

Sacred Kaya forest Ecosystem Biodiversity management project

Joyce M Jefwa, Esther Kioko, Emma Mbua, John Musina, John Kochev, Beryl Akoth.

Joint Conference and Workshops
The Role of Falconers and Local Communities in Conservation and Sustainability

24th – 26th June 2023
Cape Town South Africa



IUCN CEM-SUME



OUTLINE

- Historical Perspectives of the Kayas
- The Biodiversity of Kaya Kauma
- Threats to Kaya Forests
- Culture and Biodiversity Research
- Conservation and Management Interventions

Coastal Kenya Region

Diverse ecosystems encompassing both marine and terrestrial environments



Coastal region modern urban cities



Ancient Cities now ruins



12th Century city and 45 acres Gede, Mnarani and Jumba Ruins



Biodiversity Hotspots

- The East African Coastal forests are global Biodiversity hotspots
- In Kenya, the sacred Mijikenda kaya forests are unique fragments preserved by cultural beliefs
- The forest sites spread over some 200 km along the coast containing the remains of fortified villages,
- The kayas, created in the 16th century were abandoned by the 1940s
- Approximately 52 out of which are nine primary Kayas forests
- They are maintained by councils of elders (UNESCO, 2020).
- Among them are eight UNESCO Heritage sites



Sacred Forests cultural landscape



Cultural Items associated with Indigenous Community

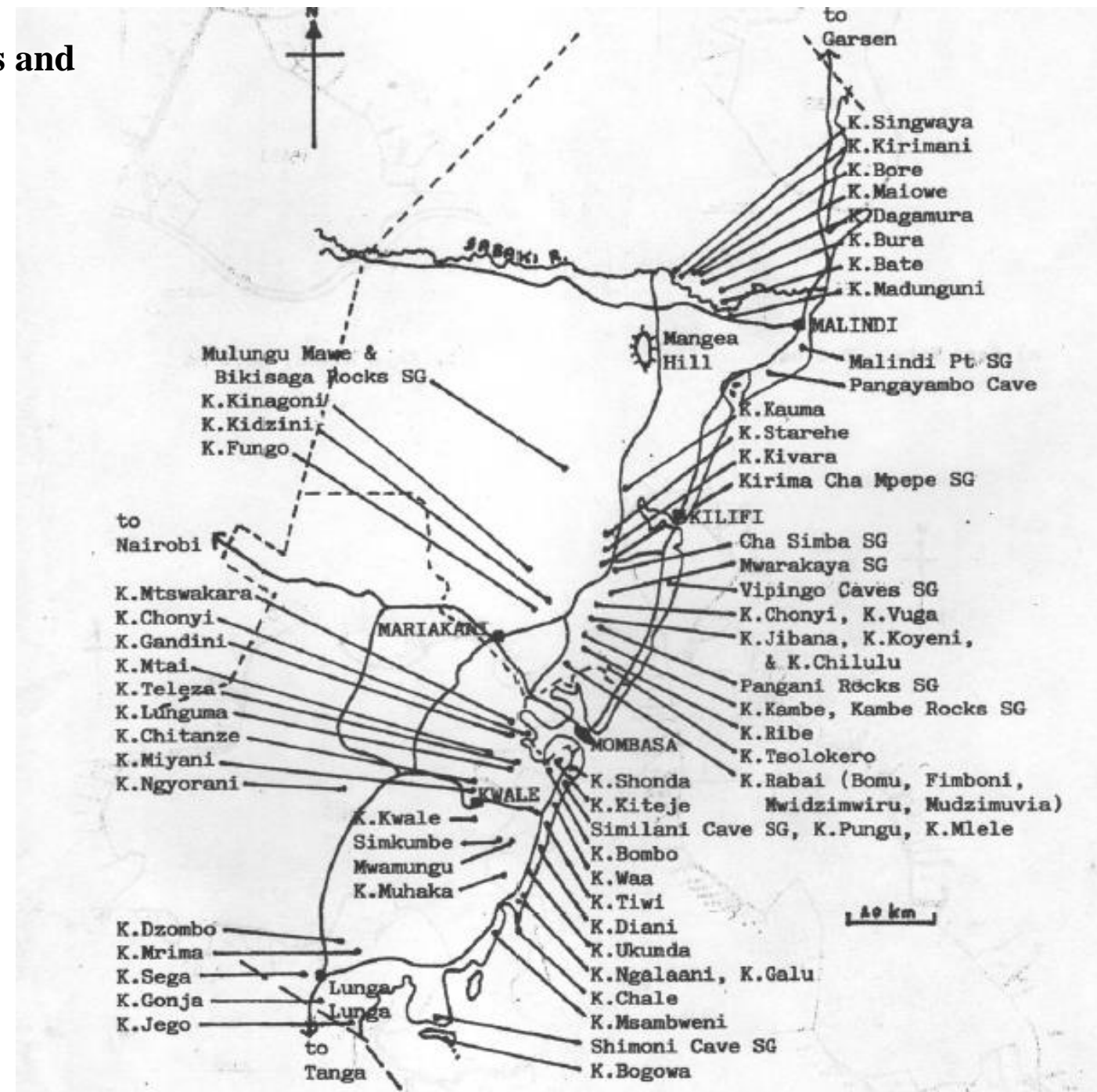
A SOCIO-HISTORICAL PERSPECTIVE OF THE ART AND MATERIAL CULTURE OF THE MIJKENDA OF KENYA by Elizabeth C. Orchardson V o T (144 pages). Ph. D. School of Oriental and African Studies University of London 1986



A region of rich Indigenous cultures and belief systems

Robertson and Luke, 1993

Kaya sacred forests fragments and grooves are part of the larger Zanzibar - Inhambane Phytochoria (which encompasses the Miombo woodlands) disjointed by settlements and farmlands stretching over a 200 Km stretch along the Coastline of Kenya.



Cultural perspective and rulership of Kayas

- Governed by Council of Elders
- Mijikenda community had a male dominated government based on age-sets.
- Age-set was a basis of political organization, and was important for transmission of historical past and customs.
- The rulership controlled wealth, the judiciary process, trade, foreign relations, warfare and regulated movement of people
- Traditional belief systems regulated the use of biodiversity and other natural resources
- Since the dispersion of the communities in early 19th Century, the system collapsed

Man and Environments

- Man as part of Biodiversity
- Interacts with other organisms and the Abiotic Environments
- Pre-Historically Man lived Harmoniously with the Environment
- Man is more advanced than other biodiversity
- Transformed Ecosystems for Food, Health and Leisure
- Harmony in Ecosystems has been disrupted to benefit Man
 - Domestication period
 - Cultivation Period
 - Biotechnological Era
 - Resulting to massive degradation

Degraded landscapes in Coastal Kenya – forests cleared for cultivation



Riparian Ecosystems characterized by sand harvesting and drying riverbeds



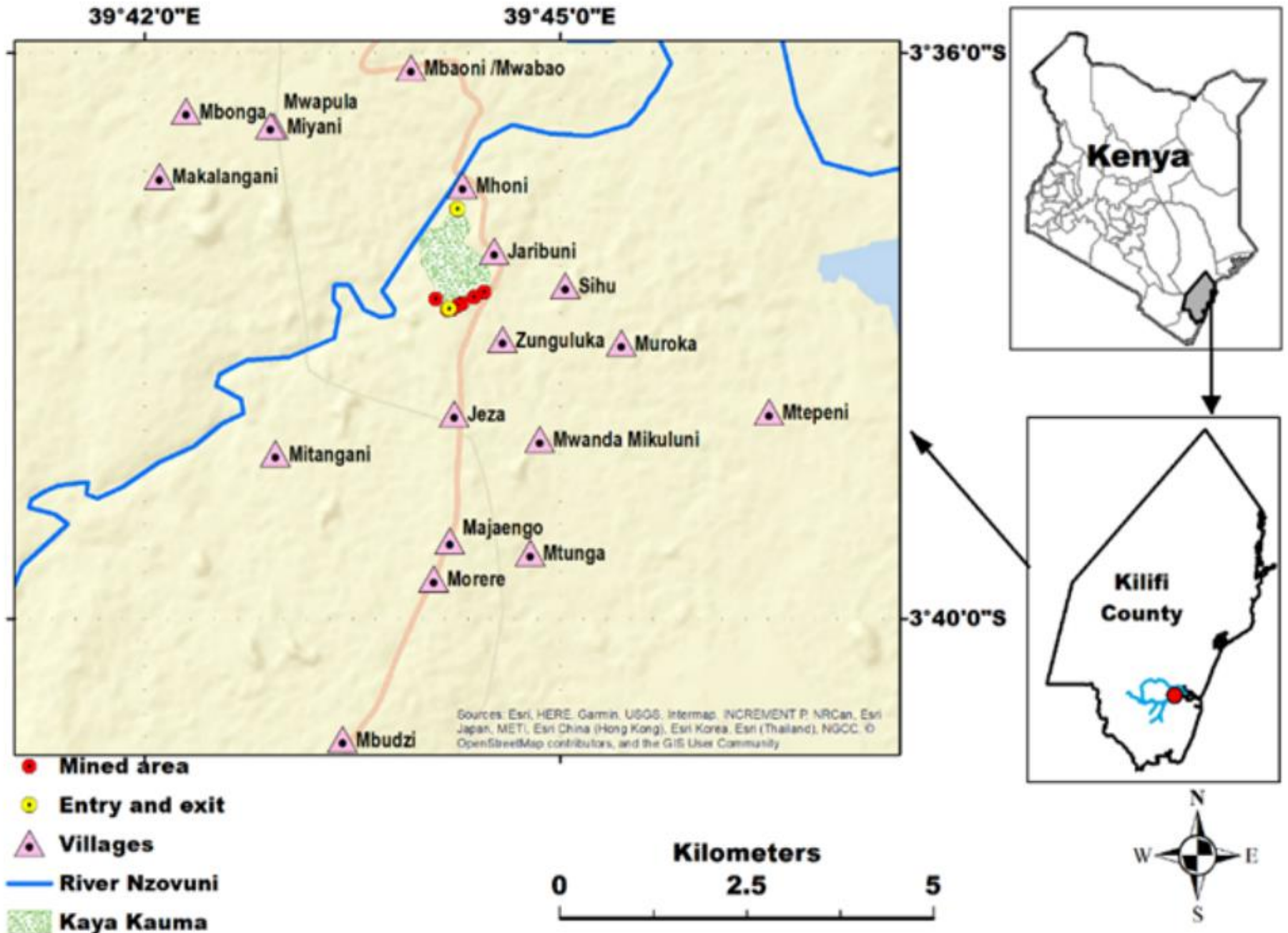
Kaya Kauma forest: UNESCO Heritage site

Size is 75-100 ha ,
Dry deciduous woodland vegetation type.

Forest slopes down the north to “Ndzovuni” river which flows into the Kilifi creek at “Mtsanganyiko”.

Once a water catchment area supplying Kilifi town.

Iron-rich soil and rich in iron-ore deposit.



Kaya Kauma and adjacent landscape

Role played by Traditional beliefs in the conservation of Kaya Kauma sacred forest.

A contrast in Kuama landscape

Highly eroded adjacent scrubland occasionally with patches of *Brachystegia* and *Afzelia*.

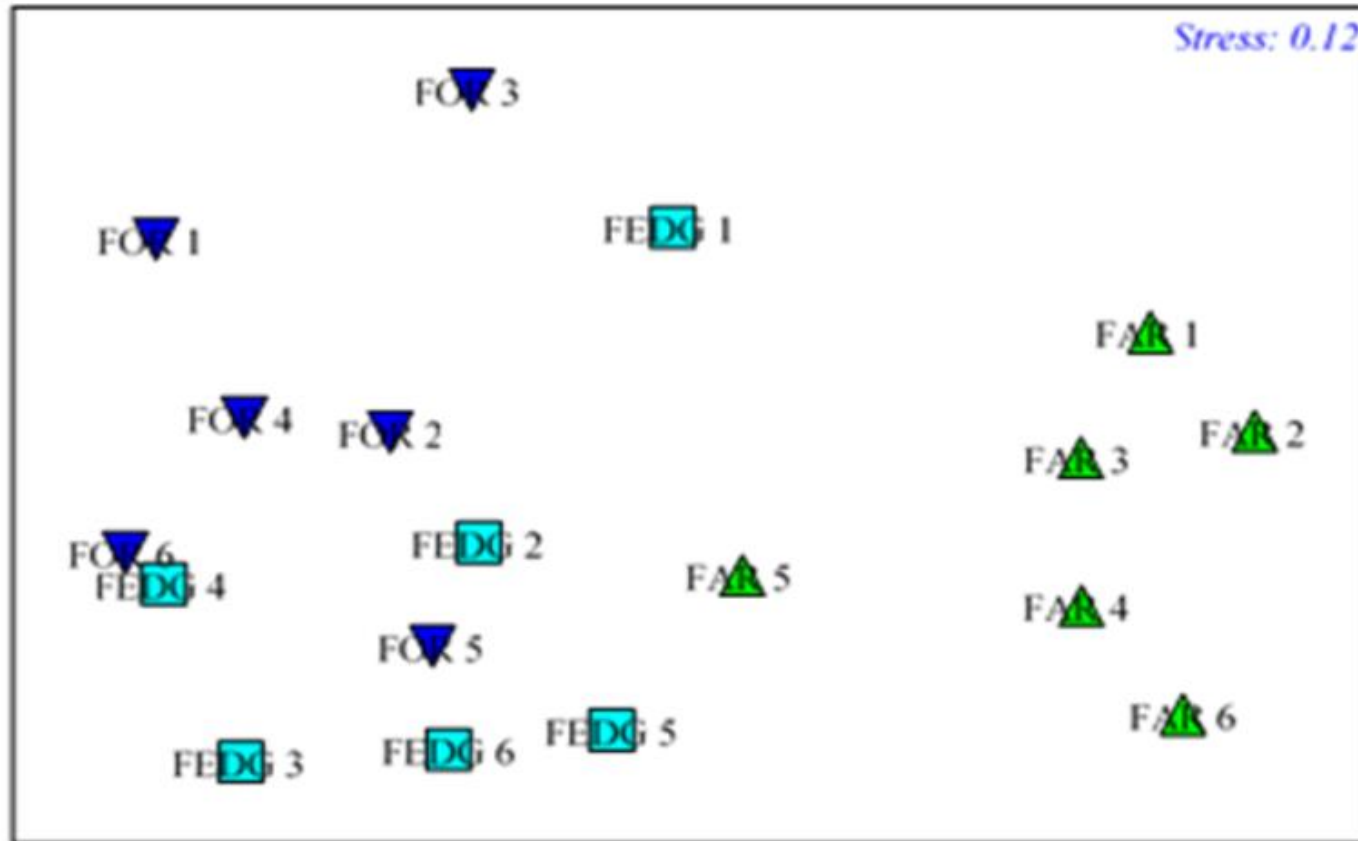


Features of Landscape of Kaya Kauma Area



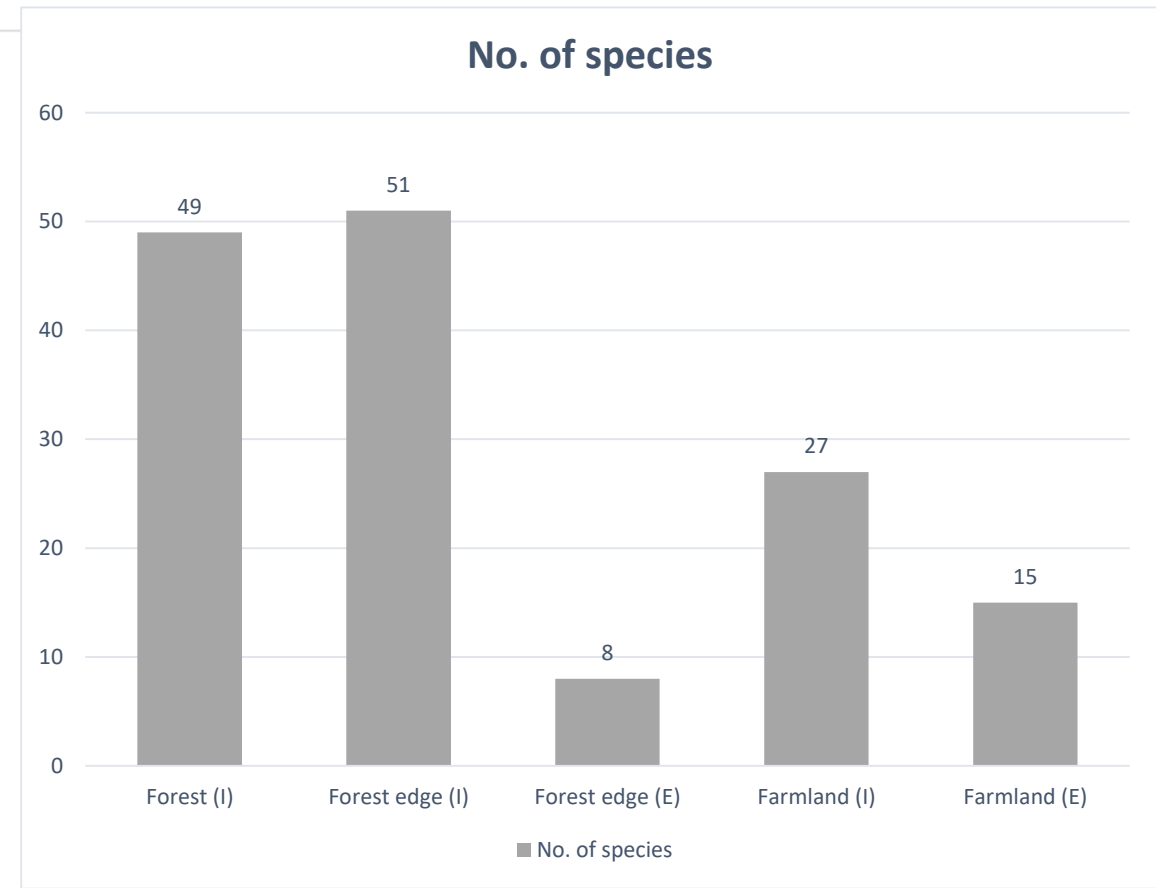
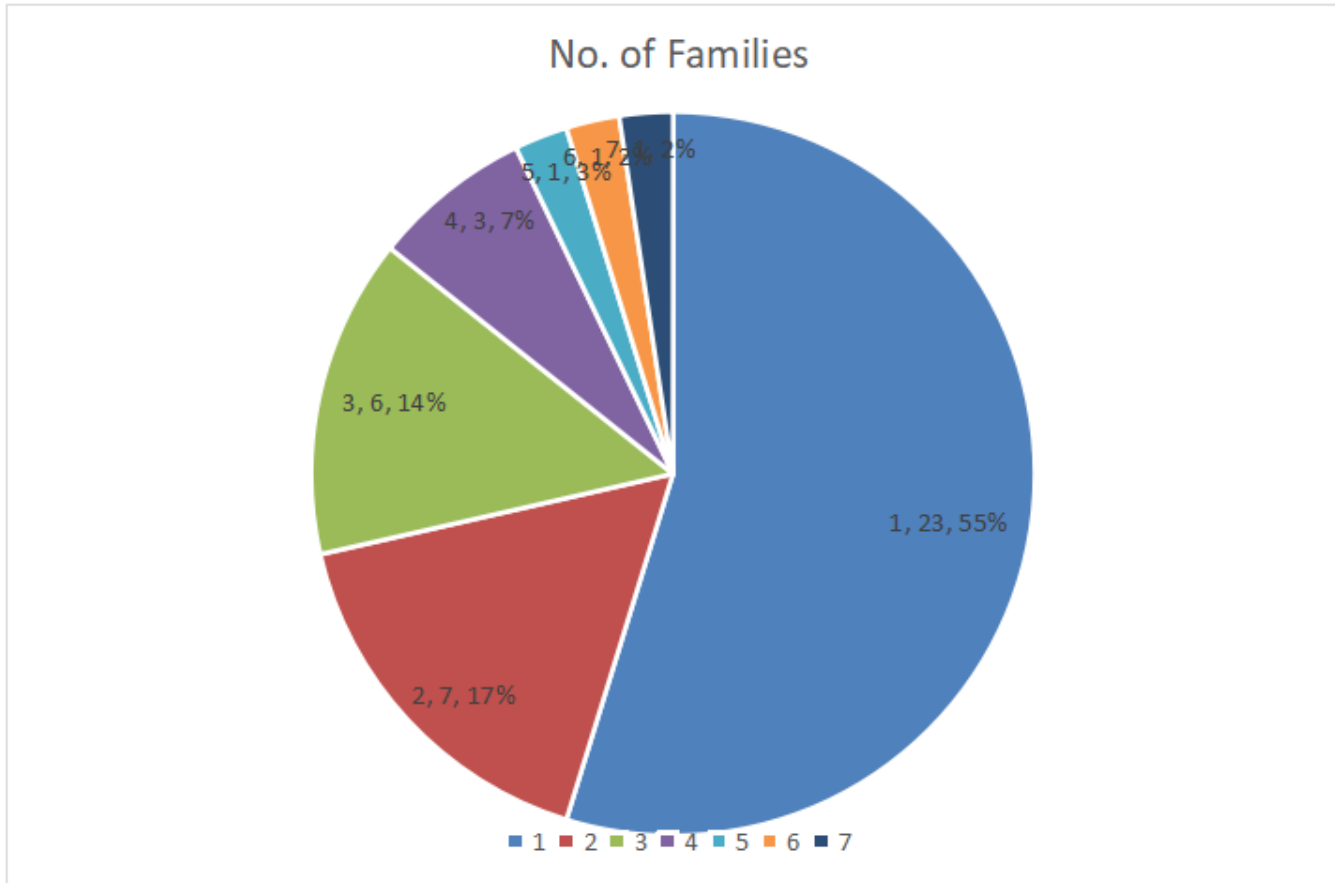
Plant communities of Kaya Kauma forest

NMK Team on Flora: Joyce Jefwa,
Lawrence Chiro, Josephine Kyaa,
Mercy Korir, Deche Mwamuye and
Reheha Hassan



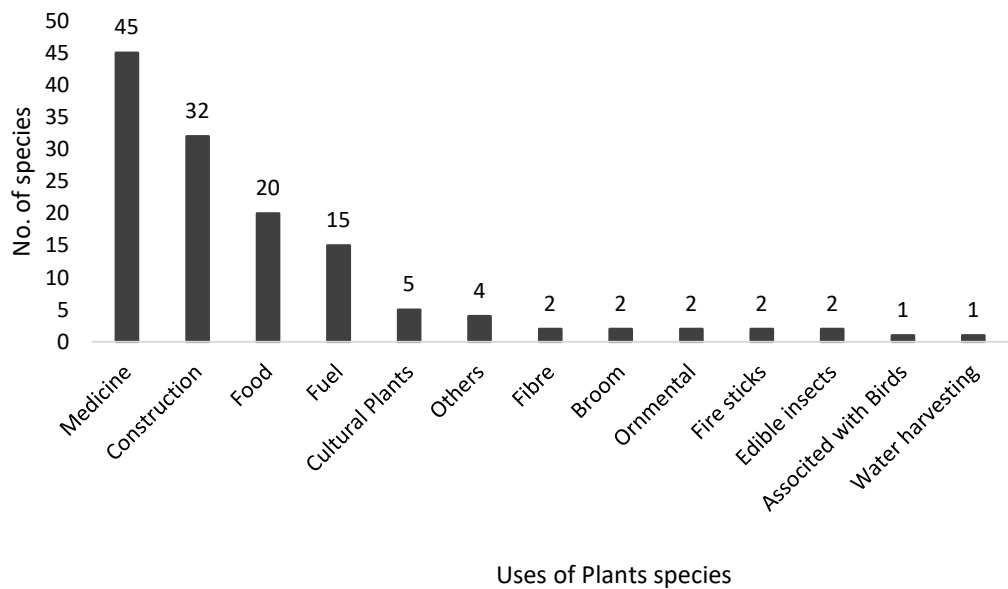
Plant assemblages in Kaya Kauma forest, forest edge and the farmlands

Characteristics of the Flora of Kaya Kauma

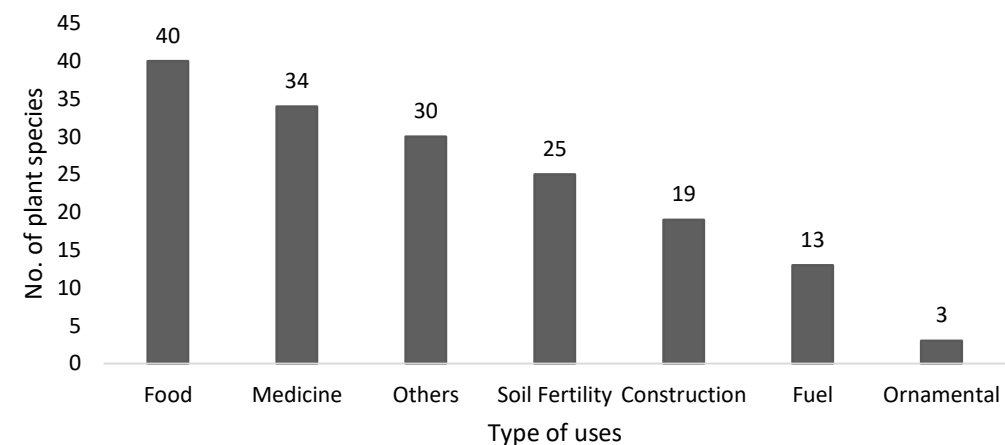


93 plant species in 42 Families. Previous surveys by Roberston, documented 51 species, 1993, and Jolly Rajat, documented 49 species, 2021

Useful plants Identified by Elders

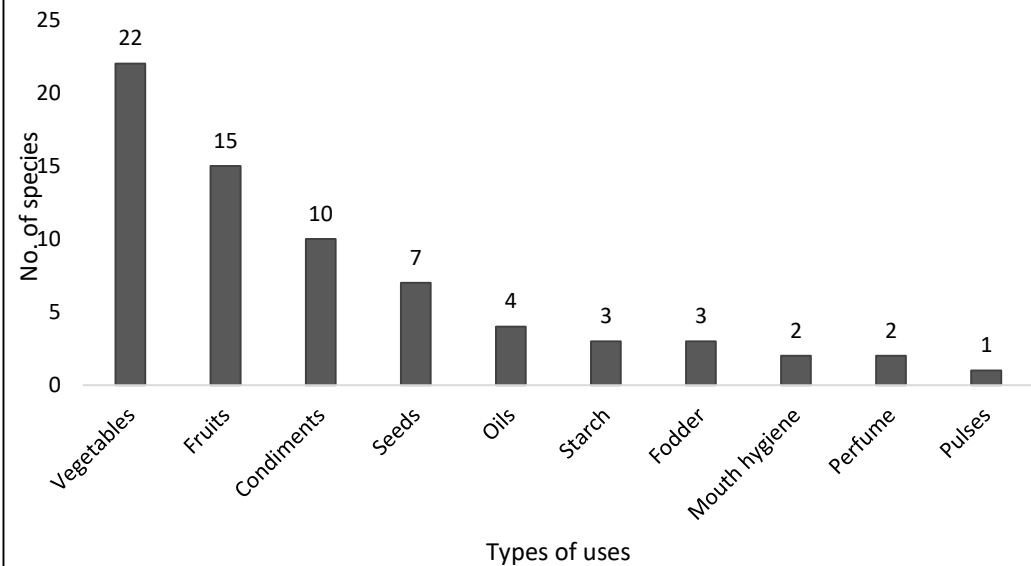


Useful Plants on-Farm



Kaya Kauma harbours economically food additives, gums and resins, dyes, essential oils, and ecologically important plants as insect repellent. Some of the important plants have been left on farmlands indicating the importance of these species to the community.

The types of Food plants on-farm





Traditional fishing basket trap



Wooden trap for small mammals



Wooden cooking stick, whipping stick and wooden bowl



Mortar and pestle

Household forest products and extent of use

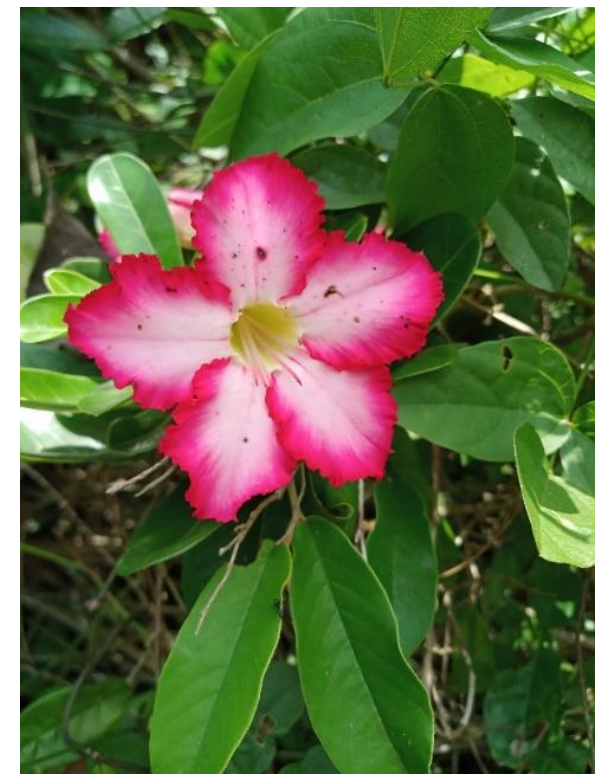
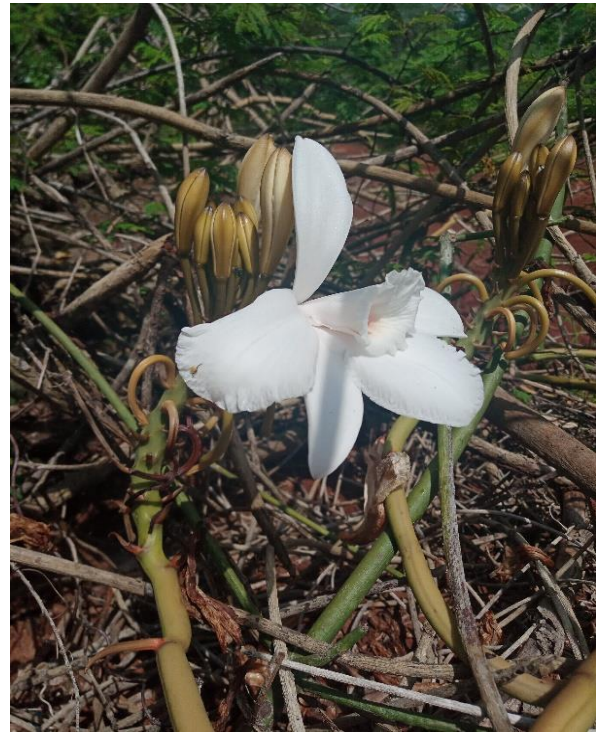
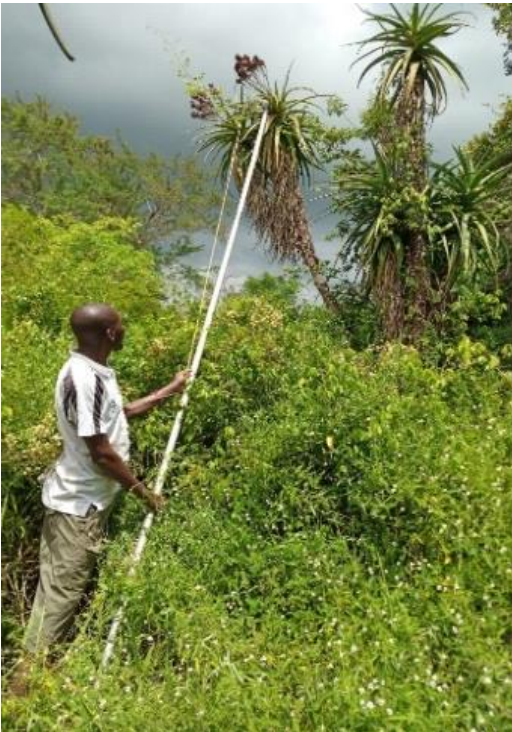
	Product	Local name	When used
1	Mortar & pestle	Kinu & mchi	Daily
2	Wooden Chair with back support	Chihi	Daily
3	Wooden cooking sticks (stirring & whipping)	Mwika & Mfidzo,	Daily
4	Informal sitting benches	Magogo	Daily
5	Wooden Fishing traps		Occasional
6	Wooden building poles	Fiho	Occasional
7	Hives for honey	Mzinga	Occasional
8	Firewood	Kuni	Daily
9	Sleeping mats	Mkeka	Daily
10	Baskets	Chikahana	Daily
11	Charcoal	Makala	Daily
12	Musical instruments (Kayamba, drums)	Kayamba, & ngoma	Occasional
13	Wooden traps for small mammals	Sanduku	Daily

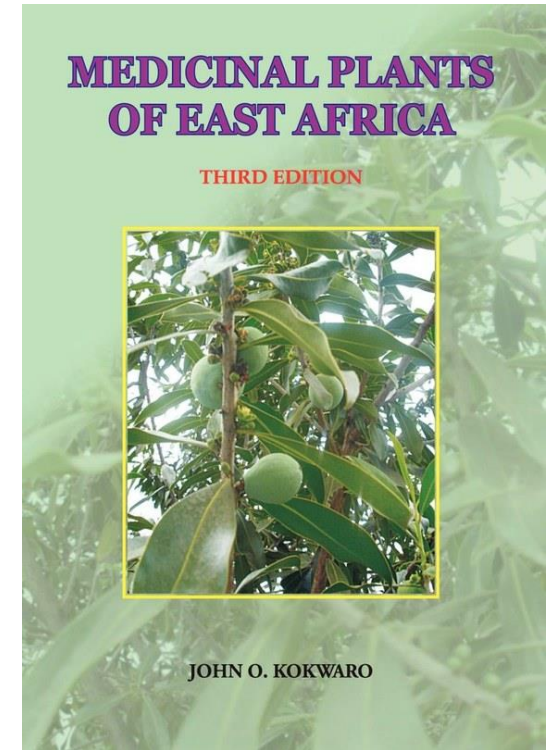
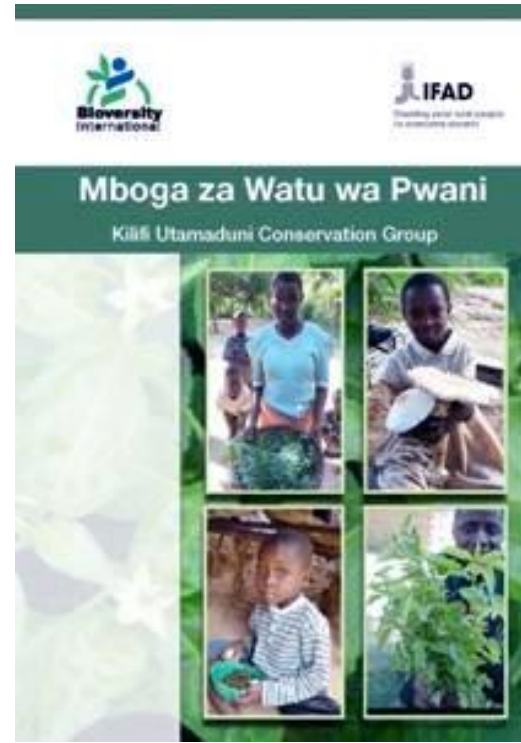
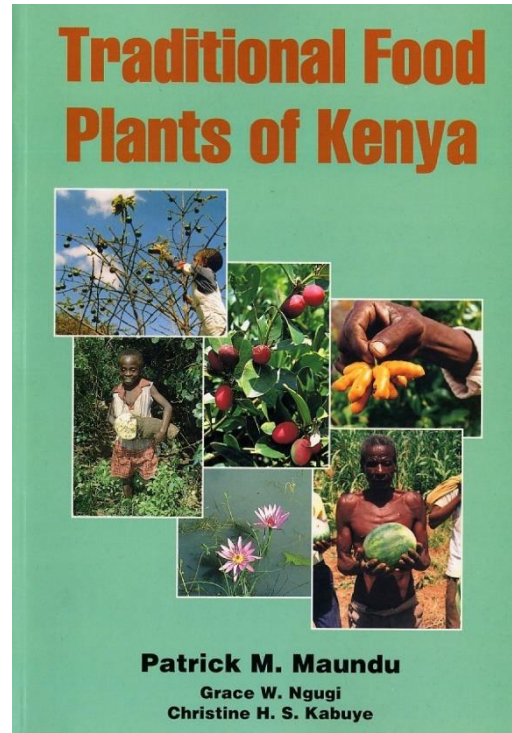
PLANT SPECIES	FAMILY	HABIT	STATUS
<i>Aloe kilifiensis</i> Christian	Asphodelaceae	Tree	Endangered
<i>Asteranthe asterias</i> (S.Moore)Engl\$ Diels	Annonaceae	Tree	Near threatened
<i>Uvariadendron kirkii</i> Verdc.	Annonaceae	Tree	Vulnerable
<i>Buxus obtusifolia</i> (Mildbr.)Hutch.	Buxaceae	Shrub	Vulnerable
<i>Azelia quanzensis</i> Welw.	Fabaceae	Tree	Vulnerable
<i>Dalbergia vacciniifolia</i> Vatke	Fabaceae	Shrub	Vulnerable
<i>Cynometra webberi</i> Baker f.	Fabaceae	Tree	Vulnerable
<i>Erythrina sacleuxi</i> Lam. ExDC	Fabaceae	Tree	Near threatened
<i>Memecylon fragrans</i> A.Fern. & R.Fern	Melastomataceae	Shrub	Vulnerable
<i>Ozoroa obovata</i> (Oliv)R\$ AFernandes	Moraceae	Tree	Near endemic
<i>Toddaliopsis sansibarensis</i> (Engl.) Engl.	Rutaceae	Tree	Vulnerable
<i>Vitellariopsis kirkii</i> (Baker) Dubard	Sapotaceae	Shrub	Vulnerable
<i>Encerphalartos hilderbrandtii</i> A.Braun & Bouché	Zamiaceae	Tree	Near threatened

IUCN RED LISTED SPECIES

Near Threatened Plants (4): *Lanea schweinfurthii*, *Pupalia lappacea*; *Brachylaena huillensis* and *Sterculia africana*; Vulnerable (5): *Cynometra suaheliensis*, *C. webberi*, *Gyrocarpus americanus*, *Euphorbia nyikae*

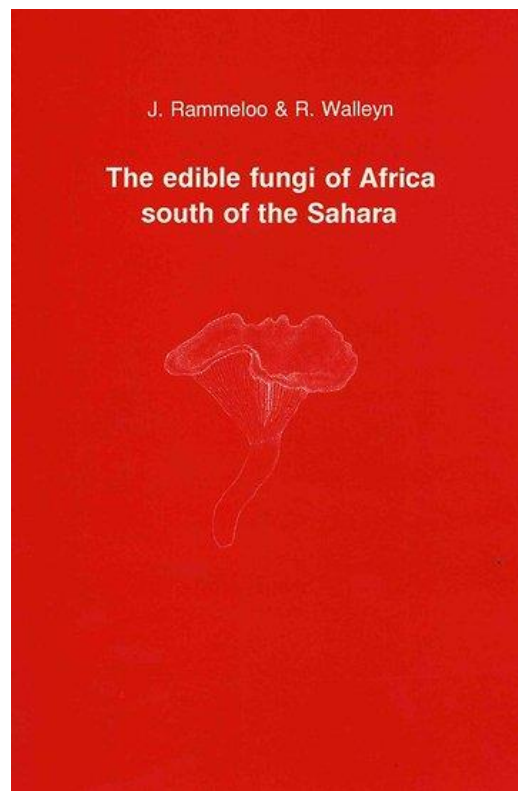
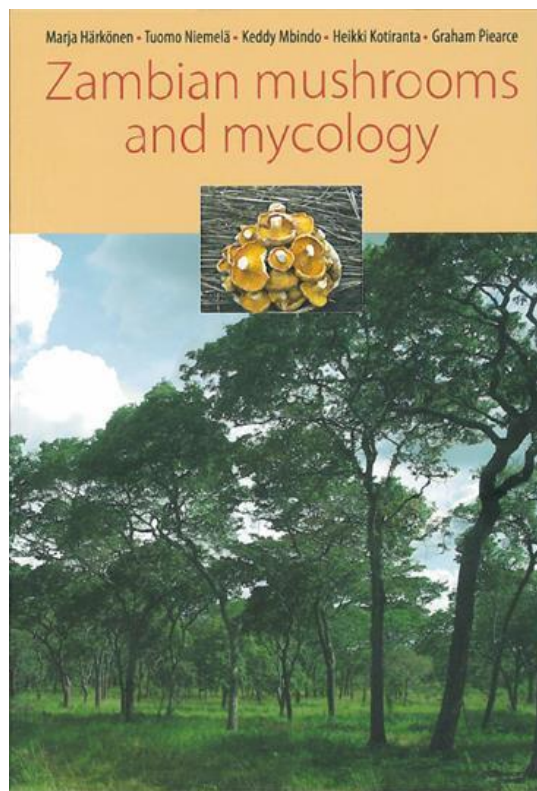
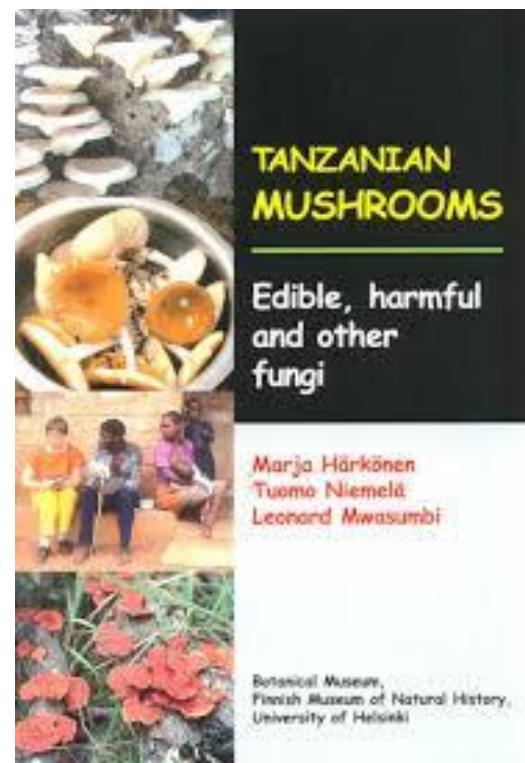
Some Ornamental plant species of Kaya Kauma





Underutilized plant Resources





Catharellus (*Chantarelle*) mostly subsistence in some of the coastal forests including some Kaya forests.



In Zambia *Cantherellus* and Truffles highly commercialized. Tanzania has wild mushroom value chain.

Fauna of Kaya Kauma forest

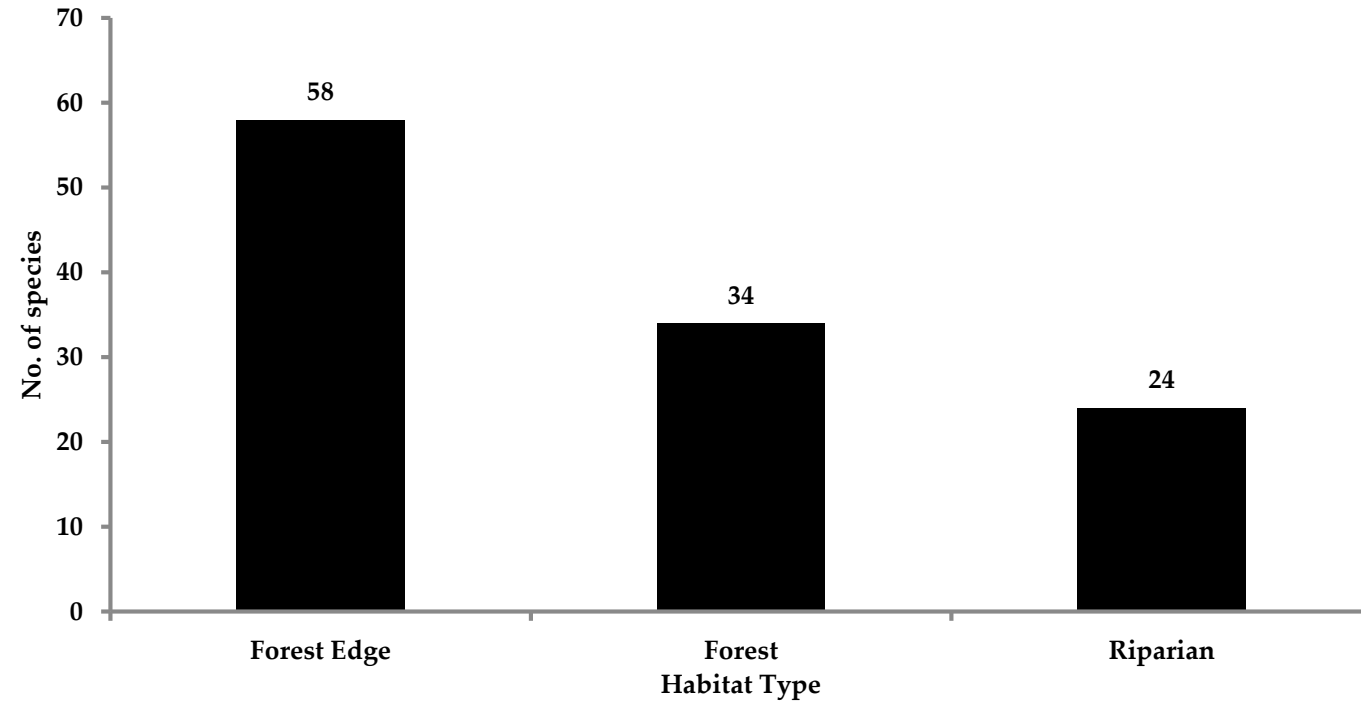
- Conducted by the Zoology department of the National Museums of Kenya. Lead Scientist: Dr. Esther Kioko.
- Bird species list of the two surveys, puts the species richness at seventy-five (75) birds' species in 32 Families.
- A total of 12 mammal species including elephant shrew one (1) species, Primates species four (4), rodents species two (2), bats species four (4), even toed-ungulates)one (1) species.
- A total of 8 amphibians and 18 reptiles recorded in Kaya Kauma forest and its surroundings
- Invertebrates: 415 species consisting of 362 terrestrial and 53 aquatic species among which are 75 Butterfly species
- A total of 5 species of fish and 3 species of prawns and crabs

Kaya Kauma forest fragment is an **important bird area (IBA)** because it is home to the globally threatened Sokoke Pipit. The forest is a **significant stop-over and dispersal site** for intra-African and Palearctic migratory birds

Most abundant species were;

- Black-bellied Starling (**19**),
- Tropical Boubou (**18**),
- White-throated Bee-eater (**18**),
- Brown-headed Parrot (**14**),
- Speckled Mousebird (**11**)
- Barn Swallow (**10**).

Bird species richness recorded in the forest, forest edge and riparian of Kaya Kauma





Eastern Bearded Scrub Robin



Dark-backed Weaver Ploceus bicolor



Black-bellied Starling restricted to coastal forests - Dominant, (19)



Fischer's Turaco, *Tauraco fischeri*, feeding on fruits of a fig tree along Nzovuni river -IUCN Red List



Forest dependent species, Yellow-bellied Greenbul, *Chlorocichla flaviventris*



Forest dependent species, Lilac-breasted Roller *Coracias caudatus*



Mombasa Woodpecker and Trumpeter Hornbill rely heavily on standing baobab or old, over-mature trees where nest-sites can be found or excavated.

Greater Blue-eared Starling *Lamprotornis chalybaeus* at nest on mature baobab tree.



Female and male Trumpeter Hornbill *Bycanistes bucanitor*, near Nzovuni river.

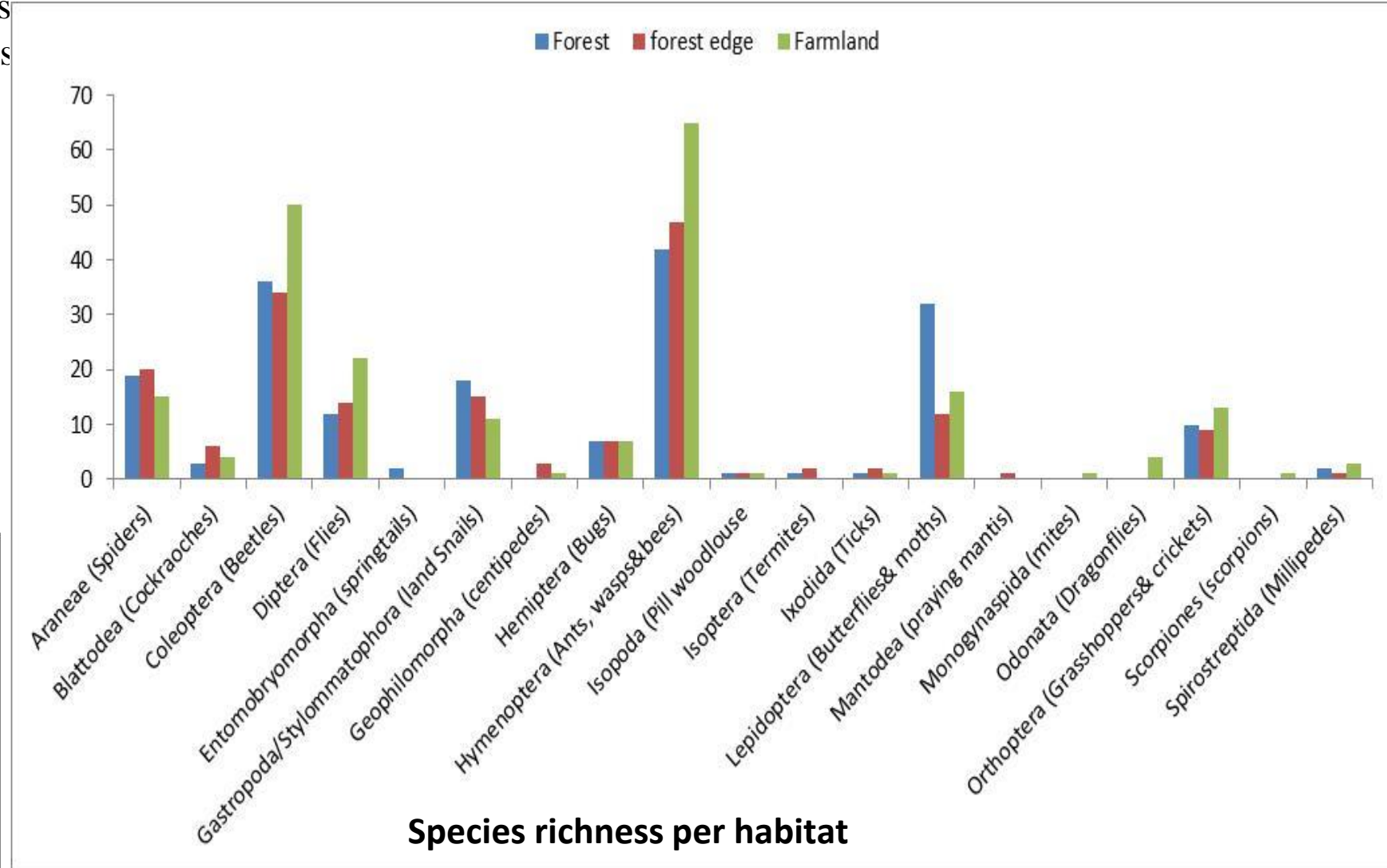
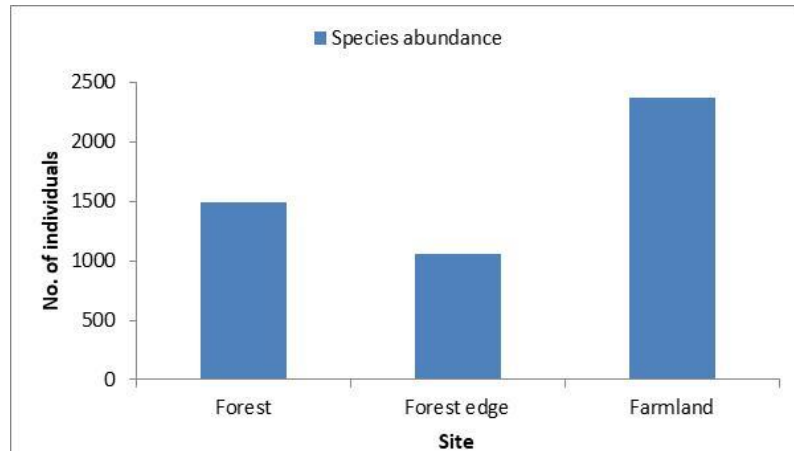
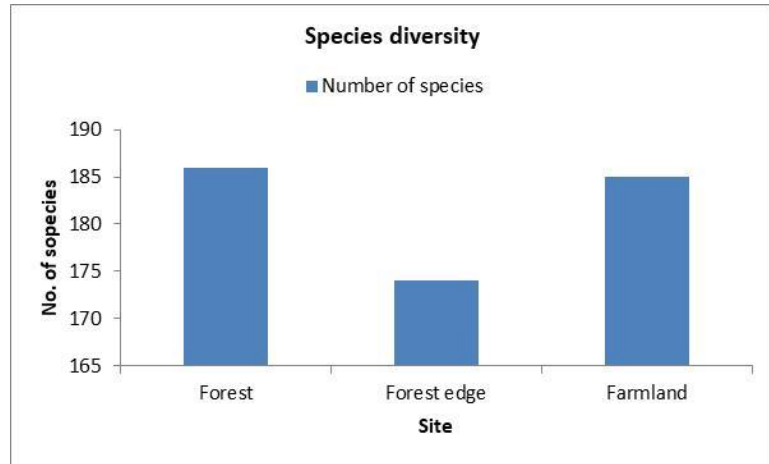
Indigenous Knowledge on Birds: Nzuzi, Puji, Kanga, Mverezi, Gia, Kerengeze, Hondolomwe, Kololo chimburu, matali, kanga, vitswetswe and mwewe- gongonyika.
Potential for domestication efforts: Kanga (Guinea fowls), sungura (rabbits) and vitswetswe (small bird) for consumption.

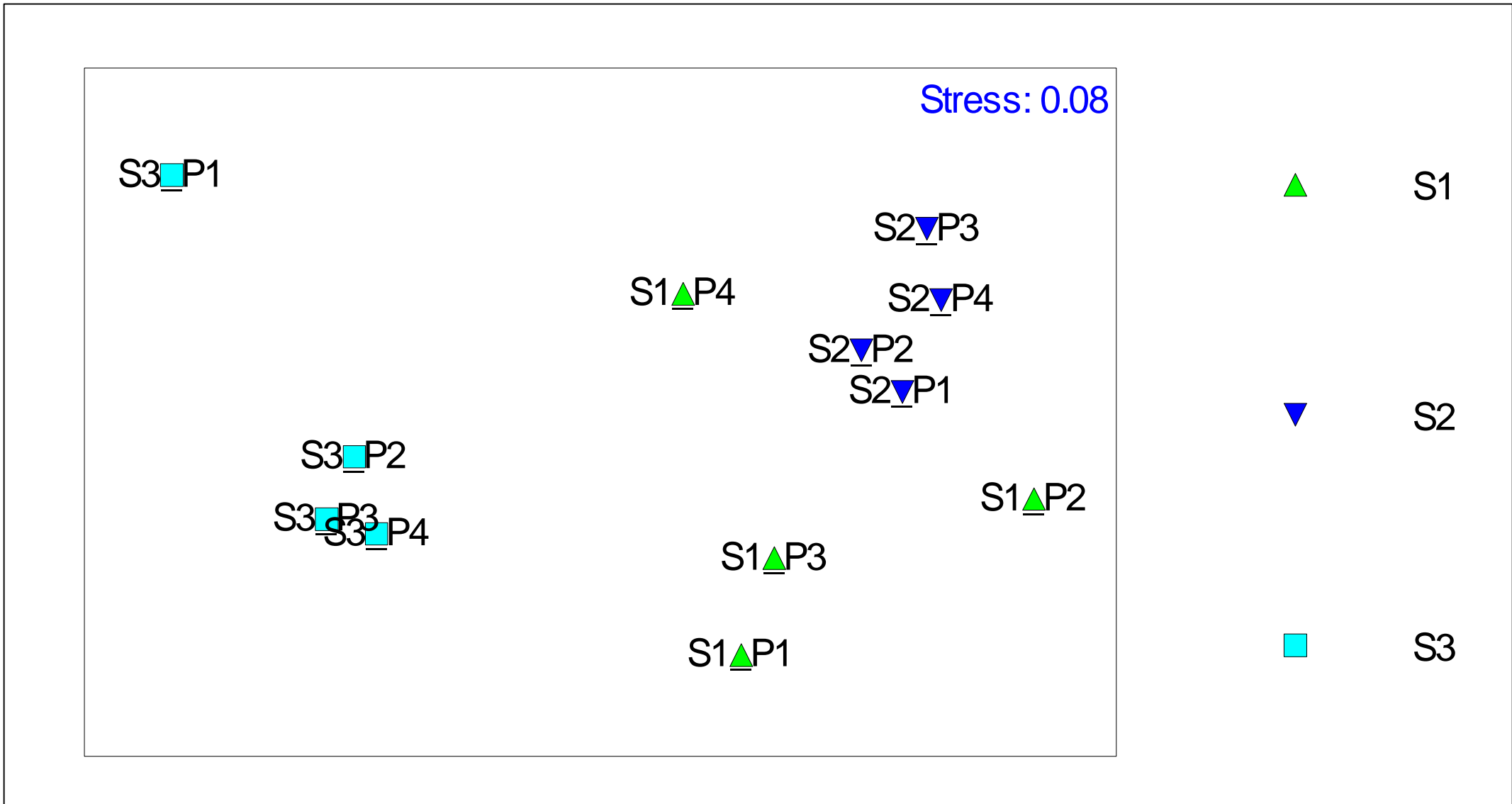
Invertebrates

Dr. Esther Kioko, Dr. Kochey - NMK Zoology Dept

Terrestrial and aquatic invertebrates comprised of **415 species** consisting of **362** terrestrial **53** aquatic species in the forest, forest edge, surrounding farmlands and R. Nzovuni within Kaya Kauma forest.

186 species in the forested area, **174 species** in the forest edge and **185 species** in the farmlands





Overall species similarity patterns of terrestrial invertebrates collected using all methods in different sites of Kaya Kauma.

Key: S1= Forest; S2= Forest edge and S3= Farmland

75 Butterfly and Moth species (Lepidoptera)



The Christmas butterfly (Lepidoptera) and Blister beetle (Coleoptera) foraging



Adult *P. dardanus* sucking nectar from flowers



Adult *Papilio constantinus*



Adult *Papilio constantinus*



Butterfly rearing cage



Langstroth hives transportation



Modern bee keeping experiential training at Kaya Kauma



Maize crop infested by fall army worm



Snail feeding on maize leaves



The old logs provide breeding sites for saproxylic beetles.



Scale insects infesting a papaya



Blister beetle defoliating vegetable leaves.



Locals collecting firewood in the kaya forest

Edible Insects

- Edible insects are traditionally important foods in Africa. The most commonly consumed insects are termites (*Macrotermes* Spp) and grasshoppers (*Ruspolia nitidula*). In Africa, 250 insect species are said to be edible, 549 in Mexico and 180 in China. The insects range from caterpillars, grasshoppers, crickets, beetles and many others. Mar 18, 2019 (FAO)



Grasshoppers and Crickets of Kaya Kauma (With some edible) species)

Orthoptera	Acrididae	<i>Acrida sp</i>	Grasshopper
Orthoptera	Acrididae	<i>Acrididae sp</i>	Grasshopper
Orthoptera	Acrididae	<i>Acrotylus sp</i>	Grasshopper
Orthoptera	Acrididae	<i>Aiolopus sp</i>	Grasshopper
Orthoptera	Gryllidae	<i>Brachytrupes membranaceous</i>	Cricket
Orthoptera	Acrididae	<i>Catantops sp</i>	Grasshopper
Orthoptera	Pyrgomophidae	<i>Chrotogonus hemipterus</i>	Grasshopper
Orthoptera	Pyrgomophidae	<i>Chrotogonus sp</i>	Grasshopper
Orthoptera	Gryllidae	<i>Cophogryllulus sp</i>	Cricket
Orthoptera	Tettigonidae	<i>Eugasteroides loricatus</i>	Bush Cricket
Orthoptera	Gryllidae	<i>Gryllidae sp</i>	Cricket
Orthoptera	Gryllotalpidae	<i>Gryllotalpa sp</i>	Cricket
Orthoptera	Gryllidae	<i>Gryllulus gracilipes</i>	Cricket
Orthoptera	Gryllidae	<i>Gryllulus sp</i>	Cricket
Orthoptera	Acrididae	<i>Heteracris sp</i>	Grasshopper
Orthoptera	Gryllidae	<i>Phaeophilacris sp</i>	Cricket
Orthoptera	Gryllidae	<i>Platygryllulus sp</i>	Cricket
Orthoptera	Tridactylidae	<i>Tridactylidae sp</i>	Cricket
Orthoptera	Tetrigidae	<i>Tridactylus sp</i>	Cricket
Orthoptera	Tridactylidae	<i>Trigonidium</i>	Cricket

A total of **12 mammal** species of **5 mammal** orders including Macroscelidea (elephant shrews) 1 spp), **Primates** (4 spp), **Rodentia** (rodents) 2 spp) - *Acomys c. percivali*, *Acomys c. ignatius*; **Chiroptera** (bats) 4 spp), and Cetartiodactyla (even toed-ungulates (1 spp).

Individuals of Pousargues's Monkey *Cercopithecus m. albotorquatus*, near-endemic primate



11 species were recorded in Kaya Kauma forest and **two (2)** in the **farmland**. **One(1) bat species**; Egyptian Rousette *Rousettus aegyptiacus* near the forest as well as in the farmland, while Wahlberg's Epauletted Fruit Bat *Epomophorus wahlbergi* was in the farmland.

Bats and primates had the highest number of species. Rodent species as well as Genus *Scotoecus* (lesser house bats) were **very rare**.

Traditional trap are used by local people to hunt mammals (Cricetomys ansorgei; Southern Giant Pouched Rat (Panya Buku) in Kaya Kauma Forest

Highlights: Rats and mice, as special kind of rodent considered a delicacy among in Kilifi County.

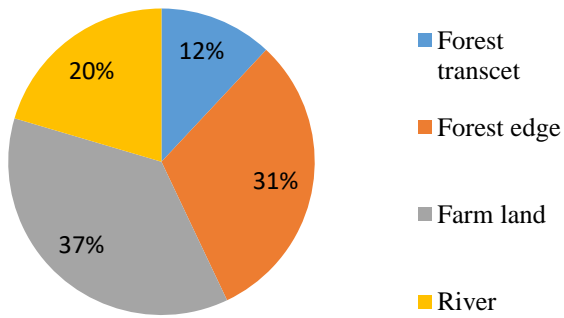
Consumption of the kadzora species of rodent may be a dying habit due to destruction of their natural habitat. Jun 3, 2014

Region where special rodent is a delicacy : The Standard

.A total of 26 species of amphibians and reptiles (8 amphibians and 18 reptiles) were recorded in Kaya Kauma and its surroundings.

AMPHIBIANS AND REPTILES SURVEY IN THE KAYA KAUMA FOREST, KILIFI COUNTY

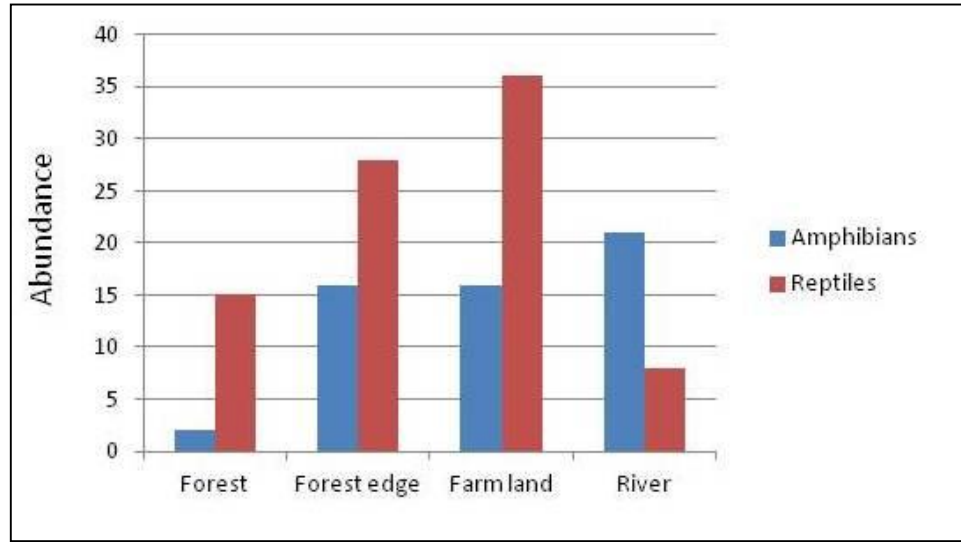
Beryl A. Bwong
Herpetology Section, Zoology Department National Museums of Kenya,



Sudan Striped-Belied Sand Snake



Shovel snout Frog



Large-eyed snake



Eastern foam-nest Tree Frog

Species	Forest transect	Forest edge	Farm land	River	2018
Reptiles					
Snakes (10)					
<i>Philothamnus punctatus</i>	2	0	0	0	1
<i>Lethiobia swahilica</i>	1	0	0	0	0
<i>Leptotyphlops macrops</i>	0	1	0	0	0
<i>Lethiobia lumbriciformis</i>	0	0	1	0	0
<i>Afrotyphlops mucruso</i>	0	0	1	0	0
Lizards (8)					
<i>Lygodactylus mombasicus</i>	4	8	15	4	1
Amphibians (11)					
<i>Xenopus muelleri</i>	0	0	0	1	0
<i>Phrynobatrachus acridoides</i>	1	2	5	5	1

Species of fishes along river Nzovuni - John K. Kochey - Zoology Dept NMK

5 species of fish, 4 species of prawns and 1 crab species that are of commercial value were documented.

Decapods (prawns and crabs) (724), aquatic snails (281) individuals, the least abundant Hirudinae (leeches). Fish population 197 individuals sampled of R. Nzovuni.

25 molluscs snails species: the giant African *Achatina fulica* with potential as food sources, ornamental shell trade, provision of lime and slime used in cosmetics



Edible freshwater crab *Varuna litterata*



***Clarius gariepinus* (African Catfish)**



**Gobiid fish *Awaous aeneofuscus*,
O. spirulus and *M. rude***



**Prawn *Macrobrachium dolichodactylus*;
a good candidate for aquaculture**



***Tilapia Oreochromis spirulus spirulus*, Nzovuni**



Young boys use spear guns and snorkels to fish in the clear water.

**Percentage(%)
population with
knowledge on
animals**

Animal	Male	Children	Female	
Nzuzi (bird)	2	3	0	
Nyuchi (bees)	3	0	0	
Puji (bird)	3	3	0	
Kavii (dikdik)	6	3	3	
Chima (primate)	13	0	0	
Makumba (fish)	14	16	14	
Nyani (primate)	24	0	0	
Maungu(moth-caterpillar)	30	35	24	
Ngulue (mammal)	43	2	0	
Matali (rodent)	43	30	16	
Kuhe (rodent)	46	35	13	
Pala (mammal)	48	8	3	
Vivii (dikdik)	49	3	3	
Parare (grasshopper)	60	71	56	
Kanga (bird)	76	60	6	
Mverezi (bird)	77	59	8	
Gia (bird)	77	63	8	
Kerengeze (bird)	79	60	8	
Hondolomwe(bird)	79	60	8	
Kololo(bird)	81	60	6	
Samaki (Fish)	86	75	81	

Edible Animals in Africa

- 200 animal species as food.
- All large and medium-sized mammalian species and all birds occurring in their area (with the exception of swallows, wagtails, owls and night jars),
- seven species of reptiles, 29 species of insects (larvae and/or adults) and about 20 species of fish.
- 254 species of wild animals harvested by hunters and trappers in Gabon.
- Primates formed the second most important prey group
- Rodents, the brush-tailed porcupine

Harvesting wood for building poles, firewood and charcoal.

90% of houses constructed from poles and fuelwood only source of energy

THREATS to sacred Kaya Kauma forest



Threats



Clearing vegetation for agriculture exposes soil to erosion



Clearing for agriculture and sand mining along Nzovuni river.



A livestock farmer in Makumbo Village in Bamba assessing one his dead cow following the persisting drought in Ganze sub-county. Kilifi county is currently leading in the number of people affected by drought. PHOTO: DAVID NGUMBAO.

Safenets during drought periods

- Residents eat tree barks and leaves to survive severe drought
- Residents are eating leaves of a pumpkin-like wild plant even without caring about how it might affect them.(Daily Newspaper Reports)
- Kenyans Turn to Wild Fruits and Insects as Drought Looms (By Miriam Gathigah)
- About 200 indigenous plant species are used as leafy vegetables in Kenya. Only a few (4) have been fully domesticated, more (15) are semi-domesticated while the majority are wild. (Patrick Maundu, National Museums of Kenya)
- About 10 more exotic species introduced during the pre-colonial period have been integrated into the traditions of various communities



A little boy on top of a tree in search for wild fruits in Bamba. Hunger has become extreme in the area and thousands of residents in Ganze and Magarini are at risk. PHOTO: DAVID NGUMBAO.



Children scramble for the wild fruits which the villagers say cause stomach and skin problems



A trader in Bamba town off-loads sacks of grass as he waits for farmers to buy the commodity for their livestock as the prolonged drought continue in some parts of Ganze, Kaloleni and Magarini in Kilifi County, October 18, 2016. Traders from Kilifi town are transporting bags of grass to Bamba, about 60 KM to sell them to the farmers at a cost of Sh200 per bag thus making a booming business from the starving farmers. [PHOTO BY GIDEON MAUNDU/STANDARD].

Alternative Livelihoods

- The forest Island is a major source of livelihood for subsistence and income generation
- To alleviate pressure from the forest, Nature based enterprises were introduced
- The basis of the enterprises was the rich biodiversity resources and rich cultural heritage
- Three enterprises based on: (1) Cultural heritage (2) Insect enterprises based on the rich butterfly and bee species and their plant resources. Edible insects are also consumed by the community and (3) Plant based on numerous useful plant species

Prior to training on enterprises, the community were taken for an awareness creation tour of existing successful enterprises in the region such as weaving, plant nurseries, butterfly farming, beekeeping, and plant nurseries



Culture based enterprises with emphasis on use of natural materials such as seeds for beads and natural fibre for weaving. The community was also trained in pottery





Harnessing bees and butterfly diversity for enterprises





Homestead
gardens for
food
security and
business and
below
seedling
nurseries for
restoration
and business





Team building activities to bridge intergenerational gap and pass on cultural knowledge and enhance cultural tourism. Other team building activities were culture walks, bird watching and building a bee yard.

Additional Conservation and Management approaches



Esther N. Kioko, John K. Kochey,
Morris N. Mutua and Duncan K. Mwinzi



Nursery based Enterprise
Seedling nursery
The species established are: *Anticarsia heratophyllus*, *Mikilia fragrans*, *Euphorbia hildebrandii*, *Cananga odorata*, *Annona squamosa*, *Dalmanea fragilis*, *Lindopis kirkii*, *Saba comorensis*, *Psidium holtonii*, *Strelitzia reginae*, and *Adiantum digitatum*.
Capsicum spp., *Passiflora edulis* (yellow passion) and *Carica papaya*.

Tapping into existing Opportunities
Indigenous plant diversity exists for ornamental purposes and other uses. All the commodities on the homestead farms and nursery therefore have access to markets from farm gate, vendor and retail.

Floral Diversity

Types of Market of market channels showing *Ladophis kirkii*, *Capsicum* sp., *Annona squamosa*, *Anticarsia heratophyllus*, or *Mikilia fragrans* and nursery seedlings of *Thang Thang*, *Gigaphium macrophyllum*, *Majolica* and *Paspalum* on sale.

SUPPORTS FAUNAL DIVERSITY THAT ENTIRELY DEPENDS ON THE FOREST. IMPORTANT SOURCE OF MEDICINAL PLANTS FOR THE COMMUNITY.

After the collapse of the East African Community in 1977, EA was managed under Agricultural Research Department (now the Kenya Agricultural & Livestock Research Organization) until 1982 when it was adopted by NMK as a department of botanical sciences. Currently, the EA has the largest herbarium collection in tropical Africa.

THE SACRED MIJIKENDA KAYA FORESTS PLANT BASED ENTERPRISES
BUILDING RESILIENCE OF HERITAGE SITES
BY
HARNESSING FLORAL DIVERSITY TO TRANSFORM LIVELIHOODS

Approaches towards conservation of Heritage Sites
HOMESTEAD FARMS
AND
PLANT NURSERIES
ENTERPRISES

INFORMATION AND CONTACTS
Joyce Mnyazi Jefva
National Museums of Kenya
Botany Department,
P.O.BOX 45166-00100
Nairobi, Kenya
Email: joycejefva@gmail.com
Tel: 254-20-3842131-4,
Ext:2274/ 2205/ 2239/ 2286

With Support of:
NATIONAL MUSEUMS OF KENYA
WORLD HERITAGE TANGS ON
German Commission for UNESCO
Federal Foreign Office

Strengthening Beekeeping Enterprise: Introduction of improved frame hives, the Langstroth hives
Beekeeping has been a tradition in most communities and traditional beekeeping skills are held in almost every society. Honey harvesting is a traditional activity among the Kaya people and the rich vegetation of the area offers great potential for modern beekeeping which has a great prospective for increasing income to support livelihood and is feasible enough to match any scale of operation by all, youth, women and men. The project introduced twenty improved frame hives, the Langstroth hives and associated beekeeping equipment- smokers, hive tools, bee brushes, protective clothing, uncapping forks and a manual honey extractor.

Bee keeping trainees inspect a Langstroth hive

Transporting hive brooder box to site in Kaya Kauma for natural bee swarm trapping.

Hive brooder box set for catching natural honey bee swarm

Strengthening butterfly farming Enterprise in Kaya Kauma
Butterfly farming has been an important income generating nature based enterprise at the Kenya coast. These important insects present a great opportunity for eco-cultural tourism for the larger urban population from the fast emerging coastal towns and tourists along the coastal region and the Mombasa butterfly house at Fort Jesus where people watch butterflies is in operation. The high butterfly biodiversity in the sacred Kaya Kauma forest (currently 86 species) is a great opportunity that is being harnessed to benefit the community. Butterflies largely depend on plant species to complete their life cycle. The high diversity of butterflies indicates an association with high diversity of forest plants for their larval stages forage. To strengthen the butterfly enterprise, the establishment of plant nurseries a targeted butterfly forage plants alongside other plants.

Raised butterfly trap

Butterfly rearing cage

Chamaea violacea caterpillar

Euxanthe wakfieldii caterpillar

Euxanthe wakfieldii pupae

Euxanthe wakfieldii

Papilio demodocus adult butterfly sucking nectar from flowers

Papilio demodocus Caterpillar on host plant (Cissampelos anisata (Kathom ka pala)

Papilio butterflies, food plant, C. anisata seedlings

With support of:
For more information contact:
Dr. Esther N. Kioko
Zoology Department, National Museums of Kenya
P.O. Box 406/8-00100, Nairobi, Kenya
Email: E.Kioko@nmsm.or.ke

With support of:

This brochure thus highlights recently strengthened and up-scaled cultural enterprises that are aimed at cushioning the Kaya community against loss of opportunities caused by Covid 19.

II. CULTURE BASED ENTERPRISE
Basketry is the art of making interwoven objects, usually containers, from flexible vegetable fibers, such as twigs, grasses, osiers, bamboo, and rushes, or plastic or other synthetic materials. It is one of the most ancient art older than pottery on the carving of stone and probably the origin of all the world's textile skills. The process of interweaving twigs, seeds, or leaves for baskets and mat making is one of the universal craftswork, ranking among the most ancient industries today in form, techniques, and materials similar to those used in past ages. An interesting fact about the age-old craft of basket making is that, while many other skills have become mechanized, no one has ever invented the machine to make baskets.

Culture based group display necklaces
They are still handmade. It's not even an easy task to mass-produce baskets with the aid of molds, electric saws and sanders, and a multitude of "assembly line" processes. The earliest and most basic techniques of basket making are still alive and regularly used. This brochure highlight introduction and up-scaling of culture based enterprises for forest adjacent communities, funded by the Germany Commission of UNESCO, and aimed to help them to cope with impacts of COVID-10.

An assortment of necklaces made by the group
A) BASKETRY/WEAVING.
Basketry is an art of making interwoven objects, usually containers, from flexible vegetable fibers, such as twigs, grasses, osiers, bamboo, and rushes, or from plastic or other synthetic materials. It is one of the most ancient art older than pottery or the carving of stone and probably the origin of all the textile arts of the world. The process of interweaving twigs, seeds, or leaves for baskets and mat making is one of the most universal craftswork, ranking among the most ancient industries today in form, techniques, and materials similar to those used in past ages. An interesting fact about the age-old craft of basket making is that, while many other crafts have become mechanized, no one has ever invented a machine that can make baskets.

They are still handmade. It's not even an easy task to mass-produce baskets with the aid of molds, electric saws and sanders, and a multitude of "assembly line" processes. The earliest and most basic techniques of basket making are still alive and regularly used.

The culture based group were taken on 2 days of experiential training to learn weaving for an assortment of items including floor and table mats, and baskets. The raw material for this enterprise were sourced from the Kilifi town markets.

A local trainer instructing group members

Floor mat weaving process

For more information contact:
Dr. Emma Mbuu
Ma Mercy Andeso
National Museums of Kenya
P.O. Box 406/8-00100, Nairobi, Kenya
Email: embuu@museums.or.ke & maemjerry@gmail.com

Acknowledgements

IUCN CEM for financial support
Pwani University
National Museums of Kenya (NMK)
Kaya Kauma elders and Community
German Commission for UNESCO
African World Heritage Fund

Colleagues Dr. Esther Kioko, Dr. Emma Mbuu who implemented the
insect based and culture based enterprises.
For Invitation and support
IUCN CEM-SUME

Thank you for Listening

