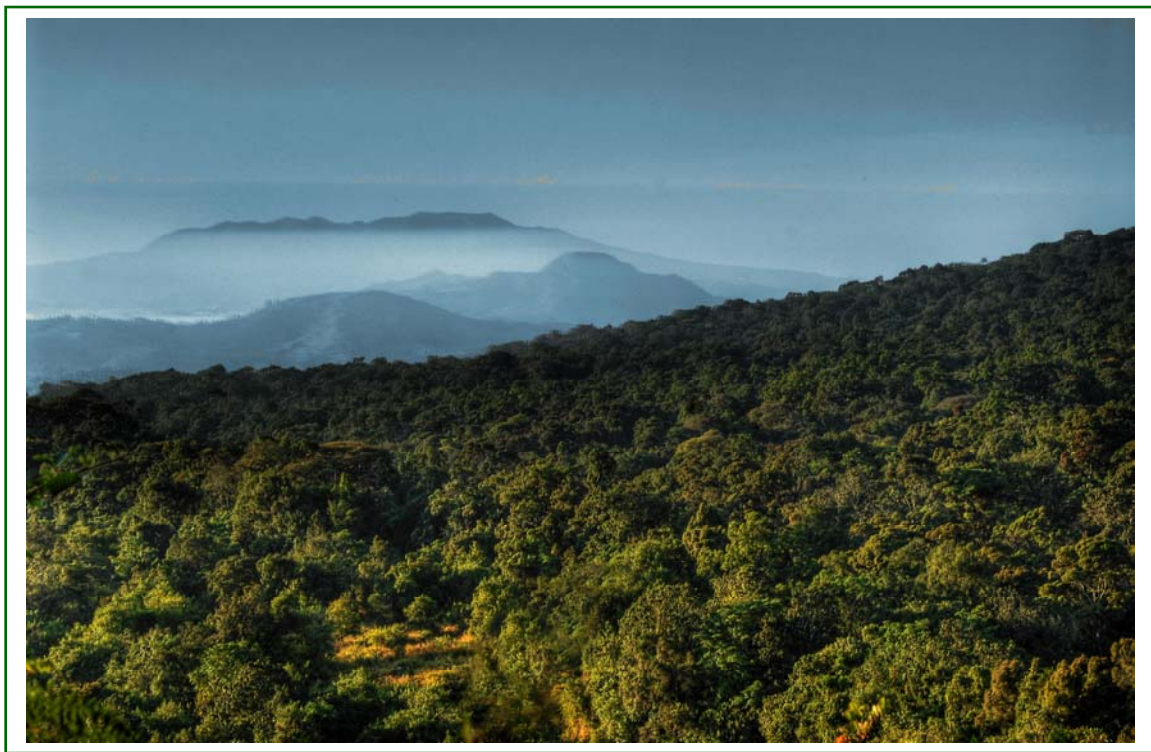




WILDLIFE CORRIDORS IN TANZANIA



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Cover photo: Bujingijila Corridor, Southern Highlands © Tim Davenport / WCS

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Statement

The contributors to this document support the conservation of wildlife corridors across Tanzania. It is their contention that wildlife corridors can help secure national interests (water, energy, tourism, biodiversity, carbon sinks and development) and can also meet the needs and rights of local communities. They are concerned that once corridors are lost they can never be restored, and that many corridors are disappearing quickly. They encourage the Government of Tanzania to look closely and immediately at the issue, and take action where appropriate.

Summary

This report presents summary information on most of the important wildlife corridors remaining on mainland Tanzania in 2008. Information on the current status of each corridor, the wildlife using these corridors and the main threats to them are given. Maps are presented to illustrate each area.

The concept of a wildlife corridor differs greatly between different people. The majority of documented corridors in the country now seem to be in a critical condition. That is, based on current rates of habitat change, they are estimated to have less than 5 years remaining before they disappear. Five corridors are in extreme condition and could disappear within 2 years unless immediate action is taken. Corridors are being destroyed by rapid agricultural expansion, unplanned land use strategies, unmanaged natural resource extraction, increased bushmeat trade and the building of roads. Unless action is taken to manage these activities, Tanzania's protected areas will become isolated; a situation likely to have serious implications for economic development including the sustainability of the tourist industry.

This report was motivated by the strong conviction that wildlife corridors are a critical resource for Tanzania and all Tanzanians, and that urgent and persistent conservation attention from all stakeholders at both national and local levels is warranted.

The aim of this document is to compile in one place and for the first time, a summary of current knowledge on the nation's wildlife corridors, to serve primarily as a useful reference. Management of wildlife corridors can be complex, and different strategies will be appropriate for different corridors. It is not the aim of this document, to prescribe any courses of action or to recommend any particular strategy. The aim is merely to present the most up-to-date available information in a way that will be of value to all interested parties.

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Background

In Tanzania, many protected areas are rapidly becoming isolated, yet the long term viability of these protected areas depends on watersheds outside the protected area, on the ability of animals to disperse and return to the area on an annual basis, and on a flow of animals from other protected areas. The reasons for the increasing isolation of protected areas in Tanzania are complex, and include a growing human population, new settlement in previously unpopulated areas, land use shifts towards agriculture, and changing infrastructure. However the Government of Tanzania recognizes that its people depend increasingly on protected areas for the ecosystem services they provide, such as clean and abundant water, hydroelectricity, revenues from tourism, and traditional and future medical products. Wildlife corridors are therefore critically important for ensuring the long term health of the nation's protected ecosystems. Unfortunately, the opportunities for establishing, maintaining or managing corridors between protected areas are rapidly diminishing, endangering the future of the ecosystem services and biodiversity provided by protected areas.

In general terms, terrestrial wildlife corridors refer to two types of area: (i) an area used by animals to pass from one 'habitat patch' to another; or (ii) an area that connects two patches of suitable habitat by passing through a matrix of unsuitable habitat. In Tanzania, wildlife corridors are often identified through their use by large charismatic mammals - so-called 'landscape-species', such as elephant (*Loxodonta africana*) or wild dog (*Lycaon pictus*). However, many smaller animals such as duikers, small carnivores, bats, birds and amphibians will also use these corridors. Thus corridors may be important both for maintenance of populations in protected areas linked by corridors, and for populations moving through or living in the corridors.

For the purposes of this document, we define a wildlife corridor as an unprotected area (defined as an area with no legally protected status, or an Open Area, or a Game Controlled Area (GCA)) between two or more protected areas (here defined as National Parks (NPs), Game Reserves (GRs), Forest Reserves (FRs), Nature Reserves (NRs) or the Ngorongoro Conservation Area) (i) either through which animals are known to move or are believed to move, (ii) that are connected by (or can potentially be re-connected by) natural vegetation such as forest or grassland, or (iii) both (i) and (ii) together. Included in our definition of corridors are dispersal areas. These are areas outside protected areas that animals use for a significant length of time but that do not connect two protected areas. Note that we do not use the term wildlife corridor if two contiguous protected areas abut each other.

Wildlife corridors are important for five main reasons:

- (i) If an animal or plant population declines to low levels or becomes extinct in one area or habitat patch, individuals from another patch can immigrate and rescue that population from local extinction.
- (ii) If a small population is isolated, it will lose genetic variation over the long term and suffer from inbreeding. A corridor allows immigrants to import new genetic variation into isolated populations.
- (iii) A corridor increases the area and diversity of habitats over and above the area of the two habitat patches that it connects.
- (iv) If the habitat of one area becomes unsuitable (e.g. because of climate change), organisms (both plants and animals) can move along corridors to reach more suitable habitat, and thus be 'rescued'.
- (v) Some protected areas do not encompass the range of ecosystem requirements needed by certain flora and fauna. Migrating species, for example, especially large mammalian herbivores and associated carnivores, move outside and/or between protected areas. They may also use corridors as dispersal areas.

In Tanzania, many protected areas are rapidly becoming isolated. The reasons behind this are complex, however. They include a growing human population and concomitant land use shifts towards agriculture, infrastructure, and settlement in previously unpopulated areas. Yet at the same time, people depend increasingly on protected areas for the ecosystem services that they provide (e.g., clean and abundant water, hydroelectricity, revenues from tourism, medicine). Unfortunately, the opportunities for establishing, maintaining or managing corridors between protected areas are rapidly diminishing, endangering the future of the ecosystem services and biodiversity that these areas provide.

The five types of wildlife corridor in Tanzania

Wildlife corridors are discussed in five different ways in this document because they are used in disparate ways by wildlife managers and interested parties.

A. Unconfirmed corridors

These are the most poorly documented type of corridor. They consist of two sub-categories (a) known historical migration routes of particular species, usually elephants, where it is unclear if these routes are still in use or (b) the shortest distance between two protected areas across which animals could travel. Current land use is not taken into account.

B. Uncultivated lands between protected areas without documentation on animal movement

These are usually patches of natural vegetation that lie between two protected areas, or sometimes a string of forest reserves or wildlife management areas (WMAs) between larger protected areas. For almost all such corridors, it is not known whether any population actually uses them to move between the protected areas. Furthermore, habitat suitability and the population sizes of species living in these corridors are unknown. Such corridors may be needed in the future if habitat in one of the protected areas becomes modified and unsuitable, for example through climate change, oil exploration or mining. These areas may also be very important for wildlife already, e.g. forest dwelling birds that will not cross open spaces, but this is not documented as yet.

C. Continuous or semi-continuous non-agricultural land between protected areas with anecdotal information on animal movements

These consist of patches or networks of one or more FRs that lie between two larger protected areas and additionally across which one or more species are known to move (or are assumed to move). This type of corridor often focuses on elephant movements.

D. Known animal movement routes between two protected areas

Documented movements of large animals, usually elephants, across a habitat that connects two protected areas, for example by radio telemetry, satellite tracking or transect studies. The habitat may be legally protected, or agricultural land, or both.

E. Potential connectivity of important habitats

Proposed or potential corridor areas linking fragmented or threatened habitat patches that contain endangered or other species. These are usually highland forests. Instigation of such corridors may involve forest restoration projects and/or compensation schemes for local people.

Summary tables of wildlife corridors in Tanzania

The following wildlife corridors are described in the report. They are listed in alphabetical order.

Table 1. List of wildlife corridors detailed in this report

Number	Map No	Name	Region
<i>All</i>	<i>1</i>	<i>SUMMARY</i>	<i>All</i>
1	2	Bujingijila (Mt Rungwe-Livingstone)	Mbeya
2	3	Burigi-Akagera (Rwanda)	Kagera
3	3	Burigi-Moyowosi/Kigosi	Kagera, Shinyanga, Kigoma
4	4	Gombe-Kwitanga	Kigoma
5	4	Gombe-Mukungu-Rukamabasi	Kigoma
6	5	Greater Gombe Ecosystem-Masito-Ugalla	Kigoma
7	6	Igando-Igawa	Iringa
8	7	Katavi-Mahale	Rukwa, Kigoma
9	8	Katavi-Rungwa	Rukwa, Mbeya, Iringa
10	9	Kilimanjaro-Amboseli (Kenya) (Kitendeni)	Kilimanjaro, Arusha
11	10	Loazi-Kalambo	Rukwa
12	10	Loazi-Lwafi	Rukwa
13	11	Manyara Ranch-Lake Natron	Manyara
14	11	Manyara-Ngorongoro (Upper Kitete/Selela)	Arusha, Manyara
15	12	Muhezi-Swaga Swaga	Dodoma
16	13, 14	Selous-Niassa (Mozambique)	Ruvuma
17	15	Tarangire-Makuyuni (Makuyuni)	Manyara
18	15	Tarangire-Mkungunero/Kimotorok	Manyara
19	15	Tarangire-Simanjoro Plains	Manyara, Arusha
20	16	Tarangire-Manyara (Kwakuchinja)	Manyara
21	17	Udzungwa-Mikumi	Morogoro
22	17	Udzungwa-Ruaha	Iringa
23	18	Udzungwa-Selous	Iringa, Morogoro
24	18	Uzungwa Scarp-Kilombero NR (Mngeta)	Iringa, Morogoro
25	19, 20	Uluguru North-South	Morogoro
26	21	Usambaras, East (Derema)	Tanga
27	22	Usambaras, West	Tanga
28	23	Wami Mbiki-Handeni/ Southern Masai Steppe	Morogoro, Tanga
29	23	Wami Mbiki-Jukumu/Gonabis/Northern Selous	Morogoro
30	23	Wami Mbiki-Mikumi	Morogoro
31	23	Wami Mbiki-Saadani	Morogoro

Table 2. Details of corridors detailed in this report

Extreme - denotes probably less than 2 years remaining; Critical - probably less than 5 years remaining; Moderate - less than 20 years remaining. Note that the contacts listed below contributed to the descriptions of each corridor which follow the table, unless denoted otherwise.

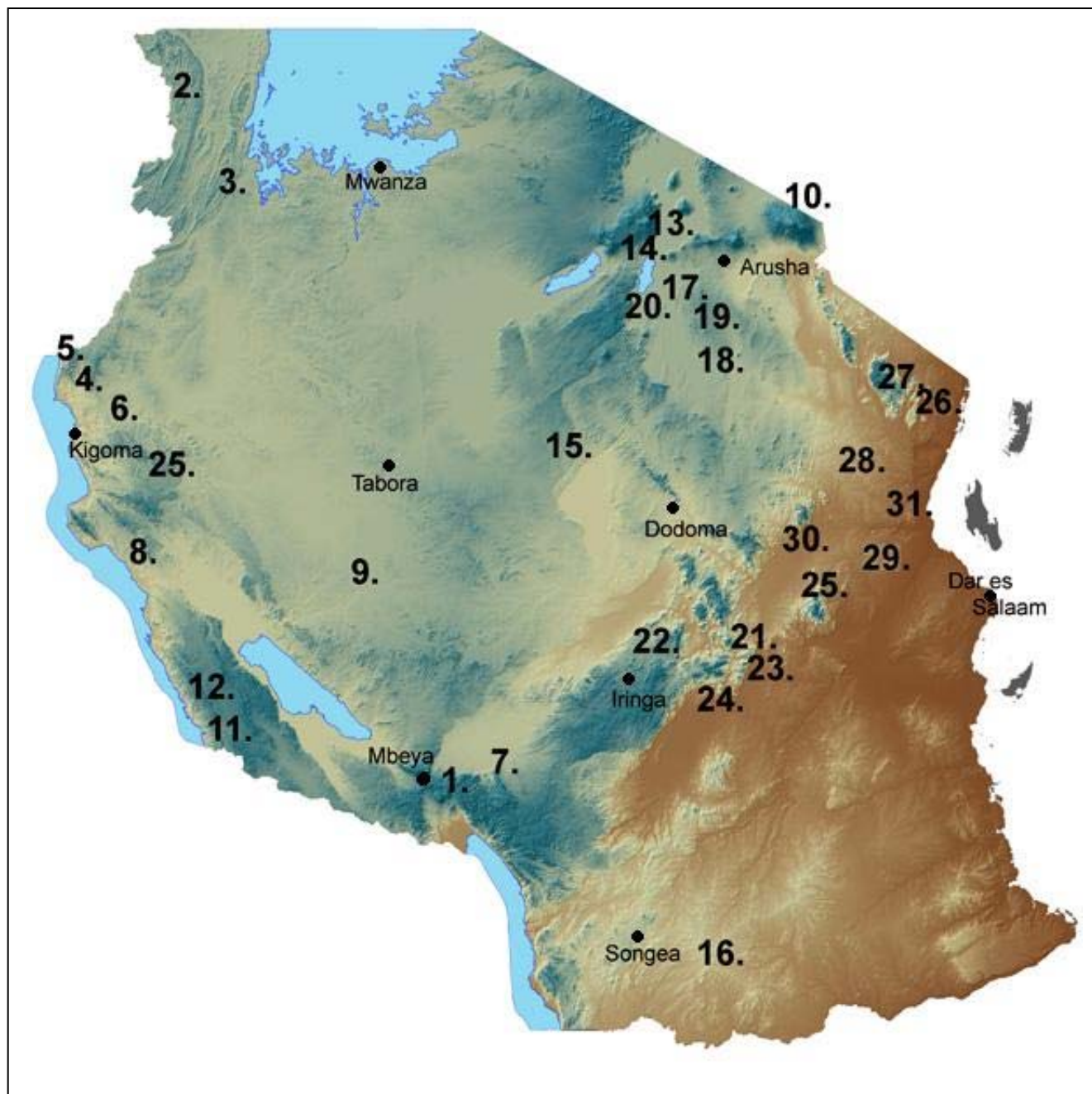
No.	Type	Urgency	Contact(s)	References
1	E	Critical	Tim Davenport tdavenport@wcs.org	Davenport, T.R.B., De Luca, D.W., Jones, T., Mpunga, N.E., Machaga, S.J. & Picton Phillipps, G. (2008) The Critically Endangered kipunji <i>Rungwecebus kipunji</i> of southern Tanzania: first census and conservation status assessment. <i>Oryx</i> 42 (3): 352-359
2	B	Critical	George Jambiya gjambiya@wwftz.org <i>Compiled by Tim Caro</i>	Jambiya, G., Milledge, S., Mtanfo, M. (2007) Nighttime Spinach. IUCN report.
3	C	Critical	George Jambiya gjambiya@wwftz.org <i>Compiled by Tim Caro</i>	Jambiya, G., Milledge, S., Mtanfo, M. (2007) Night time Spinach. IUCN report. Barnes, R., Craig, G., Dublin, H., Overton, G., Simons, W, Thouless, C. (1999) African elephant database 1998. IUCN paper 22. Blanc, J., Thouless, C., Hart, J., Dublin, HDouglas-Hamilton, I., Craig, G., Barnes, R. (2003) African elephant status report 2002. IUCN paper 29. WTEP (1997) A rapid assessment of large mammal distribution in Biharamulo and Shinyanga, Tanzania. Report to IUCN/SSC African Elephant Specialist, Group.
4	E	Critical	Lilian Pintea lpintea@janegoodall.org	Pusey, A., L. Pintea., M. Wilson., S. Kamenya., & J. Goodall. 2007. The Contribution of Long-Term Research at Gombe National Park to Chimpanzee Conservation. <i>Conservation Biology</i> 21 (3), 623–634. Pintea, L. 2007. Applying satellite imagery and GIS for chimpanzee habitat change detection and conservation. Ph.D. thesis. University of Minnesota, St. Paul.
5	E	Critical	Lilian Pintea lpintea@janegoodall.org	Pusey, A., L. Pintea., M. Wilson., S. Kamenya., & J. Goodall. 2007. The Contribution of Long-Term Research at Gombe National Park to Chimpanzee Conservation. <i>Conservation Biology</i> 21 (3), 623–634. Pintea, L. 2007. Applying satellite imagery and GIS for chimpanzee habitat change detection and conservation. Ph.D. thesis. University of Minnesota, St. Paul.
6	A	Moderate	Lilian Pintea lpintea@janegoodall.org	Sood Athumani. 2007. MSc Thesis.
7	D	Moderate	Tim Davenport tdavenport@wcs.org	No references WCS work on-going
8	D	Critical	Abel Mtui abelmtui@gmail.com Kathryn Doody kathryndoody@fzs.org Lilian Pintea lpintea@janegoodall.org Tim Caro tmcaro@ucdavis.edu David Moyer dmoyer@wcs.org	No references

9	C	Moderate	Tim Caro tmcaro@ucdavis.edu David Moyer dmoyer@wcs.org Danny McCallum danny@dmstz.com	Letter to Director of Wildlife 4/4/2003 from Danny McCallum. Coppolillo <i>et al.</i> (2006) Final report for Fish and Wildlife Elephant Grant.
10	D	Critical	Alfred Kikoti akikoti@yahoo.com <i>Compiled by Tim Caro</i>	http://www.awf.org/content/solution/detail/3705
11	E	Critical	Tim Davenport tdavenport@wcs.org	Davenport, T.R.B., Picton Phillipps, G., Machaga, S.J., Mpunga, N.E., De Luca, D.W., Kibure, O. & Abeid, Y. (2008). Developing a conservation strategy for the chimpanzees of Southern Tanganyika. Unpublished Report to USFWS (GA-0279). Wildlife Conservation Society. pp 53.
12	D	Extreme	Tim Davenport tdavenport@wcs.org	Davenport, T.R.B., Picton Phillipps, G., Machaga, S.J., Mpunga, N.E., De Luca, D.W., Kibure, O. & Abeid, Y. (2008). Developing a conservation strategy for the chimpanzees of Southern Tanganyika. Unpublished Report to USFWS (GA-0279). Wildlife Conservation Society. pp 53.
13	D	Moderate	Charles Foley cfoley@wcs.org Lara Foley lfoley@wcs.org Fortunata Msoffe (TANAPA) Tom Morrison (Dartmouth)	No references
14	D	Extreme	Hassan Shombe shombehassan@suanet.ac.tz	L. Mangewa (in press) Ecological Viability of Upper Kitete-Selela Migratory Corridor in the Tarangire-Manyara Ecosystem, Tanzania: Implications to African Elephant And Buffalo Movements. Proceedings of TAWIRI Conference 2007.
15	C	Critical	Bakari Mbano Bmbano@wcs.org	Coppolillo <i>et al.</i> (2006) Final report for Fish and Wildlife Elephant Grant.
16	D	Moderate	Rudolf Hahn snwc@satconet.net Kumwira Ngomello ngomellok@yahoo.com Louis Nzalli tononeka@yahoo.com Wayne Lotter wlotter@gauff.com Donald Mpanduji dgmpanduji@suanet.ac.tz Wilbard Ntongani ntongani26@yahoo.com	www.selous-niassa-corridor.com Mpanduji, D., Hofer, H., Hilderbrandt, T., Goeritz, F. East, E. (2002). Movement of elephants in Selous-Niassa wildlife corridor, southern Tanzania. <i>Pachyderm</i> 33, 18-31. Baldus, R., Hahn, R., Mpanduji, D, Siege, L. (2003). The Selous-Niassa Wildlife Corridor. Tanzania Wildlife Discussion Paper No 34. Baldus, R. & Hahn, R. (2007) Connecting the world's largest elephant ranges: The Selous – Niassa Wildlife Corridor. In: Saleem, H. A. ed. <i>Peace Parks: Conservation and Conflict Resolution</i> . Cambridge, MIT Press, Chapter 7. Ntongani, W.A., Munishi, P.K.T., Mbilinyi, B.P. (2007). Land use/cover change and socio-economic factors influencing land cover dynamics in the Selous-Niassa wildlife corridor Nachingwea District Tanzania. <i>Proceedings of the Sixth TAWIRI Scientific Conference</i> . Dec, 2007. Pesambili, A.A. (2003). Wildlife resources of Lukwika-Lumesule and Msanjesi GR. WWF-TPO
17	D	Moderate	Charles Foley cfoley@wcs.org Lara Foley lfoley@wcs.org Fortunata Msoffe (TANAPA) Tom Morrison (Dartmouth)	No references
18	D	Moderate	Charles Foley cfoley@wcs.org	No references

			Lara Foley lfoley@wcs.org Fortunata Msoffe (TANAPA) Tom Morrison (Dartmouth)	
19	D	Critical	<i>Compiled by Tim Caro</i>	Rodgers, A., Melamari, L., Nelson, F. (2003). Wildlife Conservation in Northern Tanzanian rangelands. Conservation in Crisis Symposium Mweka Dec 2003. Sachedina, H. (2006) Conservation, Land Rights and Livelihoods in the Tarangire Ecosystem of Tanzania Wildlife and Pastoralists Symposium Nairobi June 2006 Bolger, T., Newmark, W., Morrison, T. Doak, D. (2008). The need for integrative approaches to understand and conserve migratory ungulates. <i>Ecology Letters</i> 11, 63-77. Mwalyosi R. (1991). Population growth, carrying capacity and sustainable development in south-west Masailand. <i>J. Environ. Mgmt</i> 33, 175-187.
20	D	Critical	Hassan Shombe shombehassan@suanet.ac.tz	Hassan, S.N. (2007) Impacts of space use by humans on large mammal species diversity in the Kwakuchinja-Mbugwe wildlife Corridor, Northern, Tanzania. <i>Tanzania Journal of Forestry and Nature Conservation</i> 76, 134-143. Goldman M.J. (2006) Sharing Pastures, Building Dialogues: Maasai and Wildlife Conservation in Northern Tanzania. Unpublished PhD thesis, Department of Geography, University of Wisconsin—Madison, Madison, WI http://www.awf.org/content/solution/detail/3505
21	C	Critical	Clint Epps buzzard@nature.berkeley.edu	Epps, C.W. (2006) Past and present connectivity of wildlife populations in Tanzania, East Africa. TAWIRI-COSTECH interim report (unpublished).
22	D	Critical	Clint Epps buzzard@nature.berkeley.edu Bakari Mbanu Bmbano@wcs.org	Epps, C. W. (2006) Past and present connectivity of wildlife populations in Tanzania, East Africa. TAWIRI-COSTECH interim unpub report. Coppolillo <i>et al.</i> (2006) Final report for Fish and Wildlife Elephant Grant.
23	D	Extreme	Trevor Jones tembomkubwa@gmail.com	Vanishing Corridors (unpublished report): http://www.easternarc.or.tz/udzungwa#dl
24	E	Critical	Francesco Rovero francesco.rovero@mtsn.tn.it	http://www.cepf.net/xp/cepf/static/pdfs/udzungwa_mtsn_report_may2007.pdf
25	E	Critical	Neil Burgess neil.burgess@wwfus.org	Doggart, N., J. Lovett, B. Mhoro, J. Kiure and N. Burgess (2005). Biodiversity surveys in the Forest Reserves of the Uluguru Mountains, Tanzania. WCST and TFCG, Dar es Salaam, Tanzania. 200 pages. See http://www.easternarc.or.tz Rodgers, W.A. & Burgess, N.D. (2006). The conservation of the Uluguru Mountains: learning lessons from the past. <i>Miombo</i> 29: 6-9. Batulaine, G. (2007). Assessment of baseline ecological and socio-economic factors for forest restoration planning in the Bunduki Gap, Uluguru mountain forests of Tanzania. Unpublished M.Sc. thesis, Sokoine University of Agriculture.
26	E	Critical	Bill Newmark bnewmark@umnh.utah.edu George Jambiya gjambiya@wwftz.org <i>Compiled by Tim Caro</i>	Resettlement Action Plan for Farm Plots Displaced for Biodiversity Conservation in the Derema Forest Corridor (2006). Ministry of Natural Resources and Tourism, Forestry and Beekeeping Division. Newmark W.D. (1992) Recommendations for wildlife

				corridors and the extension and management of forest reserves in the Eastern Usambara Mountains, Tanzania. Final Report, East Usambara Catchment Forest Project.
27	E	Critical	<i>Compiled by Tim Caro and Trevor Jones</i>	Halperin J. (2002) Reforestation planning in the West Usambara Mountains. Unpublished M.Sc. thesis, North Carolina State University
28	A	Moderate	Tue Danielsen tue_d@hotmail.com Rasmus Nielsen rasmuscfnielsen@gmail.com	No references
29	A	Critical	Tue Danielsen tue_d@hotmail.com Rasmus Nielsen rasmuscfnielsen@gmail.com	No references
30	A	Extreme	Tue Danielsen tue_d@hotmail.com Rasmus Nielsen rasmuscfnielsen@gmail.com Frederick Mofulu fredrickmofulu@yahoo.co.uk	No references
31	A	Extreme	Tue Danielsen tue_d@hotmail.com Rasmus Nielsen rasmuscfnielsen@gmail.com	No references

Map 1. Summary map of wildlife corridors in mainland Tanzania



Descriptions of corridors

1. Bujingijila Corridor, Mt Rungwe-Livingstone Forest (Type E, Map 2)

Description

The western part of the Kitulo National Park (NP) consists of the former Livingstone Forest Reserve (FR). Montane and upper montane forest cloak the escarpment from the plateau grassland down into Unyakyusa. At its furthest west, the forest connects with Mt Rungwe FR, soon to become the new Mt Rungwe Nature Reserve (NR). For the time being however, the area remains largely unmanaged. Most of the forest in the area, both inside the park and the reserve, is secondary and in a poor condition. The connection itself is amongst the poorest in condition and whilst the whole area used to be forested, now just a very narrow corridor links these two very important forests.

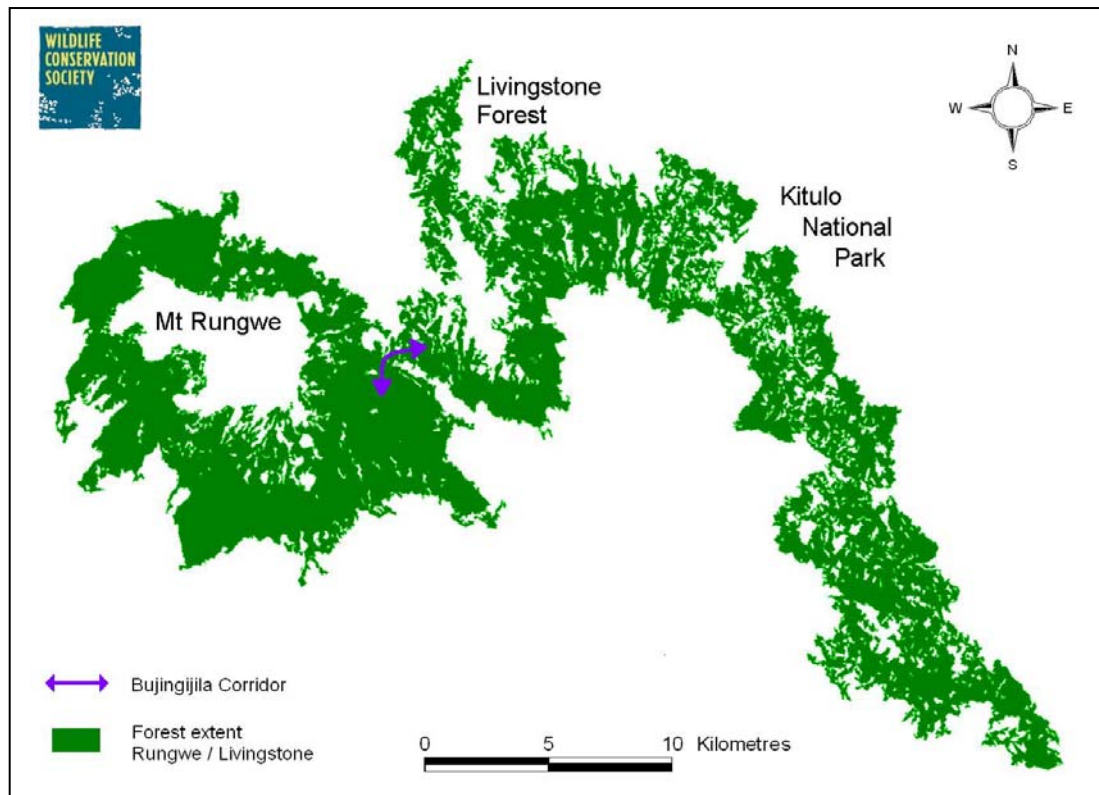
Wildlife

A range of rare and restricted-range species occupy the forest landscape. Most notably, the kipunji (*Rungwecebus kipunji*), Abbott's duiker (*Cephalophus spadix*), bushbuck (*Tragelaphus scriptus*), Rungwe galago (*Galagoides sp nov*) and Sharpe's black and white colobus (*Colobus angolans sharpei*). Leopard (*Panthera pardus*) use the corridor seasonally and the two forests are also home to a variety of endemic vertebrates, invertebrates and plants.

Threats

Technically, most of the corridor is protected either within the park or the reserve. However, there has been no active management in Mt Rungwe for decades and TANAPA staff are only now addressing deforestation in this steep and remote landscape. The corridor is encroached upon, and still being logged, hunted and cut for charcoal.

Map 2. The Bujingijila Corridor



2. Burigi-Akagera (Type B, Map 3)

Description

The western boundary of the Burigi Game Reserve (GR) lies close to the border with Rwanda and the southern tip of Akagera NP in Rwanda. Between these two wildlife areas sits the Kimisi GR on the Tanzanian side, and thus part of this corridor area has legal protection; however, part of the corridor is unprotected land within Tanzania between Kimisi GR and the Akagera NP. The corridor is threatened by Rwandan refugee encampments at Greater Benaco that lie between the border town of Rusumu and Kasulo 20kms away, and Kilale Hill. An influx of over 600,000 refugees had a devastating impact on the Kimisi and Burigi GRs.

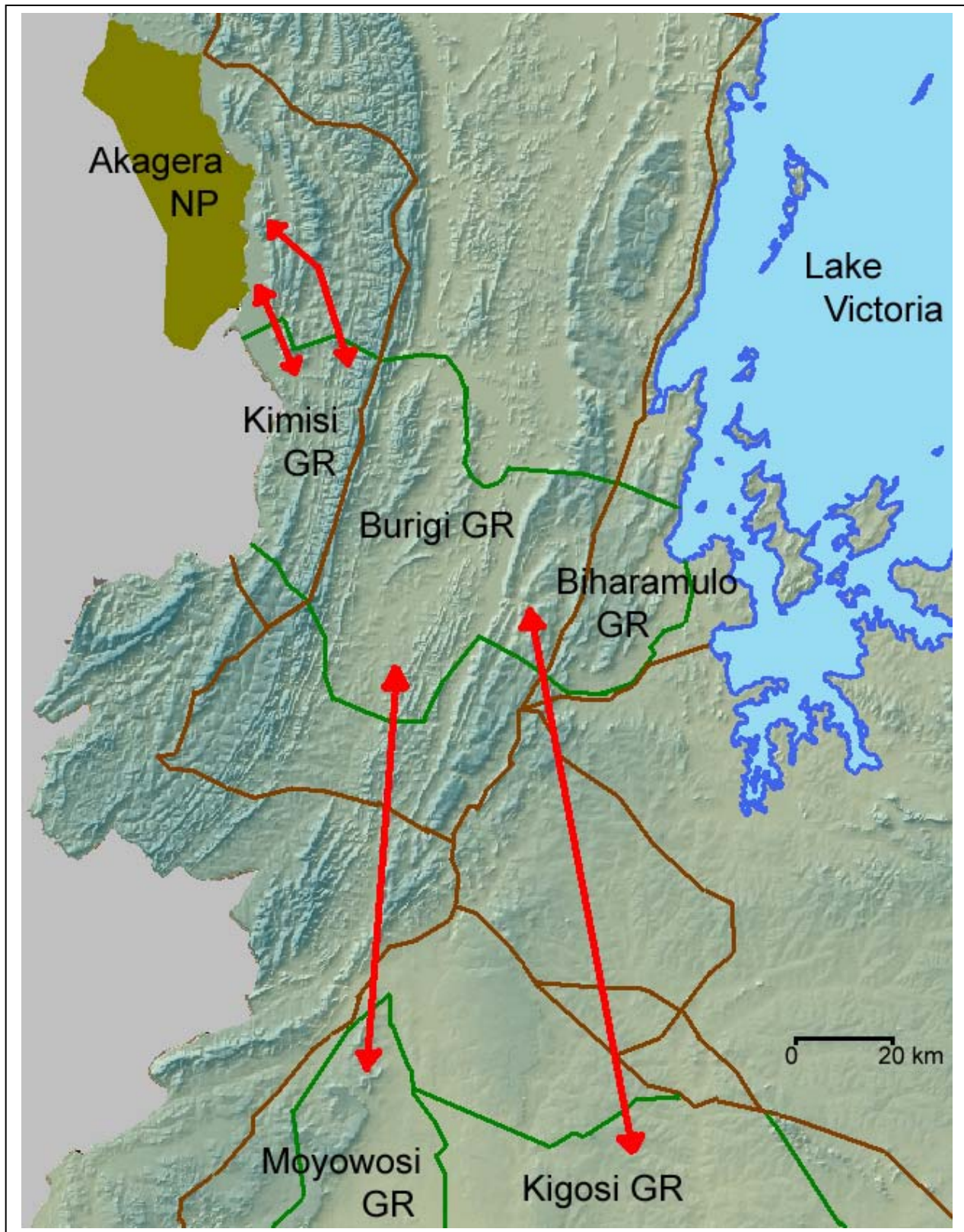
Wildlife

The area contains miombo and water-loving species of large mammal including buffalo *Syncerus caffer*, bushbuck (*Tragelaphus scriptus*), eland (*Taurotragus oryx*), giraffe (*Giraffa camelopardalis*), impala (*Aepyceros melampus*), hartebeest (*Alcelaphus buselaphus*), reedbuck (*Redunca redunca*), roan (*Hippotragus equinus*), sable (*Hippotragus niger*), sitatunga (*Tragelaphus spekii*), topi (*Damaliscus lunatus*), waterbuck (*Kobus ellipsiprymnus*), warthog (*Phacochoerus africanus*) and zebra (*Equus burchelli*). The principal economic benefits from these species are through tourist hunting with very little photographic tourism currently occurring. There is no information on migratory routes between Burigi and Akagera.

Threats

Following the refugee influx in 1994, great reductions in all large herbivore species were noted as refugees sought meat and firewood from the GRs. The Kagera Kigoma Game Reserves Rehabilitation Project has strengthened GR management, law enforcement and developing management plans with the goal of conserving ecosystem biodiversity and improving the livelihoods of people living adjacent to the GRs. Many refugees have returned home but many have also stayed.

Map 3. The Burigi-Akagera and Burigi-Moyowosi/Kigosi Corridors



3. Burigi-Moyowosi/Kigosi (Type C, Map 3)

Description

The southern boundary of Burigi GR lies close to (approximately 100 km north of) the Moyowosi and Kisigo GRs. Two roads intersect this area, from Biharamulo to Kasulu, and from Rusumu to Nzega. The area has corridor status because elephants are thought to move between these GRs.

Wildlife

The area contains miombo and waterloving species of large mammal including buffalo, bushbuck, eland, elephant, giraffe, impala, hartebeest, hippopotamus (*Hippopotamus amphibius*), reedbuck, roan, sable, sitatunga, topi, waterbuck, warthog and zebra. The principal value of these species is through tourist hunting with very little photographic tourism in the area. The extent to which these species are found in the corridor is not known.

Threats

Influx of refugees into Benaco resulted in heavy poaching. Large numbers of permanent poaching camps can be seen within the Moyowosi and Kigosi GRs, as well as cattle, saw pits and signs of agriculture. Some species in Moyowosi and Kisigo GRs declined over this period such as warthog and hippopotamus, but many populations remained stable. Elephant numbers have risen. The Kagera Kigoma Game Reserves Rehabilitation Project has strengthened GR management and law enforcement, and developed management plans with the goal of conserving ecosystem biodiversity and improving the livelihoods of people living adjacent to the reserves.

4. Gombe-Kwitanga (Type E; Map 4)

Description

This corridor connects Gombe National Park and Kwitanga Forest, the largest remaining natural forest east of Gombe that has a documented community of chimpanzees.

Wildlife

Kwitanga forest is still home to approximately 26 chimpanzees (13-52) at 1.2 (0.6–2.4) individuals per sq km. High chimpanzee density and population size estimates in Kwitanga forest make this area an important conservation objective for Greater Gombe Ecosystem.

Other recent chimpanzee sightings have been reported in areas bordering Gombe National Park: southeast of Mwamgongo to southeast of Bugamba, and western Mgaraganza. Gombe chimpanzees visit these areas occasionally to feed on banana and oil palm on people's farms. In some cases chimpanzee feed on natural food species occurring in the area, such as Matunguru (*Afromomum spp*) that ripen in April and May every year.

In 2000 Gombe chimpanzees travel as far as three kilometers south of the Park's southern boundary in a valley, east of the Rift Escarpment between the lake shore village of Mtanga and the inland village of Mgaraganza. Chimpanzees were observed from a footpath passing from Mgaraganza to Mtanga through Kisenga sub-village, a Burundi settlement of farmers, and from the farmed slopes above Kazinga and Ngelwe.

Threats

Forest and woodland loss to farmland, charcoal and human settlements are the main threats. Poaching was probably a major factor in the decline of chimpanzees and other mammals in the area as well.

5. Gombe-Mukungu-Rukamabasi (Type E; Map 4)

Description

This corridor includes a mosaic of forest-miombo woodland-grassland habitats along Rift Valley escarpment between Gombe National Park and Burundi border, with the closest protected area Mukungu-Rukamabasi Protected Landscape.

Wildlife

The main conservation target is the endangered Eastern Chimpanzee (*Pan troglodytes schweinfurthii*). A rapid survey in 2007 found 21 chimpanzee nests in a miombo woodland patch along the Ngonya and Beswe streams showing that the chimpanzees still use the area. This patch of woodland is connected to woodland habitats that according to local people are used by chimpanzees as they travel to Burundi near the Mkamba hill.

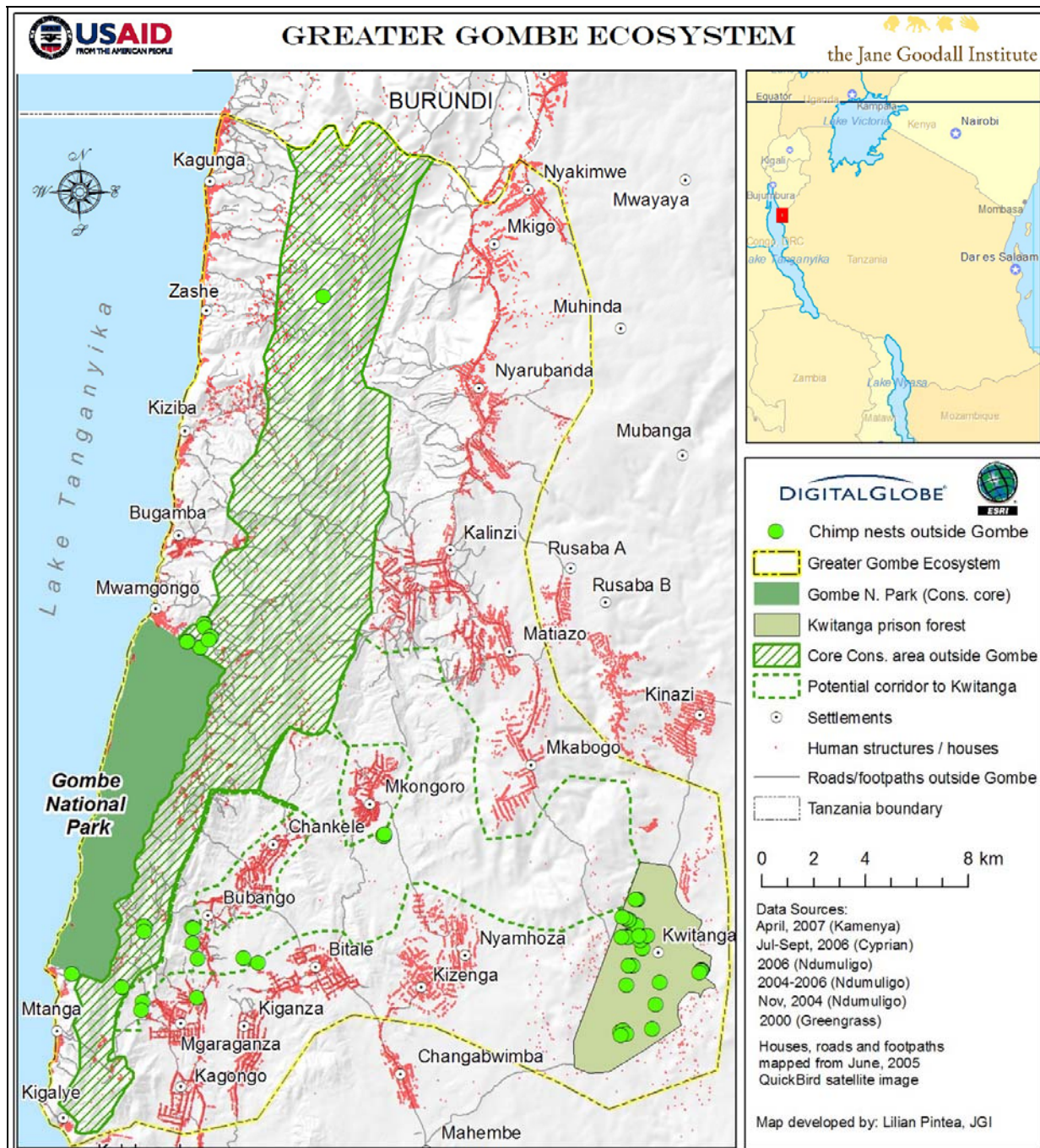
The area was known in 1960s to have high diversity of wildlife including chimpanzees, baboons, red colobus monkeys, bushbuck, duikers, leopards, civets, genets, mongooses and many other mammals. Recent surveys in 2006 located a small group of about 30 red colobus monkeys (*Colobus badius tephrosceles*) in Kalinzi Forest reserve. There is a chance that some red tail monkeys (*Cercopithecus ascanius*) are still present in the area. Olive baboons (*Papio hamadrayas anubis*) are still found but they numbers seem to be decreasing as well.

Threats

The area has been severely affected by the destruction of forest and woodland habitats outside the Gombe National Park driven by rapid population growth and immigration of refugees fleeing wars in Burundi and Congo. Change detection analysis of 1972 Landsat MSS, 1991 and 2003 SPOT satellite imagery showed that in 1972 there were still large patches of forest and woodland similar to patches detected from 1947 and 1956 aerial photos. By 1991, 29% of those forest and woodland cover had been lost and by 2003 additional 50% of forests and woodlands had been converted to farmland, timber and charcoal production.

Poaching was probably a major factor in the decline of chimpanzees and other mammals in the area. Although chimpanzees may be caught during poaching for meat of other species, deliberate killing outside the park may occur because of crop raiding or as a preemptive measure.

Map 4. The Gombe-Kwitanga and Gombe-Mukungu-Rukamabasi Corridors



6. Greater Gombe Ecosystem-Masito-Ugalla (Type A; Map 5)

Description

This corridor includes the area between Greater Gombe Ecosystem and Masito-Ugalla bordered by the Kwitanga Forest and Malagarasi river.

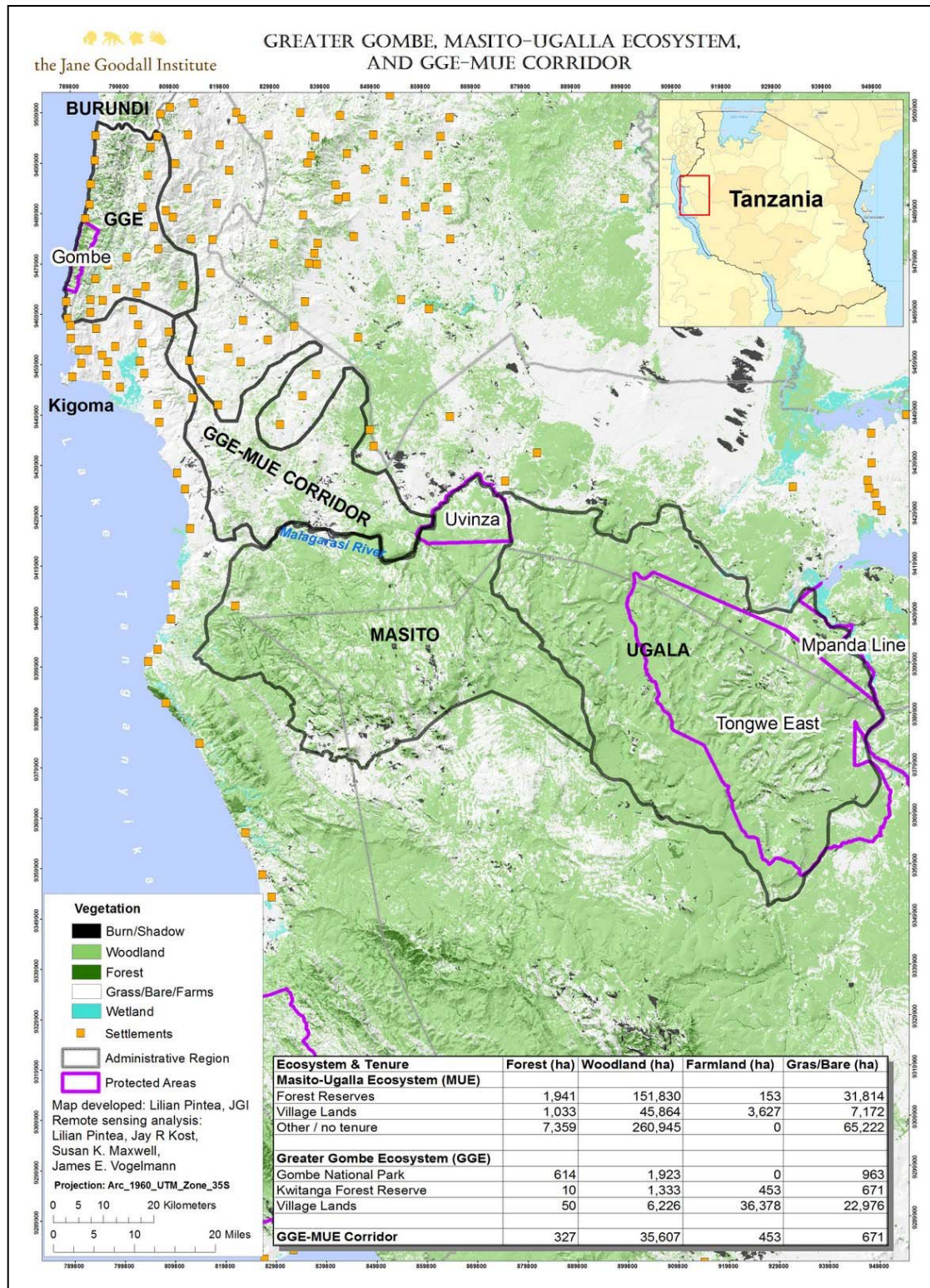
Wildlife

Chimpanzee nests have been recorded in 1995-2000 close to the northern side of the Malagarasi river. Other wildlife status and chimpanzee movements are unknown.

Threats

Charcoal and farming has been the main drivers of deforestation in this region. Former forest reserves such as Luche, Mlele and Mkuti have been degazeted and lost more than 90% of their forest/miombo woodland cover between 1972-1999 as detected by Landsat MSS and ETM+ satellite images. Poaching is probably also a major threat because of the high population density in settlements and proximity to Lugufu refugee camp.

Map 5. The Greater Gombe-Masito-Ugalla Corridor



7. Igando-Igawa (Type D, Map 6)

Description

The Mpanga/Kipengere Game Reserve was gazetted as recently as 2002 with the goal of maintaining the catchment function of the area, and sustainably managing the natural resources found within and around it. The reserve is the source of the Mbarali, Mlomboji, Kimani and Ipera Rivers, which drain northwards and join the Great Ruaha River, which then drains into the Usangu Wetlands and associated swamps. As such, these rivers have vital ecological and economic significance. The rivers and their catchments follow a continuum north through the old but still existing Igando-Igawa wildlife corridor with Usangu Game Reserve and Ruaha National Park. For this reason, the area forms a critical dry season refuge for wildlife. The survival of the southern migratory species of the Usangu Game Reserve (as was) and the Ruaha National Park extension, are dependent on the Mpanga/Kipengere Game Reserve by way of the Igando-Igawa corridor.

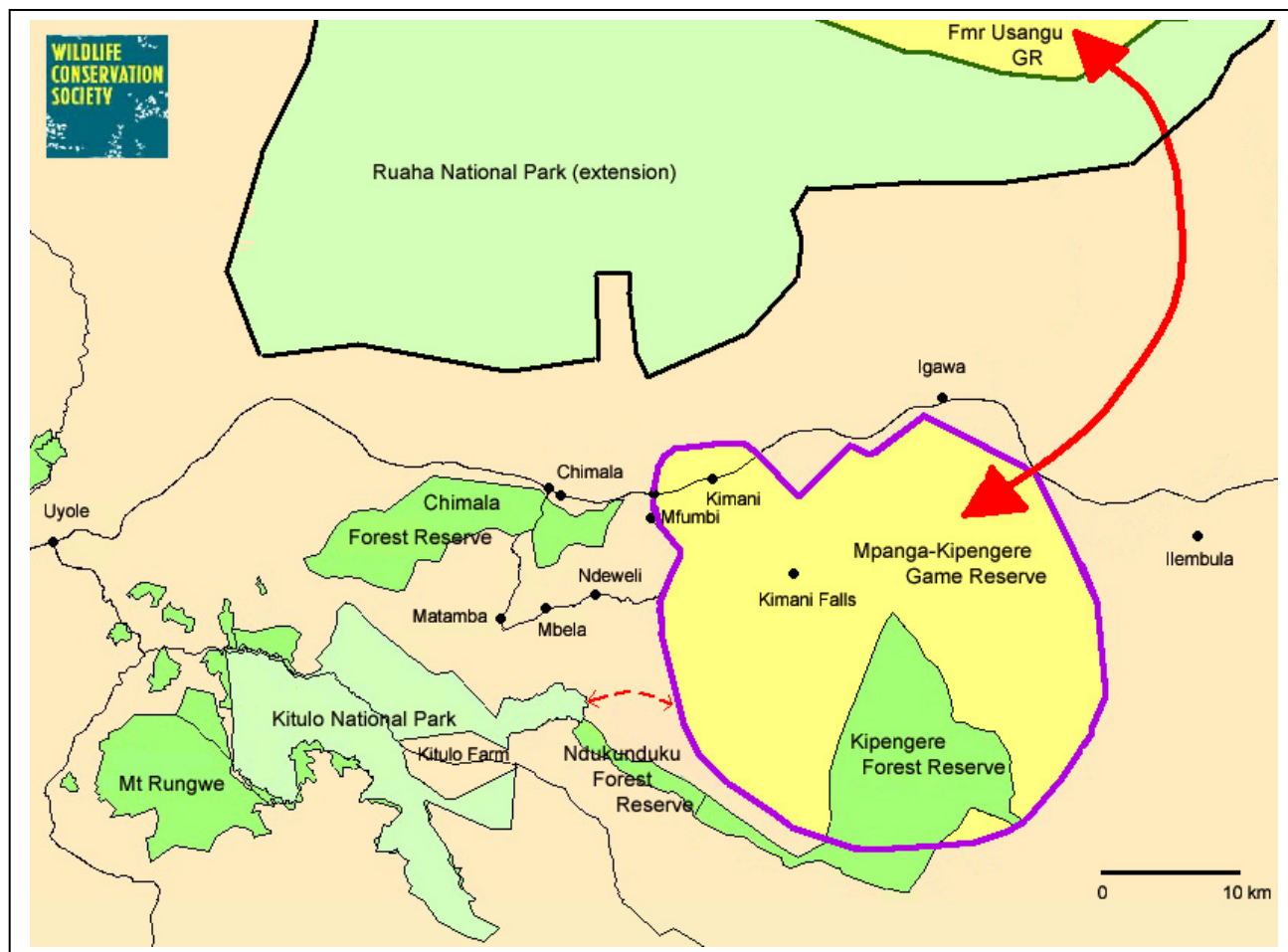
Wildlife

Amongst the larger mammals known to use the corridor (although to what extent remains unclear) are buffalo (*Syncerus caffer*), bush duiker (*Sylvicapra grimmia*), eland (*Taurotragus oryx*), elephant (*Loxodonta africana*), red duiker (*Cephalophus harveyi*) and zebra (*Equus quagga*). Larger carnivores present include caracal (*Felis caracal*), serval (*F. serval*), leopard (*Panthera pardus*), lion (*P. leo*).

Threats

The corridor has already been greatly reduced and the only remaining uncultivated or ungrazed areas occur to the east of Igawa. Threats include clearance for agriculture, charcoal manufacture, burning and hunting. It should be noted that further south there is technically no corridor between Mpanga/Kipengere and Kitulo National Park because they are contiguous. However, the link between these two PAs is important and it is possible that animals use another area to cross from one to another (see dotted red line in Fig. 6). The Wildlife Conservation Society has shown that lion and eland have returned to Kitulo from Mpanga/Kipengere and other species may follow.

Map 6. The Igando-Igawa Corridors



8. Katavi-Mahale (Type D, Map 7)

Description

Route 1: Mahale - Katavi has been mapped by a survey team following a route on the ground guided by trackers and elephants signs (see map 4). Note that north of the Lwega River the route is narrow, being channeled between the Lake and the Mbalala Hills and onwards into the south eastern corner of Mahale Mountains NP. South of the Lwega trackers say the route fans out across the flatter ground. In addition to the route shown on the map between the Lwega River and the Mpanda - Ikola road, local trackers reported another elephant path that follows a seam of 'red soil' to the west of the mapped route. The point where the elephant route crosses the Ikola - Mpanda road is still well covered with vegetation and few people are living in the area, so there is an opportunity to maintain this crossing point.

Route 2: Katavi - Ntakata (without passing through Mahale). Trackers from the Katavi side reported an elephant route from Katavi, following the Katumba River north and then along to Ntakata Forest without passing through Mahale.

Route 3: Elders from the Northeast of Mahale report a historical route from Ntakata Forest to Kakungu Mountains, through Mabungo and into the north east corner of Mahale.

Wildlife

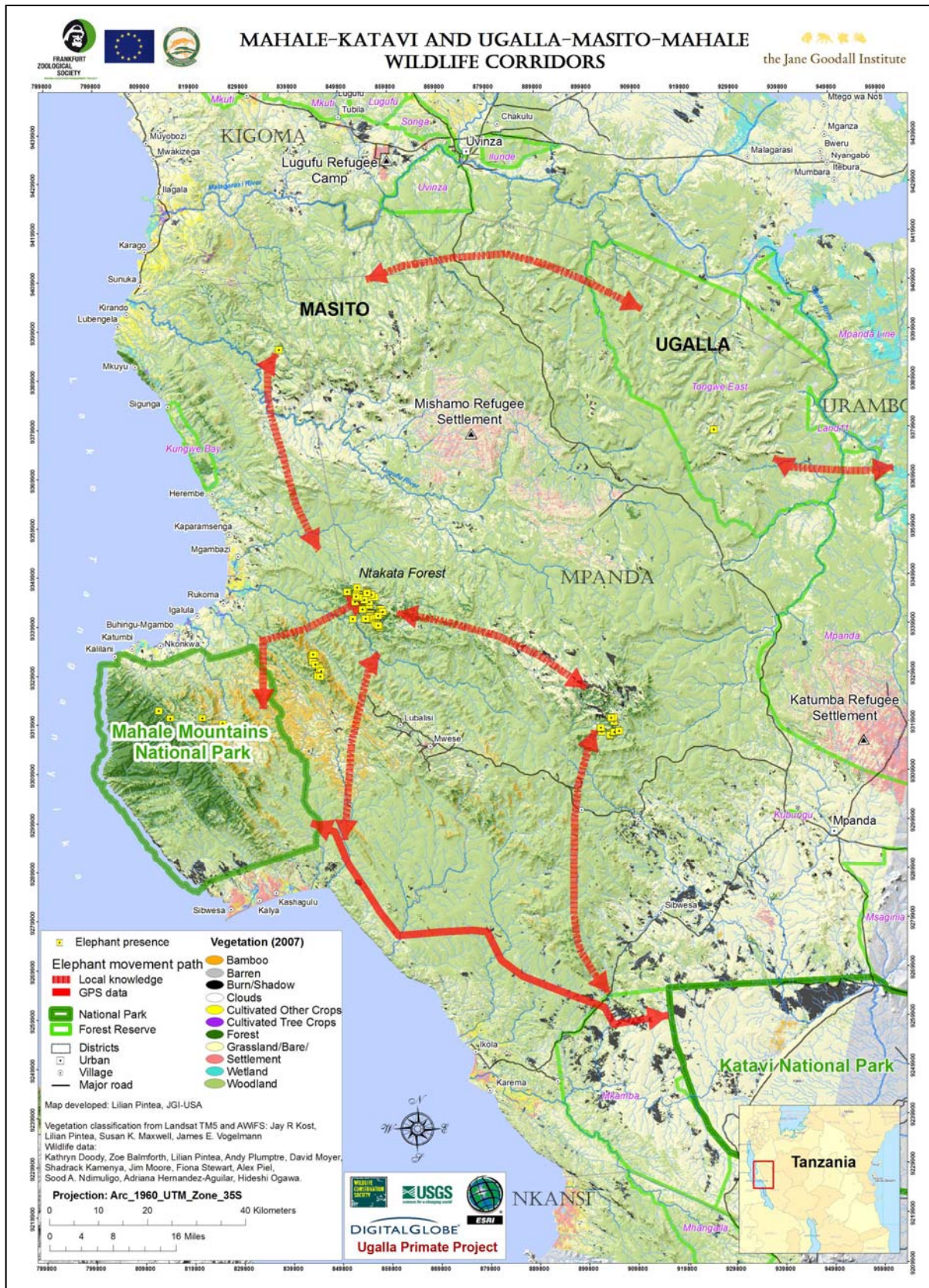
Animal movements been confirmed recently (a) by following elephant trails the whole way from Mahale to Katavi on foot (there may be four separate trails), and (b) by identifying such trails from satellite imagery. There has also been speculation that chimpanzee (*Pan troglodytes*) populations are found in this corridor area but this has not been confirmed by a Wildlife Conservation Society survey of the eastern Albertine Rift.

Threats

General: Katavi and Mahale NPs are relatively close to each other and the intervening miombo woodland is little inhabited, but there is some logging. South of the Mpanda-Lugonesi Road the area consists of almost no villages, only watercourses (the Lwega and Msenguse Rivers) flowing southwest into Lake Tanganyika. However, one dirt road bisects this corridor, the road from Mpanda to Karema that has a bus service. All three routes are potentially threatened by proposed road developments. In particular, plans to make a tarmac road from Sumbawanga to Mpanda could have an impact if the route of the road was to run west of Katavi NP instead of through it. Decisions on the route have yet to be finalized.

Specifically for Route 1: people are moving into this area, some small clusters of houses were seen in several locations along the elephant route, most notably at the Lwega River elephant crossing point. However Kashagulu Villagers have recently established a VLFR and told these people to move from the northern side of the river. Probably these people will just go back to the southern side of the river rather than moving out of the area completely. Route 2: this is of particular interest as the whole route and Ntakata is currently unprotected. Route 3: there is a road in between Ntakata and Kakungu and people are rapidly moving into the Kakungu area to farm so this route is probably disturbed already.

Map 7. The Katavi-Mahale corridors



9. Katavi/Rukwa/Lukwati-Rungwa/Kisigo/Muhesi (Type B, Map 8)

Description

Katavi-Rukwa-Lukwati and Rungwa-Kisigo-Muhesi-Ruaha ecosystems are both principally miombo ecosystems. There is a large area of uninhabited miombo woodland lying between these two protected areas centred on and north of the Rungwa River that flows west into Lake Rukwa. This area includes scattered villages and small towns such as Rungwa ya Zamani (uninhabited), Inyonga, Kitunda and Rungwa. One road from Itigi to Chunya bisects this corridor but it is a dirt road used relatively little. The area is legally protected by the Rukwa and Lukwati GRs to the west, and Rungwa-Kisigo-Muhesi GRs to the East. Between them lie a series of Game Controlled Areas (GCA).

The area is important because Matandala/Mbaga Mountains to the south east of the area form very important water catchments that feed the Lukwati Game Reserve; while the Mwipa and Mwise Rivers feed the Rungwa River; and the Mwaliji and Lueja Rivers feed the Piti River that flows into the Rungwa River. This water maintains large floodplains and borasas palm throughout the dry season and an abundance of wildlife.

Wildlife

Large concentrations of elephant move from the south western part of the corridor area from the top of the Lake Rukwa escarpment, along the Lukwati River, then on to the Mwipa and Mwise Rivers and northwards to the Piti and Rungwa Rivers during the dry season. Elephant also move from the south through the Matandala / Mbaga mountains to the Mwaliji / Lueja Rivers in the eastern part of the area. Also movement takes place from the Ruaha National Park and Rungwa Game Reserve to the east towards the Mwaliji / Lueja rivers during the dry part of the season. During the rains, movement of the elephant tends to reverse itself. Some go back towards the Rungwa Game Reserve, some through the Lukwati Game Reserve towards the Rukwa basin, Kavu River and Lake Chada in Katavi National Park. It is thought that wild dogs used to move between Rungwa, Kisigo and Muhesi GRs (and perhaps Ruaha NP) and the Katavi NP – Rukwa/Lykwati GR complex, but radio collaring is needed to confirm this. Movements of other animals are unknown but it is likely that non-migratory herbivores and carnivores live in this corridor rather than move through it. Rhinoceros have been seen in this area.

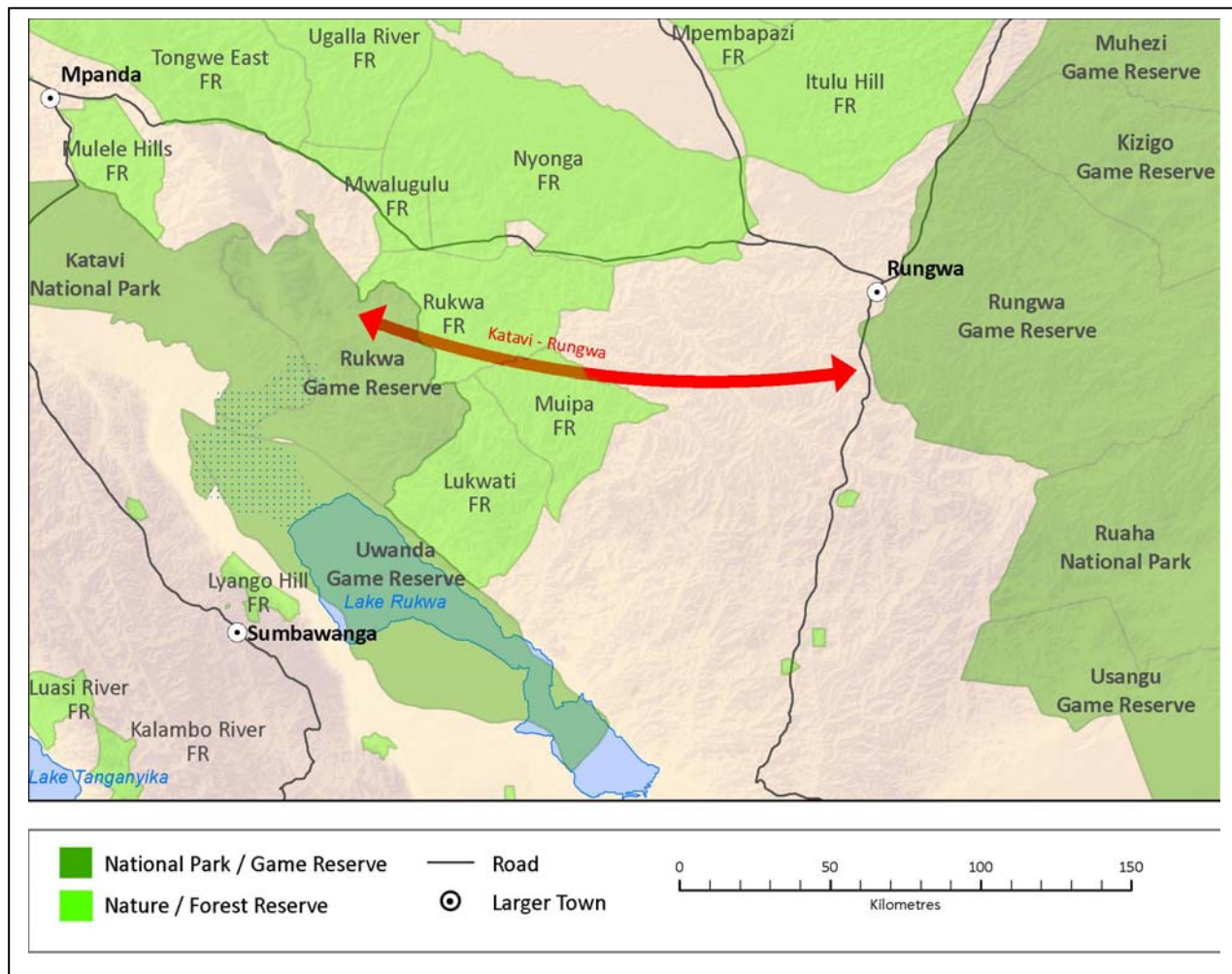
Threats

Logging is extensive in this area not only to the railway terminus at Mpanda sometimes channeled through Inyonga, and to Tabora out through Ipole, but out through Chunya and north to Tabora. Hunting blocks have opened up roads to loggers and poachers. Additionally, agriculture is expanding from the south along the Chunya-Rungwa Road with new villages appearing rapidly. Miombo is being cleared for crops, tobacco cultivation and charcoal manufacture. There is a road in between Ntakatta and Kakungu and people are rapidly moving into the Kakungu area to farm so this route is probably already disturbed. Cattle move through the area with temporary bomas all along the main road and along the road from Lupa NE to the borders of the Usangu GR.

Although this corridor is not immediately threatened, there needs to be some action to formalize the connection through Piti to Lukwati-Muipa. With the WD, Danny McCallum has been trying to establish a new Mwipa/Piti GR from what is Chunya West, Chunya East and Piti West OAs that could increase protection. Also, a lot more attention needs to be paid to the areas along both sides of the Rungwa River where it exits the Rungwa-Kisigo GR and heads through inhabited areas before entering the huge block of forest and GRs to the west.

Finally, there is a forested area on top of the high plateau to the northwest of the Isunkaviola Plateau in Ruaha NP. This area is unprotected but is an important catchment for the small permanent streams and rivers cross the main road from Lupa to Rungwa. Furthermore, this forest habitat and the riverine vegetation, is thought to be primarily ‘western’ in affinity and not directly related to the forested areas on the Eastern Arc Mountains. This area would form a logical part of any proposed corridor and it is very important from a catchment and most likely a biodiversity perspective as well.

Map 8. The Katavi/Rukwa/Lukwati-Rungwa/Kisigo/Muhesi Corridor



10. Kilimanjaro-Amboseli (Kitendeni) (Type D, Map 9)

Description

The area west of Mt Kilimanjaro (Kilimanjaro FR) supports large numbers of elephants and other wildlife and serves as an important wildlife corridor between three protected areas, Amboseli NP in Kenya, Lake Natron, and Kilimanjaro NP.

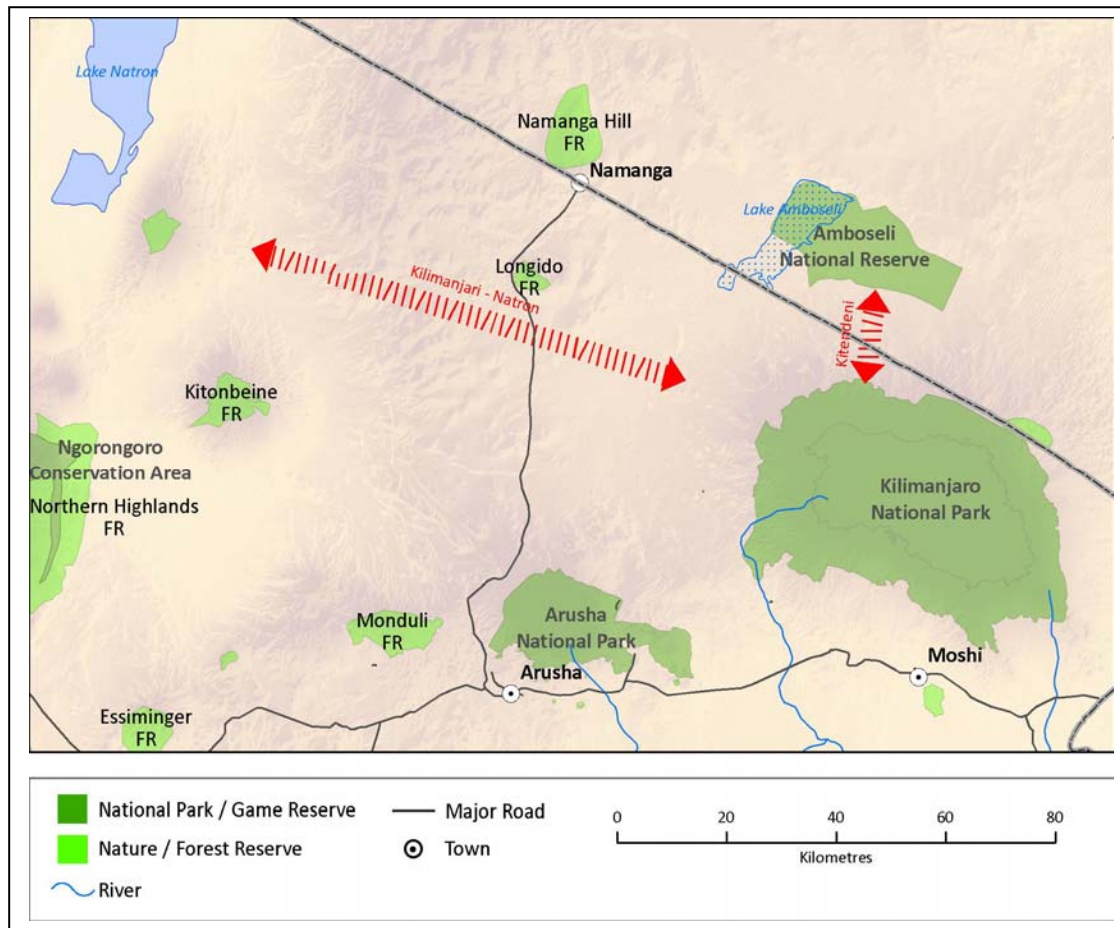
Wildlife

As many as 600 elephants use this area in the dry season, and the area provides important calving areas for zebra, wildebeest (*Connochaetes taurinus*), Thomson's gazelles (*Gazella thomsonii*), and Grant's gazelles (*Gazella grantii*)

Threats

In the past, high demand for arable land compelled people to encroach on the Kitendeni corridor, with prices fetching up to the equivalent of \$1000 per acre. As a result, the width of the Kitendeni corridor was reduced from 10 km in 1990 to 5 km in 2000. The rate at which the corridor was disappearing mobilized government officials and communities to demarcate the corridor. The African Wildlife Foundation is involved in securing a solution for this area and have negotiated the acquisition of the West Kilimanjaro Ranch; an area of 75,000 acres which has been set aside for conservation. Eight villages in the corridor are part of a WMA encompassing approximately 680 km².

Map 9. The Kilimanjaro-Amboseli (Kitendeni) Corridor



11. Loazi-Kalambo (Type D, Map 10)

Description

There are two important wildlife corridors in this neglected part of southwest Tanzania, both of which have only recently been identified. Kalambo FR and just to its north, the Loazi (or Loasi) FR are unusually and problematically connected at a single point (see map 10). The habitat is primarily miombo and riverine gallery forest. The area between these reserves, however, is open land and used by an array of important wildlife species. Neither of these protected areas are currently managed in any way and the area between them is unprotected and being rapidly converted to agriculture via charcoal manufacture. Considerable disagreement exists as to which areas are protected and which are not.

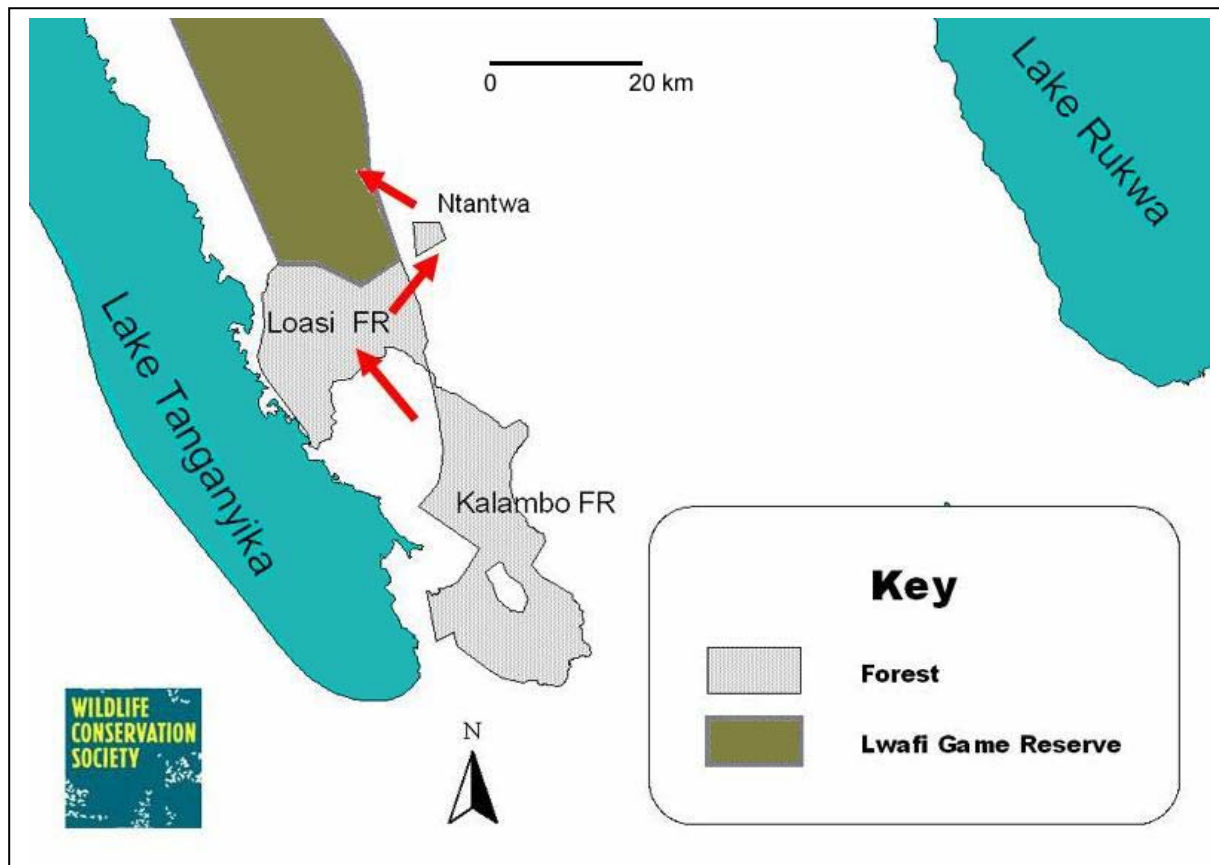
Wildlife

A range of savanna and gallery forest species, the most notable being the IUCN Red Listed eastern chimpanzee (*Pan troglodytes*). Large mammals include bush duiker (*Sylvicapra grimmia*), bushbuck, hartebeest, lesser kudu (*Tragelaphus imberbis*), waterbuck, zebra and associated carnivore species such as lion (*Panthera leo*) and leopard also use the corridor.

Threats

Much of the forest that contained chimpanzee nests in 2005 within this corridor has since been completely felled for charcoal, timber and subsequently ploughed agriculture. This is on-going and will probably be all finished very soon. Sanctioned charcoal manufacture exacerbates the problem.

Map 10. Loazi-Kalambo and Loazi-Ntantwa-Lwafi corridors



12. Loazi-Ntantwa-Lwafi (Type D, Map 10)

Description

The second of the two important corridors in this part of Tanzania consists of miombo and riverine gallery forest connecting Loazi FR and Lwafi GR via open land and Ntantwa forest. Neither of these protected areas is currently managed in any way and the corridor between them is unprotected.

Wildlife

A range of savanna and forest species are present, the most notable being the chimpanzee. It would seem that wildlife move seasonally between all these protected areas, and thus these linkages are vital for the persistence of this threatened and Tanzania's (and Africa's) most southerly sub-population of chimpanzees.

Threats

These forests are rapidly being felled and reduced by charcoal manufacture, and converted to agriculture. There is not, and has never been, any management of any of these protected areas, and thus illegal activity is commonplace. Many villages across this area (and within the corridor detailed above) consist mainly of Congolese bushmeat hunters who have temporarily settled in Tanzania, and exploit this area's remote and unmanaged status. Bushmeat (including chimpanzee) is exported from Tanzania across Lake Tanganyika for sale in the Democratic Republic of Congo.

13. Manyara Ranch-Lake Natron (Type D, Map 11)

Description

The corridor starts at the northern end of TNP and crosses the main Arusha – Dodoma road in two places (at Mswakini Chini and Mswakini Juu villages), and then passes through Manyara Ranch. Wildlife exits on the northeast boundary of Manyara Ranch, crosses the main Makuyuni – Mto-wa-Mbu road between Manyara Ranch and Losirua/Esilale villages, passes through a narrow channel at the northwest base of the Lolsimongori mountain and continues northwards to the plains on the southern edge of Lake Natron. Much of the area is open grassland interspersed with patches of bushland.

Wildlife

Wildebeest and zebra movement from TNP to Lake Natron has been confirmed by radio collaring and tracking of individual animals. It is likely that giraffe and eland also use this route. The first stage of the corridor between TNP and Manyara Ranch is heavily used by elephant, wildebeest, zebra and there is also migration of giraffe, buffalo and eland.

Threats

The most immediate threat is increasing cultivation in the 4 km strip of land between TNP and Manyara Ranch. There is also an increasing threat from cultivation where the corridor crosses the Makuyuni – Mto-wa-Mbu road and along the lower slopes of Lolsimongori. The land further north near Lake Natron is too arid for cultivation. However plans to tarmac the road to Loliondo via Natron are likely to negatively impact wildlife movement.

14. Manyara-Ngorongoro (Upper Kitete/Selela) (Type D, Map 11)

Description

In 1978, the upper Kitete corridor was assigned an NCAA nature reserve (i.e. under the jurisdiction of the Ngorongoro Conservation Area Authority) with the intention to maintain a route for wild animal movements from the Northern Highland Forest (northern highlands) to the lowlands below the rift escarpment. The Selela corridor extends from the lowlands, particularly the Selela groundwater forest to Lake Manyara NP. Therefore, the upper Kitete/Selela corridor (2 km wide and 10 km long) is a key feature along the Great Rift Valley that connects Ngorongoro Conservation Area and the Lake Manyara NP.

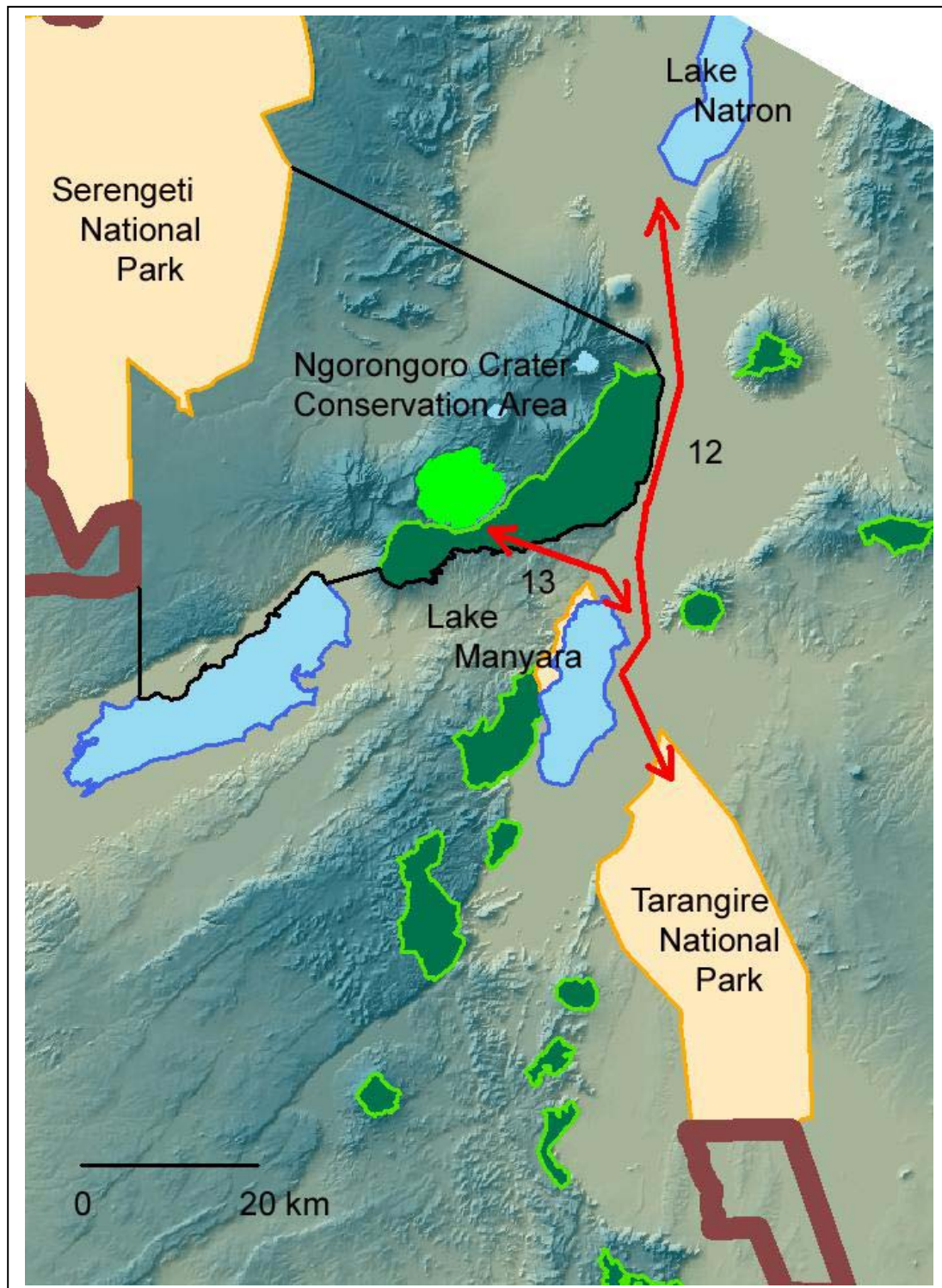
Wildlife

The upper Kitete/Selela corridor is utilised by elephants and buffalo.

Threats

Outside the southern edge of the Ngorongoro Conservation Area, the increased human settlement and cultivation caused interruption to the movement of elephants, buffalo, and other large animals from the northern Highland FR to the lowlands below the escarpment. Even though cultivation was stopped, homes, domestic livestock and cattle dips still exist in the corridor. All areas adjacent to the corridor are settled and cultivated by local people.

Map 11. The Manyara Ranch-Lake Natron and Manyara-Ngorongoro Corridors



15. Muhezi-SwagaSwaga (Type C, Map 12)

Description

Little is known about the Muhezi-Swaga Swaga corridor, beyond the fact that elephants are known to use the area seasonally and other species are found throughout the corridor. Whether it is one diffuse corridor or a number of separate ones is unknown, but it seems likely that the Itigi thicket-type habitat is important.

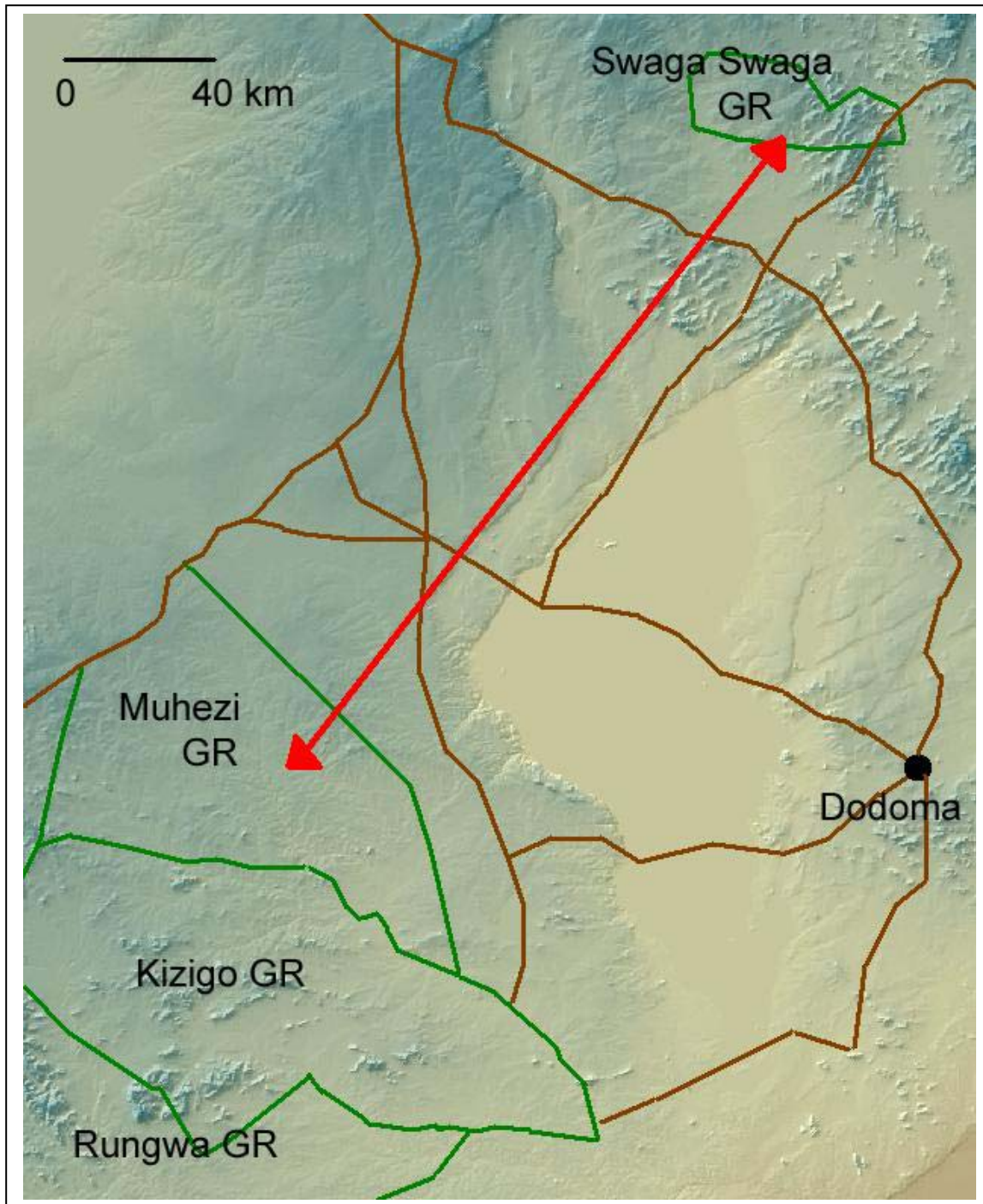
Wildlife

Elephant are known to use the area, and human-elephant conflict is not uncommon. There are reports of a seasonal round, with elephants passing through the northern area from Muhezi toward SwagaSwaga early in the wet season, returning via the south of Bahi later in the year. Preliminary genetic evidence suggests that Ruaha elephants (including Rungwa-Kizigo-Muhezi) may be more closely related to Tarangire than Selous elephants, but the population structure is far from clear (C. Epps, pers comm.). Kudu, impala and eland are also reported, though it is not clear whether they move through the area, or are locally resident in habitat remnants or simply disperse from Muhezi and SwagaSwaga.

Threats

Cultivation is probably the largest single threat to the area. Clearing of thicket for charcoal or cultivation may eliminate local refuges within the corridor. Some mining occurs in the area, with known uranium anomalies and calcrete deposits around the Bahi Swamp, but whether mining these resources will affect wildlife or use of the corridor is not clear. The hydrology of the Bahi swamp may also be affected by diversions associated with mining or irrigation.

Map 12. The Muhezi-SwagaSwaga Corridors



16. Selous-Niassa (Western and Eastern Routes) (Type D, Maps 13; 14)

Description (Western Route)

The Selous – Niassa ecosystem, which extends across southern Tanzania into northern Mozambique, is one of the largest trans-boundary ecosystems in Africa covering approximately 154,000 km² of miombo woodland interrupted by wetlands, open woodland and riparian forest. Within this ecosystem the Selous-Niassa Wildlife Corridor (SNWC) provides an important landscape linkage between the extensive protected areas of the Selous GR (47,000 km²), southern Tanzania and the Niassa GR (42,000 km²), northern Mozambique.

SNWC comprises an area of about 10,000 km² extending approximately from 10° S to 11°40' S with a north–south length of 160 to 180 km. It borders the Selous GR (North East Undendeule FR) in the north and the Niassa GR in Mozambique along the Ruvuma River in the south. Administratively, the corridor is located in Namtumbo and Tunduru districts of Ruvuma Region in southern Tanzania.

Detailed work has been carried out on elephant movements. There are resident elephants living in the corridor and also migrating individuals moving from Niassa to Selous. Specifically, elephants move north from Mozambique crossing the Ruvuma River at 10 points. They then use 3 routes to move to the centre of the corridor: (i) from Lukawanga (27 km east of Magazini village), along the Msanjesi, Majimahumuu and Matepwende Rivers to the Chagalanga and Mtungwe Mountain area, (ii) 14km west of Magazini village, from Mkasha Mountains, Lusanyando, Ajemsi, and Rutukila, that join at Binti Uredi stream to proceed northeast via the Namisegu River to join the Lukawanga route, and (iii) from Ndalala River, Binti Hasani, Msawisi and Kipembele Rivers going northwest to London Mountain and north along Msawisi River to Luyati and Tingilafu Mountains near Amani village. From there some join the Lukawanga route, others go west via Nambwela forest and Lisugu and Kimbande mountains to the Lukimwa River and Ngoma Litako swamp ending up at Mtelamwahi.

From the centre of the corridor there are 4 routes to Selous: (a) the Malimbani route links Mbarangandu and Kitwanjati near Mtungwe using small tributaries; this route crosses the Songea-Tunduru road between Mchomoro and Kilimasera; (b) the Nampungu ya Chakame route starts at the Mbarangandu River, crosses the Songea-Tunduru road at Mt Kilimasera, continuing along 3 tributaries to the Mbawa River, to the Luchilikulu River and Nkalela Forest to the Msanjesi River; (c) the Ritungula route follows a series of tributaries to the Kapesula River and then to Muhuwesi and then to the Ritungula River crossing the Songea-Tunduru road at Mlima Simba and Mwembenyani village, through small tributaries to the Nampungu River. Elephants then raid crops around 6 small villages and go on to the Nkalela Forest to the upper banks of the Mjanjersi River; and (d) the Sasawala-Lukumbule route that uses tributaries draining into Sasawala that then lead to Kiumbe Forest, Lukumbule River and Mwambesi GR.

Description (Eastern Route)

This is another more eastern wildlife corridor between the Selous and Niassa GRs especially the portion outside Nachingwea district. In this corridor migration of elephant, buffalo and zebra has been observed (Pesambili 2003; Ntongani et al. 2007). Two elephant migratory routes have been identified as follows: (i) from Selous through Nahimba, Nakalonji, Mbondo, Kilimarondo, Matekwe and Kipindimbi proposed GR in Nachingwea District and then via Msanjesi, Mkumbalu, Sengenya, Nangomba and Nanyumbu in Masasi district to Lukwika GR and then crosses Ruvuma River to the Niassa GR; (ii) From Selous to Kiegei, Namatunu, Kilimarondo in Nachingwea then along the Mbangala and Lumesule rivers to Mchenjeuka and Mitonga in the Lukwika GR, from where they cross

the Ruvuma River to the Niassa Reserve. The Selous-Masasi corridor includes the Msanjesi (2,125 ha) and the Lukwika –Lumesule (44,420 ha) GRs in Masasi District and areas of Nachingwea, Masasi and Tunduru Districts.

Wildlife in western and eastern portions

TAWIRI / CIMU carried out regular aerial surveys since 1998 with the latest results available from 2006. From 2001 until 2003 the SWNC Research Project (Wildlife Department, TAWIRI, SUA Morogoro, Institute for Zoo and Wildlife Research, IZW, Berlin, Selous Conservation Programme, SCP-GTZ) showed with Argos satellite tracking the existence of elephant migration routes between Selous and Niassa GRs. Beside the landscape species, elephants and wild dogs, the corridor supports populations of buffalo, crocodile (*Crocodylus niloticus*), eland, impala, greater kudu (*Tragelaphus strepsiceros*), hartebeest, Roosevelt sable antelope (*Hippotragus niger roosevelti*), hippopotamus, leopard, lion, and Niassa wildebeest, to name a few, and constitutes a resting and breeding place for migratory birds on their fly way route from Europe to South Africa.

Threats in both portions

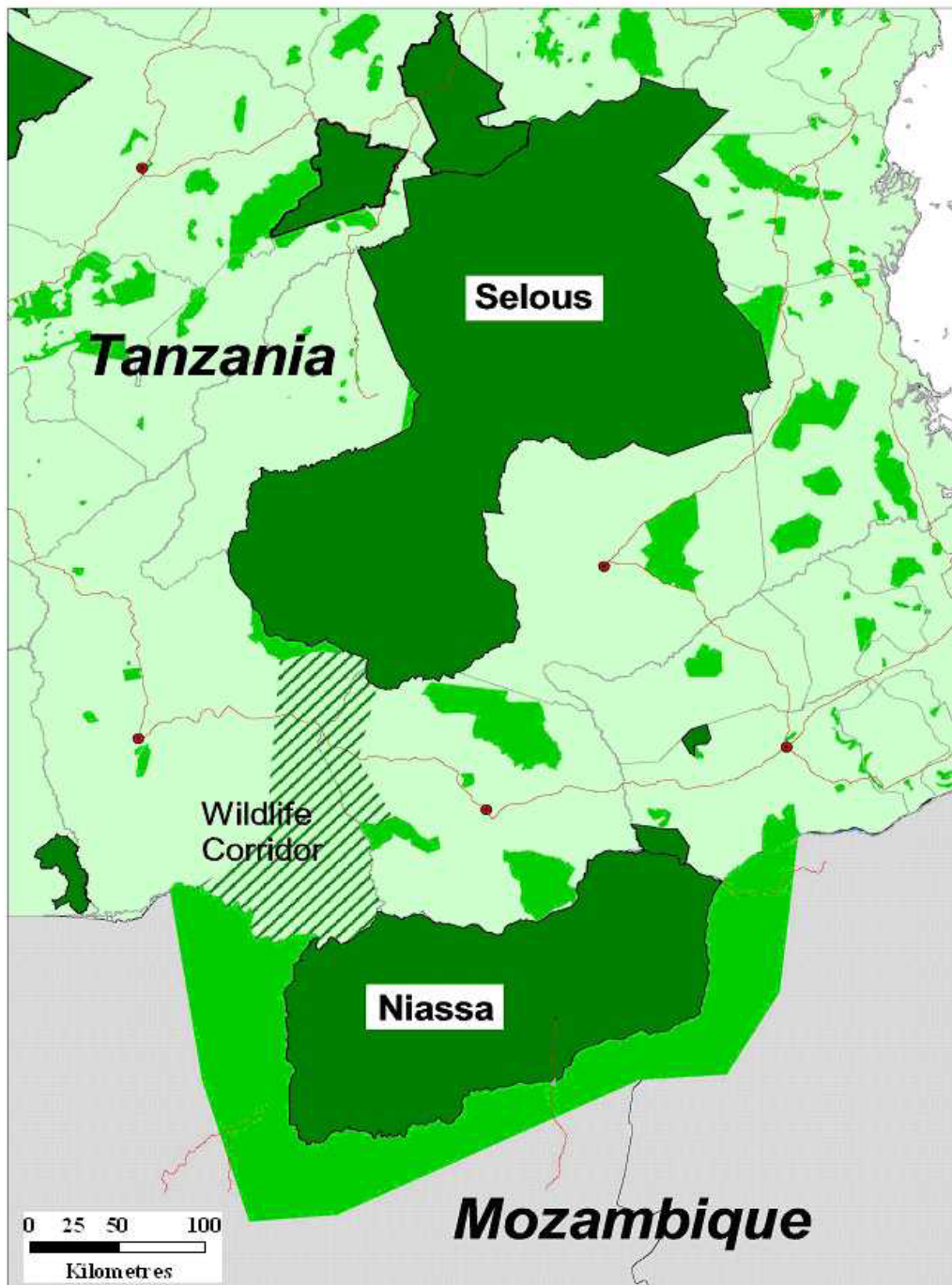
Ribbon strip development of settlements along the major roads leads to the blockage of the corridor. Uncontrolled and unplanned conversion of land for agriculture and settlements on the major migratory routes leads to fragmentation of the ecosystem and increased human–wildlife conflicts. Unsustainable and often illegal use of natural resources (illegal logging, fishing with poison) including the high value poaching of ivory across the national boundaries, uncontrolled fires and prospecting/mining for uranium and other minerals are severe threats to its continued existence. Note that EIAs for prospecting and mining were not carried out.

To ameliorate these threats, it may be necessary to establish a contiguous network of WMAs in cooperation with 29 villages, that already formed five Community Based Organisations. However, WMAs in the northern part of the corridor (Nalika and Mbarangandu) do not receive any tangible benefits from conservation although their areas are high profile tourism hunting blocks, thus they may get discouraged from conservation.

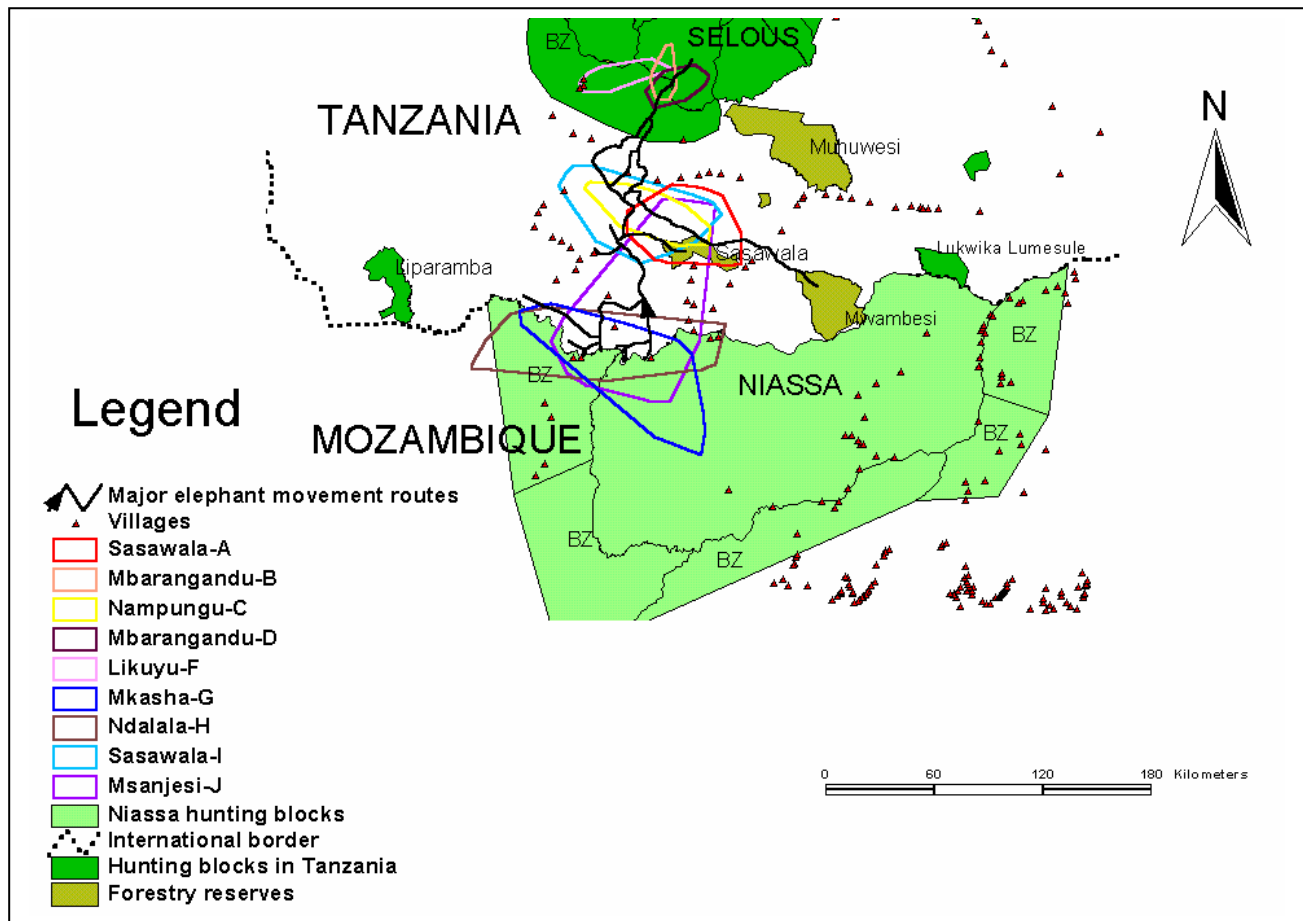
Cross-border cooperation between Tanzania and Mozambique on conservation, tourism and environmental issues according to a regional MoU is necessary. Currently, the following projects are under way under the leadership of the MNRT: (1) Selous–Niassa Wildlife Corridor with funding from UNDP/GEF and implementation by GTZ-IS, (2) Selous–Niassa Wildlife Protection Corridor with funding from German Development Bank (KfW) and implementation by Gauff and Wildlife Conservation Society Tanzania, (3) Selous–Niassa Bee-Keeping Support by Association for the Development of Protected Areas (ADAP) Switzerland, (4) Ruvuma River Basin Authority with support from African Development Bank and InWEnt, Capacity Building International, Germany, under SADC agreement.

Map 13. The Selous-Niassa Corridor (Western and Eastern routes)

Selous - Niassa Wildlife Corridor



Map 14. Movements of elephants in the Selous-Niassa Corridor (Western routes), based on satellite tracking data and local knowledge. (By D. Mpanduji)



17. Makuyuni corridor (Type D, Map 15)

Description

This is a short corridor (approximately 15 km) linking Tarangire NP with a key elephant dispersal area to the northeast of the Park. The corridor bisects land belonging to Naitolia and Lolkisale villages, though most of the dispersal area is in Makuyuni village. Much of the corridor lies within the Lolkisale Game Controlled Area. The land is dominated by Acacia woodland and dense thicket. About half of the corridor is protected through land lease agreements with tour operators.

Wildlife

This is the main dispersal area for the northern sub-population of elephants in Tarangire, approximately 800 individuals. These elephants leave the park during the wet season and spend a total of 3-5 months in the dispersal area. Their movements in the dispersal area have been well documented through radio collaring and ground counts.

Threats

Loss of habitat through tree felling for charcoal production and increasing cultivation are the main threats in this area.

18. Mkungunero/Kimotorok corridor (Type D, Map 15)

Description

Animals move from the southern end of TNP through Mkungunero Game Reserve and then eastwards towards Makame and Ndedo villages. The habitat is a combination of open grassland/swamp, open *Acacia* microphyll woodland, and dense thicket in the Makame and Ndedo villages.

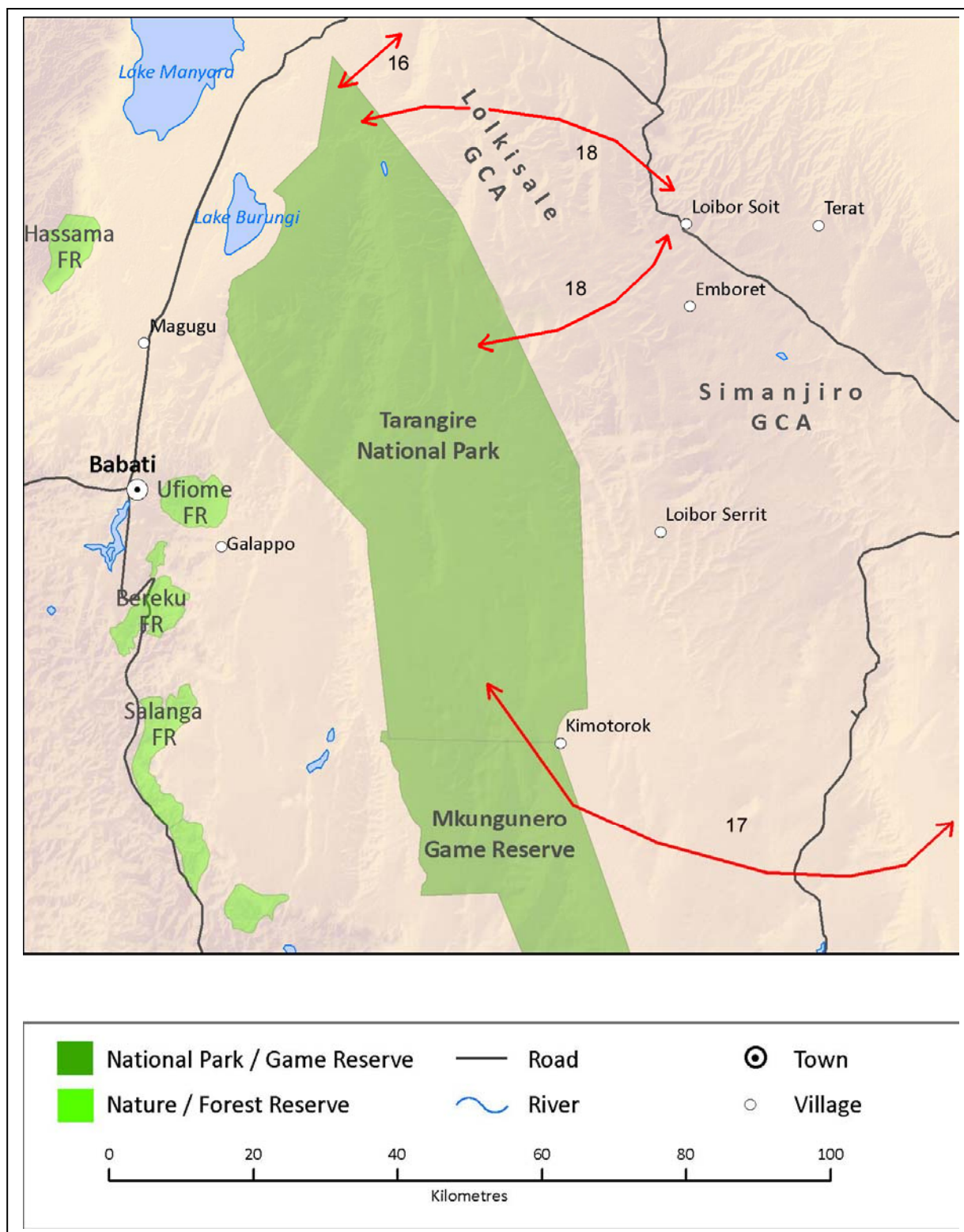
Wildlife

There is well documented movement of elephants (from radio collars) along this corridor. Wildebeest also use part of the corridor and there is likely to be considerable use by other large mammal species, including the rarer gerenuk, lesser kudu and wild dogs.

Threats

The corridor is not yet under threat from agricultural expansion, though there is increasing agricultural production south of Makame which may impact the area in future years. The construction of a main road from Babati to the Simanjiro will bisect the corridor at the southern end of the park and will likely lead to increased immigration and settlement. Much of this area is set to become a WMA.

Map 15. The Makuyuni, Mkungunero/Kimotorok and Tarangire–Simanjiro Corridors



19. Tarangire–Simanjiro (Type D, Map 15)

Description

The Tarangire ecosystem is approximately 20,000 km², the majority of which was historically used by wildlife and Maasai pastoralists. Tarangire NP (2600 km²) lies in the northwest corner of the ecosystem. The Park is a dry season refuge for migratory herbivores that in the past moved west, north, northeast, east and south from the Park at the beginning of the rains in November. Many of the former migration routes have already been lost. The most important remaining corridor is east through the Lolkisale GCA out to the villages of Emboreet, Sukuro and Terrat.

Wildlife

Migratory species are zebra, wildebeest, hartebeest and oryx (*Oryx beisa*) and they move between 10 and 110 km out of the Park. Most migratory routes have been blocked due to agricultural expansion; bushmeat hunting and resident hunting have reduced wildebeest, hartebeest and oryx populations by 88%, 90% and 95%, respectively.

Threats

As of the early 1990s approximately 10.5% of lands in the Tarangire ecosystem were under agricultural cultivation much of it abutting the Park, and this has accelerated dramatically in the last 15 years. Sport and illegal hunting is common in the area. Considerable controversy has arisen between some stakeholders over the corridor between Tarangire NP and villages to the east, and politically this is a very sensitive area. Increasingly the villages adjoining the National Park are entering into land lease agreements with tour operators and creating concession areas which are used solely for tourism and cattle grazing.

20. Tarangire-Manyara (Kwakuchinja) (Type D, Map 16)

Description

The Tarangire-Manyara corridor is also known as the Kwakuchinja wildlife corridor, and is part of the Kwakuchinja Open Area (600 km²) lying between Lake Manyara and Tarangire NPs. It is located between latitude 03° 35' 38'' and 03° 48' 02''S and longitude 35° 48' 21'' and 35° 59' 25''E. The vegetation is primarily savanna with pockets of woodlands along waterways. The area is home to several ethnic groups in at least five sub-villages. Their occupations include livestock keeping, subsistence and/or commercial agriculture and business. Moreover, fishermen from nearby areas and as far as Babati town emigrate to the area and establish temporary fishing villages when Lake Manyara is most favourable for fishery activity. The Great North Road, which bisects the corridor, enhances transportation to and from the villages in the corridor of farm products, farm implements and fishery products.

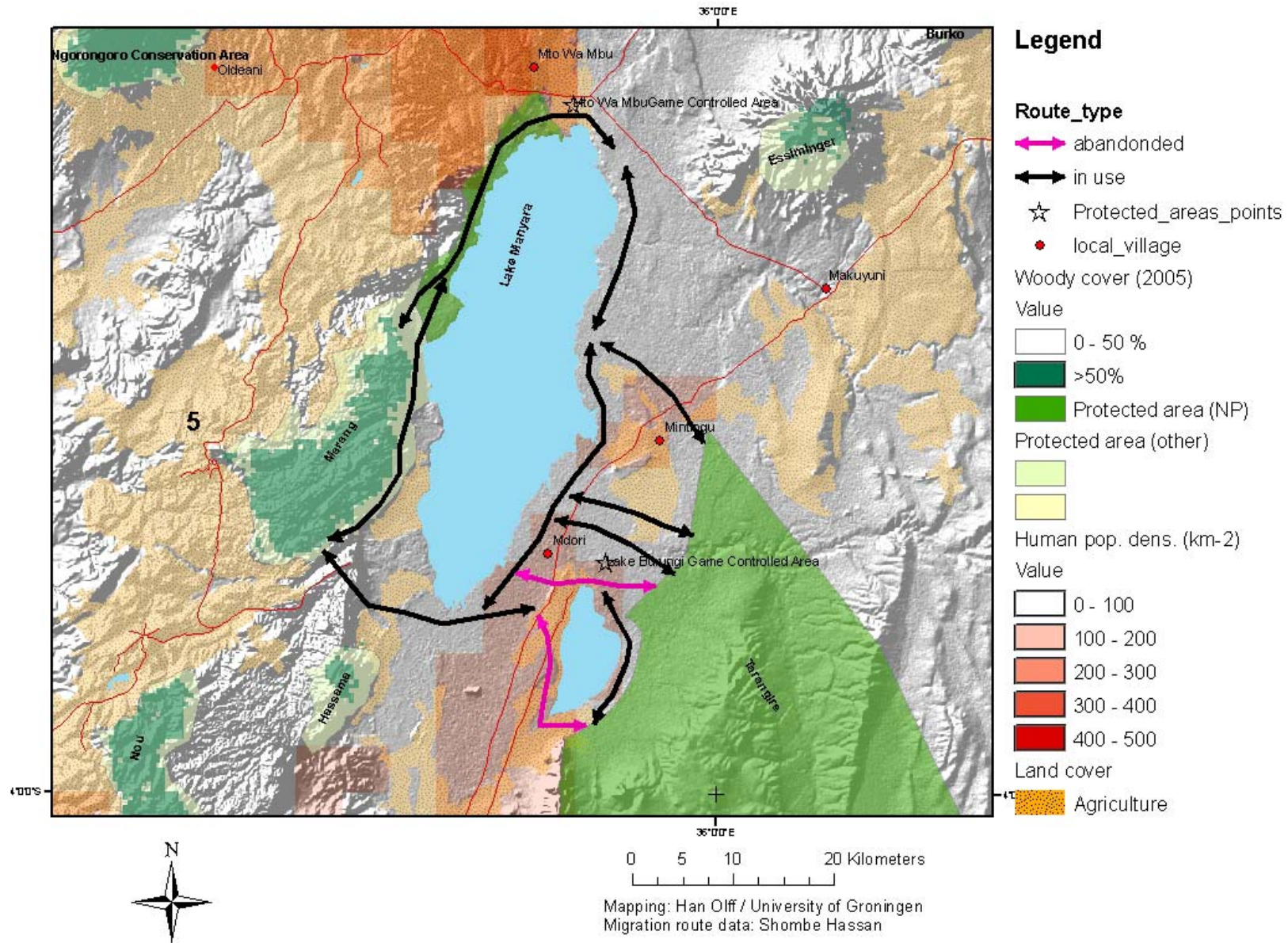
Wildlife

The corridor was once vital to 25 large mammal species, some of which (including elephant) move between the two parks. Field observations two decades ago suggested that elephants moved from Lake Manyara NP into the corridor via Marang forest (adjacent to Lake Manyara NP) then proceeded to Tarangire NP via the Lake Burungi Area. Some populations of bushbuck, impala and vervet monkey (*Cercopithecus aethiops*) together with livestock utilize the corridor throughout the year.

Threats

The corridor faces sets of conflicting land uses such as agriculture versus livestock keeping, and settlement, agriculture, phosphate mining, cattle holding and fishing versus wildlife management and conservation. So far eight large mammal species - eland, hartebeest, buffalo, oryx, lesser kudu, cheetah (*Acinonyx jubatus*), leopard and lion - are locally extinct. The extinction is attributed to growth in settlements and agriculture which block animal movements, and poaching and human disturbance. Of the five historical migratory routes in the corridor, only three persisted in 1998. Management Zone Plans (MZP) and General Management Plans (GMP) are envisaged as a way to rescue the area in the current absence of full protection by law. Establishment of WMAs and Biodiversity Conservation Projects such as Api-Agro-forestry in appropriate land units may be useful.

Map 16. Kwakuchinja Corridor.



21. Udzungwa-Mikumi (Type C, Map 17)

Description

These two protected areas are connected by two possible routes for wildlife movements. First, movement of wildlife from the western portion of Mikumi NP to Udzungwa NP may occur in the narrow hilly region south of the Dar es Salaam-Mbeya highway and north of the sugarcane plantations of the Kilombero Valley (map 13, Area G). Some of the area west of the road is used for military training. While settlement is therefore unlikely in this area, the effect of military activity on wildlife and wildlife movements in this intervening area is unknown. Secondly, wildlife movement may occur out of the northern portion of Udzungwa NP into the mountains north of the Dar es Salaam-Iringa highway (an area including the currently unprotected Ilole Forest), then east through thinly-settled land to the western border of Mikumi NP north of the highway.

Wildlife

Direct movement of elephants appears to occur across the Kilombero road in the hilly area north of the sugarcane plantations (map 13, Area G), based on observation of elephant dung along this road. Movement of other species seems likely but has not been evaluated, although foot surveys in Mikumi NP detected well-used trails for elephant and buffalo along ridges near the western edge of the park. Animal movements and distribution north of Udzungwa NP and east to Mikumi NP (north of the Dar-Iringa highway) have recently been studied by (a) both randomly-located and targeted cross-country walking survey transects of tracks, sign, and wildlife across the corridor and in protected areas at either end of the corridor, and (b) conversations with local people across this area. Extensive elephant sign was detected in the mountains directly north of Udzungwa NP (map 13, Area C). Elephants are also known to move out of the west side of Mikumi NP; elephant sign was detected in agricultural areas near Ihombwe and west into the Pala Ulanga FR (map 13, Area E). Local people describe movements of elephants between Pala Ulanga FR and thinly-settled areas to the south (map 13, Area F); from this point contact with elephants known to occur in the Ilole Forest to the west seems likely but could not be verified during the 2006-07 surveys. If elephant movement through this area does occur, this area (map 13, Area F) provides the potential for direct movement between Ruaha NP and Mikumi NP as well as Udzungwa NP. Other westward movement corridors, for instance from the north end of the Pala Ulanga range into Ukwiva Forest (map 13, Area D), appear to have been severed by heavy human settlement throughout the valley lying east of the Rubeho Mountains. Movement of elephants and other large mammals down the spine of the Rubeho Mountains and into the area near Ilole Forest also seems unlikely after surveys and discussion with local people in this area found no evidence of such movement. Buffalo, sable, waterbuck and other large mammal species still occur in the largely unsettled area west of Mikumi NP, southeast of the village of Kisanga, and north of the Dar es Salaam-Mbeya highway (map 13, Area F).

Threats

Poaching and clearing of habitat for farms is occurring throughout the corridor; local residents often claim that wildlife movements have decreased in areas where farming or extensive grazing occurs. Wildlife, including elephants, was detected less often in areas where these activities occurred. Farming and settlement west of Mikumi NP appear to have expanded rapidly in the last 10 years, disrupting several former elephant corridors and threatening habitat for many other species. The area east of Ilole Forest up to the border of Mikumi NP (map 13, Area F) is likely to be the last hope for elephant movements linking Mikumi to Udzungwa (by the northern route) and thus the Ruaha ecosystem via the Ruaha-Udzungwa corridor. Poaching appears to be heavy as numerous snares were encountered in this area.

22. Udzungwa-Ruaha (Type D, Map 17)

Description

These two protected areas are separated by a wide area subject to a variety of human activities. The Idodi-Pawaga WMA forms an eastern extension of the Ruaha ecosystem. Further to the east lies the Lunda GCA, extending to the Nyang'oro Hills of Ismani District, and the Ruaha GCA in Dodoma region north of the Ruaha River and downriver of Mtera Dam (map 13, Area A). The Image FR (south of the Ruaha River; map 13, Area B) lies in mountainous terrain about halfway between Ruaha and Udzungwa NPs and may also serve as a 'stepping stone' for wildlife such as elephants and large carnivores.

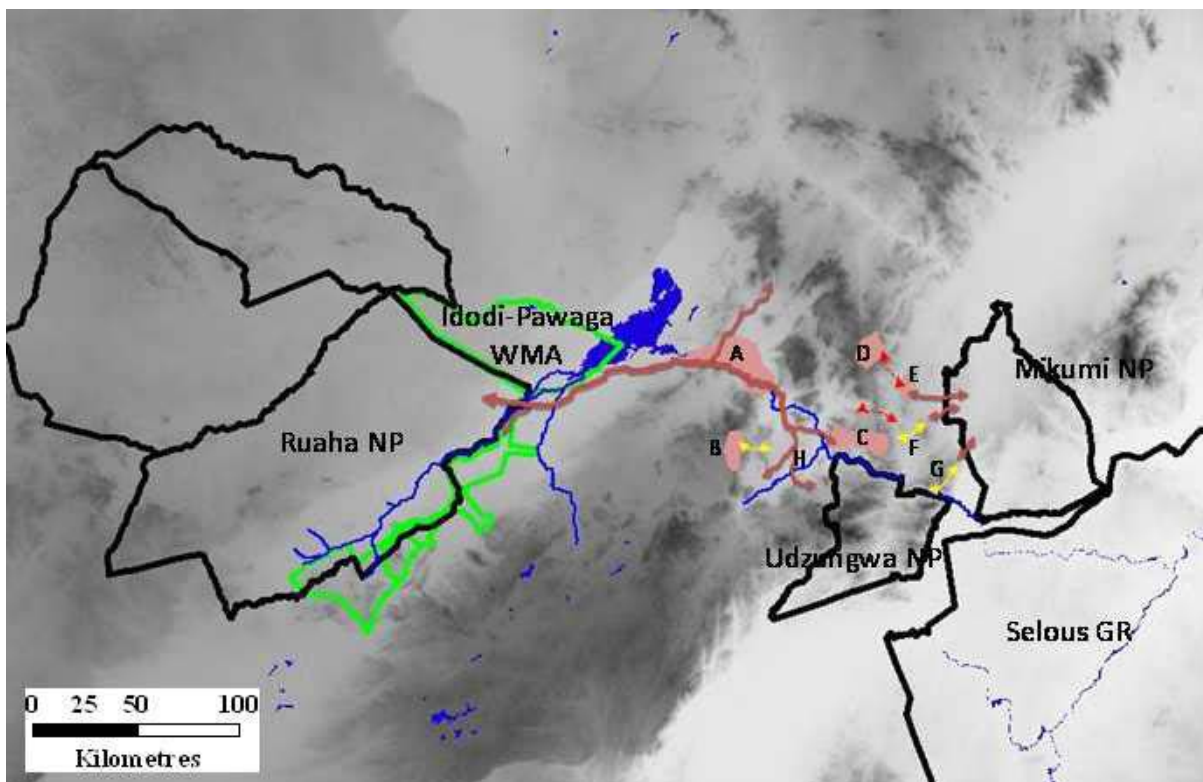
Wildlife

Animal movements and distribution across this area have recently been studied by (a) both randomly-located and targeted cross-country walking survey transects of tracks, sign, and wildlife across the corridor and in protected areas at either end of the corridor, and (b) conversations with local people. Elephant sign was detected continuously from Ruaha NP, through Idodi-Pawaga WMA, between Mtera Reservoir and the escarpment to the south eastward into the Nyang'oro Hills, on both sides of the Ruaha River downstream of Mtera (including well north of the river through the Ruaha GCA of Dodoma region; map 13, Area A), in Isole FR (map 13, Area B), along the Ruaha River in the vicinity of Idodoma and Nyanzwa, east to the area around Malolo B (Kilosa District, Morogoro Region), further east into the mountains directly north of Udzungwa NP (map 13, Area C), and south to the Dar-Mbeya highway (map 13, Area H). Only one major crossing point of this highway has currently been verified and is located a few kilometers west of the village of Mtandika. From here, elephants can cross the Lukosi River and easily access Udzungwa NP. Although extensive elephant activity (both wet and dry season) was documented in the mountains north of Udzungwa NP (map 13, Area C), regular movements from this area into Udzungwa NP could not be verified. Many other wildlife species were detected in the more intact habitats across this corridor, including large predators (leopard and spotted hyaena, *Crocuta crocuta*), ungulates such as greater kudu and impala, and buffalo and giraffe in isolated locations.

Threats

Poaching and clearing of habitat for farms are occurring throughout the corridor; local residents often claim that wildlife movements have decreased in areas where farming or extensive grazing occurs. Large mammals, including elephants, were detected less often in areas where these activities occurred. Probably the most vulnerable section of the corridor is the Mtandika crossing point of the Dar es Salaam-Mbeya highway (map 13, Area H). Irrigation schemes and onion cultivation have increased very rapidly in this area in the last few years and traffic on the highway is often heavy. This point may mark the only viable connection between northern and southern populations of elephants in eastern and central Tanzania and needs swift action to prevent permanent disruption and reduce human/elephant conflict in this region.

Map 17. Udzungwa-Mikumi and Udzungwa-Ruahha Corridors



Pink polygons = areas with probable year-round use by elephants. Dark red arrows are movement corridors inferred from detection of elephant sign across these areas during field work and from discussions with local people. Bright red dashed arrows are movement corridors described by local people that are no longer active. Yellow arrows reflect possible but unconfirmed movements. Letters are referred to in written description of corridors. By Clint Epps.

23. Udzungwa-Selous (Type D, Map 18)

Description

Anecdotal evidence indicates that until recent decades, there was regular and abundant movement of large mammals between the Udzungwa and Selous ecosystems, across the Kilombero Valley. High levels of human immigration and a spread of agriculture throughout the valley during the second half of the twentieth century, including a vast monocultural sugar plantation, have resulted in most animal routes becoming blocked off. A 2006 study into the feasibility of maintaining ecological connectivity between the Udzungwa and Selous PAs found that two routes remain active for wildlife: the Nyanganje and Ruipa Corridors. However, it is predicted that without conservation interventions, both of these corridors will also be blocked by the end of 2009.

The Nyanganje Corridor is situated at a narrow ‘bottleneck’ of the Kilombero Valley and represents the shortest distance for animals to cross between the Udzungwa and Selous ecosystems. From the Nyanganje FR (69 km², centred on 36°47'E, 8°00'S) to the Selous GR is a straight distance of approximately 13 km. Here the Valley is a mosaic of low density shambas, degraded grassland and semi-natural grassland, scrub, marsh and scattered small patches of woodland. The most important area for protection is the corridor area closest to the Nyanganje FR, and adjacent to the road and railway, where there is scattered cultivation and some human-wildlife conflict (though no permanent human settlements). This critical section of the Corridor is about 3 km long and 0.5-2.5 km wide.

The Ruipa Corridor is situated close to the Ruipa river to the southwest of Ifakara, in the southern Kilombero Valley. It begins at the large Matundu forest (ca. 250 km², centred on 36°21'E, 7° 86'S, split between the Udzungwa Mountains NP and the Kilombero Nature Reserve), and heads southeast up to and across the Kilombero River (from where animals disperse to reach the Selous GR). This large mammal corridor (0.5 – 6 km wide, 20 km long; a total area of ~ 25 km²) crosses a mosaic of habitats, including riverine forest, woodland, scrub, degraded pasture and swamp.

Wildlife

Nyanganje Corridor: Elephant (during January-March) and buffalo still use the corridor annually to migrate between protected areas, although according to questionnaire respondents their numbers have reduced significantly in recent years. Other animals reported from the corridor include bushbuck, bushpig (*Potamochoerus larvatus*), leopard, lion, puku (*Kobus vardonii*) and yellow baboon (*Papio cyanocephalus*).

Ruipa Corridor: Elephant (during March-May) and buffalo still use the corridor annually to migrate between Protected Areas, although according to questionnaire respondents their numbers have reduced significantly in recent years. Other animals reported from the corridor include the aardvark (*Orycteropus afer*), Angolan black-and-white colobus (*Colobus angolensis*), bushbuck, crested porcupine (*Atherurus africanus*), Harvey's duiker (*Cephalophus harveyi*), bushbuck, hippopotamus, leopard, lion, puku, spotted hyaena, waterbuck and the Udzungwa-endemic Udzungwa red colobus (*Procolobus gordonorum*).

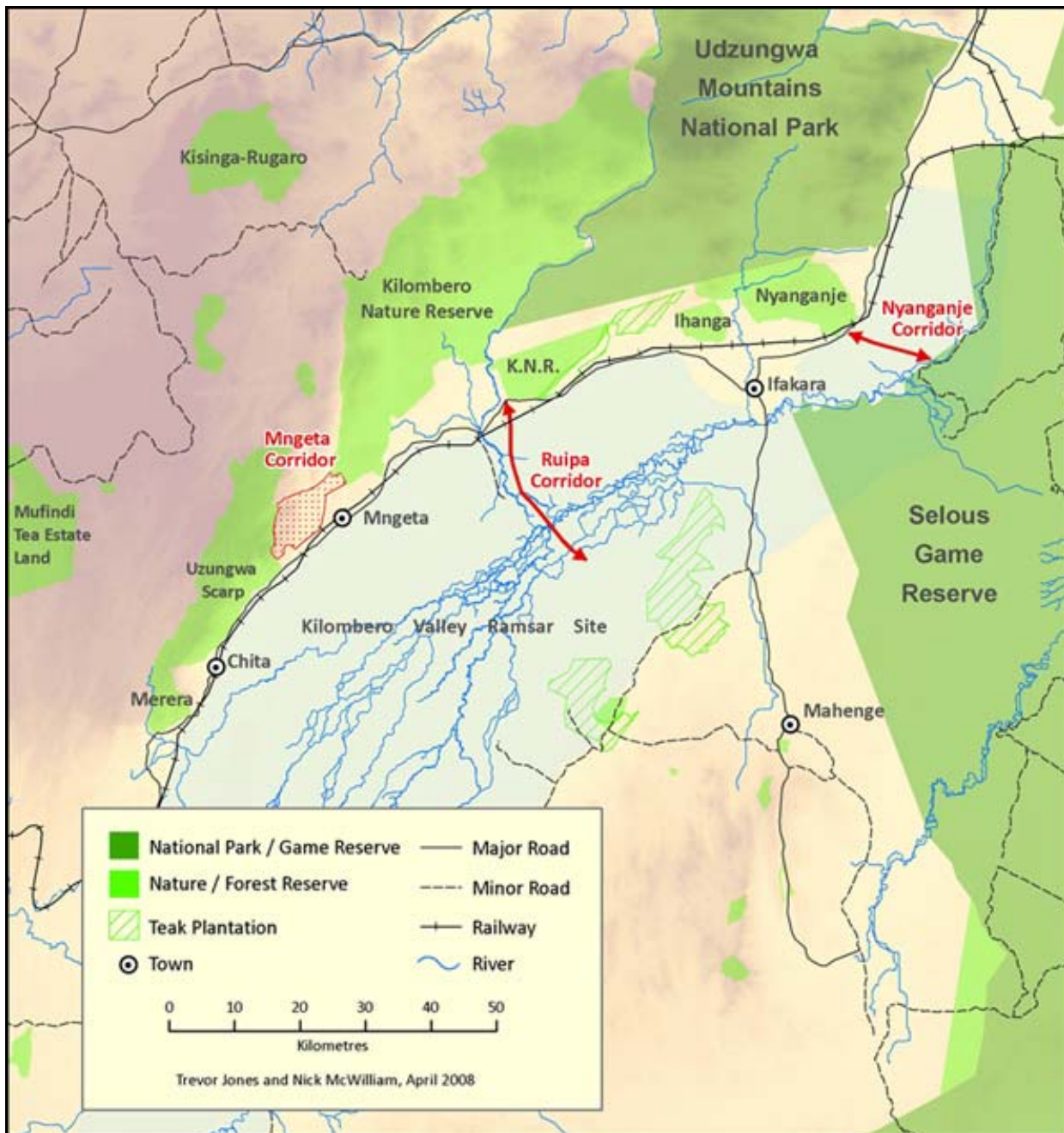
Threats

Nyanganje Corridor: Amongst local farmers there is little perception of conflict with wildlife, apparently because elephants and other mammals cross farms rapidly at night without causing much damage to crops. However very few animals are still using the corridor, probably because of increased human activity – despite the narrow corridor being one of the less densely cultivated areas of the

Kilombero Valley. The most immediate threat to the Corridor is the likelihood of intensified cultivation and human settlement until animals are completely unable to pass.

Ruipa Corridor: This Corridor is under immediate threat, especially in the Namwai forest area, from: rapid destruction of habitat by cutting of timber (including commercially) and burning; pole cutting and charcoaling; new human settlements and conversion of woodland to agriculture; hunting; increased cattle herding. An additional very recent threat is the settlement of Wasukuma immigrants along the western bank of the Kilombero River, with associated large herds of cattle and planting of crops.

Map 18. Kilombero Valley, showing Udzungwa-Selous (Nyanganje and Ruipa) and Uzungwa Scarp-Kilombero NR (Mngeta) Corridors.



24. Uzungwa Scarp-Kilombero NR (Mngeta Corridor) (Type E, Map 18)

Description

The Mngeta corridor links the Uzungwa Scarp FR (USFR, 200 km²) to the united network of northern Udzungwa forests (protected as Udzungwa Mountains NP and Kilombero Nature Reserve, totalling 3335 km²). USFR has forest cover at elevations of 300-2000 m and is one of the largest and most important single forest blocks in the whole Eastern Arc, according to the number of forest endemics and provision of ecosystem services. Its progressive insularisation from the northern network of protected areas can only be reversed through maintaining forest connectivity. The corridor has been identified from recently conducted ground and aerial surveys. It is composed of public land (government land) and borders village land (including proposed PFM schemes). The corridor length between protected areas is 9.2 - 15.2 km, the width 2.1 - 6.8 km, and the area is estimated at 63 km². As much as 80% of the corridor appears to be covered by natural vegetation (grass, shrubs, woodlands or forest), including approximately 25% under natural forest and woodland. Some parts of the proposed corridor are very steep and covered with mixed grassland, shrubs and low-canopy forest. Only about 20% appears occupied by recent and seasonal farms. It is estimated that less than 100 households live in the corridor area.

Wildlife

The Udzungwa Mountains contain the largest blocks of moist forests and the greatest amount of biodiversity in the Eastern Arc. It is one of the most important areas in Africa for primate conservation. Uzungwa Scarp FR, in particular, hosts endangered and endemic forest mammals, namely the Sanje mangabey (*Cercocebus sanjei*) (only found there and in the northern Mwanihana forest), Udzungwa red colobus and Abbott's duiker, as well as several other vertebrates. Some of these are also found in Iyondo forest, the nearest forest to the north linked to USFR by the Mngeta corridor. Reports of Sanje mangabeys in Iyondo forest have not yet been confirmed but would support the hypothesis that the two forests were once more widely connected.

Threats

Ever-increasing, documented rates of human immigration in the southern Kilombero valley in search of land for farming represent the most serious threat to the persistence of the Mngeta corridor. With the Kilombero valley being progressively saturated it is likely that the number of people settling in the corridor area will increase, which will rapidly diminish the chances of protecting the area. Protection of the Mngeta Corridor, along with more efficient management of Uzungwa Scarp, was one of the key recommendations that the Government endorsed following the Udzungwa stakeholders' meeting held in 2007.

25. Uluguru North-South (Type E, Maps 19; 20)

Description

The Uluguru Mountains are one of the blocks within the Eastern Arc range, and consistently rank in the top three of the blocks in terms of overall species values; many species are endemic just to this area. Forest habitat on the Uluguru Mountain range has been reduced from over 300 km² to around 220 km² over the past 50 years, and is now largely confined to a number of Forest Reserves – the two largest being Uluguru North Forest Reserve (83.57 km²) and Uluguru South (172.93 km²) – both of which contain significant biodiversity. The Uluguru Mountains are also of critical importance for the provision of water to the Ruvu River, especially during the dry season. Water flows from the Ruvu have been declining over the past 50 years and hence better protection for the remaining forests in the watershed of this river might help reverse this situation and thereby improve the situation for millions of people in Dar es Salaam.

Wildlife

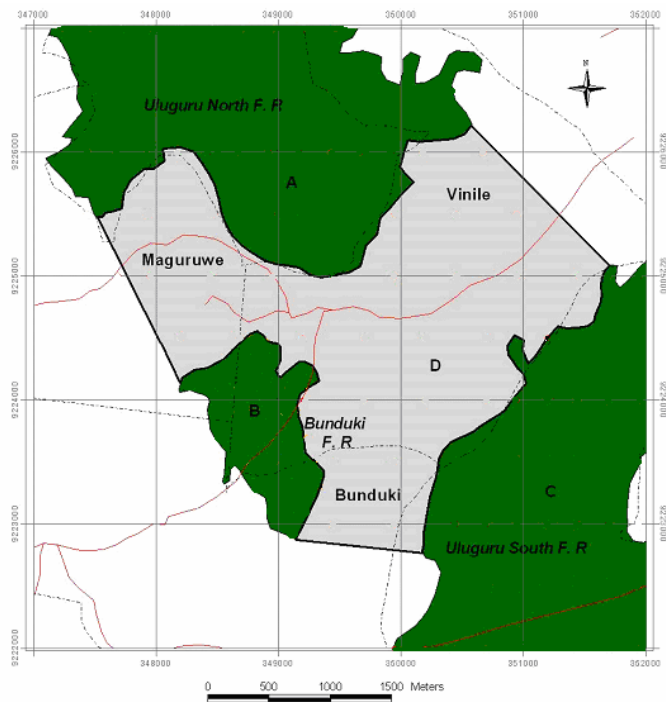
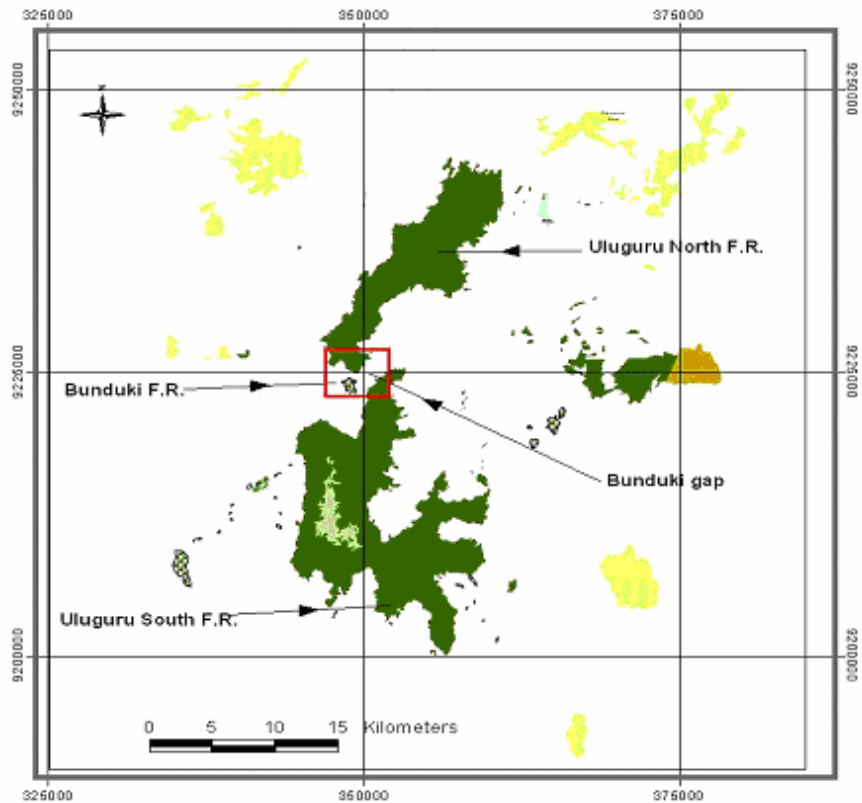
Extensive long term research in this area has identified more than 135 endemic species of plants, two endemic species of birds (Uluguru bush shrike - *Malaconotus alius* and Loveridges sunbird - *Nectarinia loveridgei*), six endemic species of amphibians (*Hyperolius tornieri*, *Nectophrynoides laevis*, *Nectophrynoides cryptus*, *Nectophrynoides pseudotornieri*, *Scolecormorphus uluguruensis*, *Probreviceps uluguruensis*), two endemic species of reptiles (*Typhlops uluguruensis*, *Xyeledontophis uluguruensis*) and one endemic small mammal (*Myosorex geata*). Forty four Eastern Arc endemic vertebrates are also found in the Uluguru Mountains. Some species are confined to only one or other of these reserves. Many of these species are regarded as threatened with extinction.

The two dense forest endemic birds of the Ulugurus have been studied to a significant degree in recent years. A census of the Uluguru Bush Shrike in year 2000 indicated there were at least 1,200 pairs of this bird, mainly in Uluguru North Forest Reserve, with some in the degraded public land forest outside the reserve. A further survey in 2006 showed that the bird also occurs on the eastern flanks of the Uluguru South Forest Reserve, and hence the Bunduki gap is a real conservation issue for the long term survival of this forest dwelling bird. Loveridge's sunbird is another endemic bird of the Uluguru Mountains, where it is known from Uluguru North, Uluguru South and Bunduki Forest Reserves. A census in year 2000 indicated a population range between 21,000 and 166,000 individuals (with a median estimate of 37,000 individuals). As the species is found in all three of the higher altitude reserves on the Ulugurus, then maintaining forest connection between them is important.

Threats

Continued cutting of the forest and village expansion severely threaten this area. In 1955 the Uluguru North and South reserves were joined by natural forest across the Bunduki Gap. Over the past 50 years this forest has been cleared back to the reserve boundaries, creating a deforested gap of farmland. A new Nature Reserve has been proposed that includes the Uluguru North, Uluguru South, Bunduki FRs and a strip of land in the Bunduki corridor (106.5 ha) that joins the three reserves. The total area of the proposed Nature Reserve is 24,115.09 ha. This Nature Reserve, if formally gazetted, would allow the forest vegetation of the Bunduki Gap to regenerate and re-establish the connection between the forests of the three reserves in the area.

Maps 19; 20. The Bunduki Corridor, Uluguru Mountains



Legend

-  Roads network
-  Forest cover
-  Bunduki Gap
-  Villages boundary

26. Usambaras, East (Derema) (Type E, Map 21)

Description

The Derema corridor links the Amani Nature Reserve in the East Usambara Mountains with the Kambai FR to the north, and hence helps maintain the connectivity of the East Usambara forests. The Derema corridor is 960 hectares in extent and is almost all forested, 60% on steep hills and the rest in lowland slopes below 850m altitude. Together Derema and the Kambai FR further north adds more than 2,000 ha to the Amani Nature Reserve, and there are programmes on the ground trying to link the lowland reserves to the Nilo Nature Reserve (2007) further north again. If successful, this would ensure the connectivity of the largest of the southern and northern forest areas in the East Usambara Mountains. The conservation of the Derema corridor is, thus, essential if these areas are to remain connected and to prevent the loss of species due to fragmentation, isolation and habitat area reduction.

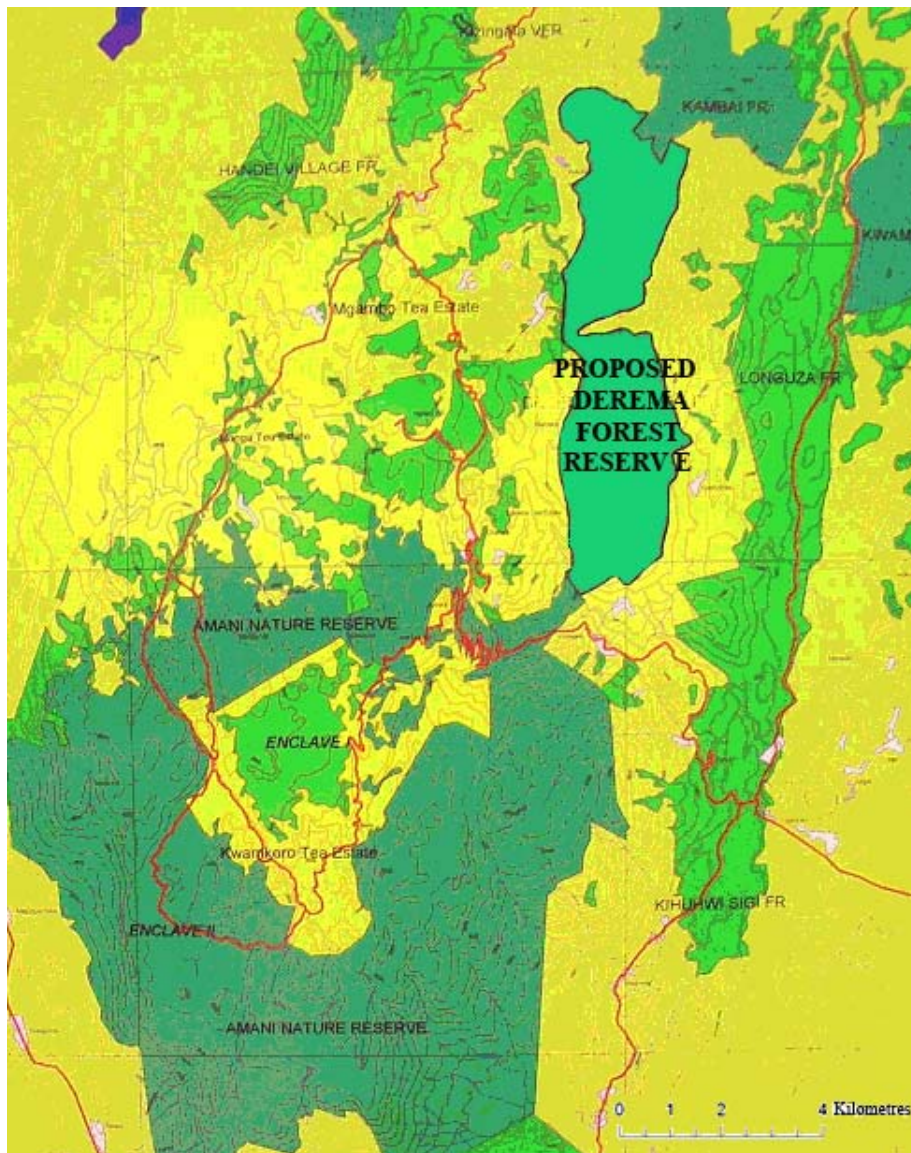
Wildlife

The Eastern Arc chain of mountains contains extraordinarily high biodiversity with more than 100 endemic amphibians, reptiles, mammal and birds, and perhaps as many as 1,500 endemic plants. The East Usambara Mountains are on block within the Eastern Arc and are of exceptional importance for the conservation of biological diversity, generally ranked among the top 5 forest sites on the African continent in terms their biological values. More than 100 species of plants and animals are endemic to the 413 km² of remaining forests in the East Usambaras. In the vertebrates 78 endemic and near-endemic species are present. The Amani Nature Reserve and the Nilo Forest Reserve have been demonstrated as having the highest biodiversity values within the East Usambaras, but all the remaining forests are extremely as rare and endemic species are found at all altitudes. The Derema corridor area of forest has not been surveyed in detail for its biodiversity values, but is likely to possess many of the East Usambara endemic species as it ranges in altitude from lowland (c.300 m) to sub-montane (around 1,000 m).

Threats

Five villages, Kisiwani, Msasa IBC, Kwezitu, Kwemdimu and Kambai, lie around the edges of the Derema corridor and in 2002 there was 1,567 farmers with cardamom plantations within the Derema forest. Villages have also used the land within the forest for cultivation of black pepper and banana, and they extracted firewood and non-timber forest products. Actions by the Forestry and Beekeeping Division (FBD) stopped cultivation within the Derema forest in 2002 and a process of compensation and provision of alternative livelihoods and farmland has been going on ever since. More than \$2.5 million has been paid to the affected farmers over the past 5 years, from the Tanzanian Government, Finnish Government, Global Conservation Fund and the World Bank. This process is being concluded in 2008 – and farmers are being assisted with income generating projects and alterantive farming land on the Misozwe Sisal Estate in the lowlands. The final gazettment process will lead to the Derema forest becoming either a separate Forest Reserve, or a part of the Amani Nature Reserve. This has still to be concluded.

Map 21. The Derema Corridor, East Usambara Mountains



27. Usambaras, West (Type E, Map 22)

Description

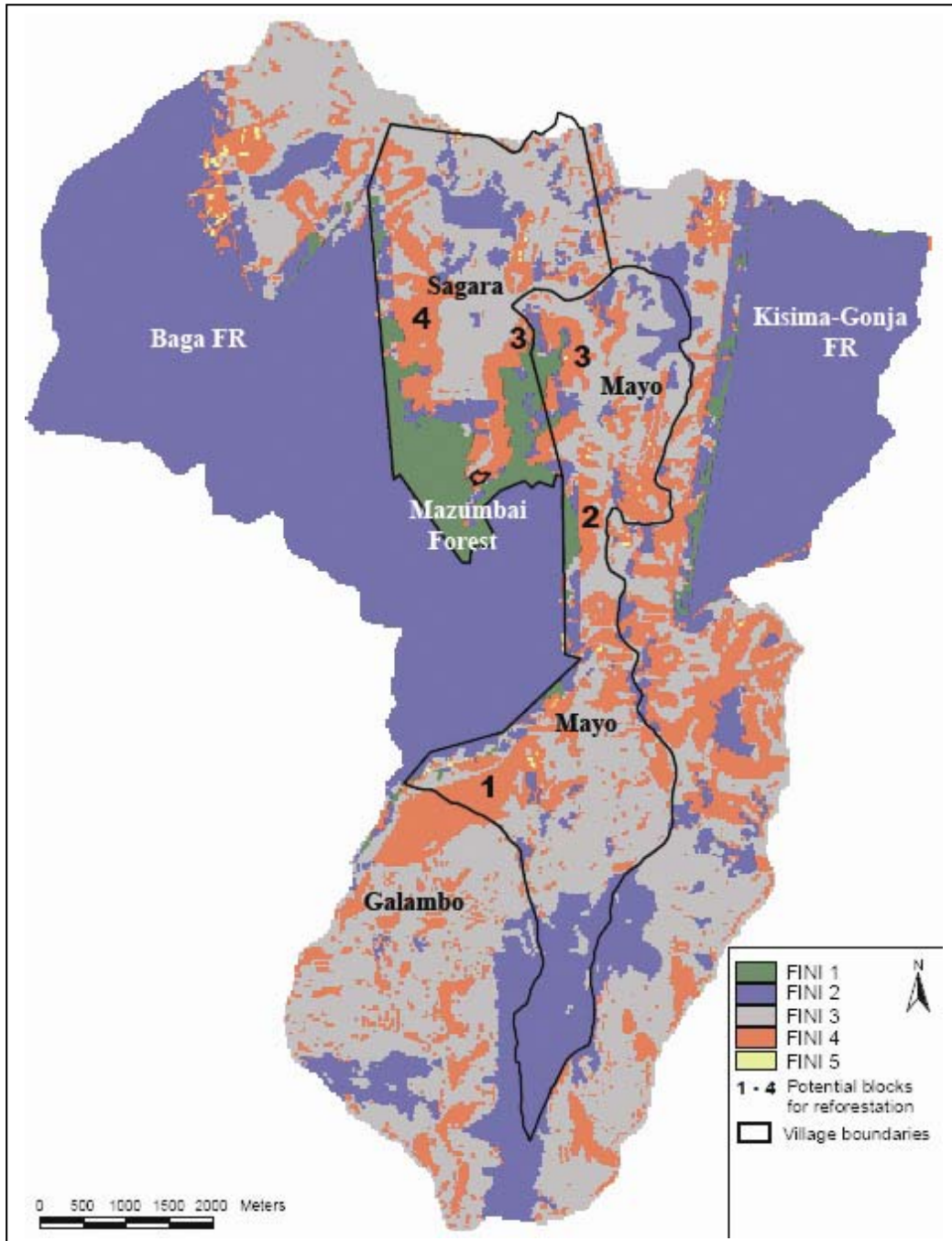
The West Usambaras (2,200 km²) is one of the most important mountain ranges in the highly species-diverse Eastern Arc Mountains. Only 13% of the land area remains forested and this forest is highly fragmented owing to severe logging. Two FRs in this area, the Baga FR and the adjacent Mazumbai Forest lie only 2-3 kms from the Kisima-Gonja FR. They are separated by the Mkolo River catchment with Sagera and Mayo village boundaries that lie in between them. Increased connectivity of forest patches would greatly enhance sustainability of the ecological services and biodiversity values of this landscape. A study by J.J. Halperin developed a number of potential forest restoration scenarios, taking into account data on ecological potential, environmental need, and social acceptability of different interventions among communities.

Wildlife

Home to many endemic African violets and 10 new species of lichen, and 29% of tree species are endemic. There is great endemism of amphibians and reptiles, 8 out of 15, and 14 out of 37 species respectively. Of 81 bird species, 5 have very restricted ranges and 1 or 2 strictly endemic. One species of hyrax is believed to be endemic. Many of the larger mammals have been hunted out of the West Usambaras, leaving only squirrel species, black and white colobus (*Colobus guereza*), Sykes monkeys (*Cercopithecus mitis*), and very few duikers.

Threats

Small scale subsistence agriculture converting forest to maize, beans, cassava and banana fields and cash crops for local towns. The increased area of forest edge resulting from fragmentation of forest also introduces pathways for invasion of exotic species which may reduce indigenous plant diversity. The invasive exotic *Lantana sp.* is frequently seen along forest patch edges in the West Usambaras. Trial areas for community forest development exist within the watershed, and people's attitudes to reforestation is positive as indicated by questionnaires, but these areas are mostly for fast growing exotics.



Map 22. An example Forest Restoration Scenario for the West Usambara Mountains (modified from Halperin, 2002, p. 74). FINI area rankings reflect a ‘Forestry Intervention Need Index’ (1 = lowest need, 5 = highest need) which was derived from assessments of ecological potential, environmental need and social acceptability of forestry intervention in each area. For more details and discussion, refer to Halperin (2002).

28. Wami Mbiki-Handeni (Southern Masai Steppe) (Type A, Map 23)

Description

The area north of Wami Mbiki between Turiani and Handeni is still relatively forested, although logging in the area has increased dramatically in the past few years. There is one gravel road dividing the area and connecting Handeni and Turiani with a bus route, this road still has a stretch of several kilometres where the forest is intact.

Wildlife

Elephants and buffalo movements are thought to occur between the Wami Mbiki and southern Masai Steppe. It is uncertain whether they move east or further north from here. Other animals such as sable antelope which are only found north of the Wami River could use the corridor to the north as well. More studies are needed to confirm possible movement.

Threats

The corridor area is not under immediate threat, but villages from the east and west are increasingly removing patches of formerly untouched forest. Illegal hunting is also widely occurring in that area.

29. Wami Mbiki-Jukumu/Gonabi /Northern Selous (Type A, Map 23)

Description

Again a major highway intersecting a possible corridor. Interviews with local people in the villages south of Wami Mbiki close to the Morogoro road support the notion that elephants and buffalo move between these areas. A possible crossing might be nearby Mwidu village. However, droppings, broken trees or other signs are never seen when travelling on the highway. The areas on both sides of the highway are well forested with Ngerengere being the only larger village before reaching Ruvu river north of the Selous.

Wildlife

Interviews with local people in the area indicate that it is possible that buffalo, greater kudu, hartebeest, waterbuck and wild dog are crossing near Mwidu. Last crossings observed by the locals were in the rainy seasons of 2006 and 2007.

Threats

Hunting south of the Morogoro Road is substantial. This might prevent wildlife from moving through the possible corridor. Increasing human population, settlements and traffic along the Morogoro Road and especially around Mwidu could cause this possible corridor to close.

30. Wami Mbiki-Mikumi (Type E, Map 23)

Description

Wami Mbiki and Mikumi NP are relatively close to each other, approximately 100 km apart. Wildebeest are reported to have moved between Mikumi and Wami back in the 1980s, until sugar cane production and human settlements cut off this migratory route. The Morogoro-Dodoma Highway is intersecting this route, as are numerous small settlements.

Wildlife

Although still possible, there is presently no documentation supporting wildlife moving due west of Wami Mbiki. There are signs of elephant and buffalo moving in this direction from Mikumi NP, with elephants raiding small farms. Moreover there is potential for animal movement along the right/east side of the Mkata river. Use of the Mkata River, either in the riverbed itself or along its banks, is a good way for animals to travel with plenty of cover.

Threats

The 600,000 ha Mkata Ranch situated at the Mikumi end of the Mikumi-Wami corridor is owned by the government but has recently been subdivided and leased to locals to farm cattle. One of the conditions is that the locals fence their land (using poles and wire); this will impede large mammal movement. However only the western side of the Mkata Ranch is leased (on the western side of the Mkata river) and the east side, while still being a government owned cattle ranch, is not fenced and is open for movement of animals. The WMA to the east of the ranch and north east of MNP may still be a viable route for animals to move between the north east section of the park, the WMA, and the Wami WMA, but nearby villages and a highway may mean that the area is easily accessed by people.

31. Wami Mbiki-Sadaani (Type A, Map 23)

Description

Wami Mbiki WMA is situated 150 km due west of Dar es Salaam north of the Dar es Salaam-Morogoro highway in Morogoro and Coast Regions. The WMA is a watershed for the Wami River, which runs from west to east through the northern third of the area, joined by many minor and seasonal rivers, including the Lukigula River from the north and the Ngerengere River that makes up the southern boundary. The area is interspersed with rocky hillsides of thin soil cover and valleys with deep clay or alluvial soils, altitudes vary between 350 and 400 m with some high spots of 500 m. The primary vegetation type inside the WMA is woodland. Wami Mbiki is less than 100 km from Sadani NP and Mikumi NP respectively. The area west of Wami Mbiki is intersected by the Chalinze-Arusha Highway and numerous villages and settlements along the highway. The number of settlements away from the highway is not known but it is thought that those settlements are mostly small and scattered.

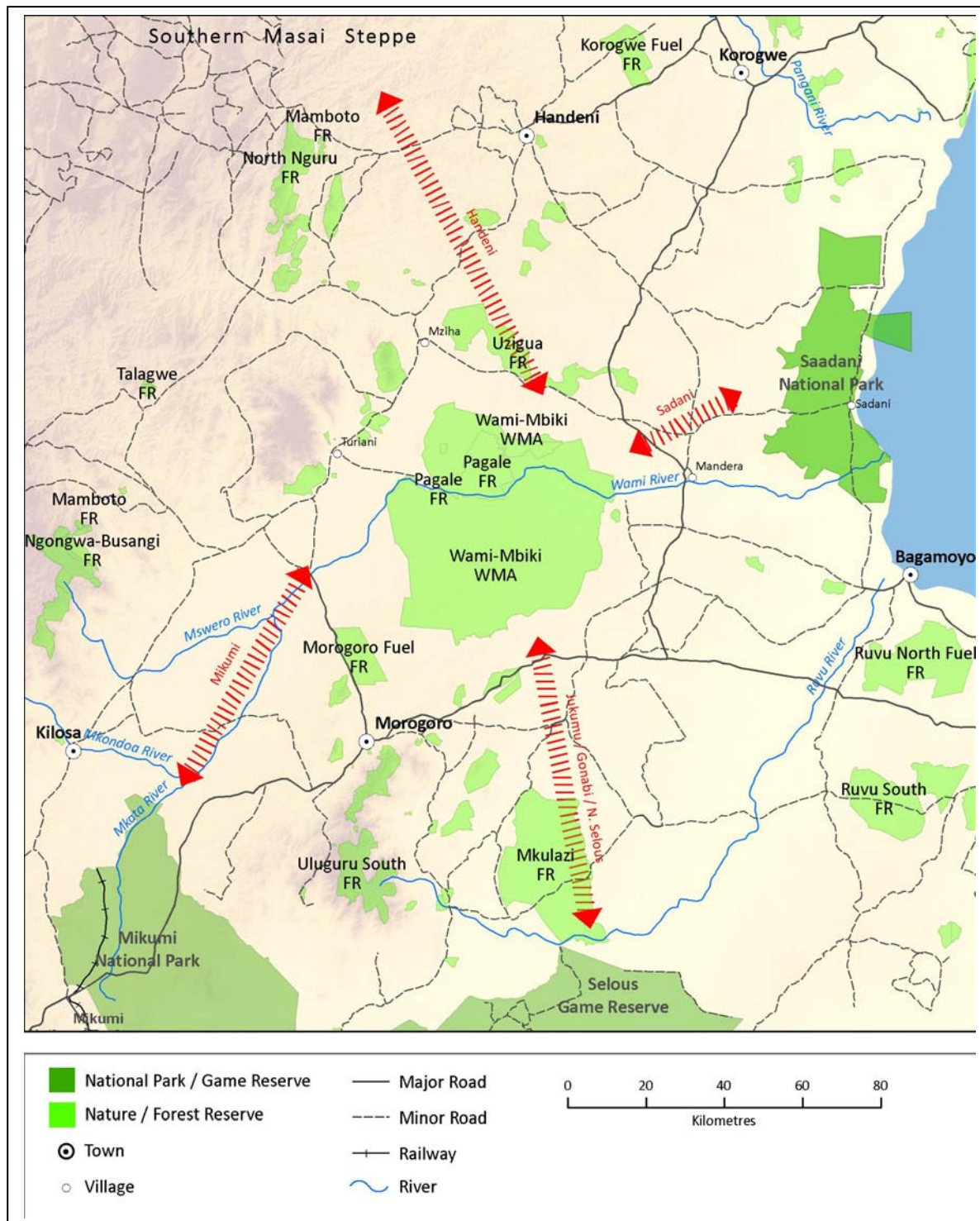
Wildlife

It is thought, although not fully documented that elephants and buffalo move between Wami Mbiki and Sadani. Recent interviews held in the villages at the north-eastern side of Wami support sightings of elephants and buffaloes using this corridor. The animals are supposed to migrate in the rainy season. Presently, little documentation is available on migratory routes and all corridor information requires further investigation.

Threats

The corridor is under increasing pressure due to human settlements, timber exploitation and charcoal burning. Wildlife moving between Sadani and Wami Mbiki, however, would be forced to cross the Chalinze-Arusha highway. Given increasing human development, it is unlikely that this corridor can be sustained for very long.

Map 23. The Wami-Mbiki to Selous/Mikumi/Handeni/Saadani corridors



Conclusions

This compilation of all the major wildlife corridors in Tanzania highlights three distinct issues. First, the concept of a wildlife corridor differs greatly between different people, even between different stakeholders discussing the same linkage between two protected areas. Most corridors in Tanzania are either in the category of known animal movement routes between two protected areas (type D) or are proposed connections of important habitats (type E); the latter being dominated by proposals in the Eastern Arc chain of mountains, and the Southern Highlands. Second, the vast majority of the documented corridors in the country are in poor condition, and many critically so. This means that they may have less than 5 years remaining (up to the year 2013) before they disappear, judging on current rates of habitat change. Five corridors are in an extreme condition and will disappear within an estimated 2 years unless immediate action is taken. These are the Loazi-Lwafi corridor, the Ngorongoro-Manyara corridor, the Udzungwa-Selous corridor(s), the Wami Mbiki-Mikumi corridor, and the Wami Mbiki-Saadani corridor. Third, most corridors are being destroyed by rapid agricultural expansion, increased bushmeat trade and the building of roads. Unless action is taken in specific areas to manage these activities in a way that considers both human and wildlife needs, human-wildlife conflict will increase and Tanzania's protected areas will become ecologically isolated islands, leading to inevitable decline of animal and plant populations to decline. This will have serious economic and environmental implications for the next generation of Tanzanians.

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