

Biodiversity surveys of Mariarano and Matsedroy tropical dry forests and associated wetlands, Western Madagascar

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Final Report

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Executive summary

The 2017 field season at Mahamavo saw scientific research conducted for a period of six weeks. The main focus of the research was the continuation of the long term ecological monitoring programme which has now been conducted since 2010.

Preliminary results suggest that although Mahamavo holds high biodiversity across all taxonomic groups studied, continued anthropogenic disturbance of the forest may have a detrimental effect in the future especially for the more sensitive species and those with specific habitat requirements. We recommend that scientific research, in collaboration with DBCAM (Development, Biodiversity and Conservation Action for Madagascar), continues in Mahamavo in order to gain a clearer understanding of the functioning of the ecosystem, animal ecology, and the effects of human activities.

Introduction

The Mahamavo region in Western Madagascar contains relatively large blocks of intact western dry forests and wetland ecosystems. A consortium comprising Development and Biodiversity Conservation Action for Madagascar (DBCAM), Operation Wallacea and the University of Oxford has been conducting a programme of biodiversity surveys and monitoring in this area since 2010. DBCAM is a grass-roots Malagasy conservation NGO, Operation Wallacea is an international volunteer-based NGO which supports conservation research through academic partnerships and The University of Oxford is a research intensive university.

The Mahamavo region has received relatively little study, yet supports considerable biodiversity including globally threatened flowering plants, reptiles, birds and mammals. Flagship species in the area include the Madagascar Fish Eagle, Coquerel's sifaka and Angel's and Oustalet's chameleons. Forests in the area are currently threatened by fires, charcoal production and agricultural expansion.

This project is a landscape-scale long-term monitoring programme of multiple taxonomic groups. The aims of the research project are to identify which species are present in the Mariarano and Matsedroy forests, to characterize spatial patterns and temporal trends in biodiversity, to monitor the condition of the forest habitat, to provide sustainable revenue to local villages and leverage further funding for environmental projects from the research results. Additionally, we aim to assimilate share data from the biodiversity surveys in Mahamavo in repositories and allow our observations to be assimilated into global datasets and indicators including the Living Planet Index (LPI) and the Global Biodiversity Information Facility (GBIF).

We believe that it is particularly important to undertake long-term biodiversity surveys in Mahamavo because this watershed is a large dynamic landscape which is experiencing changes in land cover and configuration. Climate change is also a potential threat to the persistence of biodiversity features in Mahamavo. Biogeographically, the Mahamavo region is a transition area between Northern and Western species pools, which means that potentially very large numbers of species may be found here, and there is great potential to document range extensions. The region does not contain any protected areas and has received relatively little scientific study.

Research questions

The overall objectives of the research programme are to perform a biodiversity inventory, characterize the pattern of biodiversity, and monitor biodiversity over time with sufficient power to enable trends to be detected. We can also compare trends between areas with different management practices.

The monitoring programme in Mariarano was also designed to address landscape ecology questions related to the effect of landscape configuration on several taxonomic groups. The sampling units are stratified with respect to forest configuration.

Additionally we are using the data collected to prioritise the landscape, identify threats to biodiversity and potential management actions to address these threats. A crosscutting theme is the development of technologies for monitoring, including the use of databases, and satellite remote sensing. This research system also permits the relationship between biodiversity and ecosystem function to be explored.

In addition to the long-term monitoring programme (Peter Long), a number of detailed studies of the ecology of individual taxonomic groups are supported, including: trees (Harison Andriambelo), Crocodiles (Rob Gandola), Mouse lemurs (Ute Radespiel), Chameleons (Randall Morrison), Passerine birds (Solohery Rasamison).

Long-term monitoring programme

The Mahamavo watershed lies between the larger Betsiboka and Sofia rivers. Within this large area, we have focused our research in Mariarano village. We have established a spatial sampling framework based around eleven forest sample routes, each approximately 4km long, which are stratified with respect to forest condition and configuration. There is one additional sample route along the Mariarano river sampled for reptiles only. For some sampling activities the routes are sample units, whereas for others, the routes are paths used to access around 150 sample sites. Additionally, wetlands are sampled by boat along 6 standard routes and opportunistic observations of animals and plants are collected throughout the wider landscape.

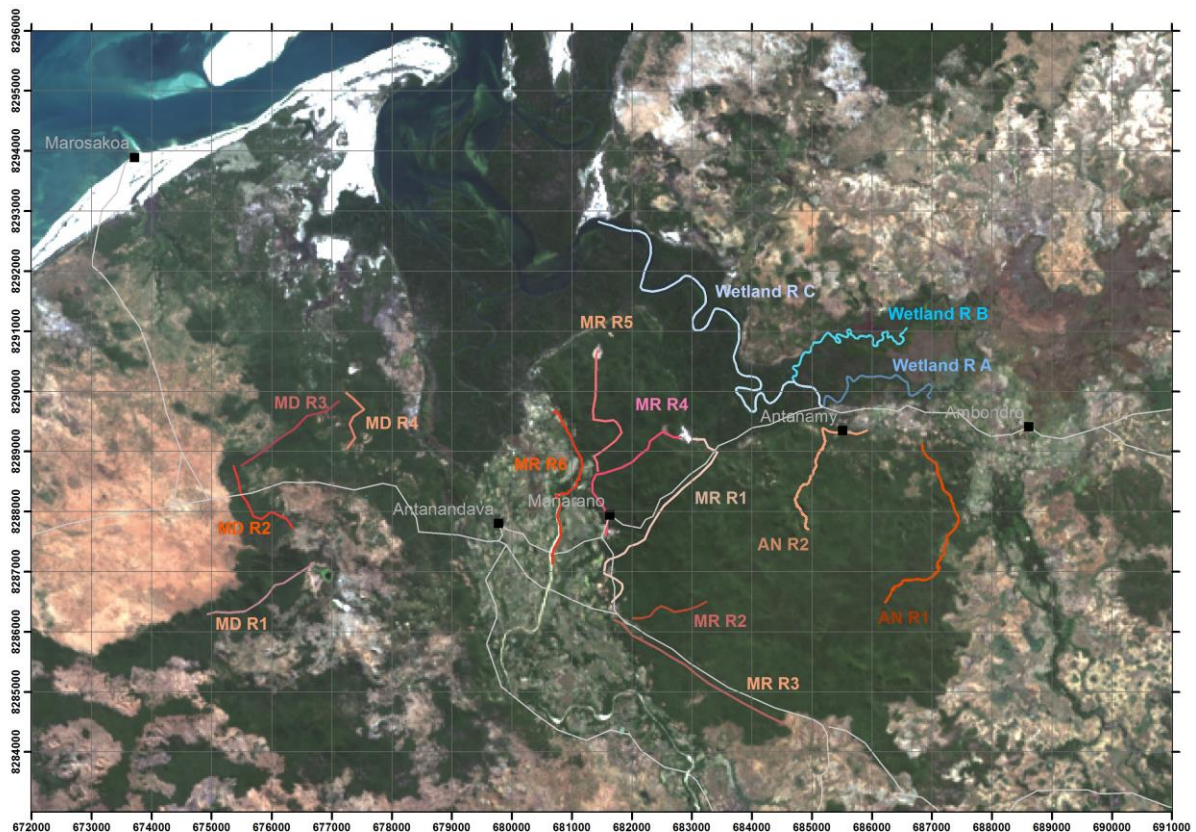


Fig 1: Map of the Mariarano and Matsedroy tropical dry forests and associated wetlands

In order to draw valid inferences about trends in relative abundances, all sample units are sampled on repeated occasions by each survey method during a field season. In the field, spatially-referenced observations are recorded on paper data sheets, which are then entered into a custom database. This permits the field data to be queried in multiple ways and combined with ancillary spatial data for further analysis.

Forest structural properties are measured in 150 plots each 20m by 20m. At each plot for tree with a diameter greater than 5cm the diameter at breast height (DBH) and height of the tree is recorded. Canopy cover at ten random locations within the plot is recorded. The number of saplings within a 2m by 2m plot within the larger plot is recorded to indicate forest regeneration. Flowering plants are also sampled in plots. In plots as many tree species as possible are identified and recorded together with each trees spatial co-ordinates.

Reptiles and amphibians are sampled by walking sample routes on multiple occasions by day and night, as well as by opportunistic searches. When a reptile or amphibian is found, it is identified and recorded together with its GPS coordinates. Crocodiles are surveyed opportunistically and by boat along 6 wetland sample routes. 100m lines of pitfall traps are also constructed with pitfalls every 10m.

In addition to the sample routes, amphibians are also sampled at inland lakes or rice paddies with as many amphibians collected as possible over a 40 minute standard search period. Each frog collected is identified to species, weighed and the snout to vent length (SVL) taken to determine the abundance of each frog species in the area as well as the population structure.

Forest birds are surveyed using 10 minute early point counts in 150 sample sites on at least six occasions per year. When a cluster of birds is detected, the species, group size, distance to birds, method of observation (seen, heard) and site co-ordinates are recorded. Additionally terrestrial birds are recorded opportunistically. Wetland birds are also surveyed by boat along 6 wetland sample routes.

Mammals are sampled by walking sample routes on multiple occasions by day and night, as well as by opportunistic searches. When a mammal is found, it is identified and recorded with its location. Mammals are also recorded opportunistically, by boat surveys and by bat mist netting and pitfall trapping small mammals. Due to the cryptic nature of mammals, a network of 13 camera traps are set at various locations in the forest for a period of 6 weeks. At the end of the research season the SD cards are reviewed and if an image of a mammal has been taken the species name, number of individuals and the GPS location of the camera is recorded.

Additional research projects

Demographic monitoring of forest birds using mist netting

Solohery Rasamison – University of Antananarivo

A mist-netting programme is being undertaken in Mariarano to study the forest-dependent passerine birds. Every morning 100m of nets are opened from 0600-1000 and checked regularly to remove captured birds. The main reason to sample birds with mist nets is to be able to ring individuals and enable blood samples to be collected. We are doing this in order to permit genetic monitoring of forest-dependent passerines both in Mariarano and in other forest sites across Madagascar. We are also using this opportunity to put unique combinations of colour rings on four abundant species to allow individuals to be recognised when resighted in future. This will allow us to fit demographic models for these species and monitor demographic parameters. Morphometric measurements are also being taken from all individuals before they are released. In a typical morning perhaps 20 individuals will be caught and processed.

2017 student projects

Nocturnal lemurs

Harry Skinner, Bangor University

Sarah Rouse, University of Oxford

Quinn Parker, Princeton University

Eric Wuesthoff, University of Massachusetts

Using a trapping grid as well as sample routes, these students studied abundance, spatial distribution, ecology and behaviour of Microcebus, Lepilemur and Avahi.

Colour variability in chameleons

Rachel Haynes, University of Exeter

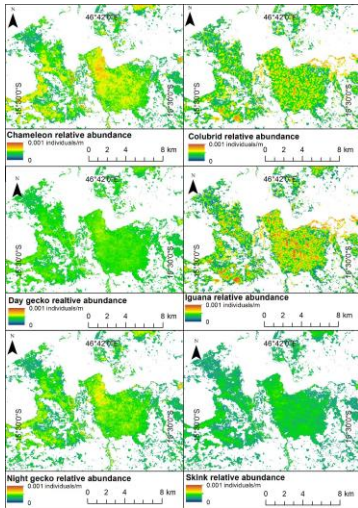
Matthew Damen, University of Nottingham

Exposed *F. angeli* and *F. oustaleti* to stimuli and measured change in colour of various body parts by taking before and after photos with a standard digital camera including krylon plates. RGB reflectances were calculated and hence colour space transformation to yield covariates for analysis.

Landscape ecology of reptiles

Georgina Ellis, University of Oxford

Investigated effects of landscape configuration on the abundance of 6 guilds of reptiles by fitting GLMs for abundance~configuration covariates. Then expressed results using map algebra.



Species distribution modeling of reptiles

Alice Clutterbuck, University of Southampton

Made distribution models for ~40 reptile species using Maxent.

Forest bird community ecology

Alfred Redman, Portsmouth University

Used relative abundance of ~60 species of forest bird by point count sites, 2010-2017 together with forest structural properties to fit models.

Occupancy models for monitoring forest birds

Nina del Rosario, Lund University

Used bird detection histories 2010-2017 at point count sites, with forest structural properties derived from plots as site specific covariates to fit occupancy models for ~60 forest bird species.

Occupancy models for monitoring reptiles

Alex Evans, University of Witwatersrand

Used reptile detection histories 2010-2017 by route segments, with zonal covariates by route segment derived from forest plots. Fitted occupancy models for ~40 reptile species.

Species lists

Birds

Primary Habitat	Scientific name	Common Name	Primary Habitat	Scientific name	Common Name
Wetland	<i>Mycteria ibis</i>	Yellow-billed Stork	Wetland	<i>Sarkidiornis melanotus</i>	Comb Duck
Wetland	<i>Numenius arquata</i>	Eurasian Curlew	Wetland	<i>Nettapus auritus</i>	African Pygmy Goose
Wetland	<i>Numenius phaeopus</i>	Whimbrel	Wetland	<i>Charadrius marginatus</i>	White-fronted Plover
Wetland	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Wetland	<i>Ardeola ralloides</i>	Squacco Heron
Wetland	<i>Haliaeetus vociferoides</i>	Madagascar Fish Eagle	Wetland	<i>Arenaria interpres</i>	Ruddy Turnstone
Wetland	<i>Himantopus himantopus</i>	Black-winged Stilt	Wetland	<i>Bubulcus ibis</i>	Cattle Egret
Wetland	<i>Ixobrychus minutus</i>	Little Bittern	Wetland	<i>Ardea purpurea</i>	Purple Heron
Wetland	<i>Phalacrocorax africanus</i>	Long-tailed Cormorant	Wetland	<i>Butorides striatus</i>	Green-backed Heron
Wetland	<i>Limosa lapponica</i>	Bar-tailed Godwit	Wetland	<i>Ardea humbloti</i>	Humblot's Heron
Wetland	<i>Thalassornis leuconotus</i>	White-backed Duck	Wetland	<i>Calidris alba</i>	Sanderling
Wetland	<i>Threskiornis bernieri</i>	Madagascar White Ibis	Wetland	<i>Calidris ferruginea</i>	Curlew Sandpiper
Wetland	<i>Porphyrio porphyrio</i>	Purple Swamphen	Wetland	<i>Calidris minuta</i>	Little Stint
Wetland	<i>Philomachus pugnax</i>	Ruff	Wetland	<i>Charadrius hiaticula</i>	Ringed Plover
Wetland	<i>Phoeniconaias minor</i>	Lesser Flamingo	Wetland	<i>Gallinula chloropus</i>	Common Moorhen
Wetland	<i>Platalea alba</i>	African Spoonbill	Wetland	<i>Acrocephalus newtoni</i>	Madagascar Swamp Warbler
Wetland	<i>Plegadis falcinellus</i>	Glossy Ibis	Wetland	<i>Actitis hypoleucos</i>	Common Sandpiper
Wetland	<i>Tachybaptus ruficollis</i>	Little Grebe	Wetland	<i>Actophilornis albinucha</i>	Madagascar Jacana
Wetland	<i>Tachybaptus pelzelni</i>	Madagascar Little Grebe	Wetland	<i>Ardeola idea</i>	Madagascar Pond Heron
Wetland	<i>Porphyryla alleni</i>	Allen's Gallinule	Wetland	<i>Alcedo vintsioides</i>	Madagascar Malachite Kingfisher
Wetland	<i>Porzana pusilla</i>	Baillon's Crake	Wetland	<i>Amaurornis olivieri</i>	Sakalava Rail
Wetland	<i>Riparia paludicola</i>	Brown-throated Sand Martin	Wetland	<i>Anas bernieri</i>	Madagascar Teal

Wetland	<i>Riparia riparia</i>	Common Sand Martin	Forest	<i>Xenopirostris damii</i>	Van Dam's Vanga
Wetland	<i>Dryolimnas cuvieri</i>	White-throated Rail	Forest	<i>Xenopirostris xenopirostris</i>	Lafresnaye's Vanga
Wetland	<i>Egretta alba</i>	Great Egret	Forest	<i>Zoonavena grandidieri</i>	Madagascar Spinetail
Wetland	<i>Egretta dimorpha</i>	Dimorphic Egret	Forest	<i>Zosterops maderaspatana</i>	Madagascar White-eye
Wetland	<i>Charadrius thoracicus</i>	Madagascar Plover	Forest	<i>Neomixis striatigula</i>	Stripe-throated Jery
Wetland	<i>Egretta ardesiaca</i>	Black Egret	Forest	<i>Phedina borbonica</i>	Madagascar Martin
Wetland	<i>Charadrius tricollaris</i>	Three-banded Plover	Forest	<i>Philepitta schlegeli</i>	Schlegel's Asity
Wetland	<i>Gallinago macrodactyla</i>	Madagascar Snipe	Forest	<i>Phyllastrephus madagascariensis</i>	Long-billed Greenbul
Wetland	<i>Rostratula benghalensis</i>	Greater Painted-Snipe	Forest	<i>Polyboroides radiatus</i>	Madagascar Harrier-Hawk
Wetland	<i>Anas hottentota</i>	Hottentot Teal	Forest	<i>Pterocles personatus</i>	Madagascar Sandgrouse
Forest	<i>Newtonia archboldi</i>	Archbold's Newtonia	Forest	<i>Schetba rufa</i>	Rufous Vanga
Forest	<i>Monticola sharpei</i>	Forest Rock Thrush	Forest	<i>Ploceus sakalava</i>	Sakalava Weaver
Forest	<i>Motacilla flaviventris</i>	Madagascar Wagtail	Forest	<i>Calicalicus madagascariensis</i>	Red-tailed Vanga
Forest	<i>Nectarinia notata</i>	Long-billed Green Sunbird	Forest	<i>Artamella viridis</i>	White-headed Vanga
Forest	<i>Nectarinia souimanga</i>	Souimanga Sunbird	Forest	<i>Asio madagascariensis</i>	Madagascar Long-eared Owl
Forest	<i>Neodrepanis hypoxantha</i>	Yellow-bellied Sunbird-Asity	Forest	<i>Aviceda madagascariensis</i>	Madagascar Cuckoo-Hawk
Forest	<i>Neomixis tenella</i>	Common Jery	Forest	<i>Caprimulgus enarratus</i>	Collared Nightjar
Forest	<i>Otus rutilus</i>	Madagascar Scops Owl	Forest	<i>Caprimulgus madagascariensis</i>	Madagascar Nightjar
Forest	<i>Nesillas typica</i>	Madagascar Brush Warbler	Forest	<i>Centropus toulou</i>	Madagascar Coucal
Forest	<i>Mirafra hova</i>	Madagascar Bush Lark	Forest	<i>Ceyx madagascariensis</i>	Madagascar Pygmy Kingfisher
Forest	<i>Newtonia sp.</i>	Newtonia sp.	Forest	<i>Buteo brachypterus</i>	Madagascar Buzzard
Forest	<i>Ninox superciliaris</i>	White-browed Owl	Forest	<i>Coturnix coturnix</i>	Common quail
Forest	<i>Numida meleagris</i>	Helmeted Guineafowl	Forest	<i>Accipiter francesii</i>	Frances's Sparrowhawk
Forest	<i>Nesillas lantzii</i>	Subdesert Brush Warbler	Forest	<i>Accipiter henstii</i>	Henst's Goshawk
Forest	<i>Lophotibis cristata</i>	Madagascar Crested Ibis	Forest	<i>Acridotheres tristis</i>	Common Myna
Forest	<i>Hartlaubius auratus</i>	Madagascar Starling	Forest	<i>Apus affinis</i>	Little Swift
Forest	<i>Hirundo rustica</i>	Barn Swallow	Forest	<i>Apus barbatus</i>	African Black Swift

Forest	<i>Hypsipetes madagascariensis</i>	Madagascar Bulbul	Forest	<i>Apus melba</i>	Alpine Swift
Forest	<i>Leptopterus chabert</i>	Chabert's Vanga	Forest	<i>Newtonia brunneicauda</i>	Common Newtonia
Forest	<i>Leptosomus discolor</i>	Cuckoo-roller	Forest	<i>Elanus caeruleus</i>	Black-shouldered Kite
Forest	<i>Monticola erythronotus</i>	Amber Mountain Rock Thrush	Forest	<i>Cypsiurus parvus</i>	African Palm Swift
Forest	<i>Lonchura nana</i>	Madagascar Mannikin	Forest	<i>Dicrurus forficatus</i>	Crested Drongo
Forest	<i>Monticola bensoni</i>	Benson's rock Thrush	Forest	<i>Cyanolanius madagascarinus</i>	Blue Vanga
Forest	<i>Macheiramphus alcinus</i>	Bat Hawk	Forest	<i>Falco newtoni</i>	Madagascar Kestrel
Forest	<i>Margaroperdix madagascariensis</i>	Madagascar Partridge	Forest	<i>Eurystomus glaucurus</i>	Broad-billed Roller
Forest	<i>Merops apiaster</i>	European Bee-eater	Forest	<i>Falco concolor</i>	Sooty Falcon
Forest	<i>Merops superciliosus</i>	Madagascar Bee-eater	Forest	<i>Falco eleonorae</i>	Eleonora's Falcon
Forest	<i>Mesitornis benschi</i>	Subdesert Mesite	Forest	<i>Falco peregrinus</i>	Peregrine Falcon
Forest	<i>Mesitornis variegata</i>	White-breasted Mesite	Forest	<i>Falcula palliata</i>	Sickle-billed Vanga
Forest	<i>Milvus aegyptius</i>	Yellow-billed Kite	Forest	<i>Foudia madagascariensis</i>	Madagascar Red Fody
Forest	<i>Upupa marginata</i>	Madagascar Hoopoe	Forest	<i>Agapornis canus</i>	Grey-headed Lovebird
Forest	<i>Terpsiphone mutata</i>	Madagascar Paradise Flycatcher	Forest	<i>Copsychus albospecularis</i>	Madagascar Magpie-robin
Forest	<i>Thamnornis chloropetoides</i>	Thamnornis Warbler	Forest	<i>Circus maillardi</i>	Reunion Harrier
Forest	<i>Treron australis</i>	Madagascar Green Pigeon	Forest	<i>Falco zoniventris</i>	Banded Kestrel
Forest	<i>Turnix nigricollis</i>	Madagascar Buttonquail	Forest	<i>Cuculus rochii</i>	Madagascar Lesser Cuckoo
Forest	<i>Tylas eduardi</i>	Tylas Vanga	Forest	<i>Cisticola cherina</i>	Madagascar Cisticola
Forest	<i>Oena capensis</i>	Namaqua Dove	Forest	<i>Coracina cinerea</i>	Ashy Cuckoo-shrike
Forest	<i>Tyto alba</i>	Barn Owl	Forest	<i>Coracopsis nigra</i>	Lesser Vasa Parrot
Forest	<i>Streptopelia picturata</i>	Madagascar Turtle Dove	Forest	<i>Coracopsis vasa</i>	Greater Vasa Parrot
Forest	<i>Uratelornis chimaera</i>	Long-tailed Ground-roller	Forest	<i>Coua caerulea</i>	Blue Coua
Forest	<i>Vanga curvirostris</i>	Hook-billed Vanga	Forest	<i>Creatophora cinerea</i>	Wattled Starling
Forest	<i>Coua coquereli</i>	Coquerel's Coua			
Forest	<i>Coua cristata</i>	Crested Coua			

Reptiles and Amphibians

Scientific name	Common Name	Group
<i>Mantella ebenaui</i>	Brown Mantella	Frog
<i>Paroedura sp.</i>	Ground gecko	Night gecko
<i>Paroedura oviceps</i>	Ground gecko	Night gecko
<i>Paroedura karstophilla</i>	Gecko	Night gecko
<i>Oplurus cyclurus</i>	Merrem's Madagascar swift	Iguana
<i>Oplurus cuvieri</i>	Madagascan collared iguana	Iguana
<i>Madascincus intermedius</i>	Stripeneck skink	Skink
<i>Mantidactylus ulcerosus</i>	No common name	Frog
<i>Madascincus polleni</i>	Madagascar Coastal Skink	Skink
<i>Madascincus melanopleura</i>	Common Manager Skink	Skink
<i>Paroedura stumpffii</i>	Stumpff's Madagascar Ground Gecko	Night gecko
<i>Phelsuma madagascariensis</i>	Madagascar Day gecko	Day gecko
<i>Madagascarophis colubrinus</i>	Malagasy Cat-eyed Snake	Colubrid
<i>Lygodactylus tolampyae</i>	Grandidier's Dwarf Gecko	Day gecko
<i>Mimophis mahfalensis</i>	Madagascar grass snake.	Colubrid
<i>Phelsuma mutabilis</i>	Thick Tail Gecko	Day gecko
<i>Scaphiophryne aff. calcarata A</i>	Mocquard's Rain Frog	Frog
<i>Dromicodryas bernieri</i>	Bernier's Striped Snake	Colubrid
<i>Liophidium vaillanti</i>	Madagascar three-lined snake	Colubrid
<i>Ramphotyphlops braminus</i>	brahminy blind snake	Skink
<i>Ptychadena mascareniensis</i>	Mascarene ridged frog	Frog
<i>Phelsuma kochi</i>	Koch's giant day gecko	Day gecko
<i>Phelsuma borai</i>	No common name	Day gecko
<i>Paroedura tanjaka</i>	Ground gecko	Night gecko
<i>Phelsuma lineata</i>	lined day gecko	Day gecko
<i>Phelsuma dubia</i>	olive day gecko	Day gecko
<i>Phelsuma abbotti</i>	Abbott's day gecko	Day gecko
<i>Pelusios castanoides</i>	Yellow-bellied mud turtle	Turtle
<i>Pelomedusa subrufa</i>	African helmeted turtle	Turtle
<i>Paroedura vazimba</i>	Vazimba Gecko	Night gecko
<i>Pseudoxyrhopus quinquelineatus</i>	Striped Brook Snake	Colubrid
<i>Astrochelys yniphora</i>	Ploughshare Tortoise	Tortoise
<i>Dromicodryas quadrilineatus</i>	Four-striped Snake	Colubrid
<i>Crocodylus niloticus</i>	Nile crocodile	Crocodile
<i>Boophis doulioti</i>	Tree frog	Frog
<i>Blommersia wittei</i>	Witte's Madagascar Frog	Frog
<i>Blaesodactylus sakalava</i>	Grandidier's velvet gecko	Day gecko
<i>Dyscophus insularis</i>	Tomato frog	Frog
<i>Bibilava lateralis</i>	Lateral Water Snake	Colubrid
<i>Furcifer oustaleti</i>	Oustalet's Chameleon)	Chameleon

<i>Amphiglossus tanyasoma</i>	skink	Skink
<i>Amphiglossus reticulatus</i>	Giant water skink	Skink
<i>Alluaudina bellyi</i>	snake	Colubrid
<i>Acrantophis madagascariensis</i>	boa	Boa
<i>Sanzinia madagascariensis volontany</i>	boa	Boa
<i>Scaphiophryne menabensis</i>	frog	Frog
<i>Blaesodactylus antogilensis</i>	gecko	Day gecko
<i>Heterixalus luteostriatus</i>	tree frog	Frog
<i>Leioheterodon modestus</i>	snake	Colubrid
<i>Leioheterodon madagascariensis</i>	snake	Colubrid
<i>Langaha pseudoalluaudi</i>	snake	Colubrid
<i>Langaha madagascariensis</i>	snake	Colubrid
<i>Laliostoma labrosum</i>	frog	Frog
<i>Ithycyphus miniatus</i>	snake	Colubrid
<i>Erymnochelys madagascariensis</i>	turtle	Turtle
<i>Heterixalus tricolor</i>	tree frog	Frog
<i>Furcifer angeli</i>	chameleon	Chameleon
<i>Hemidactylus mercatorius</i>	gecko	Frog
<i>Hemidactylus frenatus</i>	gecko	Frog
<i>Geckolepis typica</i>	gecko	Night gecko
<i>Geckolepis polylepsis</i>	gecko	Night gecko
<i>Geckolepis maculata</i>	gecko	Night gecko
<i>Liophidium torquatum</i>	snake	Colubrid
<i>Hoplobatrachus tigerinus</i>	tiger frog	Frog
<i>Uroplatus guentheri</i>	gecko	Night gecko
<i>Blaesodactylus ambonihuzu</i>	gecko	Day gecko
<i>Sirenoscincus yamagishi</i>	skink	Skink
<i>Pygomeles petteri</i>	skink	Frog
<i>Phelsuma laticauda</i>	gecko	Day gecko
<i>Heteroliodon sp.</i>	snake	Colubrid
<i>Zonosaurus laticaudatus</i>	plated lizard	Iguana
<i>Uroplatus henkeli</i>	gecko	Night gecko
<i>Uroplatus ebenaui</i>	gecko	Night gecko
<i>Typhlops decorsei</i>	snake	Colubrid
<i>Typhlops arenarius</i>	snake	Colubrid
<i>Paracontias sp.</i>		Skink
<i>Trachylepis gravenhorstii</i>	skink	Skink
<i>Trachylepis elegans</i>	skink	Skink
<i>Stenophis variabilis</i>	snake	Colubrid
<i>Stenophis pseudogranuliceps</i>	snake	Colubrid
<i>Voltzkowia mira</i>	skink	Skink

Mammals

latin	english
<i>Eulemur mongoz</i>	<i>Mongoose Lemur</i>
<i>Setifer setosus</i>	<i>Greater hedgehog tenrec</i>
<i>Viverricula indica</i>	<i>Indian Civit</i>
<i>Microcebus sp.</i>	<i>Common Mouse Lemur</i>
<i>Pteropus rufus</i>	<i>Madagascar Flying Fox</i>
<i>Lepilemur edwardsi</i>	<i>Milne-Edwards's Sportive Lemur</i>
<i>Propithecus coquereli</i>	<i>Coquerel's Sifaka</i>
<i>Setifer setosus</i>	<i>Greater hedgehog tenrec</i>
<i>Eulemur fulvus</i>	<i>Common Brown Lemur</i>
<i>Chorephon leucogaster</i>	<i>Bat</i>
<i>Phaner pallescens</i>	<i>Pale Fork Marked Lemur</i>
<i>Cheirogaleus medius</i>	<i>Fat-tailed Dwarf Lemur</i>
<i>Avahi occidentalis</i>	<i>Western Avahi</i>
<i>Cryptoprocta ferox</i>	<i>Fosa</i>
<i>Microcebus murinus</i>	<i>Grey Mouse Lemur</i>
<i>Eliurus myoxinus</i>	<i>Western tuft-tailed rat</i>
<i>Canis familiaris</i>	<i>Dog</i>
<i>Felis catus</i>	<i>Cat</i>
<i>Potamochoerus larvatus</i>	<i>Bush Pig</i>
<i>Mops Leucastigma</i>	<i>Malagasy white-bellied free-tailed bat</i>
<i>Eupleres major</i>	<i>Falanouc</i>
<i>Rousettus madagascariensis</i>	<i>Madagascan rousette</i>
<i>Otomops madagascariensis</i>	<i>Madagascar free-tailed bat</i>
<i>Microcebus ravelobensis</i>	<i>Golden Brown Mouse Lemur</i>

Trees

<i>Terminalia fatraea</i>	<i>Tabernaemontana calcarea</i>
<i>Mussaenda arcuata</i>	<i>Myroxylon aethiopicum</i>
<i>Thylachium sumangui</i>	<i>Carissa sessiliflora</i>
<i>Dorathoxylon chouxi</i>	<i>Schizenterospermum majungensis</i>
<i>Andrazyina</i>	<i>Commiphora aprevalii</i>
<i>Rauvolfia sp</i>	<i>Salacia madagascariensis</i>
<i>Dupuya haraka</i>	<i>Salacia sp</i>
<i>Tina isaloensis</i>	<i>Neoapaloxylon madagascariense</i>
<i>Tina isaloensis</i>	<i>Dypsis madagascariensis</i>
<i>Albizia mainaea</i>	<i>Margaritaria anomala</i>
<i>Pachypodium rutembergianum</i>	<i>Brachylaena perrieri</i>
<i>Erythroxylum eligulatus</i>	<i>Bridelia pervilleana</i>
<i>Sapium melanostictum</i>	<i>Rourea orientalis</i>
<i>Citrus sp</i>	<i>Erythroxylum coffeifolium</i>
<i>Dracaena sp</i>	<i>Erythroxylum coffeifolium</i>
<i>Dypsis madagascariensis</i>	<i>Croton argyrodaphne</i>
<i>Eugenia sp2</i>	<i>Croton argyrodaphne</i>
<i>Zanthoxylum madagascariensis</i>	<i>Pyrostria sp</i>
<i>Chrysophyllum sp</i>	<i>Tetracera rutembergii</i>
<i>Mimosa sp</i>	<i>Leptadenia madagascariensis</i>
<i>Mundelea viridis</i> <i>Mundelea viridis</i>	<i>Lohavoto</i>
<i>Bridelia pervilleana</i>	<i>Trilepisium sp</i>
<i>Dupuya madagascariensis</i>	<i>Tamarindus indica</i>
<i>Trilepisium madagascariense</i>	<i>Artabotrys scitophyllus</i>
<i>Phylloctenium bernieri</i>	<i>Hildegardia erythrosiphon</i>
<i>Commiphora grandifolia</i>	<i>Apodytes sp</i>
<i>Evonymiopsis longipes</i>	<i>Karomia sp</i>
<i>Psorospermum sp</i>	<i>Hildegardia erythrosiphon</i>
<i>Homalium sp</i>	<i>Noronhia seyrigii</i>
<i>Homalium albiflorum</i>	<i>Dalbergia trichocarpa</i>
<i>Rauvolfia sp</i>	<i>Dalbergia sp.</i>
<i>Diospyros tropophylla</i>	<i>Albizia sp.</i>
<i>Diospyros sp</i>	<i>Dalbergia greveana</i>
<i>Artabotrys scitophyllus</i>	<i>Dalbergia greveana</i>
<i>Cedrelopsis microfoliata</i>	<i>Dalbergia greveana</i>
<i>Monanthes micrantha</i>	<i>Dalbergia bracteoclata</i>
<i>Hazomboay</i>	<i>Monanthes micrantha</i>
<i>Strychnos madagascariensis</i>	<i>Mangifera indica</i>
<i>Hazomena</i>	<i>Stereospermum euphoroides</i>
<i>Polyalthia henricii</i>	<i>Mascarenhasia lisianthiflora</i>
<i>Baudouinia fluggeiformis</i>	<i>Sarigavo</i>
<i>Baudouinia fluggeiformis</i>	<i>Comoranthus minor</i>

<i>Terminalia mantaliopsis</i>	<i>Gymnospoia divaricata</i>
<i>Macphersonia gracilis</i>	<i>Norhonia aff. Linoceroides</i>
<i>Carissa spinarium</i>	<i>Norhonia stadman</i>
<i>Commiphora aff. Guillaumii</i>	<i>Olax emirnense</i>
<i>Acridocarpus excelsus</i>	<i>Memecylon bakerianum</i>
<i>Mazara</i>	<i>Albizia sp</i>
<i>Grewia sp</i>	<i>Carissa sessiliflora</i>
<i>Menabe</i>	<i>Homollea sp</i>
<i>Hibiscus dicrersifolia</i>	<i>Anisocyclea perrieri</i>
<i>Zanthoxylum madagascariensis</i>	<i>Brachylaena ramifolia</i>
<i>Tina chapelieriana</i>	<i>Rothmania sp</i>
<i>Diospyros miriophylla</i>	<i>Plagiosciplus sp</i>
<i>Vitex beraviensis</i>	<i>Fernandoa macrantha</i>
<i>Strychnos spinosa</i>	<i>Elaeocarpus subserratus</i>
<i>Schizenterospermum rotindifolium</i>	<i>Baphia capparidifolia</i>
<i>Diospyros squamosa</i>	<i>Ficus grevei</i>
<i>Diporidium ciliatum</i>	<i>Diospyros sakalavarum</i>
<i>Albizia sp</i>	<i>Brexia madagascariensis</i>
<i>Grangeria porosa</i>	<i>Norhonia lanceolata</i>
<i>Cinnamosma fragrans</i>	<i>Securinea seyrigii</i>
<i>Bauhinia porosa</i>	<i>Milletia richardiana</i>
<i>Syzygium sakalavarum</i>	<i>Strophantus boivini</i>
<i>Psidium sp</i>	<i>Hyperacanthus perrieri</i>
<i>Eliea articulata</i>	<i>Hyperacanthus perrieri</i>
<i>Eliea articulata</i>	<i>Erythroxyton plactycladum</i>
<i>Hugonia longipes</i>	<i>Rhodocolea telfairiae</i>
<i>Coptosperma madagascariensis</i>	<i>Bathiorhamnus louvelii</i>
<i>Novanoby</i>	<i>Bathiorhamnus louvelii</i>
<i>Croton macrocarpus</i>	<i>Nuxia capitata</i>
<i>Landolphia myrtifolia</i>	<i>Terculia africana madagascariensis</i>
<i>Polyscias sp</i>	<i>Strychnos decussata</i>
<i>Petchia erythrocarpa</i>	<i>Dalbergia tsiandalana</i>
<i>Canarium madagascariense</i>	<i>Monanthataxis sp</i>
<i>Polyscias sp</i>	<i>Monanthataxis boivini</i>
<i>Rhopalocarpus lucidus</i>	<i>Breonadia salicina</i>
<i>Strychnos mostueoides</i>	<i>Psorospermum androsaemifolium</i>
<i>Turraea delphinensis</i>	<i>Antidesma madagascariensis</i>
<i>Commiphora coleopsis</i>	<i>Mundelea sp</i>
<i>Samata</i>	<i>Grewia grandidieri</i>
<i>Albizia lebeck</i>	<i>Grewia grandulosa</i>
<i>Phyllanthus tenellus</i>	<i>Hyperacanthus reiniformis</i>
<i>Acridocarpus excelsus</i>	
<i>Croton macrocarpus</i>	
<i>Landolphia myrtifolia</i>	

<i>Polyscias sp</i>
<i>Petchia erythrocarpa</i>
<i>Canarium madagascariense</i>
<i>Polyscias sp</i>
<i>Rhopalocarpus lucidus</i>
<i>Strychnos mostueoides</i>
<i>Turraea delphinensis</i>
<i>Commiphora coleopsis</i>
<i>Samata</i>
<i>Albizia lebeck</i>
<i>Phyllanthus tenellus</i>
<i>Acridocarpus excelsus</i>
<i>Mascarenhasia lisianthiflora</i>
<i>Sarigavo</i>
<i>Comoranthus minor</i>
<i>Gymnospoia divaricata</i>
<i>Hyphaene coriacea</i>
<i>Grewia glyphaeoides</i>