

ENHANCING THE RESILIENCE OF THE SACRED MIJIKENDA KAYA FORESTS WORLD HERITAGE SITE DURING THE COVID-19 PANDEMIC



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FROM THE GERMAN COMMISSION FOR UNESCO*

Enhancing the Resilience of The Sacred Mijikenda Kaya Forests World Heritage Site During The Covid-19
Pandemic

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FOREWORD

Kaya Kauma Forest is situated in the North Coast of Kenya within Kilifi County and is part of the Mijikenda Kaya Forests inscribed to the UNESCO World Heritage List in 2008. The Mijikenda Kaya forests consist of 10 separate forest sites spread along the coastal region of Kenya. The forest around the Kayas have been nurtured by the Mijikenda community to protect the sacred groves that are the only remains of the once extensive coastal lowland forests. The Kaya forests for many years have remained protected through long standing local community rich and environmentally friendly traditions, taboos, beliefs and cultures. In the recent times though, decline in community adherence to these taboos, traditions and beliefs has been witnessed threatening the survival of these long-standing unique forests. The communities surrounding the forest has led to high demands on forest resources. These demands include; mining, fuel wood, medicinal plants, hunting, water and demand for agricultural land. The Forest Act of 2005 has ushered in a new era in forest management in Kenya, with a dispensation that allows the involvement of forest adjacent communities in their management.

According to the Forest Act 2005, forests should be managed in accordance with a management plan. The current process of developing a management plan for the forest has some key stakeholders that include the National Museums of Kenya (NMK), Coastal Forest Conservation Unit (CFCU), the Kaya elders, the County government of Kilifi and the Kenya Forest Services (KFS). The forest management plan should guide the process of managing the resources of the forest. This is the first management plan for Kaya Kauma forest.

The natural and cultural heritage if harnessed sustainably, has great potential to transform livelihoods and sustain the integrity of the heritage sites. This report presents natural and cultural enterprises used as livelihood transformation tools to mitigate challenges faced during Covid-19 pandemic. The enterprises selection was based on the richness of the heritage of Kaya Kauma site. Culture based enterprise upscaled and strengthened the craft heritage of the kauma community in bead making, weaving and pottery. The nature-based enterprises tapped on biodiversity heritage of butterfly and

bees and plant diversity and farming landscapes. Butterfly farming and bee keeping enterprises were integrated into the livelihood activities of the community. The community is predominantly sustained by farming activities which have not economically profitable. Homestead farms enterprises integrated best profitable farming practices. Plant nursery enterprise was strengthened by introducing profitable exotic and indigenous plant species and good management practices.



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EXECUTIVE SUMMARY

This report provides the results of a survey on the impacts of the COVID-19 pandemic on the Sacred Mijikenda Kaya Forests, a UNESCO World Heritage Site. The report outlines measures to enhance the resilience of the Sacred Mijikenda Kaya Forests (hereinafter Kaya forests) during the COVID-19 pandemic. The report is prepared based on the German Commission for UNESCO's immediate response support programme (#SOSAfricanHeritage) that provides rapid support to African cultural and educational organizations during the COVID-19 pandemic. As envisaged by the World Health Organization (WHO) COVID-19 is an unprecedented crisis with deep-rooted health, humanitarian and socio-economic impact.

The project was undertaken at Kaya Kauma, a natural forest located near Jaribuni location in Kilifi County, Kenya which is part of the Mijikenda Kaya Forests. The Mijikenda Kaya Forests consist of 10 separate forests spatially distributed from the counties of Kilifi, Kwale and Mombasa along the coastal region of Kenya. The forests are the remains of numerous fortified villages, known as kayas, of the Mijikenda people. The kayas created in the 16th century and abandoned in the 1940s, are now regarded as the abodes of ancestors and revered as sacred sites and, as such, are governed by councils of elders.

Kaya Kauma council of elders use traditional practices, beliefs, and governance practices to manage the forest. However, this is threatened by the increase in population, disregard for traditional values and practices, and unsustainable exploitation of natural forest resources and the cultural heritage, and this requires urgent redress. This problem is compounded by a lack of governance systems and succession plans for future management of the forest. This report thus provides the socio-economic status of the community adjacent to the Kaya Kauma forest and highlights recently introduced natural and cultural enterprises aimed at cushioning the Kauma community against loss of opportunities caused by the COVID-19 pandemic and poverty.

Kaya Kauma is surrounded by five villages with a total population of 2,384 d. As a result of the pandemic, livelihoods have negatively been impacted, and people have lost their jobs in urban places and opting to return to the rural villages. This exodus has created new pressures on resources, particularly in protected forests due to charcoal burning and harvesting of timber for sale and subsistence use.

In the advent of the COVID - 19 lockdown in March 2020 and thereafter, the cultural aspects and physical environments of the site were largely affected. The results of the survey indicate that several changes occurred with the emergence of COVID -19 pandemic which includes: poaching and logging of forest resources; abandonment of ceremonial sites and destruction of the traditional huts by ants and termites; fewer rituals and ceremonies performed; over-harvesting of medicinal herbs as demand for herbals and natural products to boost body immunity against COVID-19 increased (herbal drinks, steam baths, herbal teas, indigenous foods and vegetables); deforestation caused by charcoal burning and cutting of trees for construction; and, the decline of kaya forests traditional management systems.

A total of 37 respondents were interviewed on their status of occupation during the COVID-19 pandemic out of which 25% lost their jobs and 15% lost their businesses. The forest resources used frequently by the community during the COVID-19 period was firewood and medicinal plants. Much of the forest resources were also used both for subsistence and commercial. A total 37 plant species were mentioned as sources of traditional medicine during COVID-19 period. The most preferred medicinal plant species by the community include Mwarubaini or Neem (*Azadirachta indica*), Aloe vera (*Aloe spp.*) and Mdungu (*Zanthoxylum chalybeum*).

The once expansive forest is now reduced to 100 acres and the forest is surrounded by farmlands, villages and development features. Out of the fifty-four (54) tree species recorded at this site, fifty-one (51) were found to be useful. The project identified two Insect based enterprises, beekeeping and butterfly farming; Plant-based enterprises, homestead farm and nurseries, and cultural enterprises comprising of bead work, weaving and pottery as promising sector for the improvement the livelihood of the Kaya Kauma forest adjacent community.

Contents

INTRODUCTION.....	4
THE SACRED MIJIKENDA KAYA FORESTS	6
Characteristics of Kaya Kauma Heritage site.	7
IMPACT OF COVID 19 ON THE SACRED KAYA KAUMA FOREST	10
Cultural Heritage Features	10
The Paths and practices:	10
Key Informants on Heritage Site	11
Cultural ceremonies.....	13
Restrictions to heritage site	13
The Historical Uses of the Kaya.....	14
Impact of COVID-19 on Kaya forests.....	14
Forest Medicinal Plants.....	16
The Importance of Sacred Forest Sites	17
The conservation of the sacred forest.....	17
HOUSEHOLD INFORMATION.....	18
Household Level	18
An Overview of Forest Related Household Products.....	22
Forest Products Collected	23
Availability of Products in the Village	23
Forest Product Utilization	25
Processing of Products.....	25
IMPACT OF COVID-19 ON SCHOOL CHILDREN	26
The Young Generation Involvement with the Sacred Kaya Forest Site	26
The Younger Generation Need for Interaction with the Environment.....	28
Future Outlook.....	29
NATURAL HERITAGE FEATURES.....	30
Introduction	30
BIODIVERSITY: FAUNA	31
Birds	31
Mammals	33
Amphibians and reptiles (herpetofauna).....	34
Terrestrial Invertebrates and Aquatic Macro – invertebrates.....	34
Future Outlook	38

PLANTS OF KAYA KAUMA FOREST	39
NATURE AND CULTURE-BASED ENTERPRISES	47
Plant Based Enterprise	47
Introduction	48
Indigenous and exotic germplasm for plant-based enterprises	51
Nursery Site Preparation.....	52
Homestead Farming Enterprise	53
Insect Based Enterprises	56
Initiation of modern Beekeeping at Kaya Kauma forest.....	56
Strengthening butterfly farming initiative at Kaya Kauma	58
Capacity building for the insect-based enterprises	58
Marketing of Insect Based Enterprise Products Beekeeping products.....	61
Butterfly Farming Products.....	63
Future Outlook.....	64
Culture Based Enterprises	65
Strengthening and upscaling of Culture based Enterprise	65
APPROACHES / INTERVENTIONS TOWARDS RESILIENCE OF THE SCARED KAYA	
FORESTS	68
Team Building	68
Hut Construction.....	68
Bee Yard Construction	71
Bird watching	72
Culture Walk	73
GOVERNANCE PRACTICES	74
Governance Practices Leadership Hierarchy and Roles.....	74
Conflict Resolution.....	74
Best Governance Practices.....	76
A: <i>Mijikenda</i> Greeting.....	76
B: Heritage Wealth.....	77
C: Sustainability of Kaya Kauma	77
D: Good Governance Practices.....	77
The Challenges:.....	78
E: Importance of Good Governance	78
F: Pillars of Governance.....	78
G: Role of Governance	79
H: Succession Planning	79
MARKET STATUS SURVEY REPORT	81

Objectives related to Bead/ Craft work:	81
Objectives related to nursery enterprises and farm produce:	81
Objectives related to insect-based enterprise:	82
Methodology	82
Culture Based Enterprises	83
Plant Based Enterprises in the market place	84
Insect-Based Enterprise	87
Conclusion	89
ANNEX:	90
Coastal Kenya Sacred Mijikenda Kaya Heritage sites	90
Table 1:Kaya Kauma villages and households (adapted from NMK-AWHF report 2018).....	8
Table 2:Villages adjacent to Kaya Kauma forest	8
Table 3:List of key informants	12
Table 4:Forest resources commonly used	19
Table 5: Source of medicine during COVID-19 period.	21
Table 6: Forest based products used during the pandemic.....	22
Table 7: Ecological significance of products	22
Table 8: Gender that collected the products.....	23
Table 9: Products collected on weekly basis and the average amount	24
Table 10: Location where the products were collected and frequency	25
Table 11: Reason for visiting	26
Table 12: activities that young generation used time on during the COVID-19 Pandemic school closure period.	28
Table 13: The details on the type of school compound liked by the respondents	29
Table 14: Plant Species	43
Table 15: Seed treatment prior to planting.....	49
Table 16: number of seedlings two months after establishment and estimated minimum prices.....	55
Table 17: Clans, sub-clans and founders of Kauma	70
Table 18: Areas visited	82
Figure 1:Age distribution of the respondents	18
Figure 2:Sources of income for the respondents during the pandemic	19
Figure 3: Reason for harvesting the resources	20
Figure 4: Those that preserve some products.....	25
Figure 5: Percentage of young people who had visited the sacred Kaya Kauma forest.....	26
Map 1:Villages adjacent to Kaya Kauma forest (adapted from NMK-AWHF report 2018).....	9

INTRODUCTION

The onset of coronavirus in late 2019 has negatively affected the world with close to 1.85 million fatalities. The current novel coronavirus (SARS-CoV-2) is a new strain of coronavirus whose knowledge on the virulent nature is limited. While Africa's confirmed infection cases stand at 1,996,064 (World Health Organization; Ministry of Health report 2021); as of 6th January 2021, Kenya has recorded 96,909 COVID-19 cases with a total of 79,257 recoveries (Ministry of Health report 2021). Unfortunately, 1,686 persons have lost their lives due to the pandemic as of 6th January 2021.

Similarly, COVID-19 has had a massive impact on World Heritage Sites (WHS) worldwide. In almost every country, WHS have taken a knock in one way or another. At the height of the global lockdown in April 2020, 90% of countries had closed World Heritage properties. World Heritage Sites saw a decline of visitors of up to 99 percent with cancelled cultural events and suspension of community cultural practices. The UN World Tourism Organization (UNWTO) reports that 96% of all worldwide destinations introduced full or partial restrictions since the end of January 2020. The tourism industry worldwide came to a halt in March 2020 when all international borders closed due to the pandemic. Governments issued strict guidelines and restrictions to shut down heritage sites, cultural institutions, museums, recreational centres, hotels and restaurants which provided vital sources of employment to local populations.

The abrupt halt in travel and tourism cut off the flow of visitors and revenue to most of the WHS sites, source of income that are channeled to conservation, pay wages, salaries and maintenance of the sites. The adjacent community was adversely affected, with many people losing jobs and income. Business was disrupted particularly the Small and Medium Enterprises (SMEs) which operate in the heritage sector and provide sources of livelihood for entrepreneurs.

The World Travel and Tourism Council predicted that up to 75 million jobs in the travel and tourism sector were under immediate threat, equating to a loss of US \$ 2.1 trillion GDP in 2020. Unable to make ends meet, heritage sites offered alternative livelihood with local communities turning to poaching at natural sites and looting artefacts at cultural sites due to absence of staff. The closures of heritage sites, archaeological sites and to wider extent the cultural institutions that manage

heritage sites have increased the insecurity for cultural property and natural sites around the world. For example, in April 2020, 12 rangers in the Virunga National Park, a UNESCO World Heritage property in the Democratic Republic of the Congo, were killed in a deadliest attack. In North Africa thieves looting objects from a Mosque near Larache in Morocco with images of the crime shared on Facebook trafficking group. In addition, the closures of sites that rely on tourism for their budgets would pose a long-term management challenges to the sites and negatively impact conservation and research work at the sites.

In Kenya, the country went into lockdown in March 2020. All the seven World UNESCO Heritage Sites: Fort Jesus, Lamu Old Town, Sacred Mijikenda Kaya Forests, Thimlich Ohinga Archaeological Site, Kenya Lake System in the Great Rift Valley, Lake Turkana National Parks and Mount Kenya National Park/Natural Forest were closed. The National Museums of Kenya, the World Heritage focal point and managing authority of all the 7 sites, adopted partial operations and in some instances completely closed to the public between March and December 2020. The closure of the institution affected the revenue collection and heritage sites exposed to poaching and looting.

THE SACRED MIJIKENDA KAYA FORESTS

The Sacred Mijikenda Kaya Forests comprises of fragments along the Kenyan coast including Kwale (28), Kilifi (22) and Mombasa (5), designated as either National monuments (39), forest reserves (4) and, unprotected sites (13). They range in size from the largest National Monument site of Kaya Dzombo-902 acres to the smallest unprotected Kaya Miyani within Kwale town of 3 acres. The sacred sites are scattered along the 200 km coastal ecosystem.

The Kaya forests are cultural and natural heritage sites rich in biodiversity some of which is rare and endemic, and epitomize the history and culture of the Mijikenda community. The thirty nine (39) sacred sites are declared as a National Monuments by the National Museums of Kenya under the National Museums and Heritage Act, 2006, revised in 2012. The Sacred Mijikenda Kaya Sites (Kauma, Jibana, Kambe, Ribe, Bomu Fimboni, Mudzi Muvya, Fungo and Mtswakara-Gandini) all indigenous forests, were listed as serial nominations by UNESCO as World's Heritage Site under criteria (iii) and (vi) <https://whc.unesco.org/en/criteria/>. The National monuments are managed by the National Museums of Kenya principally for their Biodiversity and their historical importance.

The sites are important centers of endemism for a variety of globally threatened fauna and flora and offer supportive, regulatory, cultural and recreational ecosystem services. The forests are highly fragmented and mainly threatened by increased human population and activities, poverty, unregulated use, insufficient local and national institutional capacities, policy gaps and weaknesses and lack of alternative means of livelihood among others (NMK-AWHF Report on strategic management plan for sustainable use of the sacred Kaya Kauma forest 2019-2024).

Erosion of cultural values and economic development has caused the greatest impact on the environment and culture. The destruction of natural and cultural heritage for short-term gain and without proper management and restoration strategy has devastating consequences that are irreversible. The Kaya resources are irreplaceable and valuable elements of the national and global heritage. The high population growth rate has created demand for food and acute clearing of once vast forests for agriculture and settlement along the coastal region. The sacred

Mijikenda Kaya sites as repositories of plant and animal species and cultural heritage are therefore under major threats. The Impact of COVID-19 on the heritage sites if not mitigated could escalate the threats to irreparable levels.

The existing Informal governance structures which entail beliefs and oral narratives, and unstructured management approaches threaten to intensify poaching and conflicts particularly in the time of COVID-19 pandemic. The forests support different forms of livelihoods for adjacent households, which now faces pressure emanating from urban-rural migration due to loss of employment since the first COVID 19 case reported and the lock down in March 2020. Hence, the mitigation measures to cushion the forest against further pressure from the increased population. The community is involved in small scale nature and culture-based enterprises not profitable enough to alleviate pressure on the existing forest resources and to meet their food and nutritional security. Additionally, the community still uses fuelwood as a major source of energy and poles and joists ("fito") for construction of houses. Hence, the need to integrate enterprises such as beadwork and weaving, beekeeping and butterfly farming and the integration of best farming practices is crucial for sustenance of livelihoods and wealth creation.

The other six Kenya UNESCO World Heritage sites are facing similar challenges, which could be mitigated through similar nature and culture-based enterprises to combat degradation. The community participatory approach in management of heritage sites by harnessing entrepreneurial opportunities is not only viable to COVID-19 period although it applies as a mitigation measure to any emerging challenges of heritage sites.

Characteristics of Kaya Kauma Heritage site.

A project was implemented at the Kaya Kauma Sacred forests in Jaribuni division, at Kauma and Jaribuni locations. Kaya Kauma is located in Jaribuni location in Kilifi County at latitude 3°37.821S and longitude 39°44.189E, with an altitude of 120 m above the sea level, and occupies an area of 100 Ha. This forest was once a water catchment area supplying Kilifi town. The forest is under the management of Council of Kaya elders and the National Museums of Kenya.

Kaya Kauma forest primarily belongs to the Kauma community. It is located on the low hills of Jaribuni area in Kilifi County. The geographical position of this forest is 3°37.821S and 39°44.189E, altitude of 120m above the sea level and the size is 100 ha in area. The forest slopes down to river Dzovuni flowing into the Kilifi

creek at Mtsanganyiko. The area is also rich in iron-ore deposit once illegally mined.

Demographic status of the community adjacent to Kaya Kauma forest

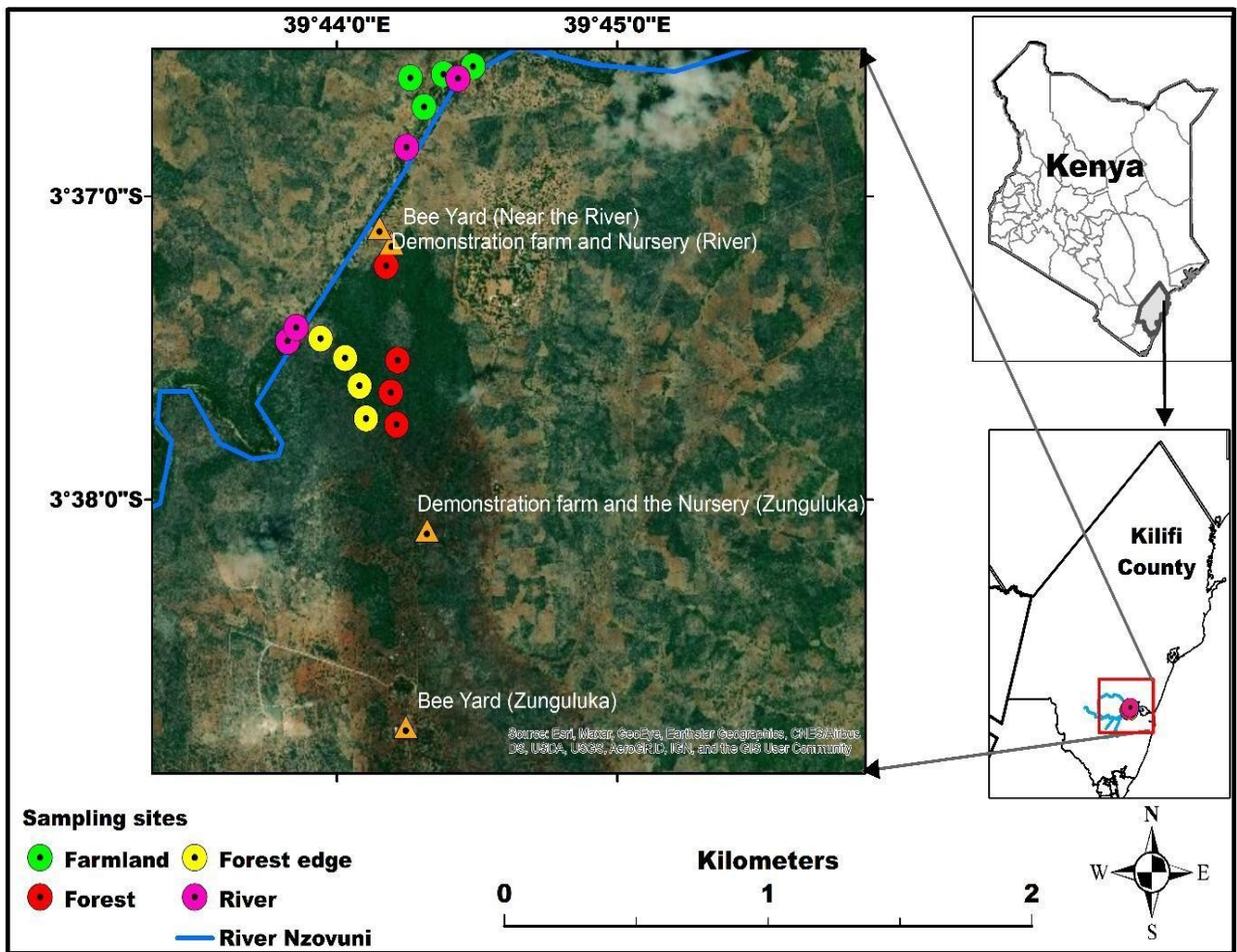
Kaya Kauma is surrounded by five villages with a total population of 2384 distributed in 166 homes composed of 777 households (Table 1: & Map1.). They are predominantly small-scale subsistence farmers. The main land uses include forests, homesteads and farmland with cassava, maize, and for those living along the river pawpaw, coconut, scattered cashewnut trees, *Tamarindus indica*, *Annona squamosa* and variety of exotic and indigenous vegetables and pulses. The community is currently involved in butterfly farming recently introduced by FOSA USAID funded project.

Table 1: Kaya Kauma villages and households (adapted from NMK-AWHF report 2018).

Name of Village	No. of Homes	No. of Households	Total
Muhoni	20	66	238
Marere	51	86	365
Mitangani	25	97	460
Wamboi	27	125	454
Jeza	43	43	403

Table 2: Villages adjacent to Kaya Kauma forest

Villages	Sub-locations	Locations
Jaribuni	Vinagoni	Jaribuni
Jeza (17)	Marere	Jaribuni
Marere (1)	Marere	Jaribuni
Muhoni	Marere	Jaribuni
Miyani (11)	Mwapula	Jaribuni
Mwabau (2)	Mwapula	Jaribuni
Sosoni (1)	Magogoni majolani	Kauma
Vinagoni	Vinagoni	Kauma
Zunguluka	Vinagoni	Kauma



Map 1: Villages adjacent to Kaya Kauma forest (adapted from NMK-AWHF report 2018)

IMPACT OF COVID 19 ON THE SACRED KAYA KAUMA FOREST Cultural Heritage Features

The Forest and Cultural Heritage Features.

Diagrammatic presentation of the Kaya structures from paths, gates, burial site and exact sites of homesteads for each Clan, the meeting place, place of vigango and the prayer site.

The Paths and practices:

Path clearing is an activity undertaken by all members of the community. Traditionally, they would assemble following a call the by the sound of a horn (“Mbiyu”) to clear the path. It is undertaken ‘Kaskazini ya Mwaka’ (season of short Rains-November, December, January) and at this time the ‘Kadzumba Ka Mulungu’-symbolizes small house of god, where women perform a dance for divination and prophesy on rain, diseases, war is not cleared until March –April after the rains. Another clearing follows in August after the harvest when a ceremony for thanks giving through offering of crops is performed.

During this period, the community members share a meal. The images below indicate.



Cleared paths in the forest

A ceremony at the ‘Kadzumba Ka Mulungu’ is normally performed by middle-aged women of character as determined by the society. It comprises of women who perform the dance called Ngoma za Pepo-spirit dance and women perform prophesy and divination (‘Kutupa ramli’). The women inherited the ability to prophesy and perform divination from their maternal mothers or grandmothers and are able to reveal events, as spirits possesses them as they dance. The women leaders must be of good conduct, good reputation and not witches.

Key Informants on Heritage Site

The purpose of engaging key informants was to evaluate their knowledge on products collected from the forest and their knowledge on the functions of the heritage sites. The key informants were selected according to their knowledge about the forest, their association with the heritage site and gender. An assessment of the plant materials collected indicated that they had preferences for building poles for construction mostly collected by men and boys throughout the year; firewood collected everyday by women and girls.



Illegal firewood collection



Girls collecting firewood



Over 90% of houses at the site are constructed with poles

Medicinal plants roots and leaves of *Aloe* spp (Aloe vera), *Zanthoxylum chalybeum* (Mdungu), *Acridocarpus zanzibaricus* (Mboho), *Euphorbia* sp.,

(Kanadam/Kahadama) and *Allophyllus* sp/*Cissampelos pareira* (Kasikiro paka) collected when the need arises; wood for charcoal; food (fruits, honey, mushroom) mostly collected by those with skills to identify the food products; planting materials (seedlings and seeds) and some products collected for cultural activities when the need arises by both male and female. The products are collected for use at home, food for domestic consumption, and sales. The products were harvested from Kaya Kauma forest, Kaya Chivara (the first Kaya of the Kauma community which is now deserted due to lack of water), the remnants of the Miombo or Brachystegia (*Mrihi*) woodland, with mixed forest habitats from a distance of 100m to 5km away from the homesteads to the collection point.



Illegal charcoal burning from unprotected forest patches with each motorcycle carrying ten sacks with over 20 motorcycles transporting per day

Table 3: List of key informants

Name	Position
1. Mzee Hilary Mwatsuma Kalama	Head of Kaya Elders and herbalist
2. Mwanza Mwangiri	main security person guarding the Kaya
3. Kasichana Josphat Tsuma	Kaya Elder-head of women elders and Herbalist
4. Uchi Albert Mzungu	Kaya elder and bead expert
5. Patrick Mbitsi	Kaya elder and insect-based enterprise
6. Sophia Malombo Ngua	Youth member of the Kaya conservation group and also in the plant-based enterprise
7. Joyce Pondera Kacha	committed Christian and in the plant-based enterprises
8. Ayub Nyoka	Youth in the insect-based enterprises and committed to Kaya forest site activities
9. Jaji Fain Faida	Kaya elder and in the insect-based enterprises
10. Margaret Mbitsi Mwagona	Committed Christian, married to a Kaya Elder and living adjacent to the forest

Cultural ceremonies

The sacred kaya forest is a site for various cultural ceremonies/functions conducted by the community. The types performed at the site include rain prayers in April and September, (March – July long rains are known as ‘Mwaka’ and August – December short rains are known as ‘Vuri’); clearing of the paths and harvesting ceremony; thanksgiving and blessings for good harvest between July -December; prayers for disease outbreaks as the need arises; prayers for peace (Any time of the year); the cleansing ceremony- ‘matambiko’ (any time of the year); burial ceremonies which are no longer conducted; ritual offering (‘sadaka za koma’) and ceremony to appease ancestors.

Restrictions to heritage site

The kaya forest site and its products are treated as sacred with cultural regulations restricting access to these products. The forest is gazetted and guarded against unauthorized collection and extractions of products prohibiting the community from overexploiting these products. The forest is an important resource for cheap products for the community hence prone to overharvesting and as a result, species are getting decimated. Additionally, the lack of respect for traditions, and the killing of the elders over claims of witchcraft, has predisposed the sacred site to illegal harvesting of products.

The heritage site is an attraction to local and foreign visitors of all walks of life often visiting the forest site and the sacred village. The types of visitors include researchers, education institutions (schools, colleges, and universities), politicians who go for endorsement for leadership and blessings, conservationists, cultural and nature enthusiasts, other kaya groups, and donors.

Restrictions and rules imposed on visitors to the site include; visit to the spiritual prayer site is prohibited, no extraction of materials from the heritage site, no shoes or hats are allowed. Walking in single line, visitors must throw a small branch at the first gate to announce their presence and the number of people who have entered. The throwing of a small branch is a sign of announcing that you have come in peace upon entering the historical homestead. Additionally one should not fall on the entry of the forest and besides, no paraffin and open flames are allowed.



Kaya Kauma community media (K24) interactions during culture walk

The Historical Uses of the Kaya

The site encompasses the homestead/settlement where ritual ceremonies, prayers for rains, harvest, blessings, thanksgiving, offerings ('Sadaka'), diseases, conflicts resolutions, burial place, meeting place are conducted. Among the most visible cultural artifacts at the site are 'vigango'(symbolic for ancestral leaders) and 'koma'(symbol of protection). Traditional huts arranged according to clans contain domestic utensils and items such as motor and pestle, cooking utensils, water and cooking pots, 'kaha'-water scooping spoon, "Chpawa"-soup scooping spoon and "ufidzo" – the wooden stirrer, grinding stone, hunting and trapping tools, musical instruments, Gole (a historical metallic ball) for games (was lost after the collapse of the hut). Plants perceived by the community as ornaments such as *Gardenia volkensii*, *Mkilua fragrans* (Mchilua) and the Cycad *Ecephalartos hildebrandtii* (Mstapu) and *Dalbergia melanoxylon* (Mpingo). Folklores associated with the sacred Mijikenda Kaya forests are the Singwaya pre-historical migration story, unity, and identity of the Mijikenda. The historical belief systems include big trees represent life and should not be cut, Huge trees are abode of spirits and are not to be cut, spirits are intercessors in prayers, and there is life after death.

Impact of COVID-19 on Kaya forests

In the advent of the COVID 19 lockdown in March 2020 and thereafter, the cultural aspects and physical environments of the site were largely affected. Changes that have occurred during COVID include: the forest was visited frequently by men, women, and youth for products by sneaking into the forest; the paths became bushy and uncleared; the traditional huts were destroyed by ants and termites and collapsed; fewer rituals and ceremonies were performed; there was more tree cutting for poles and heavy logging for firewood from deep into the forest; very high demand for medicinal herbs and hence more harvesting; there was a lot of deforestation caused by charcoal

burning and cutting of trees for construction. The main changes that have occurred in the kaya forest is that the forest structures have declined since COVID -19.

The main causes given for the decline in forest structure is associated with extraction of forest resources due to lack of livelihood activities as most economic activities could not be undertaken during lockdown. Further, during the COVID -19 period, there was limitation on congregation, most economic activities could not be undertaken, people also lost their jobs in their places of work and therefore moved into the forest to find products for sale. The loss of livelihoods therefore as a result caused selective logging, for example, of *Uvaria acuminata* (Mfumba) mostly used for construction.

Shortages of most preferred products/species were intensified during the COVID -19 period. The most preferred hardwood species are rare and instead alternative hardwood species are sought from *Azadirachta indica* (Neem), *Casuarina equisetifolia* (Kasorina), *Eucalyptus* sp. and wood from nearby bushes. There has been shortage of medicinal plants such as *Strychnos henningsii* (M'bate), *Harissonia abyssinica* (Murerengwa) and "Mjungumoto" with the alternative species used during the shortage period *Lannea scheyfferi* (Mumbu), the Neem tree *Azadirachta indica* (Mwarubaini) and "Kavyarira nyuma" from bushes and farmlands. There has been a shortage of species/product and *Croton pseudopulchellus* (Mnyama wa nyika) and *Brachylaena huilensis* (Muhuhu) have declined. The alternative products used during shortage of the products *Cleome* sp. (Mwangani).

During the COVID 19 lockdown in March to July and thereafter, the community faced obstacles in using the sacred site in the forests for recreational ceremonies and function. All the ceremonies were minimized due to Ministry of Health COVID-19 regulations on congregations, hygiene and lockdown. The ceremonies were not held regularly as planned in the calendar, and there were restrictions on the numbers of people attending with only ceremonies that must be undertaken held. People were prohibited from converging in large groups and as such impacting holding/conducting of functions and ceremonies. The prayers for rain and COVID-19 were performed and the rest were shelved off, fewer meetings were held and fewer people invited.

Forest Medicinal Plants

The use of medicinal herbals is common in Kaya Kauma and it intensified during the COVID 19 period creating a decrease in availability of some of the herbals. The female key informants had more knowledge on medicinal plants related to gynaecological problems. The Forest medicinal plants mentioned by women informants include *Lannea schweinfurthii* (Mumbu) leaves for treatment of menstruation, “Kavyulira Nyuma” leaves for expelling after birth and *Acalypha fruticosa* (Mtsatsa Kobe) leaves to enhance child labour.

The medicinal plant used most are *Lannea schweinfurthii* (Mumbu); *Azadirachta indica* (Muarubaini) leaves and bark are used in the treatment of malaria, headache, body pain, flu, ulcer; and *Grewia bicolor* (Mkone) leaves are used for the treatment of diarrhea and *Aloe* sp. (Kazimulo/Aloe vera) leaves for treatment of ulcer, malaria, flu, body pain, headache and coughing; *Ricinus communis* (Mbono) leaves fresh leaves for treatment of fresh wounds; *Sansevieria arborescens* (Chongwa) roots and leaves for treatment of tooth ache; *Solanum incanum* (Sodom apple) fruits for treatment of ring worms and *Euphorbia* sp. (Kahadama) leaves for treatment of headache, body pain and neurological (mshipi) conditions; and *Acridocarpus zanzibaricus* (Mboho) leaves is used for treatment of fresh wounds. Other medicinal plants include:-

Harrisonia abyssinica (Murerengaua), *Lannea schweinfurthii* (Mumbu), *Zanthoxylum chalybeum* (Mdungu), *Acacia seyal* (Mugunga), “Mtsomoto”, “Mbate Tsaka”, *Oldefieldia somalensis* (Mubirandu), “Mufungumoto” roots and leaves boiled for treatment of Chivuti (Chest pain) and Chipanya (cough related condition). The species used most for medicine are *Azadirachta indica* (Muarubaini) and *Aloe* spp. (Kazimulo/Mualovera).

The availability of medicinal species since COVID-19 is decreasing in yield. Out of fear of COVID -19 infection, the community has resorted to herbals and natural products to boost body immunity and resilience, they take herbal drinks, steam baths, herbal teas, indigenous foods and vegetables. The availability of the medicinal plants’ species for the last months since COVID - 19 is decreasing due to overharvesting as community have resorted to traditional herbals for treatment as hospitals were paying less attention to normal ailments. The reason for this was more people were taking herbals to boost body immunity and resilience to COVID-19 through herbal drinks, steam baths, herbal teas, natural products and fruits.

The mode of collection was characterized with unsustainable harvesting practices with

some are uprooting the whole plant and overharvesting to sell in Kingorani Mombasa market despite the difficulty in regeneration of some species in the wild and outside forest.

The cultural beliefs or values associated with the utilization of the medicinal species include covering the roots after harvesting, cutting roots some inches away from trunk to avoid infecting plants, no trousers/pants but wrapper when harvesting the snake bite tree, the root is dug and cut by biting with teeth. Medicinal concoction served with “chifudu cha tundu” (coconut shell with holes), some spilled as is drunk to symbolize expulsion of after birth/baby, no one is allowed to collect medicinal plants without the permission of the elders, the identification of medicine plants through elders to tell and show the species. The methods used to protect medicinal species include medicinal gardens, protection of the forest and homestead and harvesting carefully.

The Importance of Sacred Forest Sites

Sacred Kaya Forests are important for cultural identity and origin roots, historical, spiritual, educational, aesthetics, environmental (mazingira) and ecological, economical, resource values, and peace and co-existence, attracts visitors, habitat for animals, and burial ground. Conservation of the kaya as heritage site therefore is paramount.

The threats to the sacred site comprise of clearing forest, cutting of trees for building poles, firewood and charcoal burning, low respect for elders and neglect of cultural traditions, killing of elders falsely accused of witchcraft, earlier activities of mining of iron ore which cleared vegetation and created depressions and holes dangerous to human and animals.

The conservation of the sacred forest

This is a day-to-day management of the site undertaken by the council of elders and the National Museums of Kenya, through Coastal Forest Conservation Unit (CFCU). The conservation measures undertaken are gazettelement of the forest as a national monument and a UNESCO World Heritage Site, guarding and patrols of the site, sustenance of cultural traditions and cultural ceremonies, use of taboos to re-inforce traditional laws, respecting ritual; awareness and sensitization meetings, tree planting and livelihood activities such as Kipepeo farmers rearing butterflies for income generation, bee keeping farmers honey and a lobby group Kilifi County Natural Resources Network (KICORNET). The uses of forest products are to be consented by council of elder’s committee.

In the advent of loss of respect for traditional knowledge and degradation of culture and traditions, restoration of value systems that will guard the heritage site and cultural heritage will emanate from aspects that would consider economic empowerment. Although the population is guided by Government and religious laws, which all prohibit law breaking, adherence to cultural law which protects the forest can also be restored following economic empowerment and clear roles of the youth defined in the management of the site.

HOUSEHOLD INFORMATION

Household Level

Information was obtained from households in adjacent to five villages namely, Jaribuni, Miyani, Muhoni, Mwabau and Zunguluka. The average age of the respondent interviewed was 54.6 years (FIG.2), most of whom were married (98%) comprising of equals numbers of both males (49%) and females (51%).

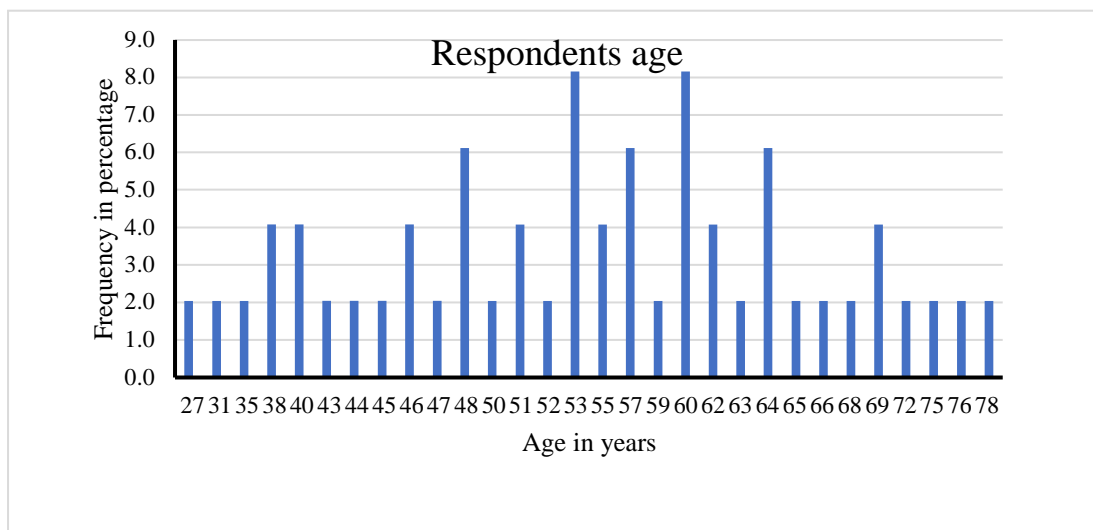


Figure 1: Age distribution of the respondents

A total of 37 respondents were interviewed on their status of occupation during the COVID-19 period out of which 25% lost their jobs and 15% lost their businesses (Table 1). Additionally, 81% of the respondents obtained their income from farming while a small number of 4.2% survived through farming and some salary. (Fig 2).

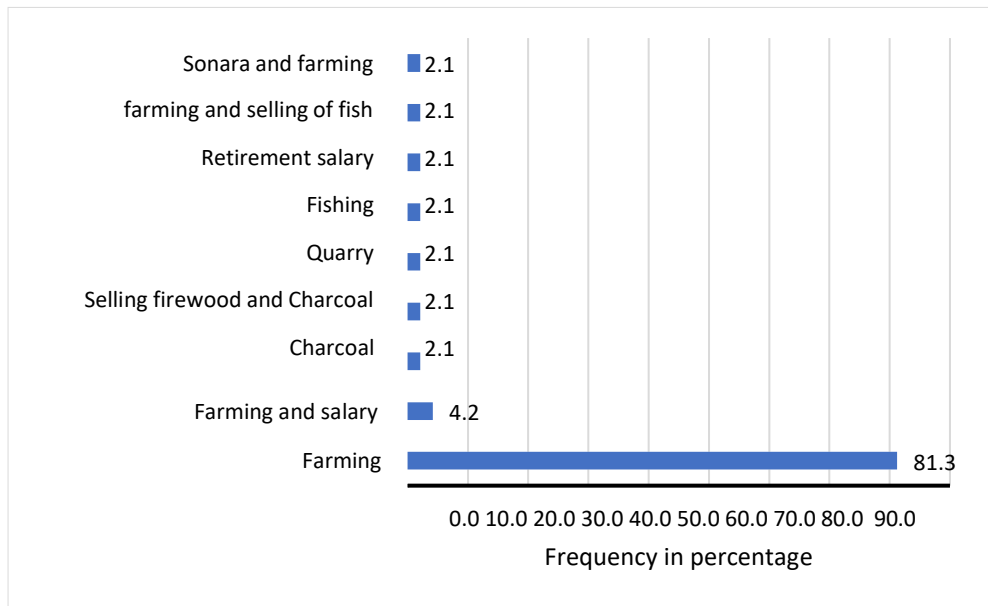


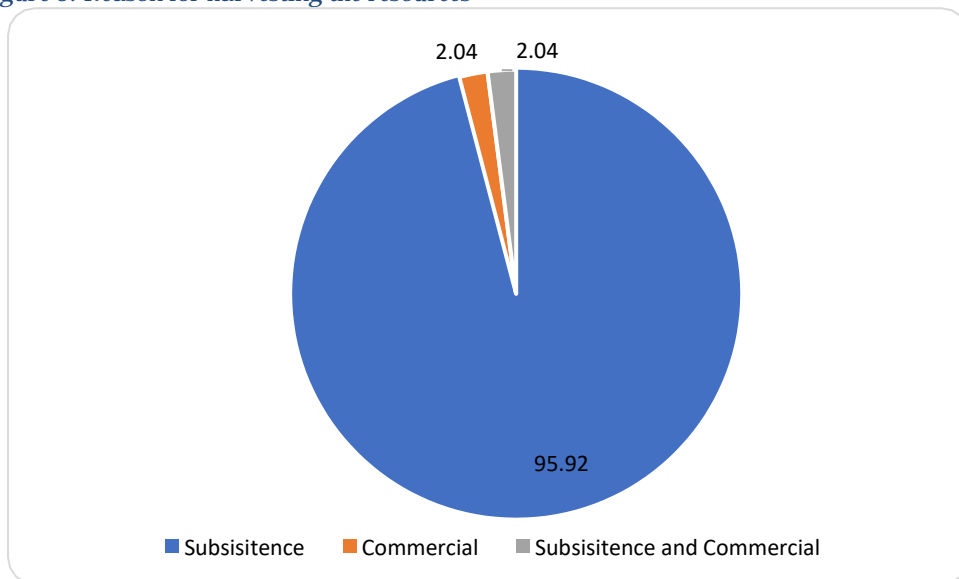
Figure 2: Sources of income for the respondents during the pandemic

The forest resources used frequently by the community during the COVID-19-19 period was firewood (90%) and medicinal plants (43%) (Table 4). Much of the forest resources were used both for subsistence (96%) and commercial (2%) and combination of subsistence and commercial (2%). (Fig. 4).

Table 4: Forest resources commonly used

Type of resources	Number	Percentage
Firewood	44	89.8
Medicine	21	42.9
Food	6	12.2
Charcoal	2	4.1
Construction material	1	2.0
Mchirya ngombe (<i>Combretum hereroense</i>)	1	2.0
Mvudza jembe (<i>Allophyllus rubifolius</i>)	1	2.0

Figure 3: Reason for harvesting the resources



A total 37 plant species were mentioned as sources of medicine during COVID-19 period. The most preferred medicinal plant species by the community include *Azadirachta indica* (Mwarobaini or Neem) (85.6%), *Aloe* spp. (All *Aloe* spp. commonly known as Kazimulo, Mualovera or Aloe vera – 46.9% and *Zanthoxylum chalybeum* (Mdungu)– 42.9% (Table. 5).

Table 5: Source of medicine during COVID-19 period.

Tree	Frequency	Percentage
Chiryangombe	1	2.04
Chiryapala	1	2.04
Karyapala	1	2.04
Mberandu	1	2.04
Mbetya	1	2.04
Mchengo	1	2.04
Chiryangombe	1	2.04
Mhindi	1	2.04
Mhumba	1	2.04
Mjafari	1	2.04
Mjafwari	1	2.04
Mkayakaya	1	2.04
Mlalapini	1	2.04
Mrembeganga	1	2.04
Mshomoro	1	2.04
Mstafeli	1	2.04
Mtomoko	1	2.04
Mtsaje	1	2.04
Mumbu	1	2.04

Mvudzajembe	1	2.04
Sodomapple	1	2.04
Terere	1	2.04
Kasikiropaka	2	4.08
Mhoe	2	4.08
Mkode	2	4.08
Mranga	2	4.08
Mtsetsere	2	4.08
Kahadamu	4	8.16
Mkone	4	8.16
Mgamu	5	10.20
Pawpawleaves	6	12.24
Mboho	7	14.29
Mfumba	7	14.29
Passion leaves	7	14.29
Mdungu	21	42.86
Aloevera	23	46.94
Mwarubaini	42	85.71

An Overview of Forest Related Household Products

Ten products comprising of a variety of house furniture and cooking items and tools were mentioned. The most commonly used forest products comprised of chairs (87.7%), beds (75.5%), tables and flat wooden ladle (mwikos) (67.4%) and 44.9% respectively (Table 6). Regarding the cultural significance of the product resources, Mvure (*Milicia excelsa*) had some taboo surrounding its harvest while other resources had significant socio-economic value attached to.

Table 6: Forest based products used during the pandemic

Forest based product	Frequency	Percentage
“Morua”	1	2.04
Pestle	1	2.04
Kabati (Cupboard)	3	6.12
Mfijo (wooden whisker)	3	6.12
Mvure (wooden bowl)	4	8.16
Motor and Pestle	7	14.29
Mwikos (flat wooden ladle)	22	44.90
Tables	33	67.35
Beds	37	75.51
Chairs	43	87.76

The contribution of the forest to ecological significance for its role in improvement of soil fertility was perceived as high (91.8%), and to some extent it attracted rain and was acting as wind breaker (65.3%) (Table 7).

Table 7: Ecological significance of products

Ecological significance	Frequency	Percentage
Fertility	1	2.04
Attracting train	10	20.41
Reforestation	17	34.69
Attracting rain/windbreakers	32	65.31
soil fertility	45	91.84

Forest Products Collected

The collection of forest products was assessed based on gender and age. There were more products collected by adult male and females (36.3%), some were collected by women alone (32.6%), only few products were collected by male alone and children (Table 8). There was no specific season under which products were collected but only when need arose.

Table 8: Gender that collected the products

Gender collecting	Frequency	Percentage
Female	16	32.65
Female and children	8	16.33
Male and female	18	36.73
Male	6	12.24
N/A	1	2.04

Availability of Products in the Village

Among the products harvested, firewood ranked highest. Other products such as mwarubaini or neem (*Azadirachta indica*), Aloe vera and mdungu (*Zanthoxylum chalybeum*) were also preferred (Table 9).

Table 9: Products collected on weekly basis and the average amount

Product	Average amount harvested		Frequency
	KGs	L	
Aloevera	1.7	1	14
Mwarubaini	1.36	1.94	19
Passionleaves	0.5		2
pawpawleaves	0.5		1
Sodomapple	1		1
Firewood	6		1
Kahadamu		1	1
Mboho	0.5		3
Mboma	0.5		1
Mdungu	2.125	1	9
Mfumba	0.42		3
Miti ya kujengea	0.75		1
Mkode			1
Mkulu			1
Mlapini			1
Mlenda	0.67		3
Mridza			1
Mtsaje			1
Mtsetsere	1		1
Mushroom	1.22		37

Much of the products were collected near the homesteads (Table 10) while others were obtained from the forest and cultivated on farms. The mean distance from homesteads to where the product was collected from an average of 685 meters ranging from 50 meters to 3500 meters (3.5 Km) with a standard deviation of 889.6, and most reported there was no scarcity of products – 95.9%, during COVID- 19 period.

Table 10: Location where the products were collected and frequency

Where collected	Frequency	Percentage
Cultivated field	11	22.45
Homestead	43	87.76
natural forest	13	26.53

The forest products were predominantly from the forest edges (75.5%) and forest margins 59.2%. (Table 10). Most respondents (83.7%) felt there was no decline in availability of the product during and pre-COVID-19 period. However, this is not reflected in the data trend observed in products such as firewood and medicinal plants.

Forest Product Utilization

Firewood ranked first in usage with an average of 9.9 kg with a range of 1 to 113 kilograms with standard deviation of 17.5. Other forest products used include various vegetable, medicinal plants and wood products (Table 12) which are collected when need arises and as much as is needed. Many respondents felt the products were important culturally - 81.6% and for maintaining the ecology – 36%. Most were culturally important due to their medicinal value for treating various illnesses in the community.

Processing of Products

The highest number of respondents (95.7%) practiced preservation of products collected (Fig, 4). The average of the amount preserved was 3.9 kgs (table 13) ranging from 1 to 20 with a standard deviation of 3.

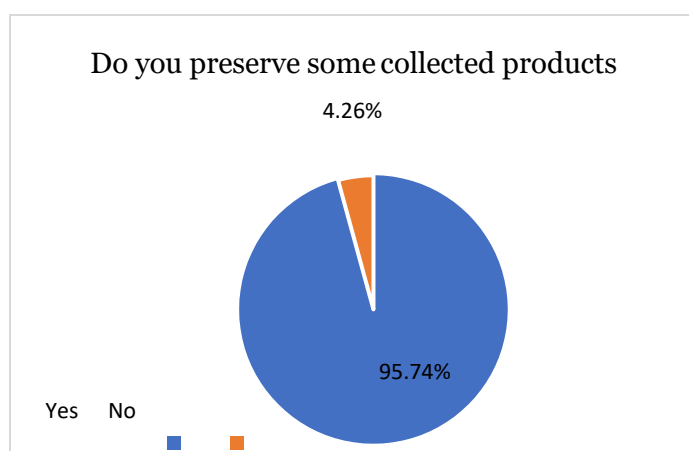


Figure 4: Those that preserve some products

IMPACT OF COVID-19 ON SCHOOL CHILDREN

The Young Generation Involvement with the Sacred Kaya Forest Site

The sacred forests are threatened by cultural erosion caused by elimination of the Kaya Elders and lack of interest by the younger generation and the notions that anything indigenous is backward. The project undertook a brief survey on the younger generation of below eighteen years old with parental consent. The objective was to determine if they have visited the sacred Kaya Kauma forest and the river Nzovuni that runs on the edge of the forest. They were to give reasons on why they had been there or if not, why they had not been to the site. Additionally, they were to give information of how they used their time during the school closure period during the COVID-19 pandemic. It was interesting that only 19% of these young people had visited the forest (Figure 5).

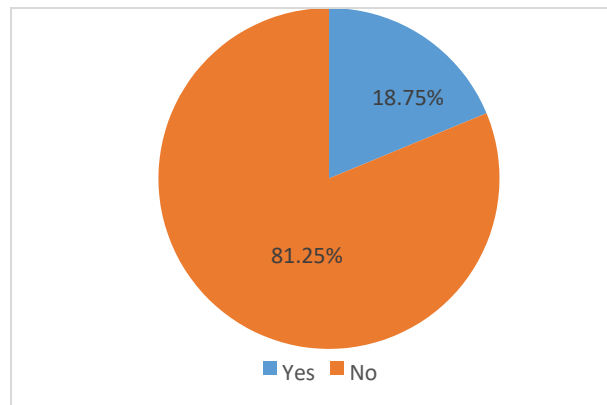


Figure 5: Percentage of young people who had visited the sacred Kaya Kauma forest

Those who had visited the forest gave varying reasons with majority, 33 % saying that they went to the forest to see animals while majority (77%) of those who had not visited the forest said they were not allowed Table 11.

Table 11: Reason for visiting

Reason for visiting		Reason for not visiting	
Learning	16.7%	Fear	26.9%
Learning about trees	16.7%	Not allowed	76.9%
Looking for fruits	16.7%	Still young	11.5%
School trip	16.7%		
To see forest animals	33.3%		

On the visits to the river Nzovuni, all the respondents had been to the river and swimming was the main reason for visiting the river followed by fishing. Nzovuni river is a rich natural aquatic resource harboring wide diversity of fish, crabs, prawns, frogs and insects which are a major source of livelihood and other ecosystem services.



Children at river Nzovuni



A boy cleaning his feet at river Nzovuni



Children from fishing from Nzovuni river holding a container with fisheries



Children's collection of prawns, fish and crabs from Nzovuni river

The children had various ways in which they spend their time during the COVID-19 Pandemic extended school closure period. Majority of them spent time reading books. Nature walks were not among the most often activity for their time as shown in Table 12.

Table 12: activities that young generation used time on during the COVID-19 Pandemic school closure period.

Activity	Extremely often	Most often	Slightly often	Less often	Least often	Rarely
Time on farm work	9.4	25.0	34.4	12.5	18.8	
Time readings books	62.5	34.4	3.1			
Time on online classes	18.8	28.1	9.4	3.1	3.1	37.5
Time on rest at home	3.1	3.1	9.4	18.8	12.5	53.1
Time on house chores	6.3	6.3	25.0	25.0	31.3	6.3
Time on nature walk		3.1	18.8	40.6	34.4	3.1

The Younger Generation Need for Interaction with the Environment

In an earlier survey, it was interesting to note the disconnect in generations response to the forest, whilst to the older generation, the forest was everything and revered, to the younger generations, there was little attachment to the forests. Although desirable that all sit around fire and the elders and the youthful generations share their stories about nature, time and space may not always allow it. To bridge the knowledge gap, initiatives to guarantee that the natural heritage lives on with generations, the younger generation need to be well informed on biodiversity and role in livelihoods and the environment. As the students learn how ecosystems function and about environmental action strategies that contribute to their maintenance, they will develop more environmentally responsible behaviors. The questionnaire results indicated that 94 % of the younger generation interviewed strongly liked a school with a clean playground, and 56% percent of them liked a school compound with many trees as shown in Table 13.

Table 13: The details on the type of school compound liked by the respondents

	Strongly like	Like	Slightly like	Slightly dislike	Dislike	Strongly dislike
School compound Clean playground	93.8	3.1	3.1			
School compound green grass		12.5	62.5	18.8		6.3
School compounds many trees	3.1	59.4	9.4	25.0	3.1	
School compound less trees		12.5	6.3	18.8	43.8	18.8
School compound with animals' insects		9.4	18.8	28.1	31.3	12.5
School compound without animals' insects		3.1		9.4	21.9	65.6

These results indicate a need to interest the younger generation into conservation initiatives so as to conserve the rich heritage that sustains and conserves life and a healthy natural environment in the Kaya Kauma landscape. The project undertook to start the establishment of pollination and food security gardens for awareness creation in young peoples' minds in order to stir interests in conservation and to arouse a sense of appreciating/enjoying nature. Four institutions of learning that are located adjacent to the sacred Kaya Kauma forest are involved. They include three Primary Schools (Jaribuni, Mitangani, Juhudi) and Jaribuni Vocational Training Institute. The four institutions were supplied with fruit tree seedlings and insect food plants for the gardens.

Future Outlook

The questionnaire results have highlighted interesting results and there is need for further action in schools. Nature based activities will need to be introduced in the various clubs. Additionally, more research to record implications of the pollination and food security garden environmental awareness on the young generation. How important will it be on the cognitive, emotional, and physical appreciation of nature and particularly the kaya forest. Some research has shown that early childhood experiences in nature significantly influence the development of lifelong environmental attitudes and values, thus at Kaya Kauma, the younger generation should be put on board for the survival of the heritage.

NATURAL HERITAGE FEATURES

Introduction

Kaya forests are protected through long-standing local community rich and environmentally friendly traditions, taboos, beliefs and cultures. A 7-day biodiversity survey was undertaken in Kaya Kauma between 28th October and 4th November of 2020. The survey focused on five taxa: Birds, mammals, amphibians and reptile, terrestrial invertebrates and aquatic fauna and the status of floral community. The survey results for the each component are summarized here while a separate full technical report has been prepared separately.



Biodiversity documentation research team

BIODIVERSITY: FAUNA

Birds

Kaya Kauma forest harbors a number of range restricted species of birds and is also a significant stop-over and dispersal site for intra-African and Palaeartic migratory bird species. During the current survey undertaken (28th October and 4th November of 2020) an expedition was conducted in the forest fragment with the aim of updating the existing ornithological knowledge and improving biodiversity conservation awareness among the residents of Kauma.



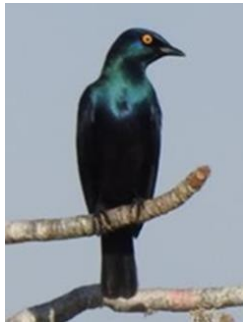
Greater Blue-eared Starling *Lamprotornis chalybaeus*



Fischer's Turaco, *Tauraco fischeri*

Timed species Counts (TSCs) and mist-netting was used to estimate the relative abundance and species diversity in different habitat types. Scientific birding was used to augment the species list of the area. Overall, seventy-three (73) species of birds from thirty-two (32) families was recorded as compared to seventy-four (74) species from thirty-six (36) recorded in November 2018. A combined bird species list of the two surveys, puts the species richness of Kaya Kauma forest at seventy-five (75) birds' species. In the survey, two (2) species are listed as threatened in the International Union for Conservation of Nature's (IUCN) Red List. Sokoke Pipit *Anthus sokokensis* is classified as endangered while Fischer's Turaco *Tauraco fischeri* is Near Threatened.

One (1) more Near Threatened species, the Southern Banded Snake Eagle, *Circaetus fasciolatus* recorded in the previous survey brings to a total of three (3) species in the IUCN Red List. We recorded seven (7) of the thirty (30) species restricted to the East African coastal forests endemic bird area. They include: Sokoke Pipit, Fischer's Turaco and Black-bellied Starling.



Black-bellied Starling, *Lamprotnis corruscus* Female and male Trumpeter Hornbill *Bycanistes bucinator*, near Nzovuni river.

These three species, including Southern Banded Snake Eagle, *Circaetus fasciolatus*, recorded in the previous survey, qualify Kaya Kauma forest system as an Important Bird Area (IBA).

Eleven (11) species were migratory, and three (3) of them, Common Buzzard *Buteo buteo*, Eurasian Golden Oriole *Oriolus oriolus* and Barn Swallow *Hirundo rustica* were long distance Palaearctic migrants. Further two (2) additional migrants namely; Northern Carmine Bee-eater, *Merops nubicus* and Eurasian Bee-eater *Merops apiaster* were recorded in the previous survey. Three (3) species were water birds occurring along Nzovuni River and the riparian gallery forest alongside it. Among the terrestrial birds, three (3) were forest specialists. These were: Black-headed Apalis

Apalis melanocephala, Sokoke Pipit *Anthus sokokensis* and Olive Sunbird *Cyanomitra olivacea*.

Kaya Kauma forest is contributing significantly to global and regional avian diversity. However, the site is facing a myriad of immediate and imminent threats such as sand mining, slashing and burning for agriculture, infrastructure development as well as the increasing population of the invasive House Crow. Protecting this fragile ecosystem calls for a fully integrated conservation and management program involving the local Kauma community, the county and national governments and non- governmental organizations. This program should include regular avian surveys, promoting avian tourism and involving locals and school children in the Kaya cultural and environmental activities.



The habitat is threatened by clearing of land and sand harvest (Photo Musina)

Mammals

Small and mediums sized mammal species were inventoried in Kaya Kauma forest, in order to document small and medium sized mammal species occurring in the forest as well as threats faced by them and their habitats. Small mammals were captured with snap traps and mist-nets. We also recorded mammals in/directly by search for signs and individuals of mammals along selected transects. A total of 12 mammal species of five mammal orders were recorded including Macroscelidea (elephant shrews) one (1) species, Primates species four (4), Rodentia (rodents) species two (2), Chiroptera (bats) species four (4), Cetartiodactyla (even toed-ungulates) one (1) species. All mammal species were not threatened. One of the primate species; Pousargues's monkey *Cercopithecus m. albotorquatus* monkey is near endemic to the north coast of Kenya. Thus, although, the size of the Kaya Kauma is still small, over the years with limited protection, it has still retained trees canopy and bushes which can sustain the survival of this primate species.

To enhance the conservation of mammals in Kaya Kauma forest the following recommendations are made:

- 1) More mammal surveys especially with camera traps to document nocturnal and most of shy mammals which would not be sighted during this survey;
- 2) More patrol and management of the forest is needed to maintain and enhance its current habitat condition
- 3) Train the representatives of local community in nature and culture interpretation to tourists to enhance appreciation of the value of the forest to local people
- 4) Create awareness on tree planting and establishment of woodlots to provide building materials and firewood to individual households, and reduce dependency on the exploitation of the forest products from the Kaya.

Amphibians and reptiles (herpetofauna)

A total of 142 individual amphibians and reptiles comprising of 26 species (8 amphibians and 18 reptiles) were recorded in Kaya Kauma forest and its surroundings. These comprised 8 amphibian and 10 reptile families. Twenty-five species (7 amphibians and 19 reptiles) were recorded using both Time limited survey (TLS) and opportunistic searches while a single species, *Hemisus marmoratus*, was collected through pitfall trapping. More species were recorded in the forest edge (18), followed by the farmland (12) and forest transect (8). Combined, more amphibians and reptiles' individuals were recorded in the farmlands 52 (31%) and least in the forest 17 (12%). The herpetofauna assemblage of Kaya Kauma consists of both coastal forest endemics and wide spread species inhabiting various habitat types. Nine out of the 26 (34.62%) herpetofauna recorded were coastal endemics. These include; amphibians, *Chiromantis xerampelina*, *Xenopus muelleri*, *Phrynobatrachus acridoides*; reptiles, *Lygodactylus mombasicus*, *Philothamnus punctatus*, *Leptotyphlops macrops*, *Lethiobia swahilica*, *Lethiobia lumbriciformis* and *Afrotyphlops mucruso*.

The diverse amphibians and reptiles found in Kaya Kauma can be used non- consumptively to enhance the resilience of the local community. A reptile park can be constructed at appropriate area within Kaya Kauma where visitors can pay to enter the park and the money from the establishment can be used to enhance the resilience of the local community. A snake Park within the areas can also serve as a resource center that can provide information on snake bite management. Such information when made available in the local language can go a long way in reducing cases of human – wildlife (Snake) conflicts in the area. Therefore, it is recommended that:

- 1) More studies targeting the wet season;
- 2) Increased sampling efforts such as digging for burrowing amphibians and reptiles;
- 3) Community awareness on identification of venomous snakes and snakebite management;
- 4) There is a need to investigate the impacts of anthropogenic activities on forest edge herpetofauna more especially on the side neighboring River Nzovuni.





Terrestrial Invertebrates and Aquatic Macro – invertebrates

Terrestrial invertebrates and the other on aquatic macro-invertebrates were collected using different methods namely pitfall, baited butterfly traps, pan traps, sweep netting, timed searches and aquatic nets. A total of 7,198 individuals of invertebrates comprising of 415 species were documented in four different habitats; forest, forest edge and surrounding farmlands and river Nzovuni in Kaya Kauma forest. The 415 species consisted of 362 terrestrial and 53 aquatic species. Of the 7,198 individuals, 4,927 individuals were terrestrial while 2,271 individuals were aquatic. Among the aquatic group the most abundant species group were the decapods (prawns and crabs) and hemipterans with 724 and 393 individuals respectively followed by aquatic snails with 281 individuals while the least abundant groups were represented by Hirudinae (leeches) and Araneans (spiders) represented by 6 and 7 individuals respectively.

The documentation for terrestrial species was as follows; 1,489 individuals in the forested area comprising of 187 species, 1063 individuals in the forest edge comprising of 174 species, and 2,375 individuals in the farmlands comprising of 185 species.

The presence of aquatic species of moderate water quality indicators in river Nzovuni such as the prawns and shrimps such as *Macrobrachium rude*, *M. dolichodactylus* and *Palaemon debilis* with a water quality index of 10 which borders the upper most least tolerant to pollution species index of 11 suggest that the water is of moderate water quality and local community are encouraged to boil the water before drinking. Others include the dragon fly larvae *Aeshnidae* sp. with water quality index of 8. The recording of 53 species of aquatic invertebrates and fish suggest that this river is an important habitat that needs to be conserved.

The documentation of 5 species of fish and 3 species of prawns and crabs that are of commercial value underscores the need for promotion of aquaculture of these species to ensure their conservation as there appear to be no management plan of this fishery in river Nzovuni since it is a free access resource. This will go ahead in improving livelihood support in particular the vulnerable group such as women who cannot be able to do the manual fishing.

	
<p>Fishing in river Nzovuni</p>	<p>Edible freshwater crab <i>Varuna litterata</i></p>
	
<p>African Catfish from Nzovuni river (<i>Clarius gariepinus</i>)</p>	<p><i>Fish from Nzovuni river</i> (Gobid fish <i>Awaous aeneofuscus</i>, <i>O.spirulus</i> and <i>M.rude</i>)</p>

A new beetle (Family Chrysomelidae, Genus *Cassida* sp.) record was documented from this survey.

The recording of 25 species of terrestrial molluscs suggest their importance in ecosystem services of nutrient cycling. Additionally, there is need to promote their commercial value as ornamental shell trade by making beads using casts as opposed to use of real specimens of the colorful snails found at Kaya Kauma e.g., *Trochonanina* sp., *Edourdia* sp., *Rhachistia* sp., *Rhachis* sp., *Gullela* sp., among others.

Most of the invertebrate species documented during this study provide ecosystem services which included; important food sources and fisheries, some are predators, scavengers, pollinators, biological control, decomposers/nutrient cycling, parasites, pests, disease transmission, water quality indicators and potential ornamental shell

for trade and sources of lime. Some species play more than one role suggesting that the higher the number of species offering particular ecosystem services the greater the impact on the environment.

There was evidence of environmental degradation where the locals were observed cutting

down dry trees and collecting dead old tree logs therefore threatening survival of those invertebrates that are dependent on those logs for breeding and nesting. Other human activities included cultivation upto the river bank which resulted in river sedimentation but also reducing the invertebrate habitat and provision of shade to the river bank. There was remarkable infestation of crops by agricultural pests thus affecting the quality and yield of crops hence post-harvest losses. Low butterfly diversity was recorded in 2020 as compared to 2018 survey, this could be attributed to low floral resources as most plants were not in flowering season. The forest harbors coastal endemic butterfly species, *Acraea rabbaiae* (Clear wing Acraea), *Acraea satis* (Coast Acraea), *Graphium kirbyi* (Kirby's swallowtail) and *Baliochila minima*, (Minimal buff), *Neptidopsis fulgurata* (Malagasy sailer), and *Graphium philonoe* (White-dappled swallowtail).

Moving forward there is need for continuous ecological monitoring during wet and dry seasons since some species are important bio-indicators of environment for long term management and monitoring programmes in ecosystems (such as the butterfly species). Creating awareness and training the local communities on better ways of utilizing natural resources within the ecosystem focusing on aquaculture for increased fisheries production using climate smart technologies, ornamental shell trade using casts of snails instead of the real snail specimens to make colourful beads for necklaces and additionally continued promotion and strengthening of insect-based enterprises such as butterfly farming, bee keeping and silk farming.

Future Outlook

The rich fauna diversity present new alternative opportunities to sustain livelihoods and generate income to alleviate pressure on the sacred forest. Eco-tourism as a major enterprise targeting the larger urban population from the fast-emerging coastal towns and tourists along the coastal region. Training the local community in both formal and informal platforms to support the opportunities such as bird, mammal, insects, amphibians and reptiles. It also presents an opportunity to academicians and researchers to visit and discover nature and provide solutions to emerging issues in food security, health, water resources, climate change and restoration of other ecosystem services such as habitats for other biodiversity, culture and recreation.

However, the site is facing a myriad of immediate and imminent threats such as sand mining, slashing and burning for agriculture, infrastructure development as well as the increasing population of the invasive species such as the house crow and insect pests like the fall army worm. Protecting this fragile ecosystem calls for a fully integrated conservation and management program involving the local Kauma community, the county and national government agencies and non-governmental organizations. This program should include regular faunal surveys, promoting eco- tourism and involving locals and school.

PLANTS OF KAYA KAUMA FOREST

Kaya Kauma forest is a semi-deciduous fragment in the Zanzibar-Inhambane phytochoria. The forest is situated on a hill top sloping to the river Nzovuni on the western side and it was once an important water catchment area supplying water to Kilifi town. The once expansive forest is now reduced to 100 acres and the forest is surrounded by farmlands, villages and development features.



Kaya Kauma forest



Bracystegia (Mrihi) tree at the Polytechnic



Baobab tree



Coconut farmlands



River Nzovuni



Maize farming at homesteads

Whereas iron ore mining was abandoned, pits are still visible and gulley soil erosion features are at the edge of the forest and along the road towards river. The forest is supposed to have only one entrance and a path across the forest leading to one exit, however, other newly formed pathways into the forest are evident.

Soil erosion features and surface covered with Iron ore particles. Some of the iron ore pits caused soil



erosion resulting to deep gulleys.



A survey was conducted during the COVID-19 period in November 2020 at Kaya Kauma forest to assess the status of plant species. Eight (8) transects/Quadrants of 20 meters by 500 meters were laid with spacing of 200 meters apart; one (1) on the farmland and seven (7) transects in the forest. Three (3) transects were laid on the East of the Kaya gate, (1) on the North Eastern part of the forest, (1) on the North of the Kaya and (2) transects on the North Western side of the forest. The tree species recorded on the farmland were twenty (20) and all except *Adansonia digitata*, *Vanilla roscheri*, *Adenium obesum*, *Azelia quanzensis*, *Sterculia africana* were restricted to this site.



Plant species of Kaya Kauma forest (*Alloe kilifiensis*, *Adenium obesum*, *Vanilla roscheri*) respectively

A total of sixty four (64) plant species were recorded on forest transects laid on the East gate of the forest, twenty one (21) species noted on the North Eastern side of the forest, the Northern side had twenty three (23) species and seventeen (17) species were recorded on the North western part of the forest. All plant species were common except *Teclea tracocarpa*, *Dalbergia vaccinifolia*, *Nectaropetallum kysnerri*, *Carpolobia goetzei*, *Calatropsis procera* which were restricted to the East gate of the Kaya Kauma forest. *Colar minor*, *Memecylon fragrans*, *Buxus obtusifolia*, *Carrisa tetramella*, *Pentas bussei* and *Vittelariopsis kirkii* plant species were only found on the North Eastern and on the North Western part, the orchid species *Aerangis kirkii* and *Aerangium dives* were restricted to this site.

Some of the common tree species across the transects were *Aloe kilifiensis*, *Cynometra webberi*, *Cynometra suahelensis*, *Adenium obesum*, *Encephalatos hilderbrantii*, *Croton pseudopuchellus*, *Lannea schweinfurthii*, *Uvaria acuminata* among others. Endemic and rare tree species such *Buxus obtusifolia*, *Vitellariopsis kirkii*, *Aloe kilifiensis* and *Colar*

minor were also noted. Four (4) out of the sixty-four (64) tree species found at Kaya Kauma forest were exotic namely *Azadirachta indica*, *Annona squamosa*, *Annona muricata*, *Annona senegalensis*.

Out of the sixty-four (64) tree species recorded at this site, fifty-one (51) were found to be useful. The usefulness in some plant species were multipurpose while others served only one role. They included; fruit plants (10), medicinal (6), food plants for butterflies (10), bee forage plants (17), ornamental (34), construction purposes (4), bead making (4), vegetables (2), fencing (1) and moth plants (2).

The fruit plants were either in the forest, domesticated, naturalized on farm landscape or both. They include, species on farm such as *Mangifera indica*, *Annona squamosa*, *Annona senegalensis*, *Annona muricata*, *Thilachium thomasiana*, *Maerua triphylla* and *Tamarindus indica*. The species still harvested from the wild were *Uvaria acuminata*, *Landolphilia kirkii* (Forest) and *Meyna tetraphylla* from the forest and *Adansonia digitata* harvested from the forest and farmland. The most commonly used medicinal plant species recorded were six; namely *Pentas bussei*, *Trichalysia ovalifolia*, *Achyrothalamus marginatus*, *Uvariadendron kirkii*, *Myena tetraphylla* and *Azadirachta indica*.

A total of Ten (10) plant species were associated with butterflies whereby they lay eggs on leaves of some plant species, they forage on the leaves and suck nectar from the flowers of these plants. The plant species include: *Toddaliopsis sansibarensis*, *Pentas bussei*, *Trichalysia ovaklifolia*, *Cassia abbreviata*, *Croton pseudopuchellus*, *Maerua triphylla*, *Uvaria acuminata*, *Annona squamosa*, *Annona murocata* and *Calatropis procera*. Only two (2) tree species noted to be moth plants and one species useful for live fences included; *Ozorea obovata*, *lannea schweinfurthii* and *Euphorbia tirucali* respectively.

A total of seventeen (17) plant species associated with bee forage were recorded at the site. They include: *Manilkara sulcata*, *Vitellariopsis kirkii*, *Colar minor*, *Grewia plagiophylla*, *Grewia bicolor*, *Pentas bussei*, *Myena tetrapohylla*, *Trichalysia ovalifolia*, *Thespesia dani*, *Dabergia vacciniifolia*, *Acacia brevispica*, *Euphorbia nyikae*, *Nectaropellatum kysneri*, *Terminalia sopinosa*, *Combretum schumanii*, *Euphorbia turicali* and *Thillachium thomasiana*.

Ornamental plants were recorded in the Kaya Kauma forest with a total of thirty-four (34) species namely: *Carpolobia goetzei*, *Majidea zanguebarica*, *Encerphalatos hilderbrandtii*, *Cissus rhotundifolia*, *Ochna thomasiana*, *Vanilla roscheri*, *Aerangis kirkii*, *Aerangium dives*, *Thespesia dani*, *Memecylon fragrans*, *Abuliton mauritanium*, *Hibiscus* spp., *Gyrocarpus americanum*,

Erythrina, sacleuxi, Cassia abbreviata, Euphorbia nyikae, Nectaropetalum kysnerii, Vernonia hildebrandtii, Terminalia spinosa, Terminalia pruionides, Thilachium thomasiana, Dalbergia vacciniifolia, Milletia usambarensis, Commiphora lindensis, Asperagus sp., Adenium obesum, Dracaena sp., Aloe kilifiensis, Asperagus aff. setaceus, Sansiviera sp., Kleinia abyssinica, Carrissa tetramella, and Calatropis procera.

Four (4) common tree species recorded for construction purposes include: *Cynometra webberi, Cynometra suahelensis, Combretum schumanii* and *Terminalia spinosa*. In addition *Jacquemontia tannifolia* and *Cucurbita* sp. are some of the plant species used as vegetables, and the species *Sterculia Africana, Afzelia quanzensis, Majidea zanguebarica* and *Combretum ilarii* although used for construction, the seeds are also used for making beads.

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>Azalia 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 saclexii</i> Lam. ex DC	Fabaceae	Tree	Near threatened
<i>Memecylon fragrans</i> A.Fern. & R.Fern	Melastomataceae	Shrub	Vulnerable
<i>Ozoroa obovata</i> (Oliv)R\$ A Fernandes	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

Variety of indigenous plant species of Kaya Kauma forest





Indigenous ornamental plants species of Kaya Kauma

NATURE AND CULTURE-BASED ENTERPRISES

The diversity of natural and cultural resources at the Sacred Mijikenda Kaya forest heritage sites can be harnessed to support enterprises to cushion the adjacent communities from adversities such as the COVID- 19 pandemic. Hence through the German Commission for UNESCO fund, the National Museums of Kenya was able to mitigate impacts of the COVID-19 epidemic by introducing nature and culture- based enterprises for resilience of the sacred Mijikenda Kaya forests sites. The three types of enterprises selected to support livelihoods at the sites were:

- Plant based enterprises
- Insect Based Enterprises
- Culture based enterprises

Plant Based Enterprise

This enterprise encompasses experiential training on best plant nursery practices and profitable homestead farming. Demonstrations farms and nurseries were installed at Zunguluka and Muhoni sites adjacent Kaya Kauma heritage site forest, for plant multiplication and seedling nurseries.



Zunguluka Farm



Muhoni Farm



Tree Nursery at Muhoni farm

Introduction

There is an increase in demand for plants for food, medicine, building materials, furniture, firewood and charcoal, ornamental and decorative purposes, restoration and rehabilitation of degraded lands, capture and purify water, soil conservation, habitats of other biodiversity, moderation of climate, increasing pollinators and forage and fodder plants. The gene pool of domesticated plants is increasingly narrowing and more prone to climate change challenges such as diseases, drought and floods. The existing forests can no longer support these uses. The severity of over-harvesting plant-based forest products is particularly pronounced during the COVID-19 period. Alternative interventions to sustain these needs simultaneously alleviate pressure on the forests exist. The introduction of plant nurseries and homestead farms is vital for sustenance of livelihoods concurrently alleviating pressure on forest resources and hence, enhancing resilience of the heritage site.

Plant based enterprises comprise of nurseries for seedlings to be used on-farm and homestead, commercial forests, ornamental plants, habitat restoration and rehabilitation, conservation (botanic gardens), agricultural cash crops, vegetables and fruit crops. Nurseries are for commercial (wholesale or retail), self, and/or education purposes. Plants may be sold as seedlings from nursery beds like pepper and other vegetables, vines and cuttings, containers or as products of variety of plants from farms established around or close to the homesteads for wholesale or retail sales.

A good nursery and best farming practices guarantee healthy plants with high survival and high-quality products. Plant life is guaranteed by quality seeds, comparing the right plant species with the right place to plant and good plant management practices in a timely manner. Indigenous plant species are more suitable, attractive and resilient to their environments.

The plant-based enterprise training was conducted through experiential learning with trainees participating in the entire process of implementing the enterprises. The community groups participating in training belonged to the Kaya Conservation group, Zunguluka Farmers Association, Bahati B Women group, Lengo Barrier, Tereni Aganga and Youth Bunge.

Planting materials comprise of seeds and vegetative plant parts. Seeds of vegetables (pepper, pumpkin and Guards) exotic fruits (pawpaw, passion, annona, jack fruit), indigenous fruits (*Saba comorensis* (mabungo) and *Landolphia kirkii* (vitoria), tubers (vines of sweet potatoes), pulses (groundnuts, bambara groundnuts, pigeon peas and green grams), ornamental plants exotic species (*Cananga odorata*, *Delonix regia*,) and indigenous species *Mkilua fragrans*, *Erythrina secleuxii*, *Azelia quanzensis* *Encepharlatos hildebrandtii*, and *Brachystegia spiciformis*. Seeds are sourced locally from forest, farms, community land, seed centers and local markets.

Site matching is mandatory to guarantee survival of the seedlings at time of establishment at a site. The area has heterogeneous soils with the upper hillside of the heritage site characterized by soils rich in Iron and the lower side up to the river bank and *Brachystegia spiciformis* area highly sandy (Sossoni). The two demonstration sites are at the two sites with distinct soil types.

Pre-sowing treatment involves soaking seeds in hot or cold water, and either nipping, chopping or breaking the seeds. Activities include collecting seeds of different types of plants and placing them under the most appropriate treatment before planting.

Table 15: Seed treatment prior to planting

Species	Pre-treatment
<i>Ipomea batatas</i> (L.) Lam.	Sweet potato vines – direct planting of vines approximately 1 cm
<i>Passiflora edulis</i> Sims.	Passion fruit: Removal of pulp and sowing
<i>Cucurbita</i> spp.	Gourds seeds were sown directly (four types) into the soil (Vidonga, Ndere, Vimumunya, Mboko) –long
<i>Capsicum</i> spp.	Pepper – first sowing on a nursery bed and thereafter transplanting (Yellow, Red long and Red
<i>Carica papaya</i> L.	Pawpaw: Dried, soaked for 30-60 minutes before sowing
<i>Arachis hypogaea</i> L.	Goundnuts direct sowing
<i>Dialium holtzii</i> Harms.	Pepeta - Nipping seeds and soaking
<i>Adansonia digitata</i> L.	Baobob seeds soaked for 10 days and nipped at distal end
<i>Azelia quanzensis</i> Welw.	Mbamba kofi – Seeds are nipped at the distal end and soaked in cold water overnight

<i>Aloe kilifiensis</i> Christian	Seeds are sown on agar – direct sowing and transferred on pots
<i>Cajanus cajan</i> (L.) Millsp.	Pigeon peas (Mbaazi)
<i>Vigna subterranea</i> (L.) Verdc.	Bambara groundnuts
<i>Annona muricata</i> L.	Soursop – seeds are spwn directly
<i>Artocarpus heterophyllus</i> Lam.	Jack fruit – direct sowing
<i>Mkilua fragrans</i> Verdc.	Mlua
<i>Saba comorensis</i> (Bojer) Pichon	Mabungo- removing pulp by rubbing with sand
<i>Landolphia kirkii</i> Dyer ex Hook.f.	Vitoria – removing pulp
<i>Delonix regia</i> (Hook.) Raf.	Msikukuu, Mkayamba
<i>Encephalartos hildebrandtii</i> A.Braun & Bouché	Mtsapu
<i>Tamarindus indica</i> L.	Nipping and soaking in water
<i>Cananga odorata</i> (Lam.) Hook.f. & Thomson	Ylang Ylang

Indigenous and exotic germplasm for plant-based enterprises



Winged fruits of *Gyrocarpus americanus* *Combretum illarii*

Sterculia africana



Seeds and fruits of *Afzelia quanzensis*

Terminalia prunioides



Seeds of *Adansonia digitata* (baobab)

Dialium holtzii (Pepeta)

Bambara groundnuts



Gourds for food and decoration peanuts and grass seeds *Caesalpinia volkensii* seeds for bead work



Yellow and red Pepper on trays, Jack fruit in punnet square and Landolphia kirkii in nettings at Mombasa old town Market

Nursery Site Preparation

Depending on the type of planting material, different approaches are undertaken to clear the land without digging to prevent wash off of top soil, establishing mounds for tuber crops and groundnuts, small mounds for germination of small seeds such as pepper, and preparing pots for sowing tree seeds. The approach of sustainably collecting seeds of indigenous species must be adapted and alternative environmentally friendly potting containers are recommended.





Preparation of land and planting of demonstration sites

Homestead Farming Enterprise

The practice of homestead farming exists among communities living adjacent to the sacred forest, however, it is not profitable or optimized for subsistence and income generation. The most dominant crop on-farm is maize and some farms have cassava that grows very well. The cash crops are coconut mainly at the valley bottom although planting is being undertaken on the upper areas and cashewnut trees are extremely few. There is also planting of vegetables, few bananas and sugarcane at the valley bottom and scattered pawpaw trees along the river. The landscape closest to homesteads rarely has fruit trees and decorative plant species and there are few indigenous tree species deliberately left on farms. The dominant farming is mainly subsistence. Homestead farming enterprises encompasses profitable farming for business and subsistence on farms adjacent to homesteads. Therefore, the choice of plant species for the enterprise is important.





Finally, for the entire plant-based enterprises, activities include management practices; postharvest handling and hygiene; record keeping and taking note of information on markets and emerging issues. The table below shows the number of seedlings and estimated minimum prices at eight weeks after planting.

Table 16: number of seedlings two months after establishment and estimated minimum prices.

	Name of Plant Seedling		Nursery (River) No. of Seedlings	Cost per seedling (Ksh) Market prices
1.	Pepeta (<i>Dialium holtzii</i>)	Slow growing threatened indigenous species	24	70
2.	Ylang Ylang (<i>Cananga odorata</i>)	Highly commercialized exotic species – ornamental and perfume.	138	150
3.	Mkwaju (<i>Tamarundus indica</i>)	It is an exotic naturalized and widely used for flavors	75	70
4.	Baobab (<i>Adansonia digitata</i>)	It is an indigenous species vulnerable and used widely in the food industry and beekeeping.	7	70
5.	Mtsapu (<i>Encephalartos hildebrandtii</i>)	Highly commercialized ornamental indigenous species under CITES	24	300
6.	Mbungo (<i>Saba comorensis</i>)	An indigenous highly commercial fruit still collected from the wild.	58	70
7.	Vitoria (<i>Landolphia kirkii</i>)	An indigenous highly commercial fruit still collected from the wild.	4	70
8.	Sugar Apple (Tomoko) <i>Annona squamosa</i>)	Exotic naturalized widely commercialized edible fruits	32	70
9.	Fenesi (Jack fruit) (<i>Artocarpus heterophyllus</i>)	Exotic naturalized widely commercialized edible fruits	44	100
10.	Mkayamba (<i>Delonix regia</i>)	Exotic naturalized widely commercialized edible fruits	164	70
11.	Pilipili (<i>Capsicum</i> spp.)	Exotic naturalized widely commercialized edible fruits	100	70
12.	Mkilua (<i>Mkilua fragrans</i>)	An indigenous highly commercial indigenous high value ornamental and perfume plant species	3	150

Insect Based Enterprises

The project identified and opted to strengthen two Insect based enterprises, beekeeping and butterfly farming as promising sector for the improvement of the sacred Kaya Kauma forest adjacent community. These enterprises not only offer an opportunity for additional income generation but also other ecosystem services. The Sacred Kaya Kauma forest adjacent community is still in total dependence on nature for its survival, the insects provide key ecosystem services in effecting plant pollination for both on farm crops and wild flora thus ensuring a sustainable environment. The insect-based enterprises thus offer environmentally friendly livelihood options and that can help the community to enhance resilience to the effects of the COVID-19 pandemic.

Initiation of modern Beekeeping at Kaya Kauma forest

Beekeeping is an important component of today's strategies for sustainable agriculture and integrated rural development programmes. Beekeeping has significant growth opportunities making it a very strategic area of intervention in most of Africa where rural households are facing great challenges in terms of food security, climate change and the recent COVID-19 pandemic. Bees play a very important role in agriculture, contributing to pollination which increases quantity and quality of crops yield. Beekeeping also enhances environmental well-being through pollination services wild flora. Honey production chain diversifies rural communities' sources of livelihood, increasing their income opportunities, some making and selling the various materials required for the value chain. Beekeeping has a great potential for increasing income to support livelihood and is flexible enough to match any scale of operation by all, women, men and youth. It can be embarked on for various hive products including honey, wax, royal jelly, bee venom and propolis. The hive products are in demand both in local and international markets.



Trainees preparing Langstroth hives for use



Langstroth hives transportation



Bee yard at Muhoni

Beekeeping has been a tradition in most communities and traditions beekeeping skills are held in almost every society. Honey harvesting is a traditional activity among the Kauma people and the rich vegetation of the area offers great potentials for beekeeping. The products of the beehive, among which honey is the most known has been consumed by the families and sold in the local markets. Beehive products have also been used as medicines; honey is a traditional medicine in nearly all societies including the Kauma community. Despite the traditional honey harvesting skills, there is need to introduce modern beekeeping technologies to strengthen the beekeeping enterprise for sustainability. The project initiated modern beekeeping in Kaya Kauma by putting in place twenty (20) Langstroth bee hives that were set in two apiaries, each with ten hives. Additionally, modern beekeeping equipment including hive tools, smokers, bee suits, were purchased to support each apiary. A three-frame stainless steel manual honey processing centrifuge was also purchased modern to facilitate the processing of honey. Training the community in sustainable beekeeping practices does

not only contribute to the food security of the households, it can also raise awareness among the beekeepers about the importance of sustainable forest management. The project undertook capacity building sessions to strengthen insights into the ways in which bees and beekeeping contribute to the livelihoods, the essential role that bees play in nature and food production and providing the basic skills necessary to practice small scale sustainable beekeeping using the Langstroth bee hives and the associated beekeeping equipment.

Strengthening butterfly farming initiative at Kaya Kauma

Butterfly farming is an important income generating nature-based enterprise at the coast. The important biodiversity and cultural materials and practices presents a great opportunity for eco-cultural tourism for the larger urban population from the fast-emerging coastal towns and tourists along the coastal region. The high butterfly biodiversity in the forest (over 70 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 larval sages' forage (food plants). To strengthen the butterfly enterprise, the establishment of plant nurseries also targeted butterfly forage plants.

Capacity building for the insect-based enterprises

Lack of appropriately-skilled trainers is a major constraint in the advancement of beekeeping and butterfly farming. Additionally, appropriate methods for managing the target insect colonies, lack of appropriately insect farming materials and training possibilities add to the list of constraints to insect-based enterprises in most rural areas. For this reason, among others, farmers gain much by forming groups. The project aimed at training of trainers from groups that would train their fellow group members. To strengthen these two insect-based enterprises, community trainees consisting of 10 members, three (3) women, two (2) youth and five (5) men were trained. They represented the group members form Muhoni, Zunguluka, Mitangani and Jeza sites that are adjacent to the sacred Kaya Kauma forest. Familiarization tours were undertaken to Kaya Kinondo where a community-based group is undertaking honey bee keeping among other enterprises. They also had a visit to the neighboring

town of Malindi where they were exposed to three relevant experiences: a farmer who has successfully reared butterflies and kept honey bees for over twenty (20) years; the Kipepeo project which markets hive products (mainly honey and beeswax) and butterfly pupae for farmers living adjacent to the Arabuko Sokoke forest and the Hive Shop Limited that deals with beekeeping equipment and hive products. This was motivating to the community trainees as they realized the great potential in insect-based business. Other learning sessions for the beekeeping enterprise covered diverse topics including honeybee colony behavior, beekeeping equipment, colony inspection/management and hive products quality control. Two sites for the establishment of apiaries (bee yards) were identified for setting up of demonstration apiaries, at Muhoni and Zunguluka. During the experiential training, the first bee yard at Muhoni was established with 10 Langstroth hives. The second bee yard consisting of 10 Langstroth bee hives at Zunguluka was established by the trained members as part of the team building activity. At each site, a sunflower farm was established for additional source of forage for the honey bees. The necessary equipment were purchased to support the beekeeping enterprise.



Modern beekeeping experiential training at Kaya Kauma

The butterfly farming experiential learning involved activity schedules for events that helped the community to experience the diversity of butterflies in Kaya Kauma, their morphological features, and lifestyle. Practical survey tasks were assigned to trainees to assemble life history stages for target butterfly species, through observation of the host plants that the butterfly lay eggs on and the hatching caterpillar feed on. Butterfly caterpillars require specific plants for food and the butterfly farmers are raising plant

stock from cuttings, seedlings and seeds. Trainees were able to determine some of the butterfly host plants as female butterflies have sensory organs at the tip of the forelegs that they use to locate their specific food plants for egg laying and they fly drumming leaves with the fore legs and settling briefly to lay eggs once they locate the right plant. Obtaining the starting stock was done for some butterflies using baited traps for *Charaxes* species, and from field sampling with sweep nets to Adult butterflies' food includes nectar and juices from fermenting fruits to give them energy. By walking in the forest, forest edge and farmlands, the community members were able to observe the colors and shapes of the flowers that the butterflies visit for sucking nectar so that they grow more of them in their compounds. To motivate the butterfly farmers, a farmer to farmer learning event was organized to one of the already established Kipepeo farmer in Arabuko Sokoke forest.

Additionally, the manager of the Kipepeo butterfly farming project briefed them on the best practices for this enterprise, market requirements and other opportunities such other than the butterfly pupae for sale which include making of souvenirs and live butterfly exhibits to support eco-tourism in the site. Sessions on butterfly farming covered several topics including the equipment required, management of butterfly plants, butterfly pests and diseases/ management and post-harvest handling of pupae. A 50 m roll of shade net was purchased to support the butterfly farming enterprise.



Baited butterfly trap



Butterfly rearing cage

Marketing of Insect Based Enterprise Products

Beekeeping products

The widening range of applications for honey products is catalyzing the growth in the global honey market. Market Research Future (MRF) has recently published a report on the global honey market which reveals that the market will grow at 6.72% from 2017 to 2023. Medical use of honey will continue to expand business opportunities for manufacturers, unifying pharmaceutical production with honey production. Drugs containing honey are equipped with key trace elements having wound-healing properties. Hydrogen peroxide, methylglyoxal and other compounds that are present in honey can be used in production of antibiotic drugs, compelling researchers to devise more accurate studies on medical uses of honey. Effectiveness of honey-derived drugs will inflate its presence in healthcare measures across the world. Beekeepers in developing countries face constraints including problems arising because of the remoteness of the producers from suppliers, traders and technical advisers, the often- small volumes of products, and difficulties of honey packaging and marketing.

The Manager of the NMK Kipepeo Project at Gede Museum in Kilifi County addressed the community and assured them that the project is ready to assist in marketing of the hive products as they have done the same for beekeepers around the Arabuko Sokoke forest.



Mr. Hussein Aden , Manager at Kipepeo Project addressing the community

The manager emphasized that maintenance of honey authenticity is very important. Authenticity in terms of honey content, that is 100 percent real honey, thus ensuring zero contamination. He encouraged the beekeepers to take advantage of a second honey authenticity that concerns its description in terms of geographical and botanical origin to create a special niche for the sacred Kaya Kauma forest honey. Additionally, honey may have other categories for marketing such as comb honey. Organization of honey collection centers where beekeepers can bring their products, bulk up for marketing is also important as transport is a major constraint to most rural beekeepers. When significant volumes of quality honey are available in a collection centre, traders will travel to remote areas to purchase the product.

Butterfly Farming Products

The Kipepeo Manager informed the trainees of the butterfly pupae markets in the USA, United Kingdom, and Turkey. Additionally, there are local markets in Kenya, the main one being the Mombasa Butterfly House at Fort Jesus. Other upcoming markets include demand for souvenirs from butterfly products.



Euxanthe wakefieldi caterpillar



Euxanthe wakefieldi pupae



Adult *Euxanthe wakefieldi*



Papilio constantinus pupae



Papilio dardanus pupae



Adult *Papilio constantinus*



Adult *P. dardanus* sucking nectar from flowers

Future Outlook.

Due to the short duration of the project, the time did not allow for the project team to explore the entire beekeeping value chain and especially the area of secondary products such as the making of bee wax candles. Beeswax is a valuable product from beekeeping but its value is not yet appreciated in Kaya Kauma. Industrialized countries are net importers of beeswax, and the supply comes from developing countries. The Kaya Kauma beekeepers and other people in the community can create further assets by using honey and beeswax to make secondary products, such as candles, beauty creams, soap among others. Selling a secondary product brings a far better return for the producer than selling the raw commodity. Bees also generate other products (pollen, propolis, and royal jelly) that can with proper training be harvested, marketed, and made into secondary products to further strengthen the Kaya Kauma people's livelihoods.

Culture Based Enterprises

Strengthening and upscaling of Culture based Enterprise

A cultural enterprise was established comprising of fifteen (15) members, three (3) men and twelve (12) women from existing local groups such as Baraka Women Group, Kaya Kauma Conservation group, Zunguluka farmers field school and Bunge network group. Through awareness and advocacy activities, the group gained knowledge through exposure to already established enterprises such as, a) Kaya Kinondo for weaving enterprises; b) Coast Forest Conservation Unit Ukunda for Nursery enterprises; c) Mida creek for bead work and mangrove nursery enterprises, d) Kipepeo Project at Gede Museums for bee keeping and butterfly farming enterprises and, e) Watamu 20 acre Tropical nursery plant garden.

Through six (6) days experiential learning, the culture-based enterprises members gained skills in weaving, bead making and pottery molding. In addition, the members also gained necessary skills into identifying raw material - mostly plant seeds, tools and various craft styles and methods. An assortment of cultural crafts or products including necklaces, earrings, and bracelets were produced (Fig 1A-f). Several bead-work items were marketed and sold to visitors during the implementation of the project and also to the project team from NMK. Pottery knowledge gained comprised identifying the ideal clay, processing, and pot molding and firing. Eight pots were molded, dried, and treated in a fire for hardening.

It was interesting to note that pottery has some cultural traditions attached to it from the digging up of the clay to the pottery itself. The trainer took time to explain the cultural traditions associated with it. She explained that any man or woman who had had sexual intercourse the previous night was not allowed or supposed to dig up the clay or be involved in the pottery process. Also, any woman who was on her monthly periods was not supposed to be involved in the process. Failure to adhere to these traditions and beliefs would lead to the breaking and cracking of the pots. She explained that this was an old age tradition which is being observed till today.



Pottery training



In addition, the group gained knowledge and information through awareness talk on governance systems and development of succession plans of the Mijikenda UNESCO Kaya forests. The expertise talk was presented by Professor Mashauri of Pwani University, Kilifi County.



Culture based enterprise members



An assortment of necklaces made by the group member



Trainer training group members on weaving



Basket made by cultural enterprise group members



Material used for weaving basketry



An assortment of neckless made by the group members

For continuity of the enterprises, a three (3) member's committee was constituted including Chairperson, Secretary and Treasurer were chosen to coordinate the affairs of the group in craft production and sales. The group established weekly meeting for continuation of the enterprise.

APPROACHES / INTERVENTIONS TOWARDS RESILIENCE OF THE SCARED KAYA FORESTS

Team Building

Kaya Kauma community is historically a gerontocracy society (a society where older men have authority over young men and both have authority over women). In the advent of modernity this has resulted to conflicts at all levels of interaction culminating to weakening of relationships by members of the community. This is evident between the elders and the youths as demonstrated by occasional killing of the elders on suspicion of witchcraft. The existing structure of Kaya Governance systems has no platforms of interaction between the elders and the youth. Although, nature and culture-based enterprises interventions are attractive to both elders and the youth and are able to some extent bridge the gap in relationships between the two generations, they have not integrated the two groups fully. The project therefore embarked on introducing team-building activities that brought together elders, youth, men and women to work together on the identified such as traditional hut construction, joint participation in familiarization tours, clearing of paths in the forest, bird watching and cultural walk combined with media interactions.

Hut Construction

In total there are five major areas allocated to the five Kauma clans represented by the five “Vigango” (Leaders of each clan and short sculpture of wife each). In each of the designated clan areas a traditional hut existed.



Kaya Elders standing at the “Vigango” that were largely affected by COVID -19 pandemic lock down

Three of the traditional huts except one collapsed and the hut under construction although destroyed during the COVID-19 lockdown, the frame was still in place and only needed renovations.

The hut structure is comprised of (a) Pillar (“Nguzo”) (b) “Mwamba” (c) “Mahalu” (d) “Mihambalo panya” (e) “Fiho” (f) “Nyasi”. The traditional huts are built of grass (Nyasi), and wooden poles (Kitonza). The roofing poles (Mwamba) are from a tree known as *Manilkara sulcata* (Mtesedzi) and Mfunda (*Cynometra webberri*) which host edible catapillars (Maungu).



Processes of traditional hut construction

The plant species used for construction of each part are: Nguzo (Kingpins) and Mwamba and Viguzo: *Manilkara sulcata* (Mtesedzi), *Cynometra webberri* (Mfunda), *Millettia usaramensis* (Muhambwa), *Terminalia prunioides* (Mutoro), *Brachylaena huillensis* (Muhuhu), *Grewia plagiophylla* (Mkone), murya mbuzi, *Manilkara mochisia* (mgambo), murya nyani, *Thespesia danis* (Muhoe), *Cordia monoica* (Musasa), “Muhalanda”, *Zanthophyllum chalybeum* (Mdungu-Mjafari) used for medicinal purposes. “Mwamba” is the main supporting pole for “Mahalu” (rafters). The rafters and “Mihambalo panya” are linked with the latter used to line up Mahalu on the inside. The species used for Mahalu are *Cassia abbreviata* (Muhambwa), *Terminalia prunioides* (Mutoro), *Brachylaena huillensis* (Muhuhu), *Grewia plagiophylla* (Mkone), *Croton pseudopulchellus* (Munyama wa Nyika), *Millettia usaramensis* (Muhumbwa), *Zanthophyllum*

holtzianum (Mdungu), “Murya nyani”, *Disopyros consulata* (Murya mbuzi), *Thespesia danis* (Muhoe), *Cordia monoica* (Musasa), “Muhalanda” – used when young as saplings.

The plant species used for Fiho (Fitoes) (Withers) are *Croton pseudopulchellus* (Muyama wa Nyika), *Cynometra webberi* (Mfunda), *Millettia usaramensis* (Muhambwa), *Grewia bicolor* (Mkone,) *Manilkara sulcata* (Mutsedzi) (*Afrocanthum kilifeiensis* (mufidzo), “Muhalanda”, *Manilkara sanisbarensis* (Mungambo), *Disopyros consulata* (Murya mbuzi). Grass (Nyasi) is used for thatching with the most commonly use namely Maondo (found everywhere), Mutsuchi (restricted to shrubland – “Ngamani”), “Mwamba nyama” (restricted to shrubland and ant hills) and Mkangaga (restricted to rivers).

After house construction, a ceremony is held to inaugurate the house (House warming) and the house is opened by slaughtering a goat or sheep and cooking in the new house to eat and celebrate with all members of the community. The clans represent five brothers and the sub-clans the sons with the locations of habitation from the eldest to the youngest in the family (table 17).

Table 17: Clans, sub-clans and founders of Kauma

Clan	Sub-clans	Founders
Mvitsa	Amwangala, Amwafondo, Amwachipa, Amwakubo and Amwadzala	Gohu Muhavi Nzamba
Adzundza	Amwakere, Amwaraju, Amwachizango, Akaiwe and Abwede	Mkurumbo mikirimbo – Kurumbo
Amombwe	Amwangua, Amwamaya Nyoka, Amwakoba	Mwamaya Nyoka
Adarari	Amwajefatune, Amwafondondezi and Amwakakuru.	Ndaa Tune Ndaa
Adzaka	Amwarome, Amwakogo, Amwambura	Musuko Shoka Masusko

The hut remaining intact belongs to the Adzakaa clan and the one under construction belongs to the Dzundza clan.

Bee Yard Construction

After the beekeeping training, the trainees were tasked through team work to establish a bee yard at Zunguluka site. The team worked together to locate a suitable site with key characteristics for a bee yard that include: shade, sheltered from strong wind, flat area that is easily accessible and away from homes and livestock. The team also cleaned the ten Langstroth hives and fixed bees wax foundations on the hive frames. The team then set the ten Langstroth hive brooderson trees for getting honey bee colonies from natural swarms. To emphasize on their good will the team contributed funds and purchased metal boxes for storing their beekeeping equipment. As beekeeping in most African societies is viewed as occupation for old men where the art is passed on from fathers to sons and as a result most beekeepers lack current knowledge and technical advancement in beekeeping. It was exciting to have Kaya elders, women and youth work together in this apiary building team activities. The Kauma community has no socio-cultural barriers against women keeping bees and with this kind of team work, proper training and proper modern beekeeping equipment, the women are determined to keep bees as well as the youth and men.



Youth, women and men transporting hives for natural honeybee swarm catching at Kaya Kauma

Bird watching

Bird watching Birds provide an excellent focus for conservation education and action. Some of the possible conservation actions include training locals in management strategies to mitigate the effects of fragmentation and degradation of the riparian gallery forests. Offering fundamental training to locals in ornithology including birdwatching has great tourism potential in the Kaya Kauma site.as the activity can provide a source of local employment and revenue generation. Kaya Kauma and the surrounding are potential birdwatching sites. During the survey basic training in mistnetting was offered to local assistants. Additionally, a session on bird watching was used for team- building. The NMK bird expert, the local research community guides, the kaya elders and the local youth shared their knowledge as they watched birds, listened to bird songs and shared their experiences. It was a very rewarding experience as the team recorded for the first time in Kaya Kauma the IUCN Red Listed Sokoke Pipit *Anthus sokokensis* which is classified as an endangered species.



During the survey basic training in mistnetting was offered to local assistant

Culture Walk

The culture walk was undertaken jointly with K24 media team that was able to record the traditional practices of walking down the path followed by a tour to the traditional hut and demonstration of family life in the hut and the items used for cooking, hunting, fishing and ceremonial items. The community performed a traditional dance with a special instrument played by women, “Kikwaria” singing the song “Katsungula”.



Visitor holding wooden musical instrument “Kikwaria”

GOVERNANCE PRACTICES

Governance Practices Leadership Hierarchy and Roles

To institute conservation and resilience of the sacred kaya forest, good governance is key. The existing governance structures are informal and there is no clear succession plan and management. Decisions on crucial matters concerning the community used to be a prerogative of members of council of elders and all clans were involved. This is not the case today.

The virtues used to qualify an elder for traditional leadership entails:

- One who is not a witch because then you cannot enter the shrine for prayers lest you are stricken by some powers.
- One who has perseverance
- One who does not grumble, grateful, trustworthy,
- One born without defects (i.e., a child born with teeth or born with legs first)
- one who has never stolen, never killed and has not committed adultery and is obedient.

The leadership of the Kaya is not determined by clan but by the virtues set up. These also apply to all elders appointed in the committee and women leaders. Non-compliant persons can still participate in construction of the hut and clearing of the paths but will not be allowed to access the holy place. You could be an elder even when you are married to another community, only your children will not have the same privileges. They can never be elders and neither can they perform traditional blessings ('*Kuhasa*'). An elder must sanctify themselves or not engage in sexual relations when going to the holy place.

Conflict Resolution

What causes the rift among community members is among others new generation religions which have caused the rift as they equate Kaya practices to witchcraft. This was not the case with the first missionaries when Ludwig Krapf was first received in the Kaya by the Rabai community, and later assigned by the elders a place outside the Kaya to build his house. The first missionaries allowed the traditional practices to continue and were helping the communities in the Kaya. The earlier missionaries had no objection with the community members to attend church in their traditional attire and still supports with funds for clearing the paths in the Kaya forest. The earlier days, even those who went to church would contribute towards Kaya ceremonies. This no longer happens. Any attempt for Kaya elders to request for a contribution is misunderstood for wanting to sacrifice the

contributor. The reasons given by members of the community who came into the Kaya forest for the first time after joining insect based enterprises, culture and plant based enterprises include: religious and education background and fear of being ostracised by the church upon associating with the sacred Kaya practices. Upon joining the enterprises and therefore coming into the forest, she was perceived to have backslided. Prior to coming into the Kaya forest, they all associated the elders with witchcraft. One of the members feared to associate with the Kaya forest after a family member was murdered for being associated with the Sacred Kaya. Customary law used in resolving conflicts no longer exist, neither religions and statutory law applied. Nowadays, such conflict among the Mijikenda community is resolved through "mob justice." Anybody suspected of being a *mtsai* (sorcerer) in these days, a gang of youth carry out instant justice through mob justice by lynching, burning such suspects or fatally attacking them at night which has become the norm.

To date, the governance practices continue to be of major concerns and introducing enterprises to improve livelihoods and alleviate pressure on the heritage sites will not succeed if this is not resolved. The state of governance practices was addressed during the implementation of this project to provide guidelines on the best governance practices although further strengthening of the governance systems is required.

Best Governance Practices

Governance practices and generational succession in the context of the sacred *kaya* systems: Case of *Kaya Kauma* By: Prof. Dr. Halimu Shauri;

Consultant Sociologist; Lecturer and Dean; School of Humanities and Social Sciences, Pwani University



The Speech/ Training

A: *Mijikenda* Greeting

Atsi Similani?

Mchisimila?

Ulonda Madzo?

Mahi-higo?

Mloga anji?

Mvula ya Peho?

Utsi Nmutsi?

Uchigomba? Uchigomba? Uchigomba

B: Heritage Wealth

Mijikenda Kaya Forests as UNESCO World Heritage Sites that are rich with resources: Belief systems of the community; Rich biodiversity; Diversity of livelihoods support for the community; Environmental services like water, wood, pollination, spirituality, soil erosion protection, climate mitigation and recreation. Kayas are homes to birds, mammals (monkeys, baboons), reptiles, insects, butterflies etc. Kayas are places for custody of indigenous plants species; they are homes for culture such as honour of the ancestors as represented by *Vigango*. *Kayas* are also places of history, rituals and practices.

Quote:

“...Kayas are centres of ecological sustainability in the face of environmental degradation, climate change and global warming and ...micro centres for community livelihood strategies”

Accordingly, there is need for good leadership and governance to ensure reconciliation of human livelihood needs and nature or biodiversity conservation in *Kaya Kauma*.

C: Sustainability of Kaya Kauma

Given the importance of the Kaya resources in support of livelihood activities of the community and biodiversity, it is crucial to ensure sustainability for the sake of future generations. In this regard we should as *Kaya Kauma* elders engage in **conservation** efforts for the *Kaya*, engage in activities that **building resilience** among the community members in the face of global forces of change to include climate change and global warming. Take charge of *Kaya Kauma* protection and control of its usage by the community.

D: Good Governance Practices

Kaya governance is about system of over-sighting the control and direction of the culture institution on behalf of the community. *Kaya*, elders are like directors in a corporation. *Kaya* governance involve leadership and decision making on behalf of the community, in this case *Kauma* people. However, we must emphasis on good governance of *Kaya Kauma*. Accordingly, good governance of *Kaya Kauma* will entail the way the *Kaya* will be controlled, directed and the elders or the leadership held to account.

Thus, governance is the way institutions, including *Kaya Kauma*, and their processes produce results that meet the needs of society, while making the best use of the resources at their disposal. Making good use of the resources at the elder's disposal is where there are challenges.

The Challenges:

“...these are due to high levels of **illiteracy** among the elders, **lack of capacity** to eke a **vision** for *Kayas*, including *Kauma*, **diffused and confused mission** for the *Kaya*, lack of **transparency and accountability**, **lack of support** to manage and direct the *Kayas* professionally and a glowing lack of **financial resources** to support *Kaya* programming.

The **10 major characteristics of good governance** include: it's participatory nature, consensus oriented, accountability, transparency, responsive, effective, efficient, equitable, inclusive, and compliance.

E: Importance of Good Governance

Good governance is the core or heart of successful enterprise and is essential for achieving objectives, drives improvement, maintains legal and ethical standing.

F: Pillars of Governance

There are several pillars that hold good governance. Any organization, including *Kaya Kauma* should not only take cognizance of these pillars but rely on them for ethical transformation. These pillars include: Following the rule of law, moral integrity, transparency, participation, accountability, efficiency and effectiveness

However, the million-dollar question is **“how to establish good governance for *Kaya Kauma*?”**

Attainment of good governance for *Kaya Kauma* is possible through ensuring that the elders include a mix of technical and managerial competencies in running the affairs of *Kaya Kauma*. They should inculcate among its top leadership organizational capacity and enhance their innovation, reliability, predictability and uphold the rule of law. They should not only be accountable and transparent but business must be conducted in a participatory and inclusive manner.

Once good governance is established in an institution, say **Kaya Kauma**; the next big question becomes **“what are the best practices of good governance for *Kayas*?”** As a result of instituting good governance in *Kayas*, say *Kauma*, then possibilities of building a competent council of *Kaya* elders becomes within reach,

alignment of strategies with *Kaya* goals becomes possible. Accountability and transparency are attained in the *Kayas*. There also grow higher levels of ethical conduct and integrity, which is one of the critical challenges in the governance of the *Kayas*. Another best practice is one of defining roles, duties and responsibilities, some of which cannot be delegated. There is also a possibility to manage a whole portfolio of risks associated with *kaya* forests.

G: Role of Governance

The major role of governance is to make decisions about the direction of the organization, in our case *Kaya Kauma*. Other roles include: The duties, which cannot be delegated such as decision making, budgeting, strategy, appointment of the chief elder and oversight.

However, the 4 P's of governance include: The People; Purpose; Process and Performance. This scheme should be applied in all community engagements with the governance of *Kaya*. However, good governance can also be improved by increasing diversity, especially in the organ, council of elders that make key decisions about how the *Kaya* should be administered. This can also happen by appointing competent members into the council. Ensuring information is circulated timely can also help a great deal. While these are key, more critical is prioritizing risk management and also evaluation of performance.

H: Succession Planning

Sustainability is one of the key tenets of agenda 2030 on the Sustainable Development Goals (SDGs). Key to *Kaya Kauma* good governance is its sustainability in line with transmission of *Kauma* culture and traditions from one generation to the next. Thus, transfer from one generation to the next of real heritage of know-how and skills acquired over the years of experience is key to the survival of the *Kauma* traditions and practices as a community.

Simply, succession planning is a strategy for identifying and developing future leaders or elders of *Kaya Kauma*. Succession planning is important because it helps prepare organizations, including *Kaya Kauma*, for all contingencies by preparing high potential members for take over and advancement.

The process of succession planning follows five easy steps: Identification of key

positions within the *Kaya Kauma* organizational structure. This is followed by a process of identification of capabilities in the membership or outside for the key positions. While this is the case, what is more critical is to identify interested community members who are willing to join *Kaya Kauma* governance structure and assess their capabilities. What follows then is the development of succession and knowledge transfer plans for the community and evaluation of the effectiveness of the process.

However, some ask whether succession planning is important for the *Kayas*. Indeed, yes because it makes organizations, in this case *Kaya Kauma*, to always have the right leaders or elders. By failing to create an orderly plan for succession, *Kaya Kauma* may not get a second chance if it doesn't adapt immediately after a key elder or player leaves the leadership of the council or passes on. That's why the first step in succession planning is to identify positions that are integral to the organization's success.

Whether some organizations need succession and others don't is a debatable argument, but pragmatics call for succession planning for all organizations, including *Kayas*. Thus, all organizations no matter their diverse sizes, needs a succession plan. However, you may not get people with certain capabilities in small organizations like the *Kayas*, but the mitigation is to cross-train.

Thus, I recommend *Kaya Kauma* elders to identify key positions and needs, develop job profiles and implement a recruiting initiative with a view of appointing a successor or successors and handover to the succeeding generation as the custodians of the *Kauma* heritage. It is important that all these processes are documented for prosperity and for future referencing.

MARKET STATUS SURVEY REPORT



Objectives related to Bead/ Craft work:

1. Determine the source of materials used for the craft work.
2. Identify the managers of the group (whether youth or women).
3. Identify their markets (within the county, country or overseas).
4. How Covid-19 has affected their business.
5. Identify who makes the crafts.
6. Determine whether the businesses are profitable or not.

Objectives related to nursery enterprises and farm produce:

1. Identify the types of plants grown (whether exotic or indigenous).
2. Determine the purpose of nursery (is it for landscaping, conservation or agricultural purpose?).
3. Determine the source of planting material (seeds or seedlings).
4. Identify the most preferred plants in their nurseries.
5. Get to know how long the business has been in operation.
6. Determine whether if the business is profitable or not?

7. Identify the challenges they face in their business
8. Determine how they raise their seedlings.
9. Determine the impact of COVID-19 on their business.

Objectives related to insect-based enterprise:

1. Identify their sources of products.
2. Identify their market.
3. Identify their set prices.
4. Determine the effect of COVID-19 on supply and market.

Methodology

This market survey was conducted over a two-day period on 27th and 29th October 2020 by our Youth in Conservation (YIC) team. Sources of information include one-on-one onsite interviews with prospect customers.

Every effort is made to provide accurate information and this information provided is “best available” on the day the data was gathered. Pictures were captured to give an insight of the existing nature-based enterprises within the region.

Table 18: Areas visited

Day	Place of Visit
Day 1: 27 th October, 2020	1. Mida Creek - Gede
	2. Msitu Women Group - Gede
	3. Kipepeo Project – Gede
	4. The Beehive – Malindi
	5. Malindi tropical plant nurseries – Watamu
Day 2: 28 th October, 2020	1. Rabai Curio Shop – Rabai
	2. Bombolulu Workshop - Mombasa

Culture Based Enterprises



Source of materials for the various craft work is from individual or community farms. The materials used are mostly from indigenous plants. However, there has not been any attempt to plant new ones. Such enterprises are in most cases managed by youth and women, who comprise the majority. The crafts are made by the youth and women with few elderly men practicing the art. Currently, market to their products is locally and mostly the target customers of the craft work has been both local and international tourists with a few community members. The business is mostly placed in touristic areas such as Mida Creek, Kinondo cultural village, practically the entrances

where visitors can have a look at the wide array of products while coming in and leaving the touristic sites. The business is said to be profitable. However, COVID-19 has affected business to some great extent as the number of tourist customers that they depend on has declined. Additionally, the restriction of movement has also played a part in reducing the number of potential buyers as people from other parts of the country or world could no longer tour the places of their choices.



Bead and Coconut items business at Mida creek and Rabai

Plant Based Enterprises in the market place



Mangrove Seedling Nursery



Commercial Nursery – Casuarina



Large nursery enterprise



Combination of culture and plant based business at Rabai and Watamu

Types of plants grown in most nurseries visited include *Casuarina equisetifolia*, *Eucalyptus saligma* (Blue gum), *Tamarindus indica* (Tamarind), *Grewia* sp. (Mkone), *Clausena anisata* (Kalimi ka pala) (indigenous), *Milicia excelsa* (Mvule), *Teclea trichocarpa* (Mbanje), *Carica papaya* (Papaya), *Annona muricata* (Tomoko), *Passiflora edulis* (Passion), *Adansonia digitata* (Baobab), Ashok, *Azelia quanzensis*, *Araucaria* (Msonobari), *Leuceana leucocephala*, *Senna siamea* (Mkilifi), *Terminalia catapa*, *Dalbergia melanoxylon* (Mpingo), *Gmelina aborea* (Mpesa), “Mahogany”, *Lonchocarpus bussei* (Msumari bara), palms, cape castenuts among others. The sole purpose of setting up the nurseries is mainly for income, to supply food plants for the people involved in butterfly farming and for general conservation purposes. During the visit by the Kaya Kauma community members, the Msitu women group members sold a large number of their *Clausena anisata* (local Kauma name: Kathimi ka pala) which is a food plant for the swallowtail butterflies (*Papilio*

species) that are among the species in high demand in the market and fetching good returns from sale of the pupae (Photo of women buying seedlings and the photo of seedling with butterfly pupae below). The planting materials used include seeds, wood shavings, recycled materials like cement bags, polythene pots and watering tank. The seeds are bought from KEFRI while the other materials are bought from agrovets around. The plant nurseries are diverse in their seedling products. The most preferred plants in most nurseries include Casuarina, Blue gum(*Eucalyptus saligma*) and Arborea or Mpesa (*Gmelina arborea*) because they fetch a good income. The Msitu Women Group and Malindi tropical plant nurseries in Gede started back in 2001 and 1993 respectively. Other tree nurseries in the area also have been grown for quite a long time. This gives an indication that the business is long-term as it is profitable. However, the managers of such nurseries claim that their profitability only happens when the season is good but not during the COVID-19. The main challenges faced by the tree nurseries owners, is mostly finding ready market for seedling and tough competition among nurseries in the country whereas planting materials such as the pots are expensive to buy. During the COVID-19 period, the seedling in most nurseries have overgrown because there were no buyers.



Community buying seedlings from women nursery enterprise for butterfly farming

Kaya Kauma community members selecting seedlings of Kathimi ka pala (*Clausena anisiata*) Papilio butterfly food plant to purchase and plant for butterfly enterprise support



A butterfly caterpillar on an indigenous plant species seedling

Seedling of Kathimi ka pala (*Clausena anisiata*) Papilio butterfly food plant with a *Papilio demodocus* caterpillar resting on the leaves.

Insect-Based Enterprise

The insect-based enterprises visited are those that deal with beekeeping and butterfly farming specifically, the Kipepeo project in Gede. The source of products depends on individual farmers Kipepeo project provides training and assists farmers in harvesting of beehive products. The project sells its honey and wax to hotels, shops, supermarkets and to local clients. Both wax and honey are currently sold at Ksh. 1,000 per kilogram. Due to COVID-19, the demand for honey has risen and the project has faced shortage in supplies. This presents a great opportunity for groups to strengthen and enhance beekeeping enterprises. The butterfly farming products have markets both internationally and recently locally at the Butterfly House at the Fort Jesus. Due to COVID-19, the closure of the air travel and lock down in the target countries, the pupae market has been affected. Other enterprises such as THE BEE HIVE in Malindi cited that they have been selling more honey during the COVID-19 period than ever before mainly for medicinal use such as relieving chest pain.



Butterfly and Bee farmer with plant nursery for butterfly farming

Conclusion

The Kenyan coast is endowed with wide array of nature-based enterprises. The youth and women have embraced the business as an alternative source of income as employment in the country is quite unreliable. The enterprises, which are mostly nature-based, are done individually with few cases where women groups, youth groups, collectively do the businesses and gender mixed groups. The target customers are mainly tourists (both domestic and international) and community members. From the interviews with the nature-based enterprises along the coast, the business is profitable, and market is readily available. However, most enterprises were heavily hit by the first wave of COVID-19 pandemic forcing some to quit and others to seek alternative sources of income. As such, there is need to promote locally made markets for the community. This would otherwise reduce overdependence on tourists as customers to most nature-based enterprises.

ANNEX:**Coastal Kenya Sacred Mijikenda Kaya Heritage sites**

(Source Coastal Forest Conservation Unit (CFCU) of NMK)

KAYA FORESTS OF THE KENYA COAST					
SN	Forest Name	County	Protected Status	Area (ha)	Vegetation Type
1	Kaya Singwaya	Kilifi	National Monument	10	Forest / woodland
2	Kayas Dagamura	Kilifi	National Monument	100	Forest/ woodland
3	Kaya Bura	Kilifi	National Monument	100	Forest / woodland
4	Kaya Bate	Kilifi	National Monument	25	Forest / woodland
5	Kaya Mayowe	Kilifi	National Monument	60	Forest / woodland
6	Kaya Chivara	Kilifi	National Monument	150	Forest / woodland
7	Kaya Fungo / Giriama **	Kilifi	National Monument	204	Forest / woodland
8	Kaya Chonyi	Kilifi	Forest Reserve	200	Highly degraded, enroached forest
9	Kaya Mudzimuvia **	Kilifi	National Monument	171	Forest
10	Kaya Chivara	Kilifi	National Monument	87	Forest
11	Kaya Jibana FR **	Kilifi	Forest Reserve	140	Forest
12	Kaya Kambe **	Kilifi	Forest Reserve	75	Forest
13	Kaya Kauma **	Kilifi	National Monument	75	Forest
14	Kaya Ribe **	Kilifi	Forest Reserve	36	Forest
15	Bedida forest	Kilifi	National Monument	30	Forest
16	Kaya Fimboni / Bomu **	Kilifi	National Monument	409	Forest
17	Kaya Mzizima	Kilifi	National Monument	29	Forest

18	Kaya Mwidzimwiru	Kilifi	National Monument	147	Forest, degraded, sand quarrying
19	Kaya Koyeni	Kilifi	Unprotected	5	No forest left
20	Kaya Tsolokero	Kilifi	Unprotected	15	Forest
21	Kaya Bendeje	Kilifi	Unprotected	30	No forest left
22	Kaya Jorore	Kilifi	Unprotected	20	Forest
23	Kaya Shonda	Mombasa	National Monument	10	Forest degraded
24	Kaya Mihongani	Mombasa	Unprotected	5	No forest left
25	Kaya Mtongwe	Mombasa	Unprotected	5	No forest left
26	Kaya Mrongondani	Mombasa	Unprotected	5	No forest left
27	Kaya Mvwakani	Mombasa	Unprotected	5	No forest left
28	Kaya Gandini / Takawa / Duruma	Kwale	National Monument	150	Forest
29	Kaya Mtswakara **	Kwale	National Monument	248	Forest
30	Kaya Chonyi (Digo)	Kwale	National Monument	114	Forest/ woodland
31	Kaya Lunguma	Kwale	National Monument	155	Elephant degraded forest
32	Kaya Bombo NM	Kwale	National Monument	10	Forest
33	Kaya Kiteje NM	Kwale	National Monument	10	Bushland
34	Kaya Teleza	Kwale	National Monument	67	Forest
35	Kaya Waa NM	Kwale	National Monument	30	Forest
36	Kaya Tiwi NM	Kwale	National Monument	10	Forest
37	Kaya Diani NM	Kwale	National Monument	20	Forest
38	Kaya Ukunda NM	Kwale	National Monument	25	forest degraded
39	Kaya Muhaka	Kwale	National Monument	150	Forest
40	Kaya Dzombo	Kwale	National Monument	902	Forest Reserve
41	Kaya Ganzoni	Kwale	National Monument	10	Forest
42	Kaya Kinondo	Kwale	National Monument	30	Forest
43	Kaya Chale / Chale Island SG NM	Kwale	National Monument	50	Forest
44	Mrima FR	Kwale	National Monument	377	Forest Reserve

45	Kaya Segu NM	Kwale	National Monument	50	National Monument
46	Gonja FR	Kwale	National Monument	842	Forest Reserve
47	Kaya Jego NM	Kwale	National Monument	10	Forest
48	Kaya Bogowa NM	Kwale	National Monument	10	Degraded forest, Wasini island
49	Kaya Longomwagandi	Kwale	National Monument	Unknown	Forest Reserve
50	Kaya Kwale	Kwale	National Monument	Unknown	Forest Reserve
51	Kaya Chitanze / Kitsantse forest	Kwale	National Monument	25	Forest
52	Kaya Miyani	Kwale	Unprotected	3	Within Kwale town. No forest
53	Kaya Miungoni	Kwale	Unprotected	8	No forest left
54	Kaya Puma	Kwale	Unprotected	15	Forest
55	Kaya Timbwa	Kwale	Unprotected	10	Forest
56	Kaya Mvumoni	Kwale	Unprotected	20	Woodland

Note: UNESCO World Heritage Sites indicated by asterisk (**)