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Tanzania Forest Conservation Group

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This Edition of the Arc Journal is focused on Tanzania's 12 Nature Forest Reserves. It includes descriptions of each of the 12 reserves as well as information on their biodiversity, threats, management and tourism opportunities.

SPECIAL ISSUE

View of Mkingu Nature Reserve.
Photo by Rob Beechey.

Tanzania's Nature Reserves

Introducing Tanzania's Nature Reserves

Prof. Dos Santos, Head of the Tanzania Forest Services Agency

In Tanzania, the Forest Legislation of 2002 recognises Nature Forest Reserves as protected forest areas of particularly high importance for the conservation of biodiversity. Formation of Nature Reserves started in the 1990s with the gazettement of the Amani Nature Reserve in the East Usambara Mountains.

Since 2002, the government has been working to identify and upgrade the status of a network of key sites for conservation that were already under the management of the Tanzania Forest Services (TFS) Agency. There are two portfolios of Nature Forest Reserve – firstly within the Eastern Arc Mountains, whilst the other portfolio includes the best examples of other forests in the country.

This process had resulted in the declaration and gazettement of 12 Nature Forest Reserves by early 2017. Of these, eight are found in the Eastern Arc Mountains (from north to south: Chome, Magamba, Nilo, Amani, Mkingu, Uluguru, Kilombero and Uzungwa Scarp), one is located in the Southern Highlands (Mount Rungwe), one is found in the coastal forests in southern Tanzania (Rondo) and one encompasses the forests of a recently dormant volcano (Mount Hanang). The last one (Minziro) includes areas of lowland swamp forest close to the Uganda border that is of similar composition to the forests of the Congo Basin.

These 12 Nature Forest Reserves are being managed by dedicated conservators distributed at each site, supported by teams of professional staff. At the TFS headquarters the Nature Forest Reserves fall under the section that manages the natural forests of Tanzania.

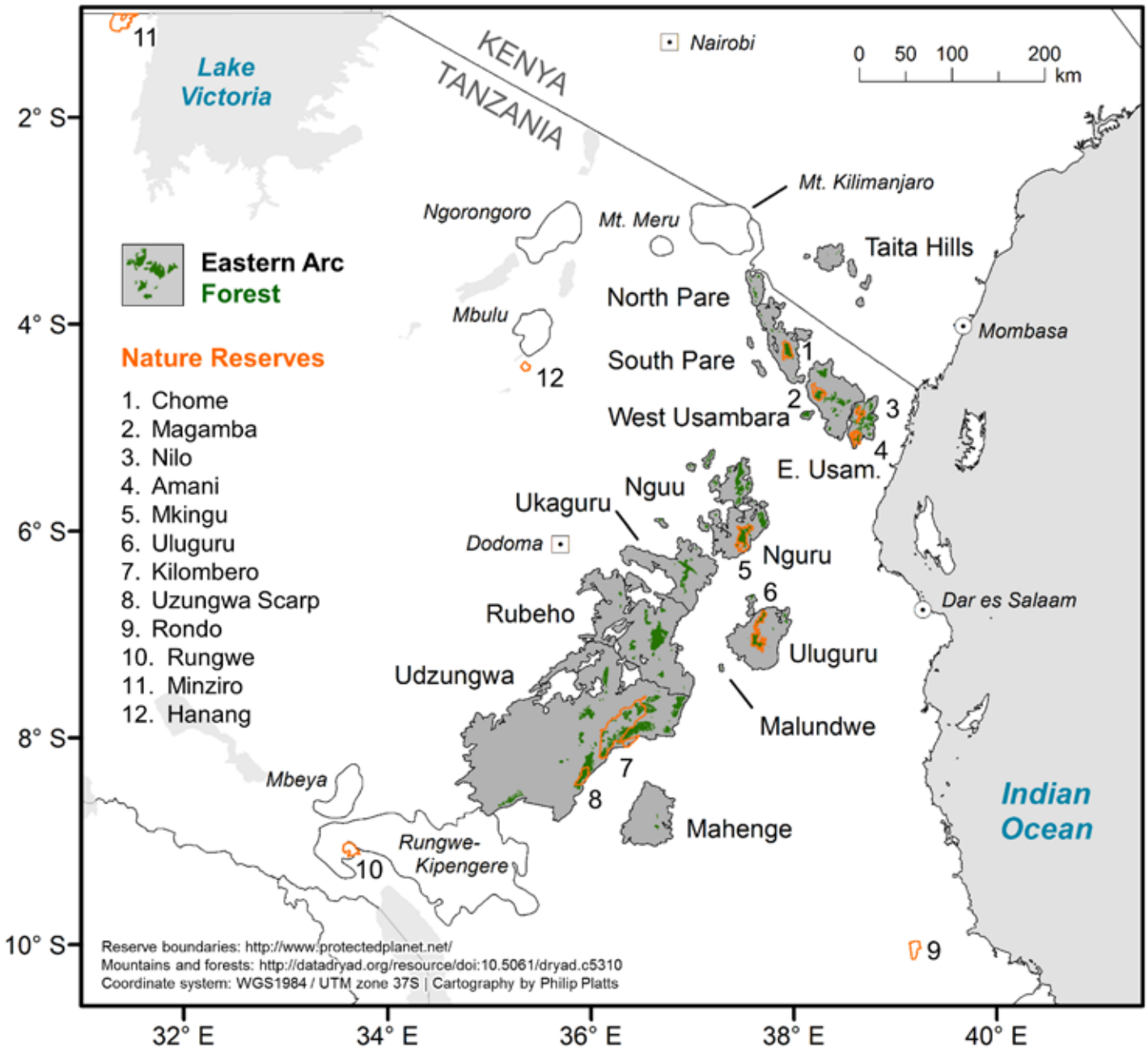
TFS is committed to improving the management and conservation of these sites and aims to generate sustainable sources of revenue for both the management of the reserves and also to help support the development needs of surrounding communities. It is likely that sustainable funding sources will come from the central government via the TFS budgets, but there are also potential ways to augment income through the national REDD+ programme and community forests, and from tourism development (especially ecological and cultural tourists), which is now gradually picking up.

Profiles of Tanzania's 12 Nature Reserves

For over a century, scientists have been documenting the biological values of the 12 forests now protected as Nature Forest Reserves. In the following pages, we present profiles of these 12 forests. The reserves are categorized as Nature Forest Reserves by the Forest Act, 2002, however, in this edition of the Arc Journal, we use the more widely used term 'Nature Reserve'.

Map of the Tanzania's Nature Reserves.

Prepared by Dr. Philip Platts, University of York.



Amani Nature Reserve

The Amani Forest tree frog, *Leptopelis vermiculatus* is one of nine amphibian species found in the East Usambara Mountains that are classified as Endangered by IUCN. Amphibians are threatened by habitat loss and the wildlife trade. Photo by Christopher Dwyer / chrisdwyer.ca

Reserve Profile

Amani is the largest forested block within the East Usambara Mountains and occupies the southern extremity of these mountains. The reserve covers 8,380 ha. The Indian Ocean, which is only 40 km away, contributes to a high mean annual rainfall, ranging from 1800 to 2200 mm. The hottest season is in January-February and the coolest in June-September. The mean daily minimum and maximum temperatures are 16°C and 24°C, with a mean annual temperature of 20°C.

Amani Nature Forest Reserve (ANFR) was created through the amalgamation of six forest reserves (Kwamkoro, Kwamsambia, Mnyuzi Scarp, Amani Zigi, Amani East and Amani West) on 08/05/1997, with official declaration under government gazette GN No. 151 and 152. ANFR ranges between 300 – 1,128 m a.s.l., with a central plateau at 930 m. Seventeen villages lie within the immediate periphery of ANFR, and a further two villages lie within enclaves where tea estates, established in the 1940s, continue to operate to-date. The 19 villages comprise a total population of 26,798.

Biodiversity

The East Usambara forests are globally recognised for their exceptional biodiversity. The mountain block contains 27 endemic vascular plant species and 40 vertebrate species endemic to the Eastern Arc Mountains of which nine species (six amphibian and three reptile species) are confined to the East Usambara Mountains. Similar high rates of endemism occur in invertebrates. Eight species of the genus *Saintpaulia* (African violet), *Leptonychia usambarensis*, *Cephalosphaera usambarensis* and *Allanblackia stulhmanii* are threatened plant species found in ANFR. There are 35 threatened vertebrate species in the East Usambara Mountains, of which 23 species are found in ANFR.

Vegetation

Semi-deciduous forests dominate in the lowlands, particularly in Mnyuzi Scarp, which also has lower annual rainfall. Tall luxuriant sub-montane and evergreen forests are found in the mountains above 750 m, where rainfall is higher. Common tree species include *Cephalosphaera usambarensis, Allanblackia stuhlmannii, Albizia gummifera, Beilschmiedia kweo, Diospyros abyssinica, Englerodendron usambarense* and *Drypetes gerrardii*. Amani Botanical Gardens (340 ha) lies within the periphery of ANFR. Established in 1902, it holds over 1,000 species from around the world.

Threats

The challenges facing the forests in the East Usambaras are conversion of forests to farmland, fire spreading from surrounding farmlands, invasive plant species, gold mining and the wildlife trade.

Amani is home to nine species of chameleon including the Usambara three-horned chameleon, *Trioceros deremensis.* Photo by Christopher Dwyer / chrisdwyer.ca

Protection and management of Amani Nature Reserve

A new 5-year management plan (2016/17 – 2020/21) is due for approval. It outlines needs and opportunities for ANFR with the aim of conserving the reserve's genetic resources, biodiversity, ecosystem functioning and cultural values. The reserve has 30 staff members, with plans to add another ten.

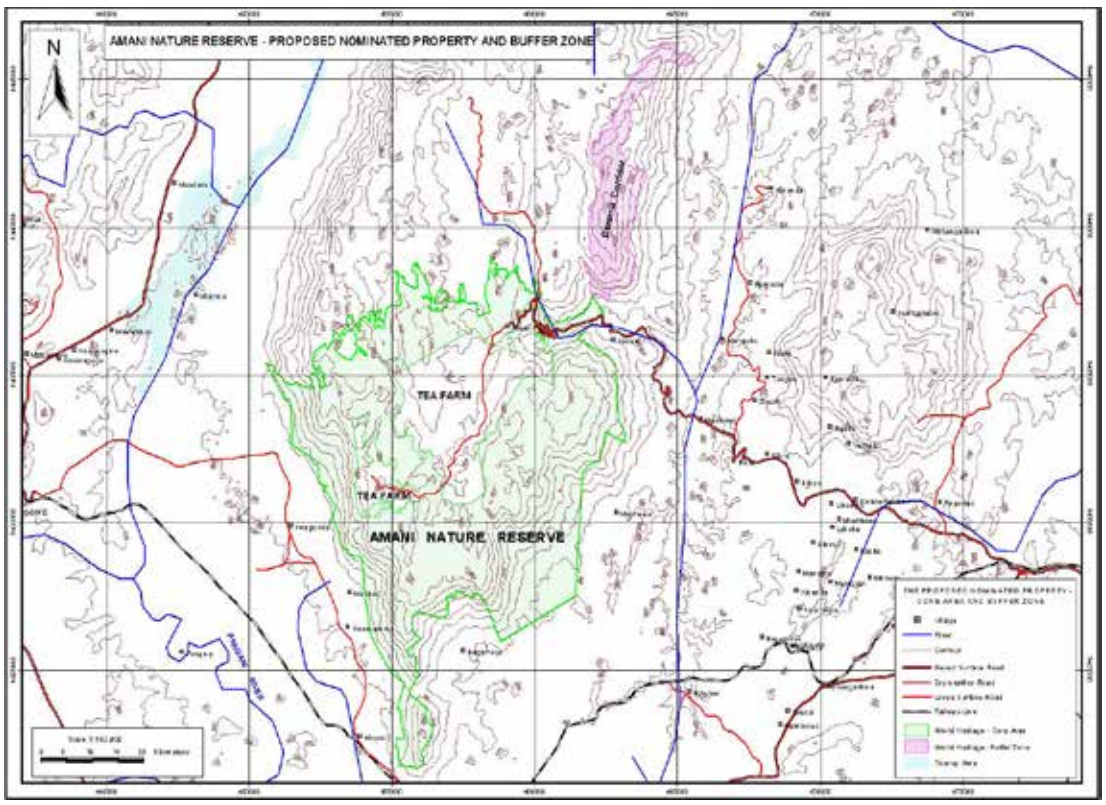
Visiting Amani Nature Reserve

The nearest large town to Amani is Muheza which is on the highway between Segera and Tanga. From Muheza it is a 2 hour drive up into the mountains as far as Amani Village where the reserve headquarters are located. Accommodation is available in two guest houses run by the Nature Reserve, one near the Sigi gate and the other in Amani Village. There is also a comfortable tented camp at Emau Hill in the enclave at the centre of the reserve, about 40 minutes beyond Amani Village. There are several tourist trails that can be followed in ANFR and a number of trained guides. Specialised bird tours are also available, as are night walks looking for chameleons and amphibians. The reserve is a popular destination for school trips. The tour operator, Wild Things, is well-established to organise educational visits.

Forest in Amani NFR. Photo by Neil Burgess

The East Usambara Mountains are part of the Sigi River catchment area supplying water to Tanga Town. Photo by Andrew Perkin.

At least 37 species of snake have been recorded in the East Usambara Mountains including this Spotted green snake, *Philothamnus punctatus*. Photo by Christopher Dwyer / chrisdwyer.ca



Map of Amani Nature Reserve

Chome Nature Reserve is an important source of water for Same District. It is part of the Pangani River Basin.
Photo by Michele Menegon.

Chome Nature Reserve

Reserve Profile

Chome Nature Forest Reserve (CNFR) extends over 14,283 ha along the ridges and peaks of the South Pare Mountains. CNFR was established on 25/03/2016 (GN 105). It is the result of upgrading the conservation status of the former Chome Forest Reserve which was declared in 1957. The reserve lies within an altitudinal range of 1,250-2,463 m with the highest peak at Mt Shengena. It is surrounded by 27 villages, with a total population of 60,916 in 2008.

The estimated annual rainfall is 1,400 mm, with short rains between November and December and long rains between March and May. The eastern slopes receive more rainfall than the western slopes, with a mist effect at higher altitudes. Temperature ranges between 15°C in July and 20°C in February.

Biodiversity

Four of the 136 vertebrate species endemic to the Eastern Arc Mountains are only found in the South Pare Mountains (1 bird, 3 amphibians) whilst 13 vertebrate species endemic to the EAM have been recorded in the South Pare Mountains. Five of these are threatened and are found only in CNFR, one of which is the South Pare white-eye. 10% of the 554 plant taxa endemic to the Eastern Arc Mountains grow in the South Pare Mountains, six of which are restricted to the South Pares and two of which are recorded only in CNFR.

Vegetation

Moss-covered upper montane forest occurs above 2300 m, with elfin forest on the highest ridges. Wet montane forests cover about 60% of the reserve, particularly on eastern and western slopes of valleys at 2,000-2,300 m. *Ocotea usambarensis* is the dominant emergent tree reaching up to 45 m tall. Primary heath, dominated by *Erica arborea*, occurs along rocky ridges in shallow, acidic soils. Secondary heath and grassland have colonized large areas between 1600 m and 2000 m in drier montane forest that have been subject to fires.

Threats

CNFR has been logged over many years for its valuable timber species, but intense efforts by the government in collaboration with adjacent communities have brought the situation under some control. The higher staffing levels afforded by the status of Nature Forest Reserve will further address this issue. Fire has also posed a serious threat to the forest within the reserve.


Photo by Michele Menegon.


There are two species of warty frog or *Callulina* that are only found in Chome Nature Reserve, *Callulina shengena* (pictured here) and *Callulina stanleyi*. Both are classified as Critically Endangered by IUCN due to the overall threats to the reserve. Photo by Michele Menegon.


The Kilimanjaro blade-horned chameleon, *Kinyongia tavetanum*, is found in Chome Nature Reserve. The species may be at risk from over-harvesting for the wildlife trade. Photo by Michele Menegon.

Protection and Management of Chome Nature Reserve

The 2016/17 – 2020/21 management plan is due for approval. It identifies needs and opportunities for the reserve and holds objectives including preservation of habitats, ecosystems and species in as undisturbed a state as possible, maintenance of genetic resources and ecological processes, safeguarding landscapes, monitoring and education, and an overall reduction in disturbance of the forest. Currently, 11 staff composed of 1 conservator, 3 technical officers, 7 forest assistants and beat officers manage the reserve. The proposed management plan includes 55 staff working toward protecting biodiversity, water catchments, and cultural values in CNFR. With support from the European Union between 2013 –16, the Tanzania Forest Conservation Group facilitated TFS and the adjacent communities to develop joint management agreements for Chome with a view to establishing joint forest management for the reserve.

Visiting Chome Nature Reserve

The nearest town to Chome is Same Town on the Segera – Moshi highway. From Same it is a 2 hour drive up to the reserve. There is also a route to the reserve from Makanya on the highway to the south of Same Town. There are 2 camp sites in the reserve, one inside the reserve and one at the reserve entrance. There are three guest houses close to the reserve, Kisaka Village Inn in Chome (1.5 km from CNFR), Tona Lodge and Tona Annex in Manka (Mbaga Hills 10 km from CNFR). Alternatively, visitors can stay at guest houses in villages surrounding the reserve. There is a visitors' centre for the reserve just outside Same Town.

Map of Chome Nature Reserve

The Mountain Dwarf Galago, *Galagoides orinus*, is a small, nocturnal primate present in many of Tanzania's Eastern Arc Mountains including in Kilombero Nature Reserve. It lives in submontane and montane evergreen forests and is primarily insectivorous. It is classified as Near-Threatened by IUCN. Photo by Andrew Perkin.

Kilombero Nature Reserve

Reserve Profile

The Udzungwa Mountains, that stretch across four Districts in central Tanzania and contain a number of separate forest blocks, are the largest of the Eastern Arc blocks. The Kilombero Nature Forest Reserve (KNFR), covering 134,511 ha, lies between Udzungwa Mountains National Park and Uzungwa Scarp Nature Forest Reserve in Kilombero District in Morogoro Region. Its highest point is Nyumbanitu Peak, at 2,600 m.

Annual rainfall is estimated to be 1,500-2,000 mm in the mountainous areas and 1,350 mm in the lowlands. Mean annual temperature reaches 20°C in December and 15°C in July in the mountains, and 27°C in December and 19°C in July in the lowlands. KNFR was formed by amalgamating three former forest reserves (Matundu, Iyondo and part of West Kilombero Scarp) and was gazetted on 17/08/2007. 21 villages with a total population of 78,784, surround the Nature Forest Reserve. Their main source of livelihood is subsistence farming.

Vegetation

The vegetation of the Udzungwa Mountains is exceptionally variable, ranging from lowland forests, through sub-montane, montane and upper montane forests. There are also extensive areas of montane grassland, montane wetland areas and heath lands. At lower altitudes, the vegetation grades into various forms of woodlands including Miombo. In upland areas, the vegetation comprises moist and dry montane, along with upper montane forest with patches of bamboo and upland grassland. In the drier, lower-lying areas, there is lowland forest, some of which has been replaced by woodland and grassland.

The Grey-faced sengi or elephant shrew, *Rhynchocyon udzungwensis* is found in KNFR. The species was discovered by Dr. Francesco Rovero in 2005 whilst conducting a biodiversity survey using camera traps. Only three other species of giant elephant-shrew are known to science. Giant elephant-shrews are considered to be living fossils. They belong to an ancient group of animals known as *Afrotheria* that evolved in Africa over 100 million years ago. They share a common ancestor with elephants, sea cows and aardvarks. Photo by Francesco Rovero.

Biodiversity

The Udzungwa Mountains support 20 strict endemic vertebrate species (seven amphibians, two birds, four mammals and seven reptiles) and a further 45 Eastern Arc endemic vertebrate species. There are also 65

vascular plants endemic to the Udzungwa block. As new species of mammals and other animals continue to be discovered in the Udzungwas, it can be assumed that we do not yet have full knowledge of the species that are found there. Threatened species within the Udzungwa Mountains include 50 vertebrates, of which 29 species are found in Kilombero NR, including 12 species endemic to the Eastern Arc Mountains.

Threats

Extensive wildfires in the grassland areas sometimes enter and destroy areas of forest. Other threats include farmland encroachment, logging where protection efforts are weak, poaching and the collection of animals for the wildlife trade.

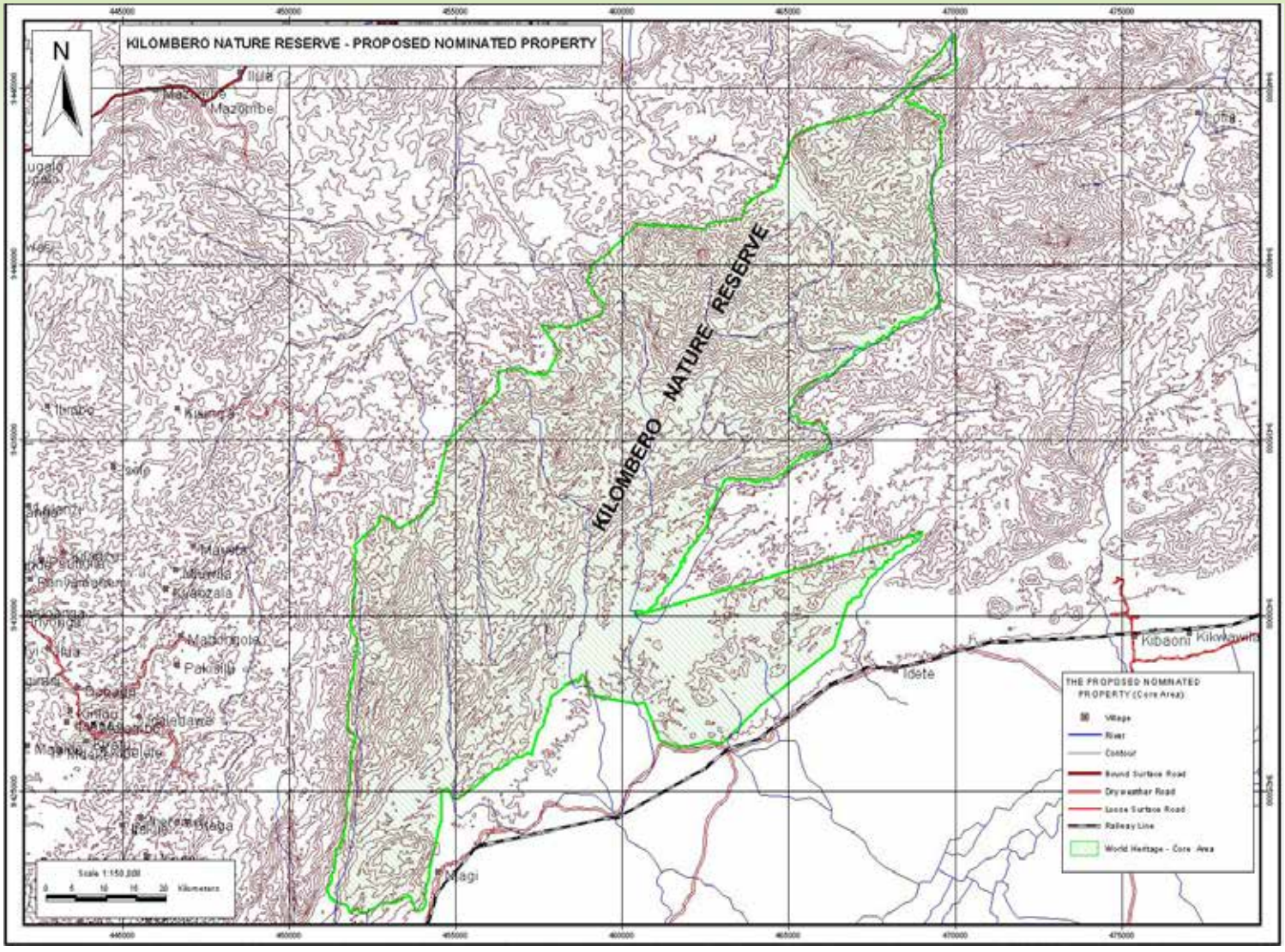
Protection and management of Kilombero Nature Reserve

A management plan prepared in 2015 was updated in 2017 and is awaiting approval. The goal of this management plan is to manage KNFR for wilderness protection in line with IUCN Protected Areas Category 1b for wilderness areas. The main objectives, beyond maintaining environmental values, are to safeguard unique cultural sites and scenic views; to promote socio-economic objectives, such as sustainable production and extraction of wood and forest products and alternative Income Generating Activities; and to promote further collaboration between forestry and other sectors. Community needs for firewood and non-timber forest products can be met in areas of natural forest and exotic woodlots on village lands that surround KNFR, by designating these as buffer zones.

Visiting Kilombero Nature Reserve

The nearest town to KNFR is Iringa. Access to the reserve is through the village of Udekwa approximately 3 hours from Iringa. It is possible to camp and hike in the reserve.

Map of Kilombero Nature Reserve



Magamba Nature Reserve

Reserve Profile

Magamba is the largest forest remaining in the West Usambara Mountains. MNFR extends in altitude from 1,650 m a.s.l. to 2,300 m a.s.l. at Kwahondo peak. The forest is an important water catchment area, with some 28 streams and five dams. Mean annual rainfall is 1,200 mm, with long rains from mid-March to May and short rains between October and December. Temperatures range from 15°C - 21°C from June to September up to 25°C - 30°C between October and December.

Magamba Nature Forest Reserve (MNFR) was established by upgrading the conservation status of Magamba Forest Reserve (9,283.9ha) on 25/03/2016 (GN 103). MNFR is surrounded by 21 villages with a total population of 57,343 (2012).

Biodiversity

The West Usambara Mountains hold 29 of the 136 vertebrate species that are endemic to the Eastern Arc Mountains. They are fifth in importance after the Udzungwa, Uluguru, East Usambara and Nguru mountains with respect to their diversity of Eastern Arc Mountain endemic vertebrates. A total of 6 (1 bird, 1 reptile and 4 amphibians) species are restricted to the West Usambara Mountains, of which one endangered bird species, the Usambara akalat, is recorded only from Magamba Nature Forest Reserve. 24 threatened vertebrates are recorded in the West Usambara Mountains, 8 of which are found in MNFR. Invertebrates are also highly diverse in the West Usambaras.

144 of the 554 plant taxa endemic to the Eastern Arc Mountains are found in the West Usambara Mountains, making them third in importance for plant endemism following the Udzungwa and Uluguru Mountains. 37 of these taxa are restricted to the West Usambara Mountains, of which one species is recorded in MNFR only. Some parts of the West Usambara forests have been well studied over the past 100 years, however biodiversity surveys are most probably not complete, suggesting potential for higher rates of endemism.

Vegetation

MNFR is comprised of montane to upper montane forests. Wet montane forests are dominated by camphor trees, *Ocotea usambarensis* and *Tabernaemontana pachysiphons*. Associated tree species include *Macaranga conglomerata, Albizia gummifera* and *Prunus africana* with *Dracaena afromontana* and *Pavetta abyssinica* in the understorey. Dry montane forest occurs and consists mainly of cedar (*Juniperus procera)*, with a thick shrub understorey of *Teclea* and *Catha* species. Other vegetation types include grasslands and shrublands, with heather and *Philippia* sp..

Threats

In the past, areas of natural forest in the West Usambara Mountains were converted to plantations. This also occurred within the area being upgraded to MNFR. Current threats include illegal logging, firewood collection, mining and grazing. Historically, agriculture has been the main driver of deforestation in the West Usambara Mountains.

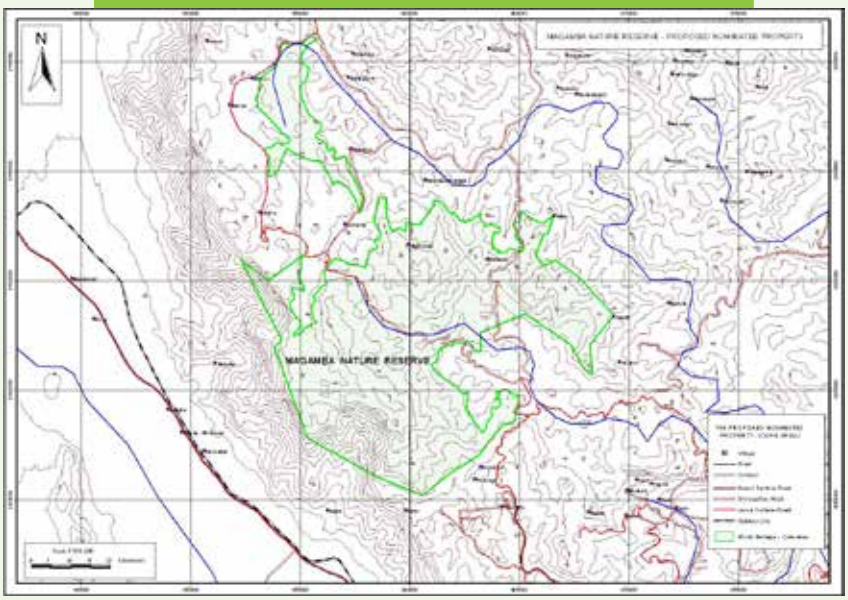
Protection and management of Magamba Nature Forest Reserve

A new management plan for MNFR, funded by TFS, EAMCEF and GEF-UNDP, is undergoing approval. Its main goal is to protect the unique natural habitat of the reserve in order to safeguard its catchment, environmental, cultural and biodiversity values. The plan also aims to increase the flow of benefits to local communities. Currently the reserve has 9 staff (5 forest officers, 3 technical staff and 1 supporting officer). The draft management plan proposes to increase the staff team to 33, including a Conservator.

Visiting Magamba Nature Reserve

The nearest town is Lushoto. At MNFR there are nature trails and driving/walking routes enabling visitors to enjoy the scenery and biodiversity. There are two camp sites: Kigulu Hakwewa and Skyline. Tents and sleeping bags can be hired from the reserve headquarters. There are also a range of hotels, lodges and guest houses in, and around, Lushoto.

Map of Magamba Nature Reserve



View of Minziro Forest.
Photo by Marcell Claassen

Minziro Nature Reserve

Photo by Marcell Claassen'

Reserve Profile

Minziro Nature Forest Reserve (MNFR), which covers 25,717 ha and has a boundary length of 80 km, is the largest forested area in northwestern Tanzania. MNFR is located in Missenyi District in Kagera Region, approximately 20 km from Lake Victoria. The northern boundary lies along the Tanzania-Uganda border, the southern and eastern boundary along the Kagera River and to the west lies a tarmac road to Uganda. Minziro plays an important role in the Kagera River floodplain ecosystem.

The area is generally flat, with an altitude ranging from 1,125 – 1,140 m a.s.l.. One small rocky outcrop, Kere Hill, lies at 1,180 m. The mean annual rainfall is approximately 800 mm per year, with the long rains falling in mid-March to May and the short rains in October to November. Temperatures range between 26.9°C in February and 16.3°C in July. Approximately 37,500 people (9,000 households) live in eight villages adjacent to MNFR.

MNFR and the adjacent villages – the Minziro swamp forest landscape - has been designated as part of the worldwide network of "Important Bird and Biodiversity Areas". Together with the Sango Bay-Musambwa Island-Kagera Wetland Ramsar Site in south-western Uganda, the areas form an important transboundary conservation site. Minziro was first designated a Forest Reserve in 1947 and re-gazetted in 2016 as MNFR.

Vegetation

Three quarters of the MNFR area can be classified as *Baikiaea-Podocarpus* seasonal swamp forest. The remainder consists of extensive grasslands, flooded Acacia woodlands and stands of Papyrus (*Cyperus papyrus*) along the Kagera River. The grasslands provide an important wintering habitat for birds. Common tree and shrub species in the MNFR include *Baikiaea insignis, Afrocarpus dawei, Warburgia ugandensis, Syzygium guineense, Mimusops bagshwawei, Beilschmiedia ugandensis, Manilkara obovata, Syzygium cordatum, Maesopsis eminii, Sapium ellipticum* and *Gardenia imperialis*. *Coffea canephora*, commonly known as robusta coffee, occurs naturally in Minziro.

The Blue Swallow, *Hirundo atrocaerulea*, is classified as Vulnerable by IUCN. It is an intra-African migrant that winters in lowland grassland areas in Minziro forest.
Photo by Per Holmen.

Biodiversity

As an outlier of the Guinea-Congo biome, MNFR supports a wealth of biodiversity and a number of site endemic species. Neil and Liz Baker have recorded 250 bird species from Minziro, of which 56 are restricted to the Guinea-Congo biome and unknown elsewhere else in Tanzania. 96 of the bird species are forest dependent specialists. Bird species recorded in Minziro include: Blue Swallow (Vulnerable), Forest Francolin (Least Concern), Great Blue Turaco, Blue-breasted Kingfisher, Blue-breasted Bee-eater, Western Nicator, Isabelline Shrike and Western Oriole. An impressive 600 butterfly species have been recorded in the forest and are abundant from June – September. Primate species that are found in the reserve include the Red-Tailed Monkey, the Grey-cheeked mangabey and Thomas's dwarf galago. The Western Tree Hyrax has also been sighted here.

Threats

The forests of Minziro are threatened by over-harvesting of forest products including fuelwood, timber (including for *Podocarpus* and *Maesopsis eminii*), construction materials, medicinal plants and bushmeat. Livestock grazing is also a key threat to the reserve, including burning for pasture. Conversion of forest to cropland is also a threat to the forest.

Protection and management of Minziro Nature Forest Reserve

The management plan for MNFR is finalised and is awaiting approval. The eight adjacent villages play an important role in the management of MNFR, contributing to fire suppression, boundary maintenance and reporting illegal incidents. Community members are permitted to collect fallen firewood. Villagers have formed Village Natural Resources Committees (VNRCs), however these remain inactive to date. There are currently 4 TFS staff managing the reserve with 1 vehicle.

Visiting Minziro Nature Reserve

The nearest large town is Bukoba. The forest can be accessed from Minziro village about 90 km (2 hours) from Bukoba. Drive to Kyaka and from there take the district road north to Minziro Village. Simple accommodation is available in Kyaka and in Bunazi (Optima Lodge). It is possible to camp in the reserve. Most tourists visiting the reserve are attracted by the reserve's birds. Tourism is still small (only 10 tourists and researchers in 2016). There is potential to attract more tourists for hiking and bird watching. Cultural and spiritual practices of the Wahaya and Baganda have potential value for cultural tourism.

Blue-breasted Bee-eater, *Merops variegatus* in Minziro NFR. *Photo by Per Holmen www.pers-birding-pages.com*

Black-throated Apalis, *Apalis jacksoni,* in Minziro NFR. *Photo by Per Holmen.*

Buff-throated Apalis, *Apalis rufogularis* in Minziro NFR. *Photo by Per Holmen*

Great Blue Turaco, *Corythaeola cristata* in Minziro NFR. *Photo by Florence Peter Holmen*

Immature wood owl in Minziro NFR. *Photo by Marcell Claassen*

Mkingu Nature Reserve

View over the South Nguru Mountains from Makunguru Peak. *Photo by Rob Beechey.*

Reserve Profile

The Mkingu Nature Forest Reserve (MkNFR) is the fourth largest protected area within the Eastern Arc Mountains and by far the largest block of forest remaining within the Nguru Mountains. The Nguru Mountains are located in Mvomero District, in Morogoro Region. These mountains extend up to 2,400 m altitude. The estimated annual rainfall is 1,200 – 4,000 mm with the dry season lasting from June to September. The dry season is not marked on the eastern side, which experiences maximum rainfall. Maximum temperature ranges from 12°C to 24°C.

MkNFR was declared on 25/03/2016 (GN 104 JB Map 2620 of 2008). MkNFR is comprised of the former Nguru South Forest Reserve and Mkindo Forest Reserve. The total population in the immediate v icinity of the Nguru Mountains is over 61,250 people. One of these villages, Ubiri (or Kombola), with 1,382 people, is an enclave within MkNFR.

Vegetation

There are seven vegetation types: lowland rain forest, sub-montane forest, montane forest, upper montane forest, drier-montane forests, heath and miombo woodlands. The forest vegetation varies according to altitude. Lowland rain forest occurs between 300-900 m in valleys of the eastern slopes. Sub-montane forest covers a large area between 900 and 1,400 m in the eastern valleys, with fragments on the western slopes at 1,400-1,500 m. Montane forest occurs between 1,400 and 1,800 m with moss covered upper montane forest at higher altitudes, and drier montane forests on the western side, above Maskati mission, at 1,600 - 2,000 m. Heath occurs on the upper ridges above 2,000 m, with some isolated stands as low as 1,200 m where soil conditions do not permit forest growth.

Biodiversity

There are at least 6 single block endemic vertebrate species (5 amphibians and 1 reptile) and a further 29 Eastern Arc endemic vertebrate species in the South Nguru Mountains. Of the 554 plant taxa recorded in the Nguru Mountains, 137 (25%) are endemic to the Eastern Arc, of which 28 are vascular plant species. Threatened species within the Nguru Mountains include 19 vertebrates, of which 18 are known from MkNFR and 17 are endemic to the Eastern Arc Mountains.

Threats

Threats to Mkingu Nature Reserve include conversion of forest to cropland, illegal logging and wildfires. Between 2014 – 2016, the annual deforestation rate has varied from -0.63% to -0.67% with much of the deforestation occurring along the western border of the reserve near Semwali and Dibago Villages and in the south-west near Kisimangulu Village. The village within the reserve (in a legally declared enclave) is expanding, and poses a threat to the integrity of the reserve.

The Nguru Spiny Pygmy Chameleon is a Critically Endangered species of chameleon only found in Mkingu Nature Reserve. Throughout the Eastern Arc Mountains, chameleons are threatened by wildlife trade and habitat loss. Photo by Andrew Perkin.

View of the Chazi River in Mkingu NR. The reserve is an important source of water for the Wami River. *Photo by Rob Beechey.*

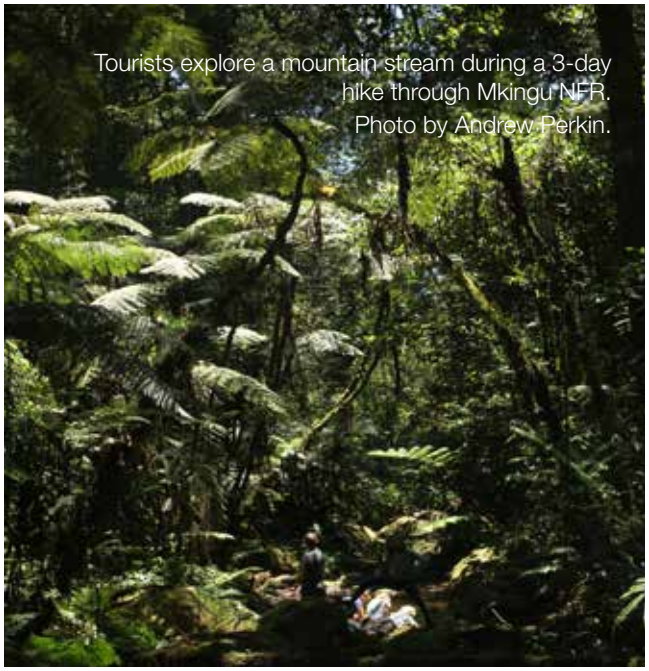
Protection and management of Mkingu Nature Forest Reserve

The new management plan (2016/17 – 2020/21) for MkNFR is due for approval, with objectives including maintenance of biodiversity status, ecosystem services and function, water catchment values and improvement of livelihoods of MkNFR's adjacent communities. There are currently 8 TFS staff managing the reserve including 3 forest officers, 3 assistant forest officers and 2 forest attendants. The management plan proposes increasing the staff team to 25 including 4 full-time forest rangers. Buffer zones around the reserve could be protected through community-based forest management and agroforestry. Ten villages around MkNFR have already established village land forest reserves with support from the Tanzania Forest Conservation Group.

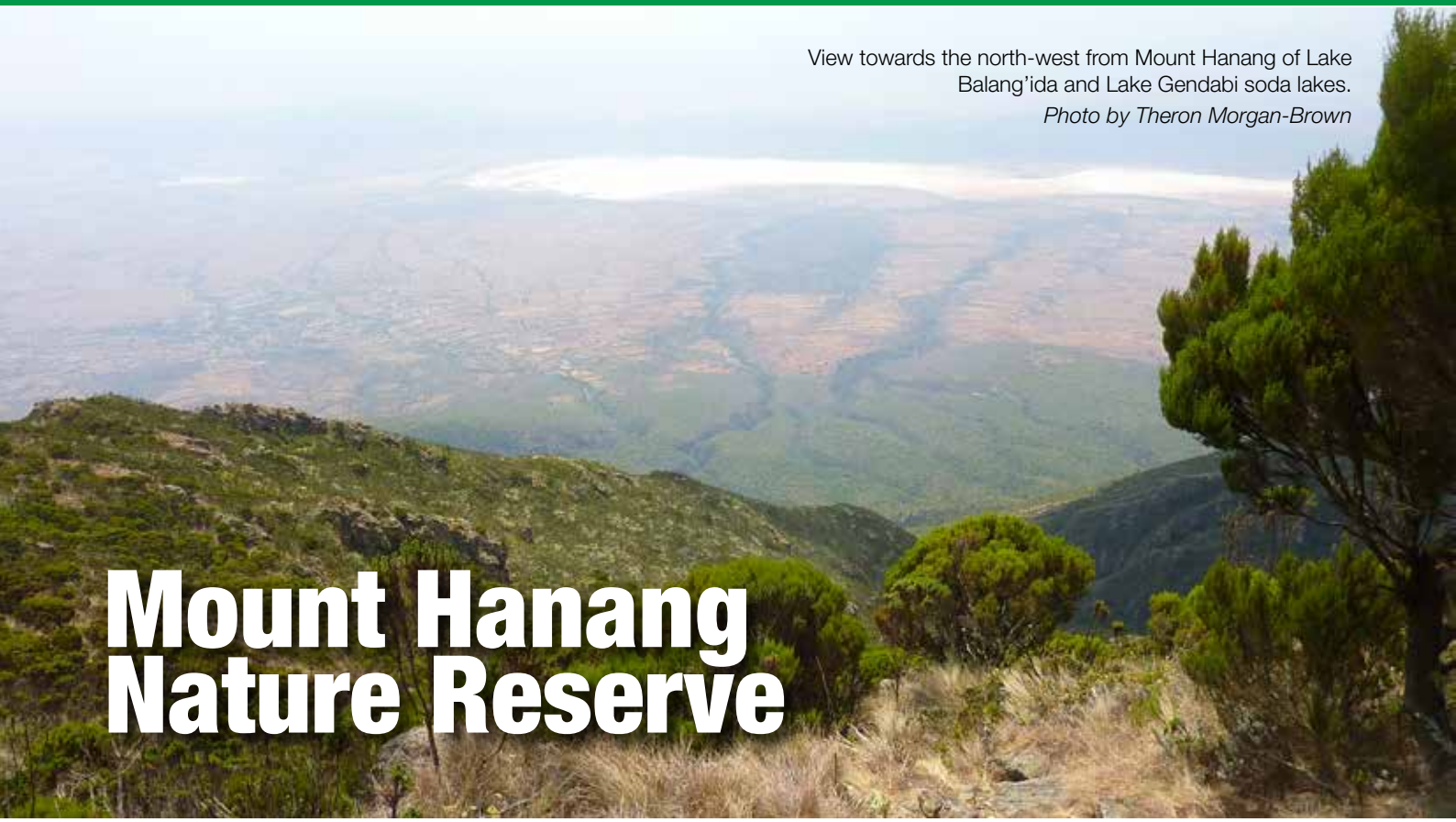
Werner's Three-horned Chameleon, *Trioceros werneri*, in Mkingu NR. The species is endemic to the Eastern Arc Mountains and has been recorded from the Udzungwa, Uluguru, Ukaguru, Nguru and Rubeho Mountains. Recent phylogenetic studies of this species suggest that populations on some of the mountain blocks are sufficiently distinct to be considered separate species. Photo by Rob Beechey.

Visiting Mkingu Nature Reserve

There are simple guest houses in Madizini and Turiani Towns, both 3 – 4 km from MkNFR. There is one camp site with basic camping facilities approximately 800 m from Mafuta Village on the eastern side of the reserve. Basic supplies are available in Madizini Town. Two nature trails at MkNFR provide an opportunity for tourists to experience the natural and cultural beauty of the area. The Maskati - Kombora trail, which starts at Maskati Village and ends at Ubiri Village, takes approximately 6 hours to walk. It passes the Makunguru Peak and Dibohero waterfalls. The second trail, Mhonda – Mafuta, starts at Mhonda Village. It passes through Kwelikwiji, Mafuta and Ubiri Villages, and takes approximately 7 hours. The trail passes the dramatic Lusingiso waterfalls and leads to the camp site at Mafuta Village. Information about guides is available from the Nature Reserve Office in Mkindo Village.



Tourists explore a mountain stream during a 3-day hike through Mkingu NFR. Photo by Andrew Perkin.



View towards the north-west from Mount Hanang of Lake Balang'ida and Lake Gendabi soda lakes.
Photo by Theron Morgan-Brown

Mount Hanang Nature Reserve

Reserve Profile

Mount Hanang is an extinct volcano at the southern end of the Gregory Rift, the eastern branch of the East African Rift System. The mountain ranges in altitude from 1,860 to 3,418 m a.s.l at the summit. It is the 5th highest mountain in Tanzania. Mount Hanang Nature Forest Reserve (MHNFR) extends over 5,871 ha with a border of 35.7 km. Five important rivers, along with seasonal streams, supply water from the reserve to Hanang District. The reserve is approximately 4 km north of Katesh Township - the administrative centre of Hanang District.

The variable rainfall, 750 – 1000 mm/year on the western side, 1200-1500 mm/year on the eastern side and more than 2000 mm/year at high altitudes, creates an interesting variety of habitats supporting rich biodiversity. Ridges and valleys contain scattered forests on the western side of the mountain, whereas continuous forest is found in valleys on the southern and eastern ridges. To the north-west of the reserve, there are two soda lakes, Lake Balang'ida and Lake Gendabi. The Basotugang underground lake is also close by.

MHNFR is a major source of water for Hanang District. There are a number of important rivers and streams, some of which are seasonal, providing water to Katesh township, Nangwa trade centre, the Hanang wheat complex and a number of villages. The Reserve is surrounded by 9 villages and 2 boroughs of Katesh township, with a combined population of 46,274 people in 2012. The Iraqw people have immigrated into the area from the north and now dominate the population. The Barabaig are also an important cultural group in the area. Agriculture, and to a lesser extent pastoralism, are the main land uses.

Vegetation

Altitudinal shifts in vegetation characterise MHNFR. Between 1,980 – 2,780 m, montane forest covers the southern and northern slopes. On the western slopes, dry montane forest is broken up by rock faces, grassland and thickets - a result of past fires.

Rocky bushland in the Mount Hanang Nature Reserve.
Photo by Theron Morgan-Brown

Grasslands and bushland dominate between 2,100 – 2,700 m and moorlands above 2,700 m. The dominant tree species are *Juniperus excelsa*, *Albizia* spp, *Fagaropsis angolensis*, *Olinia rochetiana*, *Gnidia glauca*, *Euclea divinorum, Catha edulis*, *Ficus* sp, *Clodendrum capense*, *Ekebergia capense*, *Prunus africana* and *Nuxia congesta.*

Biodiversity

Wildlife is present in MHNFR in small numbers; including silky blesmol, bush buck, klipspringer, vervet monkey, bush pigs, olive baboons, spotted hyena, leopards and a variety of snakes including python. Some elephants are occasionally found in the forest. The Mount Hanang mole-rat, *Fukomys hanangensis* was discovered in Jorodom Village on the edge of the nature reserve, and was first described in 2017. Of 171 recorded plant species, 42% are herbs and 28% trees. Threatened species include *Juniperus excelsa*, *Fagaropsis angolensis*, *Podocarpus angolensis*, *Hagenia abyssinica*, *Ekebergia capensis* and *Teclea hanangesis*.

Threats

Threats to the reserve are moderate. The growing human population increases demand for agricultural land, forest products and services. Encroachment, wildfires, illegal grazing and tree-felling pose threats to the reserve. Reduced river flow, particularly during the dry season, along with drying up of lakes and siltation of Lake Gendabi, shows that prohibitions on cutting the forest are undermined by illegal activities.

Protection and management of Mt. Hanang Nature Reserve

A management plan (2016/17 – 2020/21) for MHNFR is almost finalised. It outlines major threats, opportunities and management needs. Current resources include 7 staff members and 4 motorbikes. Management activities include patrolling, boundary clearing, annual fire campaigns and collecting revenue from areas producing licensed forest products such as honey. Village Natural Resources Committees (VNRCs) have been formed in 9 villages, acting as a link between communities, district staff and other stakeholders such as international NGOs. Further harmonization is needed to improve impact. Five tree planting groups are supported by the TFS via the District Forest Manager. Planting is carried out in a 200 m buffer zones maintained for this purpose, as well as for grazing. Relevant species are also raised for timber and fruit production.

Visiting Mount Hanang Nature Reserve

MHNFR lies close to Lake Manyara National Park and Tarangire National Park. It has potential as a hiking and cultural tourism destination. Cultural attractions include a Barabaig sacred area within the reserve. For hikers, there are two different routes to reach the summit of Mt Hanang. The Jorodom trail to the peak takes approximately 10 hours with some visitors choosing to camp close to the peak. Wildlife, the Himit River waterfalls and caves, are also attractions. 80 people visited MHNR in 2015, despite the lack of tourist facilities. These tourists mostly arrived in conjunction with tours arranged elsewhere, hoping to climb the summit and experience the local Barabaig culture. Local guides are available, and officially trained guides may increase the site's image, as would the development of additional hotels. Current accommodation is limited to the Summit Hotel and other smaller hostels in Katesh Town, with prices ranging from 5-10 USD per night.

Hiking towards the Mount Hanang Peak.
Photo by Theron Morgan-Brown

View of Mount Hanang from the south-west. The extinct volcano pre-dates the nearby rift wall and is thought to have been built up during two eruptive periods. *Photo by Neil Burgess.*

This undescribed dwarf galago species (*Galagoides* sp.) is similar to the Dwarf Mountain Galago found in the Eastern Arc Mountains. *Photo by Ben Hayes.*

Mount Rungwe Nature Reserve

Reserve Profile

Mt Rungwe, a dormant volcano, is the second highest peak in southern Tanzania (2,981 m) and forms the northern extent of the Southern Rift in the Great Rift Valley. The tropical forests of MRNR are known for their unique biodiversity, which includes two flagship species: Abbot's duiker and the Kipunji monkey.

Mount Rungwe Nature Reserve (MRNR) has an area of 13,652 ha and a boundary length of 69.3 km. It is located in Rungwe District, Mbeya region in southwestern Tanzania. To the east, MRNFR is bordered by Livingstone Forest (part of Kitulo National Park), to the north by Kiwira Forest Plantation managed by Tanzania Forest Services (TFS) Agency, and to the west, by Rungwe Avocado Farm and the Morovian Mission, which owns a small part of Rungwe forest.

The Mount Rungwe ecosystem is an important water catchment area. Annual rainfall is 900 mm in the lowlands, 2700 mm in the highlands and an astounding 3000 mm on the southeastern slopes. Temperatures range from -6°C in the highlands to 29°C in the lowlands. The high levels of rainfall and the extensive forest cover secures flow to numerous streams that provide water to villages, towns, agricultural lands and major rivers that flow into Lake Nyasa.

Vegetation

Five major vegetation groups on Mount Rungwe were described by Jon Lovett in 1986. Montane forest is found at lower elevation in the reserve, particularly in the southeast of the reserve. Common species include *Aphloia theiformis*, *Ficalhoa laurifolia*, *Maesa lanceolata*, *Trichocladus ellipticus*, *Albizia gummifera* and *Bersama abyssinica*. Upper montane forest with a broken canopy of about 10-25 m is found in higher elevations. Common tree species include *Albizia gummifera, Aphloia theiformis, Bersama abyssinica, Bridelia micrantha, Diospyros whyteana, Hagenia abyssinica, Macaranga kilimandscharica, Maesa lanceolata, Maytenus acuminata, Myrianthus holstii, Neoboutonia macrocalyx,* and *Schefflera goetzenii* (climber).

Moving up the mountain a heath transition zone lies between the forest and upper grasslands, dominated by *Erica* spp. Other species include *Protea* spp. and *Hagenia abyssinica*. The belt is most developed in the south and southeastern elevations (2,600 - 2,800 m). Above 2,500 m, bushed grassland covers approximately 300 ha of the mountain top. Scattered shrubs are common. *Buchnera rungwensis* and *Valeriana capensis* herbs are found at higher elevations. Bush and tree species found include *Agauria salicifolia*, *Aloe* spp., bracken, *Catha edulis*, *Erica* spp., *Hagenia abyssinica*, *Hypericum revolutum*, *Maesa lanceolata,* and *Protea* spp. There is also an 866-hectare bamboo belt at about 2,600 m asl.

Biodiversity

MRNFR is endowed with a unique faunal biodiversity, drawing from Eastern Arc, Southern Rift and montane Tanzanian endemism. 100 species of mammal, over 230 species of birds, 45 species of amphibians and 10 species of fish are found in the reserve, including some rare and endemic species. A new primate species was discovered in MRNFR in 2003, the Kipunji (*Rungwecebus kipunji*), and is classified as Critically

Endangered on the IUCN Red List. Many of Rungwe's plant species are used in traditional medicine by surrounding communities.

Threats

The major threats to the ecological integrity of MRNFR include invasive species, poaching, encroachment, logging, wildlife trade (orchids, birds, chameleons, butterflies) and fires for land, charcoal and honey harvesting. Furthermore, water abstraction, sand harvesting and poor agricultural practices that lead to siltation and erosion, are having negative impacts on water sources.

Pinus patula is an exotic tree species found in MRNFR, arriving from the adjacent Kiwira Forest Plantation. Approximately 16.6% of the reserve has been invaded by these pines, which are replacing grasslands and threatening the existence of natural habitats.

Protection and management of Mt. Rungwe Nature Reserve

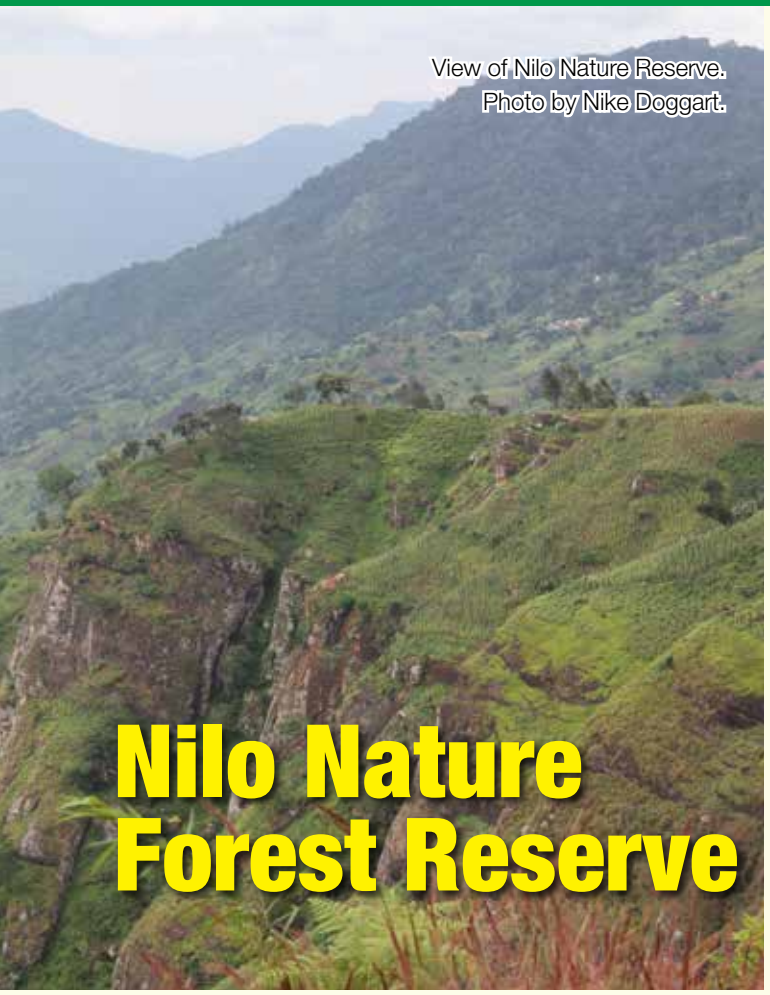
In 1949, MRNR was first gazetted as a Catchment Forest. It was updated to Nature Forest Reserve status in 2009. Currently it is under the jurisdiction of TFS through G.N 386 of 2009 and administered by forest rangers under three ranges: Syukula, Unyamwanga and Bujingijila. Twenty-three villages surround MRNR, with a population of 59,091 (2012 figure) – a growth of 11% since 2002. Agriculture, pit-sawing and charcoal burning are the major sources of income for the surrounding communities.

The 2016/17 – 2020/21 management plan is almost finalised and addresses further threats, opportunities and management needs. Current resources include 6 management staff, 1 volunteer, 3 motorcycles, 1 car and basic fire fighting equipment. Current management practices include boundary consolidation. The forest is protected from wildfires by a 66.3 km demarcated fire line that relies on patrolling and fire-fighting collaborations between Village Environment Committees, Community Forest Guards and MRNFR staff. Natural regeneration, and tree-planting with community support, help to maintain and enhance carbon stocks. To improve soil conservation and the management of watersheds, grazing has been stopped, but the plan points to a need for land use planning, agroforestry, conservation agriculture, and improved community awareness on water source management. The Wildlife Conservation Society – Tanzania Programme has actively supported the conservation of Mount Rungwe through its Southern Highlands Conservation Programme. The programme was set up in 2000 to conserve key upland habitats and endangered species across southwest Tanzania. https://tanzania.wcs.org/Landscapes/Southern-Highlands.aspx

Visiting Mount Rungwe Nature Reserve

The volcanic peaks, craters and lakes, along with the rare and interesting montane biodiversity found in MRNFR, provide high potential for attracting tourists. Plants of medicinal value, along with a number of ritual, traditional and historical sites, provide opportunities for cultural tourism. Current accommodation in the vicinity of MRNFR includes 7 hotels/lodges with a total of 169 beds. Tourism Development Plans indicate that facilities need to be improved and recreational activities developed and promoted to take full advantage of what MRNFR has to offer. Between July 2014 and June 2015, 578 tourists visited the reserve – 78 of whom arrived from outside the country.

View of Rungwe Nature Forest Reserve. Photos by Andrew Perkin



View of Nilo Nature Reserve.
Photo by Nike Doggart.

Nilo Nature Forest Reserve

Reserve Profile

Nilo is the second largest block of forest in the East Usambaras, after Amani. It lies in the north-west part of these mountains and sits on a Y-shaped ridge system, with an eastern arm that extends near to Semdoe Forest Reserve and a western arm that looks across the Lwengera Valley to the West Usambaras. A central ridge runs along its southern leg towards Derema Forest Reserve that abuts Amani Nature Forest Reserve.

Nilo Nature Forest Reserve (NNFR), which is an upgrading of Nilo Forest Reserve (6,025 ha) was established on 07/12/2007 and published in the official gazette as GN No.234. NNFR is surrounded by 17 villages, with a total population of 39,754. Both Nilo and Amani Nature Forest Reserves are part of the East Usambara Biosphere Reserve, established in 2000 and covering a total area of 90,000 ha, of which 30,000 ha is core area and 12,000 ha is buffer zone.

Nilo lies within the altitudinal range of 400 m – 1,506 m with two main peaks: Nilo (1,506 m) in the north-west and Lutindi (1,400 m) in the south-west. The site receives rainfall in all months of the year, with peaks in March-May and September-December. Mean annual rainfall increases from 1,200 mm in the foothills to over 2,200 mm at higher altitudes. West-facing slopes are drier than those facing east. Temperature ranges from 17.6°C at higher altitudes to 23.1°C in the foothills.

Vegetation

The main vegetation types are dense montane forest (30% cover) above 1,250m, sub-montane forest (60%) at 850 - 1,250m and lowland forest (10%) below 85 m. The sub-montane forest can be exceptionally tall and luxuriant, with the largest trees reaching 58 m in height in favourable sites. Surveys by Frontier-Tanzania recorded dominant tree species to include: *Allanblackia stuhlmannii*, *Leptonychia usambarensis*, *Myrianthus holstii*, *Sorindeia madagascariensis*, *Strombosia scheffleri* and *Synsepalum msolo.*

Biodiversity

The East Usambara Mountains hold 123 (22%) of the 554 plant taxa endemic to the Eastern Arc Mountains. They are fourth in importance after the Udzungwa, Uluguru and West Usambara mountains with respect to their diversity of Eastern Arc Mountain endemic plants. 22 threatened vertebrate species have been recorded in NNFR, ten of which are endemic to the Eastern Arc Mountains.

Threats

Nilo Nature Forest Reserve is threatened by wildfires, particularly on the drier western side of the reserve. Pole cutting and illegal timber harvesting are also threats.

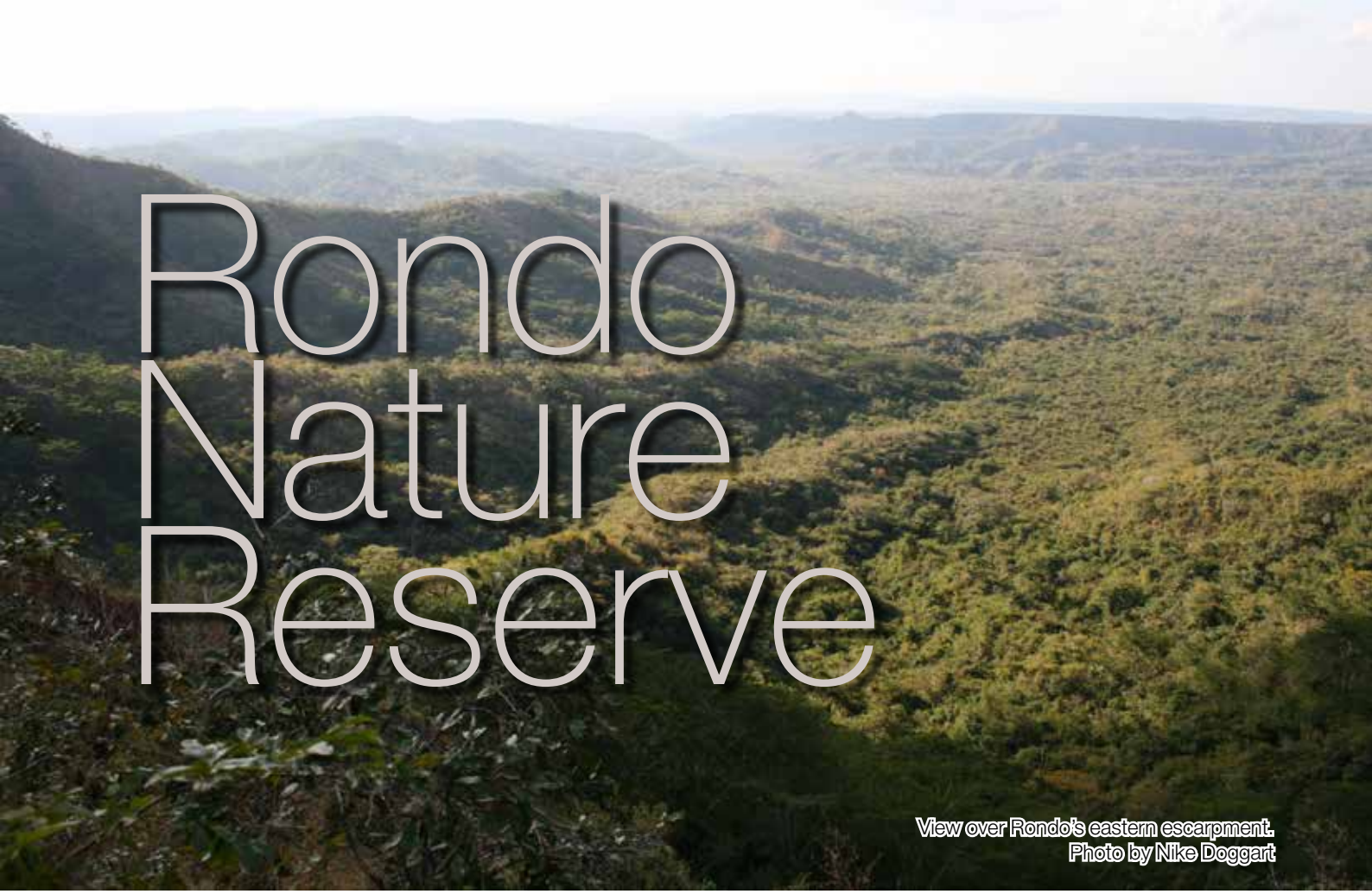
Protection and management of Nilo Nature Forest Reserve

The management plan for NNFR is awaiting final approval. It includes objectives that not only focus on conserving landscape, genetic and ecological values, but also recognise the importance of reducing disturbance by careful planning. Currently, 9 staff members manage NNFR, including 1 conservator, 1 assistant conservator, 1 research/training officer, 1 driver, 3 forest assistants and 3 forest attendants. The management plan states that 23 staff members are needed, adding a tourism officer, a forest assistant, a forest attendant, 4 tour guides and 17 support staff to the current staff.

Visiting Nilo Nature Reserve

Korogwe Town, which has various guest houses, is the nearest town to Nilo NFR. There are three camp sites within the reserve including one at Lutindi Peak. There are 22 km of nature trails providing access to different parts of the reserve including trails up to Lutindi and Nilo Peaks. There is also a 12.5 km scenic drive that passes through the reserve and Kizerui VIllage. The reserve is equipped with limited camping facilities that tourists can hire. Six tour guides are available to accompany tourists on hikes into the reserve.

Rondo Nature Reserve



View over Rondo's eastern escarpment. Photo by Nike Doggart

Reserve Profile

Rondo Nature Forest Reserve, is part of the coastal forest mosaic of Tanzania. The reserve extends across 11,742 ha on the Rondo plateau in Lindi region at an altitude of 465 - 885 m above sea level. The Coastal Forests of Eastern Africa are considered to be a globally important biodiversity hotspot. RNFR was originally gazetted in 1909 as part of the Rondo Forest Reserve. Today, RNFR constitutes the portion of the original Forest Reserve that was not utilised as a softwood plantation. The forest plantation, first initiated in 1952, lies to the north of the RNFR and includes species of pine and indigenous *Milicia excelsa* (locally known as Mvule). In 2016, 768 ha of Mvule plantation, which has returned to a semi-natural state, was included in the RNFR. The RNFR is surrounded by 6 villages whose main livelihood activity is agriculture. Average annual rainfall is 1,088 mm in a single rainy season from November to May with occasional dry spells in January and February. Temperatures range from 11°C to 32°C, with the coolest period between June and August.

Suni antelope caught on camera trap in Rondo Nature Reserve

Vegetation

The RNFR forest is considered a secondary forest, following extensive logging in the 1950s-1970s, with three major forest types. Dry evergreen forests are the last remnants of the natural forest. These are located on the southern and eastern rim of the Rondo plateau, particularly in the Mchinjindi valley. Tree species diversity is high and includes *Afzelia quanzensis, Albizia adianthifolia, Albizia gummifera*, *Bombax rhodognaphalon, Cussonia zimmermanii, Dialium holtzii, Ficus* spp., *Parinari excelsa, Ricinodendron heudelotii, Sorindeia madagascariensis,* and the valuable timber species *Milicia excelsa*. Transitional woodland/Brachystegia forest forms the natural vegetation along the plateau edges. It is dominated by *Brachystegia microphylla*, interspersed with *Faurea saligna.* Woodland with a high species diversity dominates on the northern and western portions of the plateau. Species include *Parinari curatellifolia, Pteleopsis, Julbernardia* and *Brachystegia*, along with the valuable timber species Mninga (*Pterocarpus angolensis*).

African Pitta, *Pitta angolensis* in Rondo NFR. This migratory species breeds south of the Rufiji before migrating north as far as Kenya and Uganda. They are nocturnal migrants. They are '.threatened by habitat loss. Photo by Elia Mulungu

Bearded Pygmy Chameleon, *Rieppeleon brevicaudatus* from Rondo Nature Forest Reserve. This species is found in lowland forest across eastern Tanzania and south-eastern Kenya. Photo by Elia Mulungu

Biodiversity

With two endemic and two near-endemic genera and 60 endemic plant species, Rondo Forest has the highest concentration of single-site endemic plant taxa in the Coastal Forests. The reserve also provides habitat for the Coastal Forest-endemic and Critically Endangered primate, the Rondo dwarf galago (*Galagoides rondoensis*) as well as being an important breeding site for bird species such as the East Coast Akalat (*Sheppardia gunningi*).

Threats

Fire and encroachment from agricultural land have affected the northern portion of the reserve. Illegal logging and pole cutting occur throughout the reserve. Invasive species including *Maesopsis eminii* threaten the reserve's ecological integrity.

Protection and management of Rondo Nature Reserve

A five-year management plan (2016/17 – 2020/21), which is almost finalised, places great emphasis on the conservation of biodiversity and ecosystem services. The reserve currently has 6 staff members and 3 motorbikes. Management activities including suppressing forest fires, maintaining boundaries and patrolling. A tree nursery, with the capacity to raise 600,000 seedlings per year, exists in Chikombe village, but limited planting has occurred in the Nature Forest Reserve as natural regeneration is preferred. Adjacent villages have developed land use plans under Participatory Forest Management initiatives, and Village Land Forest Reserves act as buffer zones for the reserve.

Visiting Rondo Nature Reserve

The reserve is approximately 60 km from Lindi Town. There are opportunities for hiking and nature tourism, however, due to limited infrastructure including water sources, few tourists visit the reserve. The reserve also has potential as a cultural tourism destination focusing on the history of ceremonial use by the Wamwera tribe.

View over Rondo Nature Reserve.
Photo by Neil Burgess

Parker's forest tree frog in Uluguru NFR.
Photo by Michele Menegon

Uluguru Nature Forest Reserve

Reserve Profile

Uluguru Nature Forest Reserve (UNFR) covers 24,115.09 ha and was gazetted through Government Notice No. 296 on the 7/11/2008. UNFR comprises the former Uluguru North, Uluguru South, Bunduki I and II forest reserves, and Bunduki 'gap' corridor. The reserve extends along a north -south ridge ranging in altitude from 600 m (Bunduki Gap) – 2,638 m (Kimhandu Peak). The Uluguru Mountains are the wettest part of the Eastern Arc Mountains, receiving up to 4,000 mm rainfall per annum. On the main Uluguru ridge, over 50 villages touch the forest boundary of UNFR and over 151,000 people live within the mountain area, often at increasing densities at higher altitudes.

Vegetation

The vegetation of the Uluguru main ridge and the outlying blocks is extremely variable. It ranges from drier lowland Miombo woodlands, to lowland coastal forests, transitional rainforests, and to sub-montane, montane and upper montane forest types. It also includes an area of afromontane grasslands on the Lukwangule plateau. All these habitats are rich in endemic species and are all of high conservation priority.

Biodiversity

The Uluguru Mountains hold 44 (32%) of the 136 vertebrate species endemic to the Eastern Arc Mountains, placing them second in terms of importance for biodiversity of Eastern Arc Mountain endemic vertebrates, only surpassed by the Udzungwa Mountains. A total of 14 endemic vertebrate species are restricted to the Uluguru Mountains (six amphibians, three birds and five reptiles).

The Uluguru Mountains hold 211 (38%) of the 554 plant taxa endemic to the Eastern Arc Mountains, 68 of which are recorded only in UNFR. They are on a par with the Udzungwa Mountains as being the most important mountain blocks with respect to Eastern Arc Mountain endemic plants, and in fact hold more taxa endemic to the block than the Udzungwas. Notable is the genus *Impatiens* for which the Ulugurus are a centre of radiation. Of the 13 Eastern Arc endemic species of *Impatiens* found within UNFR, 8 are known only from this single reserve. There are also 3 endemic species of African violet – *Saintpaulia.*

Tourists hiking through forest from Tchenzema up to the Lukwangule Plateau. Photo by Andrew Perkin.

Threats

The main challenges to the management of the Uluguru Mountains are fires that spread from farmlands and into the forest, intensive firewood collection in higher, colder and more densely populated areas, deforestation of unprotected forests (in the north), and the presence of invasive species (*Rubus* and *Lantana* in the south and *Maesopsis* in the north).

Protection and management of Uluguru Nature Forest Reserve

A revised management plan (2016/17 – 2020/21) for UNFR is awaiting final approval. Its objective includes maintaining biodiversity status, ecosystems services and function, water catchment values and improving the livelihoods of community members through poverty eradication mechanisms. Legal provisions for protection include the banning of timber and natural resources harvesting beyond that for domestic consumption, which will be permitted within 50m inside the reserve boundary. Villagers have also agreed to establish a 500 m buffer zone, but this awaits further approval from district authorities. Current staff includes 17 field and technical staff 7 of which are based in UNFR and 1 driver. The revised management plan requires an additional 19 staff for effective implementation.

Visiting Uluguru Nature Reserve

There are a number of hotels around the Uluguru Mountains, mainly in Morogoro town. On the mountain itself, there is a guesthouse at Kinole on the eastern side and Nyandira on the south-west. There are also camp sites in the east and west of the reserve. A steady number of visitors climb to the Lupanga or Bondwe peaks above Morogoro. A smaller number of tourists also climb to the Lukwangule plateau above Tchenzema.

The boundary of Uluguru NFR. *Photo by Andrew Perkin*

Forest interior in Ulguru NFR. Photo by Neil Burgess.

View over the Afromontane grassland of the Lukwangule Plateau. *Photo by Michele Menegon.*

The Lukwangule Plateau above Tchenzema in Ulguru NFR. Photo by Andrew Perkin.

The Eastern Arc Sharp-nosed chameleon, *Kinyongia oxyrhina*, is endemic to the Eastern Arc Mountains where it lives in forests and on forest edges. It is classified as Near-Threatened by IUCN. Photo by Michele Menegon

UZUNGWA SCARP NATURE FOREST RESERVE

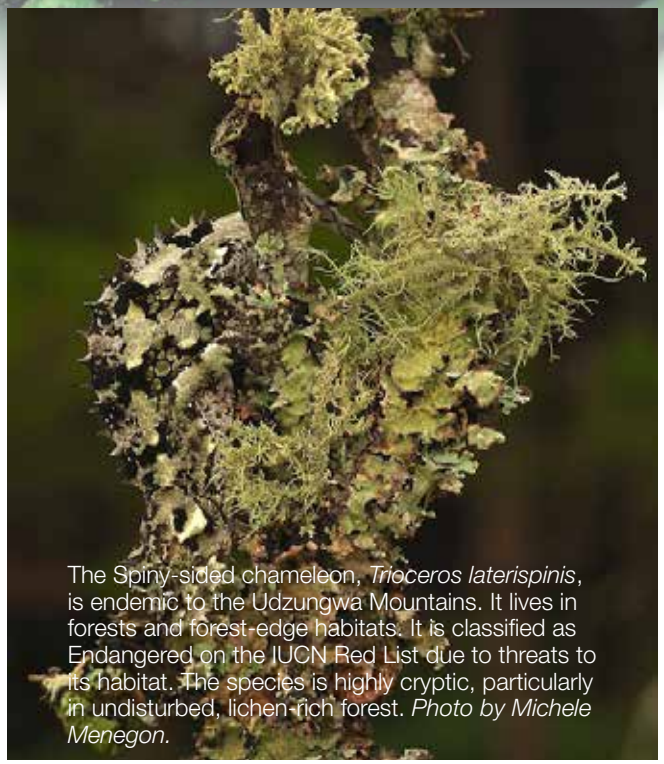
Reserve Profile

Uzungwa Scarp Nature Forest Reserve (USNFR) covers the steep east-facing Udzungwa escarpment and part of the undulating upland plateau. USNFR rises from 300 – 2,068 m altitude. The southern boundary is the Chita River, the northern boundary the Kidete River and the western boundary the Ruaha, Iwolo and Lukosi rivers. USNFR covers 32,763.2 ha and is the fourth largest protected area within the Eastern Arc Mountains.

Annual rainfall in the area ranges from 1,350 mm to 2,000 mm, occasionally exceeding 3,000 mm in wetter areas. Estimated mean temperatures range between 20 °C in December and 15 °C in July. In lowland areas, temperatures reach 27 °C in December and go down to 19 °C in July. USNFR was gazetted through Government Notice No. 148. The Nature Forest Reserve was upgraded from Uzungwa Scarp Forest Reserve. Forest Declaration Order 2016 and the boundary was re-mapped in 2009 as JB 2564. USNFR is surrounded by nineteen villages with a population of around 48,980 in 2012.

Vegetation

The vegetation in USNFR is comprised of lowland, sub-montane and montane forests, with areas of seasonally inundated mbuga and shrubby grassland. Lowland forests are relatively dry and have a low and often broken canopy with woodland species, except near streams. Sub-montane forests are well developed and ridges are occupied by dry forest species. Much of the montane forest on the plateau above the scarp is secondary and may have been cultivated in the past. Extensive stands of bamboo are reported from the western side.



The Spiny-sided chameleon, *Trioceros laterispinis*, is endemic to the Udzungwa Mountains. It lives in forests and forest-edge habitats. It is classified as Endangered on the IUCN Red List due to threats to its habitat. The species is highly cryptic, particularly in undisturbed, lichen-rich forest. *Photo by Michele Menegon.*

Outstanding universal value

The Udzungwa Mountains hold 221 (40%) of the 554 plant taxa endemic to the Eastern Arc Mountains. Thus, they are the most important block with respect to Eastern Arc Mountain endemic plants. Of these, 6 species are recorded only from USNFR.

The Udzungwa Mountains hold 46 (34%) of the 136 vertebrate species endemic to the Eastern Arc Mountains, which is more than any other mountain block. 20 endemic vertebrate species (15% of all Eastern Arc endemics) are restricted to the Udzungwa Mountains, of which 6 threatened species

A female Udzungwa Red Colobus, *Piliocolobus gordonorum*. This species is endemic to the Udzungwa Mountains where it lives in forests from 250 m – 2,200 m a.s.l. They live in groups ranging in size from 7 – 83 individuals. It is classified as Endangered on the IUCN Red List due to its limited range and the ongoing deforestation affecting the Udzungwa Mountain forests. Photo by Tom Struhsaker.

Afrixalus morerei is from the Reed or Banana Frog genus. The species has only been recorded in Uzungwa Scarp NFR and Dabaga Forest Reserve. It is classified as Vulnerable on the IUCN Red List. Photo by Michele Menegon

of amphibians have only been recorded in USNFR. Threatened species within the Udzungwa Mountains include 50 vertebrates, of which 37 species are found in USNFR, including 22 endemic to the Eastern Arc Mountains.

Threats

The fauna in USNFR is currently threatened by hunting, which has caused population reductions in many of the larger mammals in the reserve. This has particularly affected the rare Abbots duiker and is also impacting populations of red colobus monkey. Fire and illegal logging also pose serious threats to the forest in Uzungwa Scarp NR.

Protection and management of Uzungwa Scarp Nature Forest Reserve

An updated management plan (2016/17 – 2020/21), containing goals and objectives consistent with the management of reserves throughout the Eastern Arc, is due for final approval. Main objectives include the preservation of habitats, ecosystems, species, ecological processes, landscape features and genetic resources by minimising disturbance and limiting public access. Currently, 2 forest officers, 1 technical staff member and 1 supporting staff member manage USNFR. These numbers are expected to increase significantly with approval of the updated management plan. NGOs including the Tanzania Forest Conservation Group have supported conservation initiatives for Uzungwa Scarp Nature Reserve

There is potential to manage woodland on the north-eastern side of the reserve as a buffer zone using participatory forest management. On the western side, tree planting and agroforestry would be beneficial for establishing a buffer zone. A corridor containing natural vegetation (Mngeta Corridor) used for farming activities by Mhanga, Uluti, Itonya, Mngeta, Mchombe and Mkangawalo villages has been studied for its ability to function as a corridor between USNFR and Kilombero Nature Forest Reserve.

Tourism potential

Currently there are very few options for places to stay close to USNFR and the road from the nearest towns is in a poor condition. This means that the site, despite being spectacular, is rarely visited. Currently, Government plans for road rehabilitation are underway.

Kihansi Gorge waterfall. Streams flowing from Uzungwa Scarp NR flow into the Kihansi River. The river is used to generate hydro-power. Photo by Michele Menegon

Management effectiveness of Nature Forest Reserves in Tanzania – Re-assessing past baselines in 2016

Isaac Malugu, Gerald Kamwenda, Marco Njana, and Dos-Santos Silayo

An impact evaluation baseline for 11 Nature Forest Reserves (NFRs) was undertaken in 2015 to assess the status of management effectiveness (using Management Effectiveness Tracking Tools: METTs), financial score cards, threats analysis and an assessment of available staff allocations across the various NFRs. As a 12th NFR (Mount Hanang) was added to the network of sites after the baseline, some updating of information to accommodate that site has also been undertaken.

What is the forest condition in the nature forest reserves?

The results revealed that almost all the forests were disturbed by human use - often illegally according to the reserve management plans. The presence of newly cut trees and poles in most forests indicated that tree/pole cutting continues in 2015, in spite of continued efforts by NFR management to reduce these challenges. Forest disturbance was most pronounced in Mkingu and Minziro NFRs, followed by Uluguru NFR, and was least in the Amani NFR.

How are the nature forest reserves managed? The METT results show that the NFRs all have moderate management quality. Across all 11 NFRs, the mean METT score is 57%. Sites with significantly higher than average scores are Magamba, Mt. Rungwe and Uzungwa Scarp NFRs (see Figure 1), which have an average METT score of 68% - representing good management effectiveness. Two sites have significantly lower scores – these are Chome in the South Pare 49% and Minziro NFRs 30% on the border with Uganda.

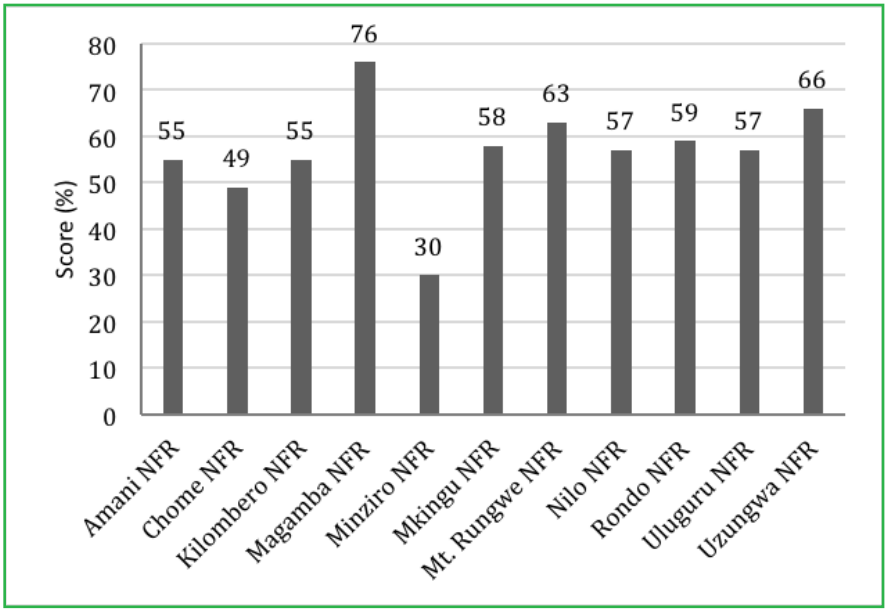


Figure 1: METT baseline scores for 11 NFRs as of 2015

The five elements of METT (context, planning, inputs, processes, outputs and outcomes) scored an average of 46% across the 11 NFRs, with scores ranging between 15% for processes and 86% for outcomes (Figure 2). Scores indicate that management initiatives need to focus on the planning, inputs and processes aspects of management effectiveness. Outputs and outcomes scored significantly higher.

Table 1: Allocated and extra budget for 11 NFRs as of 2015

Name of NFR	Allocated budget (USD)	Extra budget from donor (USD)
Amani	25,000	11,765
Chome	45.850	107,913
Kilombero	118,075	13,182
Magamba	59,221	17273
Minziro	11,364	151,364
Mkingu	46,563	10,909
Mt. Rungwe	149,552	0
Nilo	45,622	39,711
Rondo	56,001	2,273
Uluguru	76,364	25,914
Uzungwa scarp	32,812	7,736
TOTAL	**666,000**	**388,039**

Site Based Revenue Generation

The total annual site based revenue generation across all NFRs was also analysed and broken down by source (Table 2). The results indicate that NFRs generate revenue from various sources, including tourism entrance fees, recreational related fees (camping permits etc.), scientific research fees, the sale of souvenirs from state run shops and penalties and fines. Only three NFRs had significant revenues in 2015, ranging between USD 7,000–11,000. These were Magamba (USD 11,032), Kilombero (USD 9,359) and Amani (USD 7,726). The sources of income also varied between reserves. For example, Magamba NFR collected its revenue from more than 1,000 international and local tourists, whereas Kilombero NFR collected revenue from tourists and scientific research fees. Rondo NFR, which was not gazetted in 2015, collected no revenue in that year. Chome and Minziro also collected only small amounts of money (USD 188 and 145 respectively) from tourism entrance and scientific research fees.

Table 2: Revenue generated from the 11 NFRs as of 2015

Name of NFR	Revenue (USD)
Amani	7,726
Chome	188
Kilombero	9,359
Magamba	11,032
Minziro	145
Mkingu	825
Mt. Rungwe	726
Nilo	2,186
Rondo	-
Uluguru	818
Uzungwa scarp	3,695
TOTAL	**36,699**

What are the human resource investment?

The eleven NFRs are manned by appointed conservators who are in-charge of the daily management of the NFRs. The conservators are custodians of all management issues, along with supervising the pool of staff. Table 3 indicates the number of staff in each NFR and their training levels. 122 staff members are responsible for the management of about 307,000 ha of NFRs. Some of the NFRs have a minimal number of staff, hampering the optimal needs for undertaking full operation of the management activities. The most under-staffed was Uzungwa Scarp NFR, which had only four staff members managing a massive area of more than 32,763 ha. The ratio for personnel to reserve area in Udzungwa was 1:8,191 ha, whereas in Amani NFR, the ratio lies at 1:559 ha.

Table 3: Number of staff managing the 11 nature forest reserves, with a maximum potential of 175 staff required

Name of NR	Levels of education					Gender		Totals
	Basic	Certificate	Diploma	BSc	MSc	Female	Male	
Amani NR	2	2	7	3	1	3	12	15
Chome NR	4	3	4	2	2	1	14	15
Kilombero NR	3	3	8	6	1	3	18	21
Magamba NR	3	2	1	4	1	1	10	11
Minziro NR	0	1	2	1	1	0	5	5
Mkingu NR	4	1	2	2	1	2	7	9
Mt. Rungwe NR	0	0	3	1	1	0	5	5
Nilo NR	3	2	1	1	2	2	7	9
Rondo NR	0	3	2	2	1	2	6	8
Uluguru NR	5	4	7	2	2	8	12	20
Uzungwa NR	0	1	1	1	1	0	4	4
Totals	**24**	**22**	**38**	**25**	**14**	**22**	**100**	**122**

Conclusion

The following conclusions are built on the basis of this baseline study and the learned experience from the previous studies.

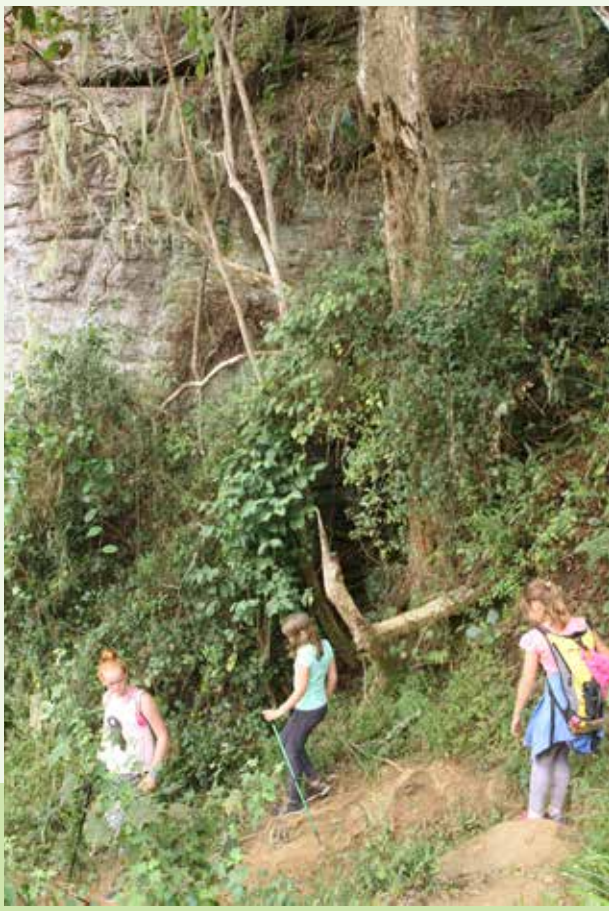
i. The average METT scores are at acceptable levels, setting the baseline for further improvement in coming years.

ii. Financial sustainability at the baseline indicates serious financing gaps across the NFRs. Much of the management activities depend on allocations from the central government and there is little self-generation of funds. This leaves the NFRs very vulnerable to the decisions of central government and the financial position of the Tanzania Forest Service.

iii. At the baseline, many of the NFRs have also indicated inadequate staff numbers for critical management activities and a lack of equipment to allow management activities to proceed.

iv. Minziro, Chome and Rondo NFRs had low to medium scores for both METT and financial score cards. Part of the reason is that these are newly established and were, at the time of this baseline study, not yet legally gazetted. Currently, these reserves are fully gazetted.

v. All the NFRs should aim to develop business plans that tap in to the potential for revenue collection through various business models. There is potential to attract investment from the private sector, through public - private partnerships, particularly by developing tourism and recreational facilities in NFRs. Others may include marketing the destinations, attractions, facilities and services of NFRs.



Tourists visit Uluguru Nature Reserve Developing tourism and recreational facilities is a priority investment area for the Nature Reserves. Photo by Andrew Perkin

The Eastern Arc Mountains World Heritage Nomination Process

View over Mkingu Nature Reserve. The Eastern Arc Mountains have been identified as a priority site for inscription in the list of World Heritage Site, primarily due to their extraordinary biodiversity values. Analysis for the UNESCO World Heritage Convention in 2005 showed that that the Eastern Arc Mountains is the most important area lacking a World Heritage site in Africa. Photo by Rob Beechey.

The Eastern Arc Mountains are known to biologists and conservationists as one of the world's most important areas for biodiversity. Systematic analyses of available species data and economic values have proven the global and national importance of the Eastern Arc Mountains.

Despite this known importance, the area is yet to be recognised internationally through inscription as a natural property on the World Heritage List. This gap in the global World Heritage Site network was first noted at the 1997 Eastern Arc Mountains Conference.

After the Eastern Arc conference of 1997, the Forestry and Beekeeping Division (FBD) of the Ministry of Natural Resources and Tourism in Tanzania, developed a conservation project for the Eastern Arc Mountains that included preparing the nomination dossier of the Eastern Arc Mountains for inscription on the World Heritage List. The resulting Project, 'Conservation and Management of the Eastern Arc Mountain Forests', ran from 2003 to 2010. During this period, the FBD organised a series of meetings with national and local government stakeholders to explain the World Heritage concept and gained support from the 5 regions, 15 Districts and numerous villages that cover the Eastern Arc Mountains. This was successfully undertaken. In 2011, the Government put the process on hold until 2016. In January 2016, the Ministry of Natural Resources and Tourism (Tanzania Forest Service, TANAPA and Division of Antiquities) revived the process of updating and re-submitting the Eastern Arc Mountains World Heritage dossier. A number of planning and coordination meetings were held to guide this updating process: June 2-4th 2016 in Amani with TFS Nature Forest Reserve coordinators, June 8th with TANAPA representatives in Arusha, June 10th with senior members of TFS in Dar es Salaam, and June 10th and 17th with representatives of the Division of Antiquities. Feedback on the draft dossier was also received from expert reviewers within and outside Tanzania, and a stakeholder meeting was held in August 2016 to review the dossier and gather inputs. This resulted in a further update of the dossier text. The 2016 process also gathered updated information for inclusion in the nomination dossier; including compiling updated biological, management, and financial and staffing data.

In 2016, there was also a renewed political process to seek the authorisation of government at all levels to re-submit the dossier. All regions in the Eastern Arc Mountains were visited in July 2016 to re-confirm and endorse the papers from stakeholder meetings in the 2005-2009 period. Internal meetings with TFS and the MNRT were held in September and October 2016 and the cabinet paper was prepared to support the application in late October 2016. The dossier is now complete and the key facts in the 150-page dossier covering Biodiversity and Economic values of the proposed Eastern Arc Mountains World Heritage Site are summarised below:

BIODIVERSITY:

- The Eastern Arc meets the UNESCO World Heritage Convention criteria for 'Outstanding Universal Value'.
- The number of endemic animals (only found in these mountains) is 211 species. There are also around 550 unique plants.
- More than 70% of the Eastern Arc endemic species are found in the 9 reserves and nowhere else on earth. Many are also threatened by extinction.

  Analysis for the UNESCO World Heritage Convention in 2005 showed that that the Eastern Arc Mountains is the most important area lacking a World Heritage site in Africa (see http://www.unep-wcmc.org/biodiversity-wh_975.html). This remains true today.

CARBON STORAGE AND SEQUESTRATION:

- The Eastern Arc mountain forests store up to ~300 tonnes of carbon per hectare (tC/ha), within the wood and roots of the trees. The total amount of carbon stored is 6.33 pitagrams and this is being proposed as part of the Tanzanian national contribution to reducing climate change. Around 35% of the carbon is stored within protected areas and about half of that in the 9 sites of the proposed World Heritage Site.
- Estimates of habitat loss suggest that over the last century, carbon storage in the Eastern Arc Mountains declined. Forest growth within protected areas saw them gain carbon at ~4.8 tC/ha over the past 100 years whereas unprotected areas emitted a mean of ~11.9 tC/ha.
- This means that the proposed REDD+ mechanism could be implemented in the Eastern Arc Mountains and particularly within the proposed World Heritage Site. This could generate revenues for TFS and TANAPA to further conservation efforts. The estimated net present value of the forest and woodland in the area is USD 0.99-1.31 million.

NATURE-BASED TOURISM:

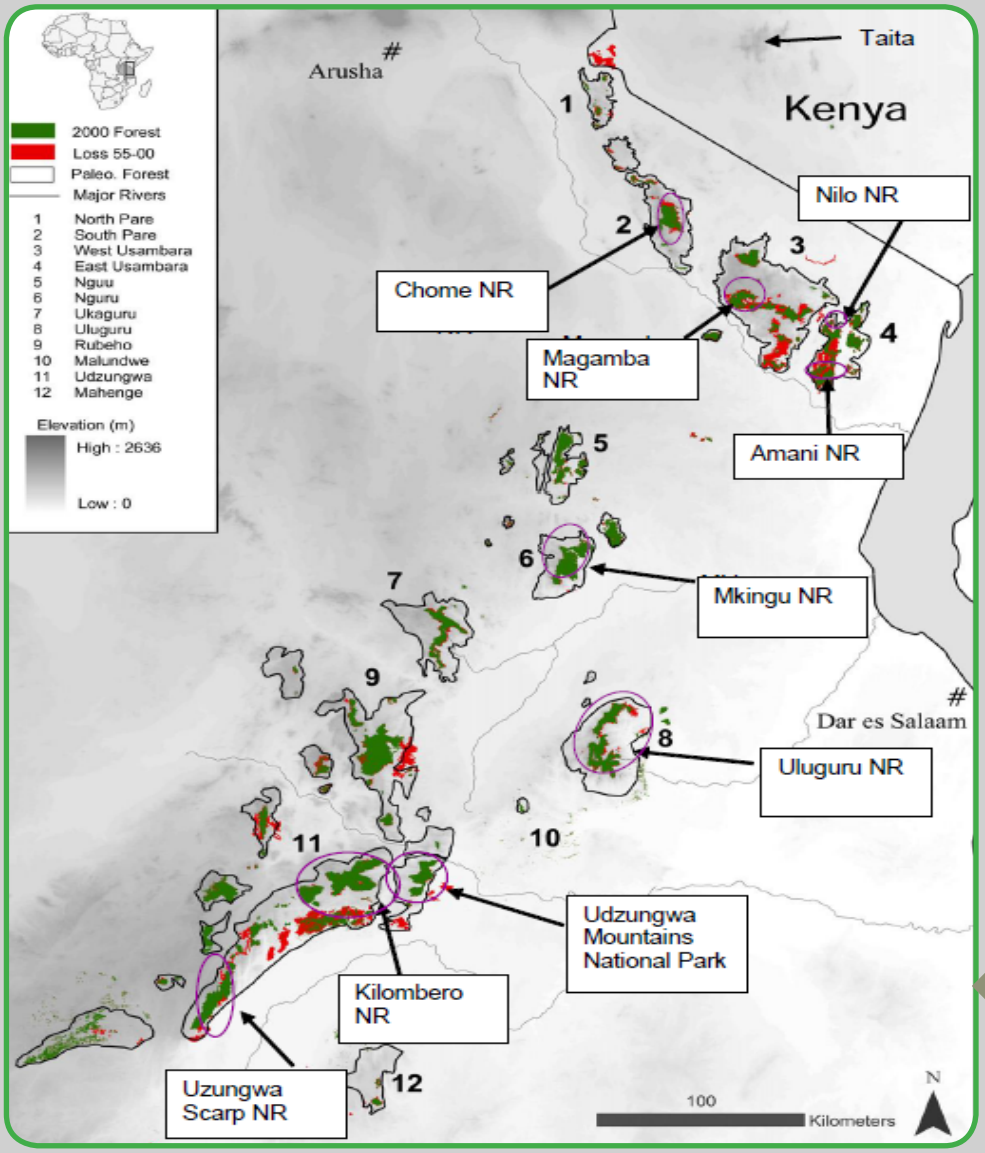
- Across the 120 hotels located in the Eastern Arc Mountains, tourism revenues were assessed as about 1.7 million dollars in 2010, with about 38% of that (~USD 650,000) from nature-based tourism. Most of this value comes from the reserves of the proposed Eastern Arc World Heritage Site, especially Amani Nature Forest Reserve, Udzungwa National Park, Uluguru Nature Forest Reserve and Magamba Nature Forest Reserve.

- The declaration of a World Heritage Site in the Eastern Arc could be expected to increase the number of tourists coming to the area significantly. Expectations are based on other mountains in the East African region (including Kilimanjaro in Tanzania) earning tens of millions of US dollars in revenue per annum.

TIMBER AND NON-TIMBER FOREST PRODUCTS TO ADJACENT COMMUNITIES:

The Eastern Arc forests and woodlands are illegally harvested for their timber values. There are a number of non-timber values in the Eastern Arc Mountains that are used by adjacent communities. These include medicinal plants, firewood, building poles, roofing thatch, food (bushmeat, wild vegetables and fruit) controlled beekeeping, artisanal raw materials (baskets, mats, dyes). There are also cultural values for burial sites, worshipping, etc. Some of these attributes were valued in 2015:

- Natural timber: USD 8.8 million
- Firewood: USD 17-34 million
- Charcoal: USD 19 million
- Building poles: USD 1.6 million
- Roofing thatch: USD 0.2 million
- Medicinal plants: around $20 per resident per year
- Cultural values: not possible to value



Map 1: Location of the 8 nature forest reserves and 1 national park proposed to be included within the Eastern Arc Mountains World Heritage site, with a background of remaining forest in year 2000 and the forest lost between 1955 and 2000

HYDROLOGY:

- The Eastern Arc Mountains are the source of a significant proportion of Tanzania's water, providing drinking water for all the major coastal cities, irrigation water for most of eastern Tanzania, and the water used to generate 50-70% of the country's electricity.
- The value of the water from the Eastern Arc Mountains in 2015 can be broken down into a number of aspects:
- Hydropower: USD 430.5 million
- Irrigation water: USD 92 million
- Domestic water use: USD 118.6 million
- Industrial water use: USD 400 million

News of the Arc

Norway renew support for the Eastern Arc Mountains Conservation Endowment Fund

The Government of Norway have pledged US$ 3 million to support the Eastern Arc Mountains Conservation Endowment Fund (EAMCEF) between 2016 – 19. The fund's mission is '*to catalyze resources to foster conservation of forest biodiversity in the Eastern Arc Mountains of Tanzania*.' EAMCEF has provided a steady flow of support for conservation throughout the Eastern Arc Mountains including for reserve management, community development projects and research. Find out more at: http://www.easternarc.or.tz

Revision of the National Forest Policy

Since early 2017, the Ministry of Natural Resources and Tourism has established a task force to revise the National Forest Policy. The team will lead a process of stakeholder consultations and technical review, with a view to producing a draft policy by the end of September 2017. Other policies that have been revised recently, or are still in the process of being reviewed, include the National Energy Policy, National Environmental Policy and the National Land Policy.

Scientists discover a new species of frog in Ruvu South Forest Reserve and a new species of chameleon in the Udzungwa and Southern Highlands

A new species of frog has been discovered in Ruvu South Forest Reserve, a forest on the outskirts of Dar es Salaam. The frog is only known to exist in this highly-threatened forest reserve. In 2001, a group of scientists working for the Non-Governmental Organisation, Frontier-Tanzania, collected a strange looking reed frog from Ruvu South Forest. Some 16 years later, a genetic and morphological analysis by British scientists, Chris Barratt and Simon Loader, revealed that the frog is new to science. The frog has been named *Hyperolius ruvuensis* or the Ruvu spiny reed frog. The frog was found on reeds and bushes in a swampy area of open grassland within the reserve. The frog has not been seen since 2001, despite a rapid survey in 2015.

A new species of chameleon, *Kinyongia msuyae*, has been described from the Udzungwa and Livingstone Mountains. The chameleon is named after Charles Msuya, the scientist who collected the first known specimen of the new chameleon. The discovery contributes new evidence relevant to understanding the historical biogeography of the Eastern Arc Mountains and southern highlands.

Research highlights and new publications about the Eastern Arc Mountains

Land cover change in the Eastern Arc Mountains between 1908 – 2000

Willcock, S. et al. 2016. Land cover change and carbon emissions over 100 years in an African biodiversity hotspot. Global Change Biology (2016), doi: 10.1111/gcb.13218

Land cover change in the Eastern Arc Mountains between 1908 – 2000

The paper presents a 100-year time series of land cover change for the Eastern Arc Mountains. The results highlight the role of agriculture as the main driver of deforestation in the Eastern Arc Mountains. The authors state that, '*forest and savanna area both declined, by 74% (2.8 million ha) and 10% (2.9 million ha), respectively, between 1908 and 2000. This vegetation was replaced by a fivefold increase in cropland, from 1.2 million ha to 6.7 million ha*.' The paper also provides an analysis of the carbon released as a consequence the land use change. The study was produced as part of the Valuing the Arc Research Programme. http://valuingthearc.org/

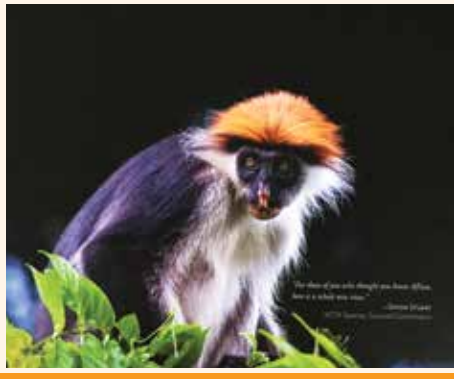
Mammal diversity in the Eastern Arc Mountains

Rovero, F. et al., 2016. Camera trapping surveys of forest mammal communities in the Eastern Arc Mountains reveal generalized habitat and human disturbance responses. Biodiversity Conservation. DOI 10.1007/s10531-016-1288-2

In this recent paper led by Francesco Rovero, the authors present the results of eight years (2003-11) of camera trapping surveys in eight of the Eastern Arc Mountain blocks. Overall, the authors recorded 43 mammal species with species richness correlated positively with forest area. Species richness was found to be lower in forest patches surrounded by high-density human populations.

Udzungwa: Tales of Discovery in an East African Rainforest

This recently published book contains 23 personal accounts of research and conservation in the Udzungwa Mountains and other Eastern Arc Mountains. The accounts are accompanied by a series of extraordinary photographs and illustrations.



TFCG News

European Union support for eco-villages in the East Usambara Villages

In the East Usambara Mountains, the European Union (EU) has been supporting TFCG to demonstrate strategies that support poor, rural households in Tanzania to adapt to the negative impacts of climate change and to alleviate poverty. The project is supporting 8 communities to manage their forests, water sources and land more efficiently and to adopt climate-smart agriculture techniques and forest-based enterprises. Funding for the project has been provided through the EU's Global Climate Change Alliance (GCCA). The EU's GCCA initiative aims at strengthening dialogue and cooperation on climate change with developing countries most vulnerable to climate change, and supporting their efforts to develop and implement adaptation and mitigation responses. So far, the project has strengthened the communities' implementation of community-based forest management; established butterfly farming in five additional communities; and trained farmers on agroforestry and conservation agriculture. Working closely with the University of Leeds, the project is also carrying out research on climate change resilience monitoring tools. To find out more, please visit: http://www.tfcg.org/eusambara.html

Progress on Joint Forest Management for Chome Nature Reserve

Working with the 27 communities that surround Chome Nature Reserve, TFCG has facilitated the Tanzania Forest Services Agency (TFS) to prepare joint forest management plans, by-laws and agreements for the reserve. The reserve has experienced annual deforestation rates ranging from 0.4% between 1975-99 to 0.14% from 2011-15. Deforestation is caused by fire, encroachment and illegal logging. The communities have agreed to support TFS in addressing these threats to the forest and to the management of the reserve. TFS have been reviewing the agreements since 2016. TFCG also provided training on fuel-efficient stoves in the communities around the reserves. This has resulted in widespread adoption of the stoves. TFCG's support to Chome NR was financed by the European Union.

TFCG supports the establishment of new protected areas in the South Nguru Mountains with funding from the European Union

In the South Nguru Mountains, TFCG have supported 10 villages to establish Village Land Forest Reserves covering 13,156 ha. Seven of the communities have integrated sustainable timber and charcoal production into the management of their reserves as a source of revenue for reserve management and for community development projects. The project has also been raising awareness on forest conservation and participatory forest management in the communities around Mkingu Nature Reserve, with the intention of establishing joint forest management for the reserve. The annual deforestation rate for Mkingu NR has declined from -0.81% between 2010-14, down to -0.6% from 2014-16. Fire and conversion of forest to cropland are key threats to the reserve. In the adjacent Kanga Forest Reserve, TFCG have supported the communities and TFS to establish joint forest management, a process due to be completed by the end of 2017. The project is also financed by the European Union.

Generating revenues for village forest reserves through sustainable charcoal production

Since December 2015, TFCG has been implementing the second phase of the Transforming Tanzania's Charcoal Sector project. This follows the successful completion of a first phase in November 2015. As a result of the project 13 communities in Kilosa and Morogoro Rural Districts have integrated sustainable charcoal production into the management of their village forest reserves. The communities have earned over US$ 220,000, since 2013, from the sale of sustainable charcoal, including US$ 125,000 in fees to cover village forest reserve managements costs and for community development projects. Overall, annual deforestation rates in the village forest reserves from 2014 – 16 have declined, compared with rates in 2010-14. This contrasts with an overall of trend of increasing deforestation in other Kilosa villages. The project has also supported Kilosa District to prepare a district-wide sustainable harvesting plan based on resource assessments and sustainable harvesting principles. The project aims to model an alternative value chain for the supply of charcoal, based on ecologically sustainable production techniques and good governance. The project is financed by the Swiss Agency for Development and Cooperation. You can find out more about the project at: http://www.tfcg.org/sustainablecharcoal.html

TFCG supports the establishment of Eco-Schools in primary schools in the Eastern Arc Mountains

The Eco-Schools approach was established following the Rio Earth Summit in 1992. It is an international programme that encourages young people to engage with their environment by allowing them the opportunity to actively protect it. The first 20 Tanzanian eco-schools were established by TFCG, in 2016, in rural villages in Mvomero District. Globally there are more than 49,000 schools with over 16 million students registered with the Eco-School Programme in 64 countries. The eco-schools approach can be adopted at all levels of education from kindergarten to universities. In April 2017, with funding from the Danish Outdoor Council, TFCG started a second 3-year phase of establishing eco-schools in communities living adjacent to Eastern Arc Mountain forests. During the 2nd phase, the programme will expand to 44 schools in 4 districts.

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About the Tanzania Forest Conservation Group

The Arc Journal is published by the Tanzania Forest Conservation Group (TFCG). Established in 1985, TFCG is a Tanzanian Non-Governmental Organisation promoting the conservation of Tanzania's high biodiversity forests.

TFCG's Vision

We envisage a world in which Tanzanians and the rest of humanity are enjoying the diverse benefits from well conserved, high biodiversity forests.

TFCG's Mission

To conserve and restore the biodiversity of globally important forests in Tanzania for the benefit of the present and future generations. We will achieve this through capacity building, advocacy, research, community development and protected area management in ways that are sustainable and foster participation and partnership..

To find out more about TFCG please visit our website www.tfcg.org.

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The Arc Journal:

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