysococcyx caprius</i>	3		x		1
59	Levaillant's Cuckoo	<i>Clamator levaillanti</i>	3		x		1
60	Square-tailed drongo	<i>Dicrurus ludwigii</i>	2,3	x	x		6
61	Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	2,3	x	x		1
62	Cabanis's Bunting	<i>Emberiza cabanisi</i>	2,3	x	x	x	10
63	Vincent's Bunting	<i>Emberiza vincenti</i>	3	x	x		5

Table 1.1 Cont. Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

Nº	Vernacular	Scientific	Survey	C	S	N	Bds/20
64	Common waxbill	<i>Estrilda astrild</i>	2,3	x		x	8
65	Peter's (Red-throated) Twinspot	<i>Hypargos niveoguttatus</i>	2	x			0
66	Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>	2,3		x	x	6
67	Yellow-bellied Waxbill	<i>Coccyzygia quartinia</i>	2,3		x		1
68	Red-faced Crimsonwing	<i>Cryptospiza reichenovii</i>	1,3	x		x	3
69	Green Twinspot	<i>Mandingoa nitidula</i>	3	x			1
70	Bronze mannakin	<i>Spermestes cucullatus</i>	3		x		1
71	African Broadbill	<i>Smithornis capensis</i>	3	x			7
72	Peregrine	<i>Falco peregrinus</i>	3	x			1
73	Dickinson's Kestrel	<i>Falco dickinsoni</i>	3		x		1
74	Lanner Falcon	<i>Falco biarmicus</i>	3		x		7
75	Sooty Falcon	<i>Falco concolor</i>	3		x		1
76	>small Falcon sp.	<i>Falco</i> sp.	3			x	1
77	Reichard's Seedeater	<i>Crithagra reichardi</i>	1,2	x		x	0
78	Southern Citril	<i>Crithagra hyposticta</i>	3	x	x	x	11
79	Yellow-fronted Canary	<i>Crithagra mozambica</i>	3		x		2
80	Brimstone Canary	<i>Crithagra sulphurata</i>	3			x	2
81	Eastern Saw-wing	<i>Psalidoprocne orientalis</i>	2,3	x	x	x	15
82	Barn Swallow	<i>Hirundo rustica</i>	3	x	x	x	6
83	Lesser Striped Swallow	<i>Cecropis abyssinica</i>	3	x	x	x	4
84	House Martin	<i>Delichon urbicum</i>	3	x	x	x	5
85	Rock Martin	<i>Ptyonoprogne fuligula</i>	3	x	x		4
86	Cecropis sp.	<i>Cecropis</i> sp.	3		x		1
87	Yellow-bellied Hyliota	<i>Hyliota flavigaster</i>	2	x			0
88	Southern Hyliota	<i>Hyliota australis</i>	1,3	x			2
89	Green-backed Honeybird	<i>Prodotiscus zambesiaie</i>	1			x	0
90	Greater Honeyguide	<i>Indicator indicator</i>	3	x			1
91	Scaly-throated Honeyguide	<i>Indicator variegatus</i>	3			x	2
92	Evergreen Forest Warbler	<i>Bradypterus lopezi</i>	1,2,3	x	x	x	19
93	Little Rush Warbler	<i>Bradypterus baboecala</i>	3		x		1
94	Yellow-fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>	2,3	x	x	x	12
95	Tropical boubou	<i>Laniarius major</i>	2,3	x	x	x	20
96	Orange-breasted Bush Shrike	<i>Chlorophonus sulfureopectus</i>	2,3	x	x	x	10
97	Black-backed Puffback	<i>Dryoscopus cubla</i>	2,3	x	x	x	19
98	Black-crowned Tchagra	<i>Tchagra senegalus</i>	2,3	x	x		8
99	Brown-crowned Tchagra	<i>Tchagra australis</i>	3	x		x	2
100	Brubru	<i>Nilaus afer</i>	3	x		x	3

Table 1.1 Cont. Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

N°	Vernacular	Scientific	Survey	C	S	N	Bds/20
101	Little bee-eater	<i>Merops pusillus</i>	2,3	x		x	2
102	Swallow-tailed Bee-eater	<i>Merops hirundineus</i>	2	x			0
103	European Bee-eater	<i>Merops apiaster</i>	3	x	x		7
104	African Paradise Flycatcher	<i>Terpsiphone viridus</i>	3	x	x	x	8
105	Striped pipit	<i>Anthus lineiventris</i>	2,3	x	x		5
106	African Pipit	<i>Anthus cinnamomeus</i>	1			x	0
107	African Pied Wagtail	<i>Motacilla aguimp</i>	3		x		3
108	Pipit sp.	<i>Anthus</i> sp.	3			x	1
109	Tree Pipit	<i>Anthus trivialis</i>	3			x	2
110	White-starred (Starred) Robin	<i>Pogonocichla stellata</i>	1,2,3	x	x	x	14
111	Cape robin chat	<i>Cossypha caffra</i>	1,2,3	x	x	x	13
112	Red-capped robin chat	<i>Cossypha natalensis</i>	2,3	x	x		8
113	(Mocking) Cliff Chat	<i>Thamnolaea cinnamomeiventris</i>	1,3	x		x	1
114	Common (African) Stonechat	<i>Saxicola torquatus</i>	1,2,3	x		x	8
115	Dusky Flycatcher	<i>Muscicapa adusta</i>	2	x			0
116	White-browed Robin-Chat	<i>Cossypha heuglini</i>	2,3	x	x	x	17
117	Familiar Chat	<i>Cercomela familiaris</i>	2,3		x	x	2
118	Miombo Rock Thrush	<i>Monticola angolensis</i>	1			x	0
119	Arnott's Chat	<i>Pentholaea arnotti</i>	1,2	x		x	1
120	Dapplethroat	<i>Modulatrix orostruthus</i>	3	x			3
121	Spotted Flycatcher	<i>Muscicapa striata</i>	3		x		1
122	Ashy Flycatcher	<i>Muscicapa caerulescens</i>	3		x		1
123	Livingstone's turaco	<i>Tauraco livingstonii</i>	1,2,3	x	x	x	20
124	(Western) Violet-backed sunbird	<i>Anthreptes longuemarei</i>	2	x			0
125	Collared sunbird	<i>Hedydipna collaris</i>	2,3	x	x	x	11
126	<Eastern> Olive sunbird	<i>Cyanomitra olivacea</i>	2,3	x	x	x	15
127	Amethyst (Black) sunbird	<i>Chalcomitra amethystina</i>	2	x			0
128	Variable (Yellow-bellied) sunbird	<i>Cinnyris venustus</i>	2	x			0
129	Miombo Double-collared Sunbird	<i>Cinnyris manoensis</i>	2,3	x	x	x	6
130	Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	3	x			3
131	Eastern Double-collared Sunbird	<i>Nectarinia mediocris</i>	2	x			0
132	Black-headed Oriole	<i>Oriolus larvatus</i>	3	x	x		5
133	Eurasian Golden Oriole	<i>Oriolus oriolus</i>	3	x			1
134	Cinnamon-breasted Tit	<i>Parus pallidiventris</i>	2	x			0
135	Southern Black Tit	<i>Parus niger</i>	3		x		1
136	Yellow-throated Petronia	<i>Gymnoris superciliaris</i>	2,3	x			1
137	House Sparrow	<i>Passer domesticus</i>	3		x		1

Table 1.1 Cont. Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

N°	Vernacular	Scientific	Survey	C	S	N	Bds/20
138	Hildebrandt's Spurfowl	<i>Pternistis hildebrandti</i>	3	x	x	x	14
139	Coqui Francolin	<i>Peliperdix coqui</i>	3	x			1
140	Green Wood-Hoopoe	<i>Phoeniculus purpureus</i>	3	x			1
141	Willow Warbler	<i>Phylloscopus trochillus</i>	3	x	x	x	9
142	Cardinal woodpecker	<i>Dendropicos fuscescens</i>	2,3	x		x	5
143	Green-backed Woodpecker	<i>Campethera cailliautii</i>	2	x			0
144	Stierling's Woodpecker	<i>Dendropicos stierlingi</i>	1,2	x		x	0
145	Red-throated Wryneck	<i>Jynx ruficollis</i>	3		x		1
146	Golden-tailed Woodpecker	<i>Campethera abingoni</i>	3			x	1
147	Dark Batis	<i>Batis crypta</i>	3	x			1
148	Batis sp.	<i>Batis</i> sp.	3		x		1
149	Pale (Mozambique) Batis	<i>Batis soror</i>	2,3	x			2
150	Black-throated Wattle-eye	<i>Platysteira peltata</i>	2,3	x	x		4
151	Bertram's weaver	<i>Ploceus bertrandi</i>	2,3	x		x	4
152	Spectacled weaver	<i>Ploceus ocularis</i>	2,3	x	x	x	17
153	Dark-backed (Forest) Weaver	<i>Ploceus bicolor</i>	2,3	x	x		11
154	Yellow Bishop	<i>Euplectes capensis</i>	2,3	x			2
155	Olive-headed Weaver	<i>Ploceus olivaceiceps</i>	1,2	x		x	0
156	>Ploceus sp.	<i>Ploceus</i> sp.	3	x			1
157	Village Weaver	<i>Ploceus cucullatus</i>	3		x		1
158	White-breasted Helmetshrike	<i>Prionops plumatus</i>	2	x			0
159	Retz's Helmetshrike	<i>Prionops rentzi</i>	2,3	x	x		1
160	Stripe-cheeked Greenbul	<i>Arizelocichla milanjensis</i>	1,3	x	x	x	9
161	Little Greenbul	<i>Eurillas virens</i>	2,3	x	x	x	19
162	Dark-capped Bulbul	<i>Pycnonotus tricolor</i>	2,3	x	x	x	20
163	Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	2	x			0
164	Placid Greenbul	<i>Phyllastrephus placidus</i>	1,3	x	x	x	8
165	Mountain Greenbul	<i>Arizelocichla fusciceps</i>	3		x	?	7
166	Buff-spotted Flufftail	<i>Sarothrura elegans</i>	3			x	3
167	White-tailed Crested Flycatcher	<i>Elminia albonotata</i>	1,2,3	x	x	x	14
168	African Wood Owl	<i>Strix woodfordii</i>	2,3	x		x	9
169	Spotted Eagle Owl	<i>Bubo africanus</i>	3		x		1
170	Violet-backed Starling	<i>Cinnyricinclus leucogaster</i>	3	x	x	x	12
171	Red-winged Starling	<i>Onychognathus morio</i>	3	x	x		6
172	Red-faced crombec	<i>Sylvietta whytii</i>	2,3	x			1
173	Garden Warbler	<i>Sylvia borin</i>	3		x	x	11
174	Blackcap	<i>Sylvia atricapilla</i>	3			x	3

Table 1.1 Cont. Bird species list with occurrence at Chitagal (C), Sanga (S) and Njesi plateau (N), and Bird days (Bds/20).

N°	Vernacular	Scientific	Survey	C	S	N	Bds/20
175	Arrow-marked Babbler	<i>Turdoides jardineii</i>	2,3	x	x		3
176	African Hill-babbler	<i>Pseudoalcippe abyssinica</i>	1,3			x	3
177	Kurrichane thrush	<i>Turdus libonyanus</i>	2,3	x			1
178	Orange (Ground) Thrush	<i>Zoothera gurneyi</i>	2,3	x	x	x	5
179	African Hoopoe	<i>Upupa africana</i>	3	x	x	x	6
180	Red-collared Whydah	<i>Euplectes ardens</i>	2	x			0
181	Pin-tailed Whydah	<i>Vidua macroura</i>	3		x		1
182	Purple Indigobird	<i>Vidua purpurascens</i>	3		x		1
183	(African) Yellow white-eye	<i>Zosterops senegalensis</i>	2,3	x	x	x	11
184	> Bishop sp.	<i>Euplectes</i> sp.	3	x	x	x	11
185	White-browed Scrub-Robin	<i>Cercotrichas leucophrys</i>	3		x		1
186	African Pygmy Kingfisher	<i>Ispidina picta</i>	3			x	1
187	Orange-winged Pytilia	<i>Pytilia afra</i>	3		x		1
188	African Scops Owl	<i>Otus senegalensis</i>	3	x			1
Total – 188 species				130	110	89	

Notable records

Long-billed Tailorbird (*Artisornis moreaui*)

Long-billed Tailorbirds were found to be common in the evergreen forest patches on all three sites surveyed (Njesi Plateau, Mt Chitagal and Mt Sanga). The observations on Mt Sanga represent a range extension of about 28km for the sousae subspecies of Long-billed Tailorbird and this now constitutes its northernmost known population. At all three sites, birds were found in the mid-storey and canopy (never the understorey) particularly in areas of the forest with a gap or clearing (such as that created by a tree fall) and dense vine tangles. Birds occurred in both the patches of riparian forest which run down from the tops of the mountains as well as on the taller forest patch that sits at the very top of Mt Sanga and Chitagal. We are pleased to report that the species is common at all three sites and territories occurred in virtually all available habitat. The locations of approximately 35 territories were marked to train a species distribution model as to the available habitat occupancy of the species.

The Long-billed Tailorbirds were highly vocal and territorial, responding aggressively to playback of their own species song but not to playback of the songs of African Tailorbird or other sympatric species such as Little Greenbul, Forest Weaver or Olive Sunbird. Each territory contained a single pair of Long-billed Tailorbirds (excepting one that appeared to be held by a lone male), with both individuals playing an active role in territory defence. Duetting between members of a pair was common and was used frequently in response to a perceived intruder following playback of Long-billed Tailorbird calls.

The bird initiating the duet would either give a series of single nasal notes or a rapid repeated chiming two-note call.

Generally, we found that the bird initiating the duet (possibly the male as they have consistently larger biometrics than the other bird in the pair when they were caught and colour-ringed) is more aggressive and 'bold' in territory defence (the so-called "responder"), reacting sooner to the playback, calling more often and approaching the speaker closer. Of 12 captured individuals, 11 blood samples were collected (1 from Chitagal and 5 each from Njesi/Sanga). Taken together, our targeted work on the Long-billed Tailorbird will inform the extent of its occurrence, a population estimate and the genetic basis for its treatment as a distinct species.

African Tailorbird (*Artisornis metopias*)

African Tailorbirds were recorded at the Njesi Plateau and Mt Chitagal but not at Mt Sanga. Their absence from Mt Sanga was surprising given the presence of Long-billed Tailorbirds there and that African Tailorbirds are present on many of the mountains further north in Tanzania (intuitively, we would expect the opposite). At both Njesi and Chitagal, African Tailorbirds were found exclusively in the understorey particularly at forest edge and clearings in both riparian and evergreen forests. Interestingly, in the absence of African Tailorbirds, Long-billed Tailorbirds were still found to forage in the canopy and not the understorey on Mount Sanga. This is additional evidence that any foraging niche differences between Mozambican and Tanzanian populations of Long-billed Tailorbird are unlikely to be mediated by the presence/absence of African Tailorbirds.

As with Long-billed Tailorbirds, African Tailorbirds were found to be highly territorial, with both members of a pair defending the territory using duetting and close approach of the perceived intruder. Aggressive territorial behaviour was recorded only in response to playback of African Tailorbird songs and not to Long-billed Tailorbird vocalisations or those of other sympatric species.

Usambara Nightjar (*Caprimulgus guttifer*)

Three birds were sound recorded calling over the montane forest/grassland on Mt Chitagal in the evening at around 6pm on 9th November. Single birds were also heard calling pre-dawn over the riparian forest we were camping in at Chitagal in on 10th and 11th November.

Usambara Nightjar is sometimes treated as a subspecies of Rwenzori Nightjar (*C. ruwenzorii guttifer*). Neither the taxon *guttifer* nor Rwenzori Nightjar more broadly has been recorded in Mozambique before. Usambara Nightjar is also known from north-east Zambia, Malawi and Tanzania.

Dappled Mountain Robin (*Modulatrix arcanator*)

Two birds were caught in mist-nets on 8th November in riparian forest at Mt Chitagal. On 9th November one was caught on a camera trap in forest at the top of Mt Chitagal and then 11th November one was photographed again in the top forest at Mt Chitagal.

This species is a highly localised endemic to the Eastern Arc Mountains. It had previously been recorded on Mt Mabu and Mt Namuli in north-central Mozambique and in the Udzungwa and Usambara

mountains of Tanzania to the north. The discovery of this species on Mt Chitagal fills a 'stepping stone' gap in the distribution of this threatened Afromontane endemic.

Dark Batis (*Batis crypta*)

One female was caught in a mist-net in the forest at the top of Mt Chitagal on 10th November. This species is another endemic to Eastern Arc Mountains previously only recorded from Tanzania and extreme NW Malawi (Fjeldså et al. 2006). This represents a first record for Mozambique and significant range extension.

African Hill-babbler (*Pseudoalcippe abyssinica*)

We found several individuals of this species in the patches of riverine forest on the Njesi Plateau. We photographed a two birds and obtained sound recordings of songs and vocalisations of other individuals. Birds were detected on 22nd, 23rd and 24th November.

This species was first recorded on the Njesi Plateau by Jali Makawa in 1945 who collected several specimens. The species was not recorded by Ryan & Spottiswoode during their 2001 visit. Visually, these birds do not match African Hill-babblers we have observed elsewhere. They are dark faced and have a distinctive white crescent on the upper breast, a feature that is not mentioned in the literature. The crescent is overlain by dark vertical streaking. The subspecific status of this taxon is thus unclear and further work examining the specimens collected by Jali Makawa is necessary for comparison.

Blackcap (*Sylvia atricapilla*)

2-3 birds (both males and females) were seen on 22nd, 23rd and 24th November moving through scrub and mid-storey vegetation at the forest edge on the Njesi Plateau. Several birds were also heard to sing. This species was outnumbered approximately 10 to 1 by Garden Warbler (*Sylvia borin*) which was very common in the same habitat on Njesi Plateau throughout the period of observation there.

This species generally winters from Tanzania north and was first recorded in Mozambique on 5-6 December 2001 on the Muretha Plateau of Mt Namuli by Melo et al. (2006) and has subsequently been recorded on Mt Gorongosa (Gary Allport pers comm.). Our records thus represent some of the first records for Mozambique, although it is likely that the species is a more regular migrant than currently appreciated in the country, at least in the north.

Vincent's Bunting (*Emberiza vincenti*)

A single individual was seen on the rocky peak of Mt Chitagal by Merlijn Jocque on 11th November. Several individuals were seen on the rocky top of Mt Sanga by various observers in the team between the 14th and 18th November.

The first record of this species for Mozambique was by Jack Vincent in 1933 who collected specimens from Zobué on the border with Malawi. Subsequently the species was found on Mt Inago (Fishpool & Bayliss 2010) and then on Mt Mecula in the Niassa Game Reserve (Spottiswoode et al. 2016). Our records represent the fourth and fifth localities for this species in Mozambique.

Green Twinspot (*Mandingoa nitidula*)

Two birds were observed and photographed foraging in the mid-storey of the 'upper forest' on Mt Chitagal on the 11th November. This secretive species has only been recorded on Mts Mabu and Mulanje in our literature reviews but occurs relatively widely (although uncommonly) elsewhere to the north and west. We are aware of no other records for northern Mozambique, thus representing a minor range extension into the region.

Mountain Greenbul (*Arizelocichla fusciceps*)

This species was conspicuous and were recorded daily on Mt Sanga and were clearly the dominant Pycnonotid species at this site. Recorded only on Mt Namuli in Mozambique, but distributed widely throughout the highlands of Tanzania. This locality at Mt Sanga represent a range extension into northern Mozambique of this range-restricted (although relatively common in range) species.

Southern Citril (*Crithagra hyposticta*)

Commonly recorded on all peaks, generally in small group (2-5), but up to ~35 birds (in the evening-possibly to roost?) on Mt Sanga on the 21st Nov. This taxon is common and widespread throughout Tanzania and Malawi and recorded in a few localities in Mozambique, namely Mts Inago, Chiperone and Namuli. These represent the first documentation of the species in north-western Mozambique and constitutes a minor range extension.



2. Mammals

Tim van Berkel

Mammals play an important role ecologically in ecosystems and have a large economical relevance for people. Even though subsistence hunting of mammals is illegal, it is common place in Northern Mozambique. The aim of the mammal surveys is to identify as many species as possible. To this extent, four survey methods were used.

1. Camera Traps

Fifteen cameras, four Bushnell Trophy Cam Agressor and 11 Bushnell Trophy Cam HD, were deployed with the main aim of surveying elusive and nocturnal medium- to large -sized terrestrial mammals. Camera traps are most useful in restricted environments such as forests where mammals are more likely to pass a camera. In open areas such as grassland and savannah this method is much less suitable due to animals' more randomised movement. Camera traps in this survey were deployed mainly in forests, and a small number in grassland and rocky areas. Set up locations were selected around traces of animal activity, such as trails, drinking locations and middens. Camera traps were placed about 40cm off the forest floor and set to highest sensitivity to maximise the detection probability. We chose for a combination of video and photo captures depending on expected exposure time of passing animals.

The total survey effort includes 105 camera trap days (Table 2.1). In Chitagal cameras were located in riverine forest (N=7), montane forest (N=7) and savannah grassland (N=1). In Sanga cameras were located in montane forest (N=8) and on rocky outcrops (N=2). At the Njesi Plateau cameras were located in montane forest (N=3), riverine forest (N=2), scrub (N=5) and on rocky outcrops in grassland (N=2)

Table 2.1 Camera trap survey effort with the total number of camera traps, total survey time in days and exact survey days, on the three surveyed sites.

Site	# cameras	Days	Survey Period
Chitagal	15	35	07 Nov – 11 Nov 2016
Sanga	10	38	14 Nov – 18 Nov 2016
Njesi	12	32	21 Nov – 24 Nov 2016

2. Sherman traps

Small mammal traps were used to catch terrestrial rodents. Thirty Sherman traps (twenty 7.6 x 9 x 23 cm and ten 5 x 6 x 17 cm) were baited with a mixture of peanut butter, oats, water and vegetable oil, rolled into small balls. Baited traps were deposited in grassland and forest to compare rodent assemblages across habitats. Four traps were placed in vegetation between 1-2m of the forest floor on Njesi.

3. Pitfall Traps

Pitfall traps were used to catch shrews and other small rodents. See Chapter on Herpetofauna for a description of the pitfall trap setup.

4. Direct Observations

Direct observations were used to observe nocturnal and arboreal species that would otherwise not be recorded using the other methods. Any signs of mammals were recorded opportunistically. These include tracks, skulls, hairs and scat, the latter which were collected.

Where necessary species were identified with the use of Stuart's Field Guide to Mammals of Southern Africa (Stuart & Stuart 2015).

Results and discussion

1. Camera traps

A total of ten terrestrial mammals were identified from camera trap images (Table 2.2). The most common species and the only species that was recorded on all three sites was the Common Large-spotted Genet (*Genetta maculata*). The majority of species observed on camera traps are fairly common, but two species are noteworthy.

Table 2.2 Mammals recorded on camera traps, with the number of times an animal passed the cameras (events), the total number of recordings (frequency) and the total number of cameras on which it was recorded.

Location	Common Name	Scientific Name	Events	Frequency	Cameras
Chitagal	African Civet	<i>Civettictis civetta</i>	1	29	1
	Common Large-spotted Genet	<i>Genetta maculata</i>	6	171	4
	Gambian Giant Pouched Rat	<i>Cricetomys gambianus</i>	1	29	1
	Slender Mongoose	<i>Galerella sanguinea</i>	2	57	2
	Syke's Monkey	<i>Cercopithecus albogularis</i>	1	29	1
Sanga	Common Large-spotted Genet	<i>Genetta maculata</i>	1	31	1
	Klipspringer	<i>Oreotragus oreotragus</i>	5	156	1
	Smith's Rock Rabbit	<i>Pronolagus rupestris</i>	2	63	1
Njesi	African Civet	<i>Civettictis civetta</i>	1	26	1
	Bushpig	<i>Potamochoerus larvatus</i>	1	26	1
	Common Large-spotted Genet	<i>Genetta maculata</i>	3	79	3
	Four-toed Sengi	<i>Petrodromus tetradactylus</i>	1	26	1
	Gambian Giant Pouched Rat	<i>Cricetomys gambianus</i>	2	53	1
	Side-striped Jackal	<i>Canis adustus</i>	1	26	1



The observation of Smith's Red Rock Rabbit (*Pronolagus rupestris*) from Mt Sanga in Niassa is only the third confirmed record for Mozambique and is a substantial range extension and the most Northern record for the species. Other Mozambican records are from Mt Mabuli (Bayliss 2007) and Mt Inago (Bayliss et al., 2010), both confirmed by sight, and Mt Mabu (Timberlake et al 2012), through interview with a local hunter. The latter record is treated as unconfirmed.

P. rupestris, was recorded twice from the same camera trap at 1777m at a communal midden site on a rocky outcrop in a recently burned grassland. At the same site scat from hyrax (*Procavia capensis*) and klipspringer (*Oreotragus oreotragus*) was found. Four other observations, always on rocky terrain near the top of the mountain, suggest it might be relatively common in this region. On three occasions *P. rupestris* was observed foraging at night and on one occasion it was flushed from its form during the day.

The second noteworthy observation was Syke's Monkey (*Cercopithecus albogularis*) recorded drinking from a stream near camp in riverine forest at 1412m altitude at Mt Chitagal (Figure 2.1). The species was also frequently heard and visually observed at one occasion in a patch of montane forest on the south side of Mt Sanga. These are the first confirmed observations for this species for the area and the northern most record of Mozambique. Timberlake et al. (2009 and 2012) recently recorded it in Mt Mabui, Mt Namuli and Mt Chipirone and Bayliss et al. (2010) recorded Syke's Monkey from the area around Mt Inago.

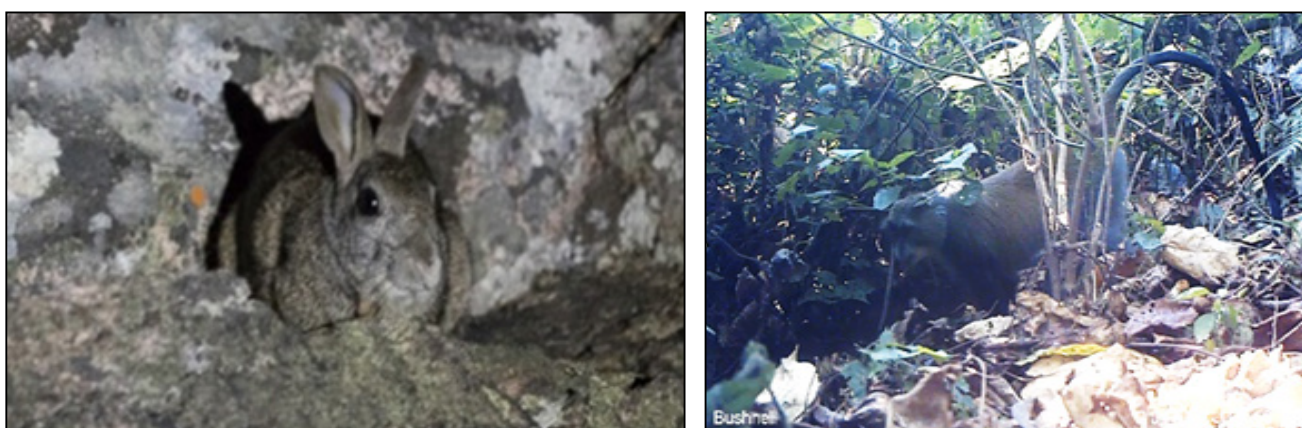


Figure 2.1. Smith's Red Rock Rabbit (*Pronolagus rupestris*) from Mt Sanga (Picture: Mac Stone), and Syke's Monkey (*Cercopithecus albogularis*) drinking from a stream at Mt Chitagal (Picture: camera trap).

2. Small Mammal Trapping

Only two individuals (murids) were trapped during the surveys on all three sites, despite a significant total effort of 360 trapping nights (Table 2.3). This represents a trap success of 0.6%. None of the traps failed and bait was never taken out of the trap or totally eaten by ants, termites or other non-target species.

Table 2.3 Sherman trap survey effort in number of trap days in the different habitats on the three study sites.

Site	Afromontane Forest	Riverine Forest	Grassland	Survey period
Chitagal	0	75	45	07 Nov – 11 Nov 2016
Sanga	60	0	60	14 Nov – 18 Nov 2016
Njesi	60	0	60	21 Nov – 24 Nov 2016

Table 2.4 Summary of mammal species recorded from the three study sites: Chitagal (Ch), Njesi Plateau (Nj), Sanga (Sa). Species in red require identification confirmation. Observation methods: Sp = Spoor, CT = Camera Trap, Pf = Pitfall, Vis = Visual, Skull =Sk. * indicates specimens were collected.

Family	Vernacular	Scientific	Ch	Nj	Sa	Altitude (m.)	Method
Bathyergidae	Silvery Mole-rat*	<i>Heliophobius argenteocinereus</i>	x	x	x		Sp
Bovidae	African Buffalo	<i>Syncerus caffer</i>	x				Vis, Sp
Bovidae	Blue Wildebeest	<i>Connochaetes taurinus</i>	x				Sp
Bovidae	Common Reedbuck	<i>Redunca arundinum</i>		x			Sp
Bovidae	Klipspringer	<i>Oreotragus oreotragus</i>			x		Vis, CT
Bovidae	Sable Antelope	<i>Hippotragus niger</i>	x		x		Sp
Canidae	Side-striped Jackal	<i>Canis adustus</i>		x		1804	CT
Cercopithecidae	Syke's Monkey	<i>Cercopithecus mitis</i>	x		x		Vis
Cercopithecidae	Vervet Monkey	<i>Chlorocebus pygerythrus</i>	x				Vis
Cercopithecidae	Yellow baboon	<i>Papio cynocephalus</i>	x				Vis
Felidae	Leopard	<i>Panthera pardus</i>			x		Sp
Galagidae	Southern Lesser Galago	<i>Galago moholi</i>	x		x		Vis
Galagidae	Thick-tailed Galago	<i>Otolemur crassicaudatus</i>			x		Vis
Herpestidae	Bushy-tailed mongoose	<i>Bdeogale crassicauda</i>			x		Vis
Herpestidae	Dwarf Mongoose	<i>Helogale parvula</i>			x		Sp
Herpestidae	Slender Mongoose	<i>Galerella sanguinea</i>	x				CT
Herpestidae	Water Mongoose	<i>Atilax paludinosus</i>	x				Sp
Hyaenidae	Spotted Hyena	<i>Crocutta crocutta</i>	x	x	x		Sp
Hystricidae	South-African Porcupine	<i>Hystrix africae australis</i>	x	x			Sp
Leporidae	Smith's Red Rock Hare	<i>Pronolagus rupestris</i>			x		Vis. Sp, CT

Table 2.4 Cont.

Family	Vernacular	Scientific	Ch	Nj	Sa	Altitude (m.)	Method
Macroelididae	Four-toed Sengi	<i>Petrodromus tetradactylus</i>		x			CT
Muridae	Woodland Thicket Rat*	<i>Grammomys sp.</i>			x	1686	Tr
Muridae	Gambian Giant Pouched Rat	<i>Cricetomys gambianus</i>	x	x	x		Vis, CT
Muridae	Pygmy Mouse	<i>Mus sp.</i>		x	x	1773, 1830	Vis
Muridae	Single-striped Grass Mouse	<i>Lemniscolys rosalia</i>			x		Vis
Muridae	Woodland Thicket Rat*	<i>Grammomys sp.</i>			x	1438	Pf
Muridae	Woodland Thicket Rat*	<i>Grammomys sp.</i>	x			1705	Tr
Myoxidae	(Woodland) Dormouse	<i>Graphiurus (murinus)</i>	x			1410	Vis
Nandiniidae	African Palm Civet	<i>Nandinia binotata</i>	x		x		Vis
Procaviidae	Rock Hyrax	<i>Procavia capensis</i>	x	x	x		Vis
Sciuridae	Mutable Sun Squirrel	<i>Heliosciurus mutabilis</i>	x				Vis
Soricidae	Climbing Dwarf Shrew*	<i>Suncus megalura</i>		x		1777	Pf
Soricidae	Greater Grey-brown Musk Shrew*	<i>Crocidura luna</i>	x		x	14147, 1686	Pf
Soricidae	Reddish-grey Musk Shrew*	<i>Crocidura cyanea</i>	x		x	1417, 1686	Pf
Soricidae	Shrew*	<i>Crocidura sp.</i>			x	1686	Pf
Soricidae	Tiny Musk Shrew*	<i>Crocidura fuscomari na</i>	x			1417	Pf
Suidae	Bushpig	<i>Potamochoerus larvatus</i>	x	x	x		Sp, CT
Thryonomyidae	Lesser Cane Rat	<i>Thryonomys gregorianus</i>			x		Sk
Viverridae	African Civet	<i>Civettictis civetta</i>	x	x	x		Sp, CT
Viverridae	Common Large-spotted Genet	<i>Genetta maculata</i>	x	x	x	1400-1600	CT, Vis

3. Pitfall Trapping

Pitfall trapping proved to be more successful than small mammal trapping. A total of 12 individuals were caught consisting of 11 shrews and one murid. Identification in the field was not possible for all but the Climbing dwarf shrew (*Suncus megalura*). All individuals apart from one shrew, identical to the four other individuals that we preliminary identified as *Crocidura luna* were collected and identification will be attempted through skull and DNA analysis. Preliminary identification of the individuals is listed in Table 2.4. These results should be taken as preliminary.

4. Scat and opportunistic observations

Several mammal species were recorded through opportunistic observations during day and night walks and collection of scat and footprints (Table 2.4). Scat found at the base of Chitagal points towards Blue Wildebeest (*Connochaetus taurinus*) which is not listed to occur in the area and only seems to survive in Niassa Game Reserve. This record needs to be verified.

Conclusion

A total of 41 terrestrial mammal species are currently recorded from the three study areas. Some of the observations need confirmation of identification. Many more are expected, but a couple of interesting additions to the regio are done.

Small mammal trapping rate was remarkably low with only two catches in the forest (one on Chitagal and one on Sanga), and none in grassland and rocky outcrops. This could possibly be explained by the end of the dry season, that trapping occurred around full moon and the sky was often clear, resulting in very good visibility. These factors might give rise to low small mammal activity. Low small mammal density or bait attractiveness are other elements that can affect capture rates. Trapping in the wet season would be most interesting.

The apparent lack of larger animals, mainly antelopes, on the mountains is remarkable. Buffalo (Chitagal) and klipspringer (Sanga) were the only large mammals directly observed and it is believed that hunting pressure is an important factor. Local people are known to hunt in Chitagal and Njesi, especially during the wet season. Hunting is predominantly with snares and based on communications with local people the target species are bushpigs, which use the mountains as part of their migration route in the wet season. Small snares were also observed on the Njesi Plateau, mostly set for terrestrial birds such as francolin. Hunting pressure in Chitagal appeared to be relatively low with only two large inactive snares observed in the study area. On the other hand, hunting pressure on Njesi was extremely high, with every forest patch filled with multiple snares. Well over 20 snares were encountered. Hunting here seems unsustainable, only further exemplified by the lack of signs of larger mammals and lower density of pig scat compared to Chitagal and Njesi. The difference in hunting pressure is almost certainly a direct result of the remoteness of Chitagal and proximity of the Njesi Plateau. The lack of accessible water on Sanga could be another limiting factor for large mammals that rely on it.

According to our local guide, elephants were known to occur in Sanga and elephant trails were observed in the forest, but the last observations are from five years ago.



3. Amphibians and reptiles

Clause J. & Jocque M.

Little is known on the amphibians and reptiles in this region. Published reports from this region include Portik et al. (2015) at the Njesi plateau and Branch et al. (2005) surveying the Niassa Game Reserve in Northern Mozambique bordering Tanzania. Additional records are found in the expedition reports of Mt. Mabu (Timberlake et al. 2009), Mt. Namuli (Timberlake et al. 2012), Mt. Chipirone (Timberlake et al. 2007) and Mt. Inago (Bayliss et al. 2010). On this expedition, amphibians were surveyed with daily and nightly herpetological surveys, consisting of both visual encounter and active search. Additionally, in each camp pitfall traps with a drift fence were placed (for details on the pitfall trap array, see section 4, table 4.2). Opportunistic specimens were collected during the other biodiversity surveys.

In total, 96 herpetological specimens were collected over 17 days of sampling, with at least 24 species confirmed across all three sites (Table 3.1). Almost all animals were observed during visual encounter surveys. Pitfall traps provided only three *Arthroleptis* sp. at the Njesi plateau. Confirmation of identification for several specimens is needed. Some of these species were collected from lower elevation on the way to the basecamp on the respective survey sites and those are listed separately in the species list. We have separated the list into “High” (over 1,400 m) and “Low” elevation (under 1,400 m). While there were high abundances of several species in all three areas, their distribution was extremely patchy. Most frogs were collected in riparian forest and partially dried wetlands, which is to be expected at the end of the dry season. Lizards were most commonly observed on rocky outcrops scattered through the grassland habitat. Only one lizard (*Lygodactylus* sp.) and two frogs (*Arthroleptis stenodactylus*) were observed in closed canopy forest that was not immediately adjacent to flowing water.

A single incident of soft rains on the Njesi plateau was the only rain during the expedition. Herpetological activity was very low. Snakes and chameleons were largely missing and frogs were restricted to wet patches. It is difficult to determine the relevance of many of these records without further identification work. However, there are two exceptions that are immediately apparent:

1. Shovel Footed Squeaker (*Arthroleptis stenodactylus*) was a commonly encountered frog, with four+ observations, recorded from the four study sites at high elevation. This species is an addition to the species list of Portik et al. 2013 within the Njesi plateau. This inconsistent detection between the two expeditions might reflect a seasonal activity pattern of these frogs.
 2. The Girdled Lizard (*Cordylus* sp.) observed on Chitagal and Sanga Mountain closely resembles *Cordylus mecula*, a recently described species (Branch et al. 2005) currently only recorded from Serra Mecula. This is a significant range extension expanding its presence to two other mountain tops (250 km distant and increase its elevation range by over 500m).
-

Table 3.1 Amphibians and reptiles recorded in the three study sites. Observations are grouped in “High” (over 1,400 m) and “Low” elevation (under 1,400 m).

	Family	Genus	Species	Chitagal	Sanga	Njesi
Anura	Arthrolepidae	<i>Arthroleptis</i>	<i>stenodactylus</i>	H	H	H
	Arthrolepidae	<i>Arthroleptis</i>	<i>xenodactyliodes</i>	H	H	H
	Bufo	<i>Amietophrynus</i>	<i>maculatus</i>	L		
	Bufo	<i>Amietophrynus</i>	<i>sp.</i>		H/L	
	Bufo	<i>Rhacophoridae</i>	<i>chiromantis</i>			L
	Hyperoliidae	<i>Afrixalus</i>	<i>sp.</i>		L	
	Hyperoliidae	<i>Hyperolius</i>	<i>sp.</i>	H	H/L	
	Microhylidae	<i>Unidentified</i>	<i>sp.</i>		L	
	Ptychadinedae	<i>Ptychadena</i>	<i>sp.</i>		L	
	Pyxicedenidae	<i>Amietia</i>	<i>sp.</i>	L		
	Rhacophoridae	<i>Chiromantis</i>	<i>xerampelina</i>			
	Hyperoliidae	<i>Unidentified</i>	<i>sp.</i>	L		
	N/A	<i>Unidentified</i>	<i>sp.</i>	L		
	Sauria	Agamidae	<i>Agama</i>	<i>sp.</i>	H	
Chamaeleonidae		<i>Chamaeleo</i>	<i>dilepis</i>		L	H/L
Chamaeleonidae		<i>Chamaeleo/Triceros</i>	<i>melleri</i>		L	L
Cordylidae		<i>Cordylus</i>	<i>sp.</i>	H	H	
Geckonidae		<i>Hemidactylus</i>	<i>mabouia</i>		H	H
Geckonidae		<i>Lygodactylus</i>	<i>sp.</i>		H	
Scincidae		<i>Tachylepis</i>	<i>sp.</i>	H	H	H
Scincidae		<i>Melanoseps</i>	<i>sp.</i>	H	H	
Squamata	Colubridae	<i>Crotaphopeltis</i>	<i>hotamboeia</i>		L	
	Lamprophiidae	<i>Boaedon</i>	<i>capensis</i>			H
	N/A	<i>Unidentified</i>	<i>sp.</i>			H
	N/A	<i>Unidentified</i>	<i>sp.</i>		H	



4. Invertebrates

Geeraert L. & Jocque M.

Few studies are available on invertebrates in the Serra Jecci mountain range. The published accounts with regards to the groups targeted on the Njesi Plateau expedition, are mostly on butterflies and include a checklist of day butterflies of the Njesi Plateau, Inago, Namuli, Mulanje, Chipirone, Mabu and Zomba Mountains (Congdon et al. 2010). Additional published information on butterflies in this region includes observations from Mt. Mecula and Mt. Yao (Congdon et al. 2012) and Mt. Mabu (Bayliss et al. 2014). A new butterfly *Cymothoe baylissi* was recently described from Mt. Namuli, Mt. Mabu and Mt. Inago (Van Velzen et al. 2016).

On the Njesi Plateau expedition selected groups of invertebrates were collected through four main methods.

1. Light trap

Target groups were hawkmoths (Sphingidae) and emperor moths (Saturnidae). Selected beetles (Coleoptera) were also collected.

The light trap setup (Figure 4.1) consisted of a 125W UV Mercury Vapour bulb (Philips, EPN) strung centrally above a white sheet draped over a rope. A black plastic (3 times 2 meters) covered the ground to easier collect inflying invertebrates. The light trap was powered by a small generator (900 Watt Tiger) and was activated soon after dusk on most days (Table 4.1).

Table 4.1 Light trap setup; latitudinal coordinates South (S) and East (E), elevation in meters (Elev.), date, start time and duration of light trapping and habitat.

Mountain	S	E	Elev. (m)	Date	Start time	Hours	Habitat
Chitagal	12°35'30.7"	35°18'22.8"	1030	6/11/16	7:40PM	2	Miombo
Chitagal	12°35'49.3"	35°15'35.7"	1428	7/11/16	6:20 PM	2	Reg. savannah
Chitagal	12°35'49.3"	35°15'35.7"	1428	8/11/16	6:45PM	2.30	Reg. savannah
Chitagal	12°35'49.3"	35°15'35.7"	1428	9/11/16	6:00PM	3	Riparian forest
Chitagal	12°35'49.3"	35°15'35.7"	1428	10/11/16	6:20PM	2.45	Riparian forest
Chitagal	12°35'49.3"	35°15'35.7"	1428	11/11/16	6:15PM	2.30	Riparian forest
Sanga	12°24'00.7"	35°20'07.0"	1702	14/11/16	8:00PM	1.30	Montane forest
Sanga	12°24'00.7"	35°20'07.0"	1702	15/11/16	7:30PM	1.40	Reg. savannah
Sanga	12°24'00.7"	35°20'07.0"	1702	16/11/16	7:30PM	30	Montane forest
Njesi	12°49'56.8"	35°11'12.9"	1728	20/11/16	7:05PM	2.45	Reg. savannah
Njesi	12°49'56.8"	35°11'12.9"	1728	21/11/16	6:35PM	2.40	Reg. savannah
Njesi	12°49'56.8"	35°11'12.9"	1728	22/11/16	6:30PM	3	Reg. savannah
Njesi	12°49'56.8"	35°11'12.9"	1728	23/11/16	6:15PM	4.15	Reg. savannah

Table 4.2. Entomological (Ent.) and herpetological (Herp.) pitfall trap setups, coordinates of the set-up location, elevation, habitat type distinguishing between montane forest (MF) and riparian forest (RF) (EV = edge vegetation), number of pitfalls (Traps), length of the driftfence in meters (Fence).

Mountain	S	E	Elev.	Date	Start time	Days	Habitat	Traps	Fence
Ent.	pitfall traps		(m)						(m)
Chitagal	12°35'49.1"	35°15'13.4"	1624	8/11/16	12:30 PM	3	MF	5	0
Sanga	12°22'58.0"	35°20'01.3"	1724	14/11/16	10:00 AM	4	MF	5	0
Sanga	12°22'52.8"	35°19'56.6"	1767	14/11/16	12:00 PM	4	MF	5	0
Njesi	12°49'45.9"	35°11'10.1"	1815	21/11/16	9:45 AM	3	MF	5	0
Njesi	12°49'43.1"	35°11'04.0"	1810	21/11/16	11:00 AM	3	EV	5	0
Herp.	pitfall traps								
Chitagal	12°35'49.3"	35°15'35.7"	1428	8/11/16	3:00 PM	3.5	RF	6	25
Sanga	12°24'00.7"	35°20'07.0"	1702	14/11/16	5:30 PM	4	MF	6	50
Njesi	12°49'53.3"	35°11'10.0"	1777	21/11/16	4:00 PM	3.5	RF	4 (6)	30 (40)



Figure 4.1 Herpetologic pitfall trap (up left), Malaise trap (up right), light trap (below left) and entomologic pitfall trap (below right). (Pictures: Lore Geeraert)

2. Pitfall trap

Target groups were spiders and ground beetles (Carabidae). Most bycatch from pitfalls was collected. Two pitfall setups provided invertebrates; the invertebrate pitfalls, consisting of small (12 cm diameter) undep (8 cm deep) transparent plastic cups filled with 50% ethanol (Figure 4.1) and the pitfall setup for herpetologic surveys consisting of six white cone shaped plastic containers (40 cm diameter) with a black plastic drift fence (Figure 4.1). The invertebrate pitfalls were placed with a distance of 10m from each other and the pitfalls for herpetological surveys were placed in a single line (Table 4.2).

3. Malaise trap

Target groups were hoverflies (Syrphidae). All bycatch from malaise traps was collected.

Two malaise traps were erected at each location and collected at the end of each stay. Collecting pots were filled with 50% ethanol (Figure 4.1). Malaise traps were placed in forest patches (Table 4.3).

Table 4.3 Malaise trap setups. Coordinates of the set-up locations, elevation in meters, habitat type distinguishing between montane forest (MF) and riparian forest (RF) (EV= edge vegetation).

Mountain	S	E	Elev. (m)	Date	Start time	Days	Habitat
Chitagal	12°35'49.1"	35°15'13.4"	1624	8/11/16	12:00 PM	3	MF
Chitagal	12°35'49.3"	35°15'35.7"	1428	9/11/16	9:00 AM	2.5	RF
Sanga	12°22'58.0"	35°20'01.3"	1724	14/11/16	9:45 AM	4	MF
Sanga	12°22'52.8"	35°19'56.6"	1767	14/11/16	11:30 AM	4	MF
Njesi	12°49'45.9"	35°11'10.1"	1815	21/11/16	9:30 AM	3	MF
Njesi	12°49'43.7"	35°11'05.4"	1812	21/11/16	10:30 AM	3	EV

4. Handnet

Target groups were butterflies (Lepidoptera) and dragonflies (Odonata).

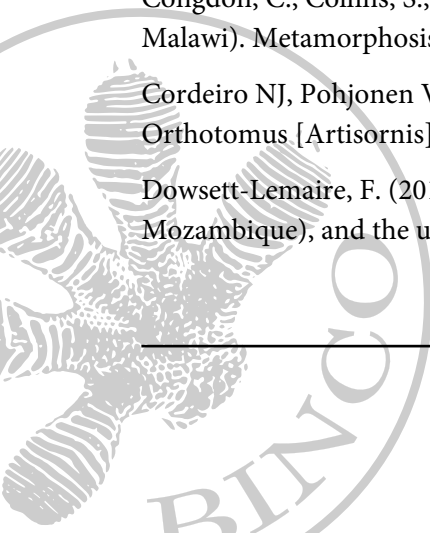
Both opportunistic and targeted collecting aimed at including a wide range of habitats to collect a representation of butterflies and dragonflies active at the moment in the study region.

Results

Identifications in progress (IIP).

References

- Baker, N. E.; Baker, L. M. 2001. Tanzania. In: Fishpool, L.D.C.; Evans, M.I. (ed.), *Important Bird Areas in Africa and associated islands: Priority sites for conservation*, pp. 897-945. Pisces Publications and BirdLife International (BirdLife Conservation Series No.11), Newbury and Cambridge, UK.
- Bayliss, J., Timberlake, J., Branch, W., Bruessow, C., Collins, S., Congdon, C., Curran, M., De Sousa, C., Dowsett, R., Dowsett-Lemaire, F., Fishpool, L., Harris, T., Herrmann, E., Georgiadis, S., Kopp, M., Liggitt, B., Monadjem, A., Patel, H., Ribeiro, D., Spottiswoode, C., Taylor, P., Willcock, S. & Smith, P. (2014). The discovery, biodiversity and conservation of Mabu forest—the largest medium-altitude rainforest in southern Africa. *Oryx*, 48; 177-185.
- Bayliss, J., Monteiro, J., Fishpool, L., Congdon, C., Bampton, I., Bruessow, C., Matimele, H., Banze, A. & Timberlake, J.R. (2010). *Biodiversity and Conservation of Mount Inago, Mozambique*. Report produced under Darwin Initiative Award 15/036. Mulanje Mountain Conservation Trust, Malawi. 32 pp.
- Benson, C.W. (1945). A new subspecies of Long-billed forest warbler from northern Portuguese East Africa. *Bulletin of the British Ornithologists' Club* 56: 19.
- Benson, C.W. (1946). A collection of birds from near Unangu, Portuguese East Africa. *Ibis* 88: 240-241.
- BirdLife International (2016) *Important Bird Areas factsheet: Njesi plateau*. Downloaded from <http://www.birdlife.org> on 03/12/2016.
- BirdLife International. 2015. *Artisornis moreaui*. The IUCN Red List of Threatened Species 2015: e.T22714958A78455639. <http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T22714958A78455639.en>. Downloaded on 03 December 2016.
- Branch, W. R., & Bayliss, J. (2009). A new species of *Atheris* (Serpentes: Viperidae) from northern Mozambique. *Zootaxa*, 2113, 41-54.
- Branch, W. R., & Tolley, K. A. (2010). A new species of chameleon (Sauria: Chamaeleonidae: Nadzikambia) from Mount Mabu, central Mozambique. *African Journal of Herpetology*, 59: 157-172.
- Branch, W.R., Bayliss J., & Tolley, K.A. (2014). Pygmy chameleons of the *Rhampholeon platyceps* complex (Squamata: Chamaeleonidae): Description of four new species from isolated 'sky islands' of northern Mozambique. *Zootaxa*, 3814, 1-36.
- Collar, N.J. & Stuart, S.N. (1988). *Key Forests for Threatened Birds in Africa*. ICBP Monograph No. 3. International Council for Bird Preservation, Cambridge
- Congdon, C., Collins, S., Bayliss, J. (2010). Butterflies of south east Africa's mountains (Mozambique and Malawi). *Metamorphosis*. 21: 46-107
- Cordeiro NJ, Pohjonen VM and Mulungu E 2001. Is the endangered Long-billed (Moreau's) Tailorbird *Orthotomus* [*Artisornis*] *moreaui* safe in the East Usambaras? *Bulletin of the African Bird Club* 8: 91-94
- Dowsett-Lemaire, F. (2010). Further ornithological exploration of Namuli and Mabu Mountains (northern Mozambique), and the urgent need to conserve their forests. *African Bird Club Bulletin*, 17; 159-177.



- Stattersfield, A.J., Crosby, M.J., Long, A.J. & Wege, D.C. (1998). *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*. BirdLife International, Cambridge
- Stevenson, T. & Fanshawe, J. (2002) *Birds of East Africa*, Christopher Helm, London.
- Stuart & Stuart 2015 - *Stuart's Field Guide to Mammals of Southern Africa*.
- Taylor, P. J., Stoffberg, S., Monadjem, A., Schoeman, M. C., Bayliss, J., & Cotterill, F. P. (2012). Four new bat species (*Rhinolophus hildebrandtii* complex) reflect Plio-Pleistocene divergence of dwarfs and giants across an Afromontane Archipelago. *PloS one*, 7, e41744.
- Timberlake, J.R., Bayliss, J., Alves, T., Baena, S., Francisco, J., Harris, T. & da Sousa, C. (2007). The biodiversity and conservation of Mount Chipirone, Mozambique. Unpublished report of Darwin Initiative project. Royal Botanic Gardens, Kew. 33 pp.
- Timberlake, J., Bayliss, J., Dowsett-Lemaire, F., Congdon, C., Branch, W., Collins, S., Curran, M., Dowsett, R.J., Fishpool, L., Francisco, J., Harris, T., Kopp, M. & Sousa, C de. (2012). *Mt Mabu, Mozambique; Biodiversity and Conservation*. Report for Darwin Initiative Award 15/036: Monitoring and Managing Biodiversity Loss in South-East Africa's Montane Ecosystems
- Timberlake, J., Dowsett-Lemaire, F., Bayliss, J., Alves, T., Baena, S., Bento, C., Cook, K., Francisco, J., Harris, T., Smith, P. & de Sous, C. (2009). *Mt Namuli, Mozambique: Biodiversity and Conservation*. Report for Darwin Initiative Award 15/036: Monitoring and Managing Biodiversity Loss in South-East Africa's Montane Ecosystems
- Vincent, J. (1933a). The Namuli Mountains, Portuguese East Africa. *The Geographical Journal* 81: 314–332.
- Vincent, J. (1933b). [Four new species and eighteen new sub-species.... collected during the recent Portuguese East African Expedition]. *Bulletin British Ornithological Club* 53: 129–149.
-