PLANNING CONSERVATION ACTION FOR KENYA'S THREATENED TREES

December 2020

CONTENTS

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ACRONYMS AND ABBREVIATIONS

Botanic Gardens Conservation International (BGCI)

Conservation Planning Specialist Group (CPSG)

International Union for Conservation of Nature (IUCN)

Kenya Forest Service (KFS)

Kenya Forestry Research Institute (KEFRI)

Kenya Wildlife Service (KWS)

National Museums of Kenya (NMK)

Non-government organisation (NGO)

Species Survival Commission (SSC)

EXECUTIVE SUMMARY

Kenya has a rich diversity of native tree species. There are more than 1,100 native tree species, 40 of which are endemic. More than ten percent (120) of Kenya's tree species are threatened with extinction. There is an urgent need for well-planned conservation action underpinned by current, reliable information on the distribution, habitat, population status, key sites and major threats for threatened species, to ensure that none of Kenya's tree species becomes extinct.

In October - November 2020, Botanic Gardens Conservation International (BGCI) and the IUCN SSC Conservation Planning Specialist Group (CPSG) hosted a series of virtual workshops in collaboration with the Kenya Forest Service (KFS) to effectively plan conservation action for Kenya's threatened tree species. Planning contributors who attended the workshops included representation from more than 30 organisations including government (national and local), NGOs, and academic institutions.

This report summarises what was achieved during the conservation planning workshops, including the development of a national Vision and Goals. Five workshops were held: two focused on priority actions at the national level; three focused on developing priority actions for two Kenyan regions (the coastal forest and the Taita Hills), which host a high density of threatened tree species. Key threats identified for the native trees of these regions include shifting agriculture and wood harvesting. The majority of actions identified during the workshops focused on site-based conservation, rather than addressing species-specific needs due to the high number of threatened species present. Next steps are outlined in this report. Additionally, participants of the workshops have formed a Kenya Threatened Tree Consortium.

Subsequent to the workshops, a website for conservation action for Kenya's threatened trees has been launched to provide a central hub for resources and to track action for each species. jointly co-ordinated by KFS and BGCI, which will oversee progress on the recommended conservation planning actions. It is proposed that conservation planning sessions are carried out for additional Kenyan regions, particularly those with a high number of threatened tree species.

1. INTRODUCTION

1.1 Tree diversity of Kenya

Kenya is located in eastern Africa between latitudes 4°2 N and 4°2 S and longitudes 34°E and 42°E, with a surface area of 582,600 km2. It is bordered by Tanzania, Uganda, South Sudan, Ethiopia, Somalia and the Indian Ocean. Kenya has a wealth of different environments creating distinctive ecosystems each with a characteristic assemblage of plants and animals. The major ecosystems include forests, grasslands, shrublands, woodlands, wetlands, deserts, lakes, rivers, montane and afro-alpine highlands and marine environments.

Kenya has a rich diversity of native tree species. There are more than 1,100 native tree species, 40 of which are endemic to Kenya. Several species that are endemic to the country are very narrowly distributed, such as *Vangueriopsis shimbaensis* (Critically Endangered), which is known from just one locality in the Shimba Hills and only seven mature individuals persist. The most common tree families include Rubiaceae, Euphorbiaceae and Fabaceae. Centres of tree diversity within Kenya include the coastal forest and the isolated mountain peaks of the afro-montane forests.

1.2 Conservation status of Kenya's trees

Of 1,100 Kenya trees species, 520 have been assessed using the IUCN Red List of Threatened Species categories and criteria. The IUCN SSC Eastern African Plant Red List Authority (EAPRLA) is mandated to carry out conservation assessments for East African plants. Since 2006, EAPRLA has led a series of workshops to evaluate the status of plant species in the region, focusing on hotspot areas and species likely to be threatened, including some tree species. In 2018, a joint EAPRLA and IUCN SSC Global Tree Specialist Group (GTSG) workshop was held to assess the conservation status of the remaining endemic trees of Kenya. More than 120 Kenyan tree species have been assessed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) (see Figure 1.).
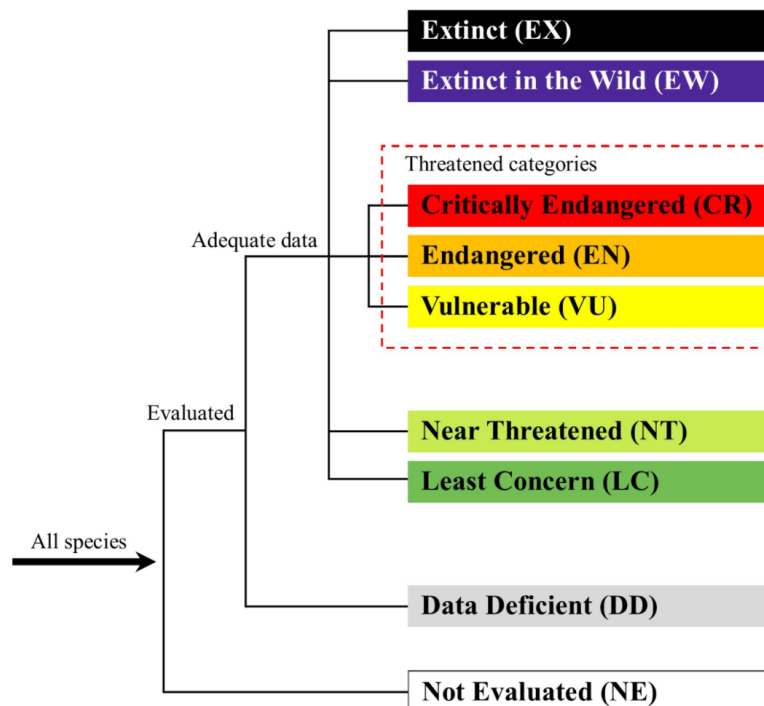

Figure 1. IUCN Red List of Threatened Species Categories

Due to the high number of threatened tree species present in the country, there is an urgent need for well-planned conservation action underpinned by current, reliable information on the distribution, habitat, populations, key sites and major threats, to ensure that none of Kenya's tree species becomes extinct.

As of 2000, 5.4% of Kenya was natural forest cover (Global Forest Watch 2020a). Kenya's forests host a disproportionate amount of the country's biodiversity, with an estimated 40% of larger mammals, 30% of birds and 35% of butterflies occurring in forests (Wass 1995). They provide a vital role in stabilising against soil erosion and providing water catchment protection. They are a source of timber and fuel for local people, as well as providing non-timber forest products such as medicine, resin and essential oils. However, there has been a 10% decrease in tree cover in Kenya since 2000 (Global Forest Watch 2000b). It is therefore of utmost importance that Kenya's forests and tree diversity are restored. Although there is a large tree planting movement in Kenya, the vast majority of tree species that are planted are non-native and sometimes even known invasive species. There is limited knowledge of the diversity of native tree species and limited availability of seed and seedlings of native species.

1.3 Scope of the project and process

In October - November 2020, BGCI and the IUCN SSC Conservation Planning Specialist Group hosted a series of virtual workshops in collaboration with the Kenya Forest Service to effectively plan conservation action for Kenya's threatened trees. The complete list of participants and which workshops they attended can be found in Appendix I.

The first workshop was attended by 30 participants, with representation from a variety of organisations including government (national and local), NGOs, and academic institutions. During this workshop the conservation planning process was introduced and context for the process given. A series of presentations on Kenya's tree diversity, current conservation actions and gaps were delivered. A visioning exercise followed which resulted in a jointly developed qualitative description of what successful recovery of Kenya's threatened trees would look like. After the session, participants' contributions were translated into a set of measurable goals, which were subsequently reviewed by participants as part of the planning process.

The next three workshops focused on two Kenyan regions (the coastal forest and the Taita Hills) which host a high number of threatened tree species. Before these workshops, the "Assess to Plan" (A2P) methodology was used to collate IUCN Red List of Threatened Species data from the two regions, and to identify overlaps among species in terms of distribution, preferred habitat and major threats. This information was used to structure and facilitate discussions with participants representing each region. The following points were discussed during the workshops:

- Causes and impacts of major threats
- Agreement on priority strategies to mitigate major threats
- Agreement on what existing conservation opportunities could be mobilized for targeted groups and on what kinds of further action or planning should be initiated; and
- Agreement on who will take the next steps towards progressing these recommendations.

In the final workshop, which was national in scope, regional leads presented a summary of regional workshop findings to the full group. Participants then voted on which actions identified as required for the two regions should be elevated to the national level and delivered as a priority.

Participants were provided with an opportunity to pledge commitments from their organisation to conserve Kenya's threatened trees. A list of pledges made by each organisation is provided in

Appendix I. A framework for implementation of identified priority actions, tracking conservation actions and continuing collaborative work amongst workshop participants was also determined. Given that maintaining tree coverage and restoring forests in Kenya is important for climate change, soil stability, watershed protection, provision of timber and non-timber forest products, many of the actions proposed in the workshops support the efforts of the many groups engaged in promoting the preservation, restoration and sustainable management of Kenya's forests, but the actions are primarily focused on protecting and conserving Kenya's threatened tree species.

2. CONSERVATION STRATEGY

2.1 Vision

By 2030 , it is a matter of national pride to be conserving Kenya's threatened trees, reflected in government policy, protection of trees, restoration of forests, provision of nature-based benefits to communities and resilience to climate change.

2.2 Goals

These goals outline the broad operational themes for conservation activity for Kenya's threatened trees over the next 30 years.

Goal 1: Key sites occupied by a high number of threatened tree species are identified, protected and restored.

Goal 2: Genetically representative and duplicated *ex situ* conservation collections are established for all threatened tree species, acting as an insurance against extinction (including in botanic gardens, farms, private plots and landscaping).

Goal 3: Knowledge and understanding of threatened tree species is increased, and all data and information is stored and tracked in a central system, facilitating coordinated conservation action.

Goal 4: Kenyans, including local communities and key conservation delivery agencies, have a sense of pride and responsibility towards protecting the country's threatened trees and are acting as custodians.

Goal 5: Threatened tree species are sustainably utilised as alternatives to exotic species, providing timber and Non Timber Forest Products.

3. REGIONAL RESULTS

3.1 TAITA HILLS

The Taita Hills are an isolated massif approximately 20 x 20 km in size, which rises to more than 2,220 m asl from the surrounding semi-arid plains of Tsavo at 900 m asl. The hills are situated in Taita-Taveta County in Southeastern Kenya. Its montane cloud forest habitat contains some of the highest levels of endemism in the world, forming a key part of the Eastern Afromontane Biodiversity Hotspot.

There are 19 threatened tree species reported from the Taita Hills, 9 of which are assessed as Endangered, 11 of which are assessed as Vulnerable and 1 of which is assessed as Near Threatened. A list of the threatened trees species that occur in the Taita Hills is provided in Appendix II. Whilst some of these threatened species are endemic to the Taita Hills, others are also found in other parts of Kenya, and some elsewhere in East Africa.

According to BGCI's PlantSearch database (http://www.bgci.org/plant_search.php), 14 of the threatened tree species of the Taita Hills are reported as held in ex situ collections, and the remaining seven species have no reported *ex situ* conservation. The most commonly occurring threatened tree species are *Encephalartos kisambo* (reported from 25 *ex situ* collections globally), Aloe ballyi (reported from 20 ex situ collections globally) and *Afrocarpus usambarensis* (reported from 12 ex situ collections globally). Tree cycads, succulents and conifers are popular in horticulture, which likely explains their prevalence in collections over other species. Seven threatened tree species from the Taita Hills are reported from between two – four collections, and four threatened tree species from the area are reported from a single ex situ collection. Accession-level information on the number of individuals or genetic diversity held within collections (i.e. whether collections of species with a wider range include genetic material from the Taita Hills) is not yet available.

The full Taita Hills area is under formal protection, hence all of the threatened tree species are reported from at least one protected area. However, despite protection, there has been a reduction in the size of the forest and there are ongoing threats, in part due to the lack of a physical boundary around the protected area.

As well as hosting a diversity of other endemic and interesting plant species, the Taita Hills forests support three endemic bird species; *Apalis fuscigularis* (Critically Endangered), Turdus helleri (Critically Endangered) and *Zosterops silvanus (*Endangered).

3.1.1 Summary of major threats to the trees of the Taita Hills

The Taita Hills have experienced significant human population expansion, and in some areas, densities reach 1,400 people/km^2 (Nature Kenya *et al*. 2015). Originally forest would have covered the majority of the hills but forested areas are now restricted to the highest peaks and steepest slopes, which are surrounded by a mosaic of human settlements, smallholder cultivation plots and exotic plantations. Almost 98% of the original forest in the Taita Hills has now been cleared (Nature Kenya *et al*. 2015). The total amount of natural forest still persisting is thought to be only around 400 ha, found in three larger remnants, Chawia (80 ha), Ngangao (123 ha) and Mbololo (220 ha), and nine tiny remnants.

In the 1950s and the 1970s, the Kenya Forest Service planted a number of exotic tree plantations, inside the forest fragments, with the aim to reduce soil erosion and to provide an alternative wood supply for the local population (Nature Kenya *et al.* 2015). Species planted include *Pinus patula*, *Cupressus lusitanica* and *Acacia mearnsii.* It is estimated that 50% of the area of natural forest has been converted to tree plantations (Pellikka *et al.* 2009). Land use systems were noted to be inappropriate and there is a particular threat to conservation on the leeward sides of the Taita Hills.

Encroachment from agriculture was recognized as a big threat in the area. Historically, habitat was cleared to plant crops. This change of land use and the methods used, such as tilling, has also exposed the soil resulting in increased erosion. Farming practices are not productive, which historically led to shifting agriculture practices and clearing of additional land. Encroachment is not a continued problem (i.e. no additional land is being converted to crops in this area), but slash and burn remains a problem as fires sometimes spread into the forest. There is also a lack of diversity of crops being grown, which means communities do not get enough to be food secure so rely on alternative sources of income. This often means extraction of timber and other forest resources, which degrades the forest. Both population expansion and a loss of traditional farming knowledge are noted to be exacerbating this problem.

Invasive species are also a threat in the Taita Hills. Most notably *Acacia mearnsii* which was previously planted a lot in this area and is very invasive. It is not known if there is continued planting of this species, but it is still spreading and is definitely a threat to birds in the area as it reduces their habitat availability, and is likely also having a negative impact on regeneration of trees as well. Additional invasive or exotic species planted in the Taita Hills were also noted to accelerate fires. Fires, particularly during the dry season, can have a major impact. **Fires** burn mature trees and also kill natural regeneration. Although some fires are natural, most fires are intentionally initiated but get out of control. Fires are caused by charcoal burning, which is done within the forest by communities around the forests. Fires are also started as part of slash and burn agriculture and to get rid of ticks and other insects that affect grazing cattle. Fire is accelerated by an invasive fern species, as well as planted exotic species. For example, Ngangao is planted with pine (*Pinus patula*) which accelerates fire spread, due to pine needles on the ground which create a thick layer of un-decomposed mulch, and resin. Planted *Cupressus lusitanica* and *Eucalyptus* have a similar effect. The needles create a thicker layer of un-decomposed mulch. Recent fires in both Ngangao and Iyale were noted to have been started by farmers.

Logging and wood harvesting is also a threat in the Taita Hills. Logging was significant in the area up to the year 1970 where the majority of commercially important timber species (such as *Ocotea usambarensis*, not yet assessed on the IUCN Red List) were removed from the forest. In recent years, the price of timber has escalated. There is a ban on logging in state forests which has led to illegal logging in some areas. Demand for timber is very high. In terms of timber, indigenous tree prices are higher than non-native. Wood is cut for charcoal burning too as the price of charcoal is also high. Youths have no other income, which results in them illegally harvesting material. Cutting mature trees has a negative impact on natural regeneration as it removes seed sources, which causes a further reduction in the population of some species. Removing trees also exposes the forest further to additional illegal activities. Community Forest Associations are relied on to police logging as there are not enough forest rangers.

Livestock farming prevents natural regeneration of trees as the smaller young trees are often grazed or trampled. This also increases erosion by exposing the soil. Grazing of animals is both by communities around the forest and nomadic grazers travelling from Somalia to Tanzania. There is also

an indirect impact as loggers and poachers move with grazers into the forest, as the grazers know the forest very well. Grazing is illegal in protected areas, but it is happening in surrounding ranches and there are no physical boundaries. At Vuria, Iyale and Ngangao there is unregulated access to the forest by grazers, which is reducing the effectiveness of restoration plantings in these areas. Grazing is also common in Chawia, Vuria, Kasighau, Maungu and Tsavo East.

As well as direct threats to tree species in the area, a number of other obstacles were also noted as exacerbating impact on threatened trees and / or hindering conservation.

For example, it was noted that society in this area has only recently heard of the word conservation and has a **lack of awareness about conservation**. There is more interest in agriculture which has damaging effects (as noted above) and this is because of a **lack of education about alternatives.**

Technical capacity was also noted as an obstacle, as not many threatened tree species have had their ecology studied, so propagation can be difficult. The dormancy and slow growth periods of some of the threatened tree species was also noted as potentially affecting natural regeneration. A **lack of information about the distribution of threatened tree species** within the Taita Hills and a **lack of knowledge about phenology** were also noted as issues.

It was also noted that there is currently a **lack of coordination amongst stakeholders**, including KFS, KEFRI and Nature Kenya, and working as a combined unit would be more effective. Competition between NGOs was also noted and the need to refer to existing data on forest use.

Although some community efforts are in place to protect the forest, for example led by Community Forest Associations (CFAs), **community efforts could be strengthened** as currently not everyone is involved, and **actions are not specifically focused on threatened tree species**. A Farmer Field School exists, but there is scope to improve it. **Information on threatened tree species is currently not accessible to communities** and needs to be disseminated more.

A **lack of zoning** within the county and no proper land-use policy and a lack of enforcement where policy exists were also noted. There is also no **physical boundary around the protected area** and **not enough forest rangers** to cover the protected area, which means enforcement is difficult.

It was also noted that funding does not always get to where it needs to, and that a general **lack of funds and facilitation of organisations with a conservation mandate** inhibits action.

3.1.2 Species-based conservation action planning

The group knew some of the threatened species present within the Taita Hills well, but others less so. **Further research into the population status, distribution and exact threats** to each species is required to help determine conservation actions for each species. Seed collection has been undertaken for some species to establish *ex situ* collections and propagation programmes to be initiated**. Monitoring of *in situ* populations is required to determine phenology of each species** to enable a supply of material to be propagated for expansion of *ex situ* collections and propagation programmes to support species recovery projects.

Research into the potential economic benefits of threatened species is also required, as well as **gathering existing information on uses of the threatened species and other species in the same genera**. This will help engage and incentivize local communities in the conservation of the threatened species. Some uses are already known, for example *Sorindaea calantha* produces edible fruits, *Ocotea*

keniensis is a good timber tree but takes over 30 years to produce good timber, and *Polyscias stuhlmanii* has potential ornamental value, could be used for drums and beehives, or pulp and papermaking (the more common native species, *Polyscias kikuensis* is used for this). Another potential incentive for farmers or others to plant could be the sale of seed in future for restoration and other plantings.

The proposed research will enable bespoke actions to be identified for target species. An example of targeted conservation actions for two threatened tree species of the Taita Hills is included in Box 3.1.2.1.

3.1.2.1 Conservation action for two threatened tree species

KEFRI through Taita Taveta Research Centre in collaboration with National Museums of Kenya (NMK), Nature Kenya (NK) and Dawida Biodiversity Conservation (DABICO) are implementing a project by the Title "Promoting long-term conservation of endangered tree species in the Eastern Arc Mountains forests of Taita Hills, Kenya." The project aims at promoting long-term *in situ* conservation of two endangered endemic tree species, *Coffea fadenii* and *Afrocarpus usambarensis.* The conservation of the species is being undertaken through participatory actions with local communities and other stakeholders involved in the conservation of Taita Hills forests. The projected is expected to enhance protection and conservation of the species through increased population in the natural range and increase awareness on the conservation of the target species among the stakeholders including the local communities. Eleven endemic woody species that grow along with the target species are also being conserved through the project. They include; *Macaranga conglomerata, Memecylon teitense, Militia oblata, Meineckia ovata, Ocotea usambarensis, Psychotria petitii, Prunus Africana, Psychotria crassipetala, Saintpaulia teitensis, Syzygium guineense* and *Albizia gummifera.*

3.1.3 Site-based conservation action planning

Both *in situ* actions, including protection and restoration, and *ex situ* site-based actions were identified. There is some cross-over between the *in situ* and *ex situ* actions as both require collection of seed and the propagation of a supply of material. The group agreed that *ex situ* actions should take place urgently due to the ongoing threats *in situ* and the longer timeframe required to initiate *in situ* protection or restoration activities, but that *in situ* actions are also urgent and should be initiated at the same time. Efforts should be taken to integrate *in situ* and *ex situ* activities as much as possible and *ex situ* actions should support *in situ* restoration activities.

In situ actions

Identification and protection of key sites for threatened tree species within the Taita Hills is needed. This will require further survey work to verify the location of individuals of threatened tree species and carry out population counts to guide site selection. The need **for training of rangers and communities** to identify and monitor threatened species was also noted.

The potential to **fence the Taita Hills, or priority sites within the protected area** was noted, recognizing the successful work of Rhino Ark to fence other forested areas within Kenya. As an immediate action, **the amount of gazette forest (protected area and county gazette forest) should be determined** to assess the potential for protection and restoration. It would also be good to determine if there are species which are only found within individual counties that could be the responsibility of devolved counties (or as well as national agencies). It is possible to gazette areas

within protected areas for research and the **potential for gazetting areas within the protected area for conservation** should be explored.

Nature Kenya, RSPB and KFS have been carrying out restoration work on the hill, rather than in lowland areas species. **Restoration work should adopt a stronger focus on threatened tree species** to increase conservation outcomes.

There is very little space left for restoration in Taita Hills as the whole area is under government (KFS) and community land (county government / community). There is a need to **target areas for restoration within the forest that are degraded and covered in plantations**. As frequent fire has been an issue and this mostly happens in exotic plantation areas, this provides an opportunity to do restoration. It is thought that only around 8ha out of 60ha are truly indigenous in Iyale, and Ngangao, which covers an area of around 144ha, is about 3-4% covered with exotics.

Though it can be hard to get permits to carry out restoration, it is possible and should be carried out with both KFS and community involvement. So far, work has mostly focused on uprooting exotics, but not actively planting native trees due to funding limitation, so allowing natural regeneration instead. This has worked to a point, but fires re-occur and **active planting of native and threatened tree species** would yield better results. This aligns with the national government plan to plant lots of trees.

Nature Kenya, RSPB and Birdlife are currently developing a map that shows areas that are good for restoration. This doesn't include threatened tree data. There is an opportunity for this group to **contribute information to restoration mapping work to ensure priority sites take threatened trees into account.**

Due to limited land within the forest, it was also noted that opportunities for **on-farm planting or planting on private land that used to be forest** should be explored. It is currently hard to do on-farm planting with native species because people want to use fast growing commercial species (the majority of preferred species are non-natives). There is a national policy that all agricultural land must have 10% tree cover, and this policy could be better enforced in the area with **a quota for native / threatened tree species on-farms** provided.

It was recognized that, as most people prefer to plant species that are beneficial to them, incentives for planting threatened tree species should also be explored (see species-based conservation actions above). A **package of threatened and useful species for planting could be developed** which incorporates a mix of useful species, as well as those that are threatened without an obvious use for people. These species are still important and need to be conserved, but may rely on packaging with species with an obvious use to encourage farmers to plant and maintain them. Farmers would also need to be trained and encouraged to protect planted trees from their animals.

There is also some private land within the Taita Hills that could be used for restoration. Most species are found in upland areas, and most private land is in the lowland, but there are some privately owned plots available upland that could be approached to gauge their interest in supporting tree conservation. There is an ongoing project to purchase or lease land from people to protect threatened birds of the Taita Hills. This is led by Nature Kenya and 6 acres have been purchased so far. There is also potential to convert community land. It would be good to investigate if the same **areas of private land, or other areas of private or community land could be used to plant threatened trees** as well, to maximize the conservation impact.

It was noted that these additional incentives are needed, alongside awareness raising. Communities are starting to understand the benefits of restoration, but additional information on the specific

benefits of specific species would be helpful. **The production of a pamphlet on the threatened tree species of the Taita Hills and their uses** would be helpful.

Wildlife Works sells carbon credits and purchases seedlings from farmers. They would be keen to purchase threatened tree species if these were available from farmers. This could be an **opportunity for farmers to sell seedlings**. KFS could purchase seedlings too. There is a need to **develop a restoration project proposal that benefits species and local communities**, in partnership with KFS and other local partners. The process would be to develop a project proposal, present it to the KFS Chief Conservator of Forests, engage additional funders, as well as present the concept to the KFS Board and Ministry.

For active restoration and on-farm or private land planting, there is a need to **collect more seeds** and **scale up seedling production in existing and new nurseries**. The need to increase the capacity of the KFS nursery in Wundanuyi was noted. It is understood that they can currently produce about 60,000 seedlings per year for enrichment planting, but this could be expanded.

There is a need to **determine if threatened tree species are pioneer or climax species to develop appropriate restoration planting strategies** that benefit the threatened species. For example, in some cases natural regeneration will work as a first step, or planting of fast growing native species will speed up that first step, which will provide the conditions for climax threatened species that require shade to be planted afterwards.

Investigation to generate silviculture information for the native and threatened species will support this process, as well as **gathering traditional and scientific knowledge that already exists on the species.**

To support seed collection and supply to nurseries, **phenology monitoring of the species** is required. **Community Forest Associations could be mobilized for monitoring and seed collection**, but will need **training on how to monitor and collect seed,** following safe and sustainable practices.

Propagation trials to generate information about the optimum growing conditions will fill a current knowledge gap and enable scaling up of production. **Existing propagation information on the target species (or species in the same genera) should be collated**. The potential to use tissue culture to propagate a large supply of planting material quickly was also noted. This would also require the collection of plant material to initiate the process.

It was also noted that KEFRI has already indicated their willingness to take material and help to develop propagation protocols, and the need to **work in partnership with the government** was noted as a key requirement for success.

Ex situ actions

An immediate action to support the scaling up of *ex situ* conservation work is to **share information on habitat type and altitude for the target species to help identify suitable sites for *ex situ* conservation.** Some of this information is available in the IUCN Red List website and gaps were filled as part of the conservation planning process.

Some sites were identified in the workshop for the **establishment of living *ex* situ collections for conservation, research, display and education, following the metacollection approach**. Brackenhurst Botanic Garden and Forest in Limuru is a safe site with similar conditions to the Taita Hills, so all of these threatened tree species would grow well there, and it also provides an opportunity for education. The wider Nairobi area would work for most of the Taita Hills species. Some Kenya

Horticultural Society members have already volunteered to plant rare trees as additional safe sites in Nairobi. Ukambani would work for some of the lower land species.

Long-term seed storage at the National Gene bank is also a good option for orthodox species. It was noted that NMK was involved in the Royal Botanic Gardens Kew Millennium Seed Bank (MSB) Seeds for Life programme, so seeds from some of these species may already be in long-term storage at the National Gene Bank, and duplicated at MSB in the UK.

There is a need to **assess the current status of living and seedbank *ex situ* collections** and **develop a plan to address gaps**, to ensure collections are duplicated and capture the genetic diversity of wild populations. As noted above, it would also be good to check if any species have been propagated and protocols already developed for any of these species.

3.1.4 Additional priority strategies

A number of additional priority strategies for addressing threats, creating enabling conditions and supportive governance for conservation were discussed, as detailed below.

3.1.4.1 Mitigating fire risk

ISSUES

Management of fire is an important component for the Taita Hills. A major cause is intentional slash and burn agriculture that gets out of control, and this is accelerated by non-native species. The leeward side of the Taita Hills is the most problematic as it is drier. Many people are still burning due to their traditional agricultural practices, and believe that rains will come soon.

Wildlife Works have suffered a lot from fires. The area their operations cover is huge and they have spent millions of shillings fighting fire.

A fire management plan is currently lacking, though one may be in development.

There is a lack of awareness among community members on controlled burning, or alternative agricultural practices such as permaculture, that could increase yields and improve soil.

Taita Hills site affected by fire, showing invasive species invading after fire

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS
- Supporting KFS with equipment to manage fires is required. - Develop fire management plan. - Raise awareness about controlled burning, climate smart agriculture, and promotion of other alternative and sustainable agricultural practices. This could be led by county extension workers and KFS Farmer Field School. - Expand Wildlife Work's training programme to establish a demonstration farm which trains about alternative practices to slash and burn and incorporation of threatened tree species on farms.

IMMEDIATE NEXT STEPS	ACTION LEAD
- Identify immediate opportunities to improve training to farmers - Seek funding to develop fire management plan	KFS

ADDITIONAL COLLABORATORS AND STAKEHOLDERS
Wildlife Works County government University of Helsinki, working on climate change resilience Sheldrick conservancy Permaculture Kenya Barefoot solutions

3.1.4.2 Invasive species

ISSUES
Invasive species, some of which were intentionally introduced as plantation species, are likely preventing natural regeneration of threatened tree species. Plantations also take up valuable space that could be used for restoration. Phased cutting of pines would help with natural regeneration of indigenous and threatened species. However, this is still pending with KFS, given the national moratorium on tree cutting. There is a restoration strategy developed for the Taita Hills by Nature Kenya, with a focus on bird species. This could be expanded upon to benefit threatened tree species.

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS
- Clearance of invasive species in patches / phases - Expand Taita Hills restoration strategy to take actions specifically for threatened tree species

IMMEDIATE NEXT STEPS	ACTION LEAD
- Taita hills group to review restoration strategy - Request KFS head office if pine removal would be possible in Taita	- All - KFS

COLLABORATORS AND STAKEHOLDERS
Nature Kenya

| African Forest |
| Brackenhurst Botanic Garden |
| Wildlife Works |
| KEFRI |

3.4.1.3 Community enabling

The threat to trees in general, and threatened tree species, comes from the communities. They are the owners as well as the threat. Without including communities, conservation strategies won't work.

There are already programmes in place to increase tree cover. Many Wildlife Works partners have their own nurseries, people grow seedlings for sale to the REDD+ planting project but for this to be successful, **a financial reward for growing is required**. For Wildlife Works, the communities own the programme and are very enthusiastic. The programme provides an alternative to tree cutting. Communities get around 30,000 shillings, depending on the effort they put in. This is consistent income as they purchase seedlings every year.

Empowering communities in terms of alternative livelihoods would also work. By making sure the community is not struggling, that will help, and it will be long-term. People would then be more likely to volunteer to do conservation.

Fuel demands also need to be addressed at the household level, to reduce pressure on the remaining natural forest, for example through energy saving cook stoves and woodlot establishment.

Community Forest Associations (CFAs) are already in place. This group can **link to CFAs to reach communities**, rather than approaching individuals. But, CFA actions and projects are not always sustainable, so for actions to be successful they will need to be well planned.

Some CFAs may be trained on seed collection already. However, in order for this to provide a sustainable income, **long-term incentives will be required**, i.e. seed demand must be there. There is a potential market through the Kenya Horticultural Society, as well as landscaping projects that represent larger planting areas. Rare trees have intrinsic value to someone, so they need to be paid for. For example, instead of paying at 100 shillings for a threatened tree seedling, some people would be willing to pay at 1000 shillings. Donors should also be prepared to pay more, as more effort often goes in to threatened seedling production. A certification scheme could be developed that shows that seedlings are from a sustainable source. Opportunities could also be made available for communities to collect seed or grow seedlings for restoration within the Taita Hills.

Production of a pamphlet about local rare trees in the local language could help to educate people about the species we are working on. This has worked well for similar initiatives, and people often hang the pamphlets as posters in their houses.

There are small forest areas or catchment areas which are conserved by village committees as well as the main forest patch. There is a need to **bring community forest areas on board to conserve threatened tree species within their forests,** under the Mitengo approach. Some species may not be present in core forest areas, but are in community forests. Each has a village conservation committee. These sites could potentially become KEFRI registered seed stands, and money paid for seeds, as an incentive for protection.

By **making tree conservation part of the curriculum,** this would educate young children, who could become conservation leaders in future. School tree planting will not work for species that have thorns

as they can't be planted in school playgrounds. Trees provide shade too so there is opportunity for planting threatened trees to shade classrooms. Children will love species that don't have known commercial benefits, which is important for conservation.

Safaricom and TOTAL Kenya have previously run competitions for who looks after the seedling the best. The concept is that children adopt a tree. This has worked really well in some schools. With a combined voice, this group could **ask TOTAL to reinvigorate the EcoChallenge programme**.

3.4.1.4 Governance

Kenya did not do zoning. The group felt it was about 50-60 years late for this and were not sure if it would be successful now or not. There are zoning laws in place, but they are not very well enforced.

Documenting areas identified as important for threatened tree species would be helpful, to avoid a last minute rush to prevent a development risk as part of an Environmental Impact Assessment. Suitable areas for planting different species could also be identified as part of zoning. County environment committees that are chaired by NEMA and KFS could be a positive approach for achieving this.

Additional potential roles were identified for stakeholders, including; KFS could provide the land for nursery establishment, e.g. at Mwatate or Voi, with a request for land coming from this consortium, KEFRI could help with the development of propagation protocols, Kenya Roads and Traffic Authority has a potential role too in terms of avoiding risk to species from road construction and encouraging road side plantings of threatened tree species, and the Kenya Water Towers Agency has a role to play too as the Taita Hills is a water tower.

There was strong support from the Taita Hills group to establish a formal group acting for threatened tree species, initially formed with the workshop participants, after the planning workshop are finished.

3.2 COASTAL FORESTS

East African coastal forests are a biodiversity hotspot of global significance (Ngumbau *et al*. 2020). These forests extend along the coastal edge of Eastern Africa, along the Indian Ocean stretching from Somalia in the North, through coastal Kenya and Tanzania, and all the way to Mozambique in the South. It is estimated that 20% of these forests are found in Kenya, where they are found mainly in four counties: Kwale, Kilifi, Lamu and Tana River County. They commonly occur on ancient coral reef bed rocks formed as a result of falling sea levels (Fungomeli *et al*. 2020).

Sixty-one tree species from the coastal forests have been assessed as threatened on the IUCN Red List of Threatened Species (Critically Endangered – 2, Endangered - 22, Vulnerable - 38), 14 of which are endemic to Kenya (*Vangueriopsis shimbaensis, Afrocanthium peteri, Anisotes ukambensi, Bauhinia mombassae, Cola octoloboides, Turraea barbata, Ziziphus robertsoniana, Dovyalis keniensis, Parkinsonia anacantha, Psydrax polhillii, Synsepalum subverticillatum, Vepris robertsoniae, Vitex keniensis* and *Warneckea maritima*). One species (*Sterculia schliebenii*) has been assessed as Data Deficient. A list of the threatened trees species of Kenya's coastal forests is provided in Appendix III.

According to BGCI's PlantSearch database, only 17 of the threatened tree species of the coastal forests are reported as currently held in *ex situ* collections, and the remaining 44 species have no reported *ex situ* conservation. The most commonly occurring threatened tree species are *Euphorbia wakefieldii* (reported from 14 *ex situ* collections globally), *Gardenia posoquerioides* (reported from 13 *ex situ*

collections globally) and *Vitex keniensis* (reported from eight *ex situ* collections globally). Eight threatened tree species from the coastal forests are reported from between two – five collections, and six threatened tree species from the area are reported from a single *ex situ* collection. Accession-level information on the number of individuals or genetic diversity held within collections (i.e. whether collections include genetic material from the coastal forests) is not currently available.

Sections of coastal forests fall under several management regimes. Several sacred forests, called Kaya Forests, are National Monuments and seven of them are designated as UNESCO World Heritage Sites, in recognition of their rich natural and cultural heritage (Githitho 2016). There are four national reserves (Shimba, Tana River, Boni and Dodori) (WWF-EARPO 2002). The largest of the Kenyan forest reserves is Arabuko Sokoke (417 km^2), which is under multi-institutional management (KFS, Kenya Wildlife Service - KWS, Kenya Forestry Research Institute - KEFRI and the National Museums of Kenya - NMK) (Arabuko-Sokoke Forest Management Team 2002).

3.2.1 Summary of major threats to the trees of the Coastal Forests

There has been considerable **population growth** in Kenyan coastal districts between 1979 and 2009. The total population multiplied by more than 2.5 during the period with a higher average annual growth rate in the urban district of Mombasa (3.71%) compared to the rural districts of Kilifi (2.98%), Kwale (2.76%) and Malindi (3.52%) (Linard *et al*. 2017). Population growth in turn increases pressure on the land, as more land is required for agriculture, human settlements and infrastructural development.

The practice of **shifting agriculture** was noted as being particularly destructive. Due to poor soil quality in the region, the majority of farmers rely on the short-term shifting cultivation of a small number of food crops such as cassava and maize. Issues related to land ownership compound this problem**.** Unclear land rights and misbalanced access to land has caused uncontrolled expansion and insecure livelihoods (Schürmann *et al*. 2020).

Along the coastal strip in particular, there are a high concentration of hotel developments for **tourism**. According to the Kenya Tourist Board (KTB), of the tourists coming to Kenya, about 65% visit the Kenyan coast (Ongoma and Onyango 2014). Native vegetation is usually removed when developments are built, and are replaced with a small number of commonly used exotics. Increasing **development** at the coast has also increased reliance on groundwater supplies. Public water supply in the coastal strip is almost completely dependent on groundwater (Mumma *et al*. 2011).

Collection of woody material for **fuel** and **charcoal production** is causing significant habitat loss and degradation. Fuelwood is the major energy source in Kenya, particularly in rural areas where it can account to up to 90% of energy consumed (Diaz-Chavez *et al*. 2010). Over 50% of households in Dakatcha Woodland are involved in charcoal production (Ruuska 2013). Timber is also collected for **woodcarving**. The industry is estimated to generate US$ 20-25 million annually in export revenue, with the main species being exploited being *Brachylaena huillensis* and *Combretum schumannii* (Matiku 2004). Even protected areas, such as Arabuko-Sokoke Forest, are subject to degradation and illegal activities, as shown in Figure 2.
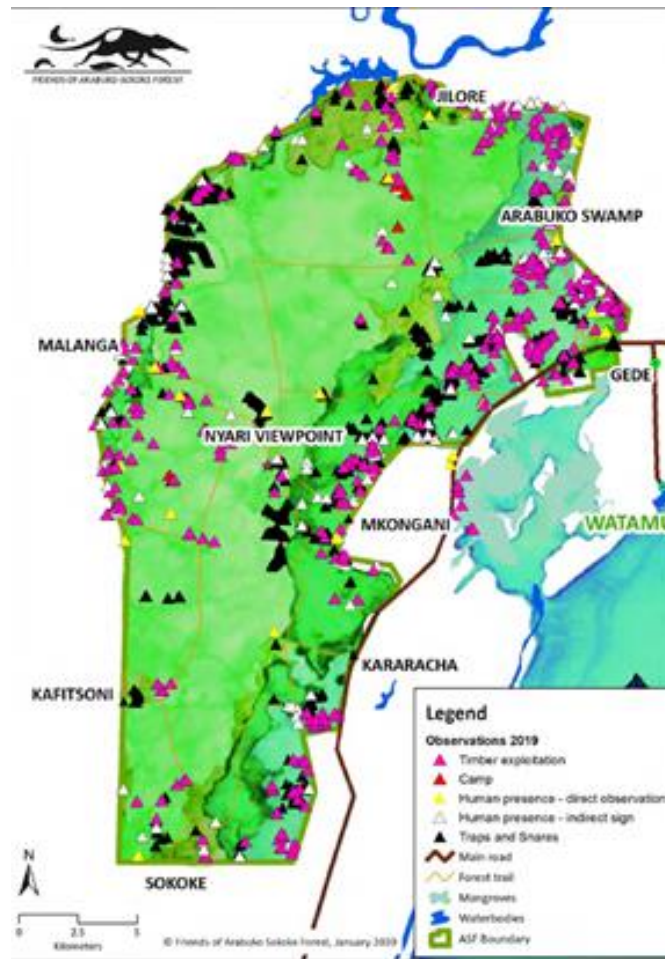
Figure 2. Illegal activities recorded during 2019 in Arabuko-Sokoke in 2019 (Friends of Arabuko-Sokoke Forest)

Coastal Kenya has a wealth of mineral resources including iron, titanium and limestone. Destructive **mining** practices are destroying large areas of land. A report by Human Rights Agenda (HURIA) (2014) found high levels of land degradation due to mining and little post-mining rehabilitation taking place and that only 17% of mining companies carried out mandatory environmental impact assessments for their mining projects.

3.2.2 Species-based conservation action planning

One species (*Cola octoloboides*) was identified as needing species-specific conservation actions. Detailed outcomes of the conservation planning for this species are presented below. It was recognised that other species also require specific conservation actions however they were not discussed during workshops due to time restraints, but documenting these actions was flagged as a follow up activity.

3.2.2.1 Species-based conservation for *Cola octoloboides*
PROJECT LEAD
Kivukoni Indigenous Tree Nursery
ISSUES

Cola octoloboides grows in evergreen forest on limestone or in shady crevices of forest. It is found in Kilifi and Kwale counties. There has been a decline in the number of subpopulations, mature individuals and area and quality of habitat due to quarrying of limestone for cement and road materials. There is also clearing of habitat for agriculture. It is assessed as Endangered on the IUCN Red List of Threatened Species.

The species is known from two sites in Kilifi. At one site, only one individual remains and due to dioecious biology is functionally extinct. The other site is on private land and engagement is ongoing to be able to survey and collect seed. The species is reported from Gongoni and Dzombo Forest Reserves in Kwale. This species is grown in the restoration nursery and planted in ex situ collections at Base Titanium mining site.

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS

- **Botanical surveys:** To confirm population status in all known sites and survey other potential sites.
- **Site protection:** Engagement with private landowners to encourage protection of the species.
- **Propagation of species:** Collection of propagation material to grow in nurseries and for *ex situ* conservation and restoration *in situ.*
- **Establish *ex situ* collections:** Establishment of multiple conservation collections of this species.

IMMEDIATE NEXT STEPS	ACTION LEAD
Develop a fundraising proposal to scale up ongoing conservation of this species.	Kivukoni Indigenous Tree Nursery
ADDITIONAL COLLABORATORS AND STAKEHOLDERS	
BGCI KEFRI	

3.2.3 Site-based conservation action planning

Due to the high number of threatened tree species found within the coastal forest, site-based multi-species conservation action was seen as favorable over species-specific action for the majority of species. It was also recognised that for many species, collection records are outdated and not comprehensive. It is therefore a priority that more botanical surveys are completed, particularly in understudied areas.

3.2.3.1 Mwangea Hill
PROJECT LEADS
Pwani University, Kivukoni Indigenous Tree Nursery & Little Environmental Action Fund (LEAF)
SITE INFORMATION
Mwangea hill forest, known as Mwangea by local people, is located ca. 40 km from Kilifi Town in Kilifi County, Coastal Kenya (-3° 15' 9.17" 39° 43' 12.12"). It is an iconic island rising 200–500 m asl and forms part of the coastal lowland forest biodiversity hotspot. It is privately owned and currently has no formal protection.

It is a fragmented forest, where a high density of threatened tree species are found, including (*Afrocanthium kilifiense* (Endangered), *Combretum tenuipetiolatum* (Endangered), *Julbernardia magnistipulata* (Vulnerable), *Isolona cauliflora* (Vulnerable), *Mkilua fragrans* (Vulnerable), *Psydrax polhillii* (Vulnerable), *Uvariodendron kirkii* (Vulnerable)). There is also a high density of avifauna with 125 species recorded, including three threatened species (Steppe Eagle *Aquila nepalensis* (Endangered), Sokoke Pipit *Anthus sokokensis* (Endangered) and Martial Eagle *Polemaetus bellicosus* (Vulnerable) (Njuguna *et al*. 2019).

The forest is disappearing rapidly and has become very fragmented. There are concerns that the forest may be lost within 1–2 years unless urgent conservation interventions are implemented. Areas are being cleared for agriculture, particularly maize farming. Charcoal burning and logging are also major threats. The situation is exacerbated by the fact that Arabuko-Sokoke Forest and Tsavo East (which surround Mwangea hill) are protected areas where access for wood harvesting is strictly prohibited. This leaves Mwangea hill to bear the brunt of overexploitation from loggers and harvesters since the area is not protected. The status of a pending application for the site to become a Kenyan Water Tower is not known.

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CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS

Development of a conservation action strategy for the site
- Lots of interest and expertise is available to conserve this iconic site; however coordination is needed to bring these stakeholders together.
- Engagement with the local community to determine suitable and sustainable conservation actions.
- Check with Kilifi County Government status of Kenya Water Tower application and discuss protection options for the site.

IMMEDIATE NEXT STEPS	ACTION LEAD
- Organise a working group to develop a conservation action plan for the site. - Engage with the local community to explore suitable alternative livelihood options. - Investigate whether private land purchase that enables community conservation would be a feasible option. - Seek potential sources of funding once a full concept document / proposal has been prepared.	Pwani University, Kivukoni Indigenous Tree Nursery & LEAF

ADDITIONAL COLLABORATORS AND STAKEHOLDERS

Local communities

| Kilifi County Government |
| Kenya Forest Service |
| Kenya Wildlife Service |
| Nature Kenya |
| A Rocha |

3.2.2.2 Cha Simba rocks

PROJECT LEADS

Pwani University, Kivukoni Indigenous Tree Nursery & LEAF

SITE INFORMATION

Chasimba is a limestone outcrop within the coastal forest. It is 22 km southwest of Kilifi. Threatened tree species found at this site include *Cola octoloboides* (Endangered), *Euphorbia wakefieldii* (Endangered), *Tarenna drummondii* (Vulnerable). Additionally, a Critically Endangered endemic herb *Saintpaulia rupicola* occurs at the site*.* It has been identified as a Key Biodiversity Area (Key Biodiversity Areas Partnership 2020).

Although the site is not suitable for agriculture, it is being encroached by fire and big trees are felled. The site is very accessible and could present sustainable livelihood options for local community members. For example, a native tree nursery could be established to support restoration activities.

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS

- Stakeholder analysis needs to take place to scope suitable conservation actions for the site
- Determine restoration opportunities at the site

IMMEDIATE NEXT STEPS	ACTION LEAD
- Engage with the local community to explore suitable alternative livelihood options. - Investigate whether private land purchase that enables community conservation would be a feasible option. - Seek potential sources of funding once a full concept document / proposal has been prepared.	Pwani University, Kivukoni Indigenous Tree Nursery & LEAF

ADDITIONAL COLLABORATORS AND STAKEHOLDERS

Local communities
Kilifi County Government
A Rocha

3.2.2.2 Kaya Forests

PROJECT LEADS	24
National Museums of Kenya (Coastal Conservation Forest Unit)	

SITE INFORMATION
Kaya forests are culturally and biologically important coastal forests that are managed by local communities. There are over 60 Kaya forest patches, ranging from 10 ha to over 500 ha (Kibet 2011). Eleven Kayas have been declared UNESCO World Heritage Sites. They are home to many threatened tree species. For example, Kaya Kauma holds *Buxus obtusifolia* (VU), *Vitellariopsis kirkii* (VU) and *Coffea pseudozanguebariae* (NT) and Kaya Rabai holds *Angylocalyx braunii* (VU), *Bauhinia mombassae* (EN), *Coffea pseudozanguebariae* (NT), *Combretum tenuipetiolatum* (published as CR but about to be published with revised EN assessment), *Synsepalum subverticillatum* (VU).

The Coastal Forest Conservation Unit uses a two-pronged approach to manage the Kaya forests. Forest patrols ensure illegal exploitation is not taking place and programmes to address livelihood needs are developed with input from local communities. Community led projects include establishment of tree orchards, beekeeping and social enterprises. These activities are, however, limited by lack of funding and resources meaning that such projects cannot be initiated in all Kaya forests. Only two Coastal Forest Conservation Unit staff support all of the Kaya forests.

Unfortunately, several Kaya forests are increasingly being exploited for logging and charcoal production. A decline in traditional values and respect for elders who are the custodians of the forests has been attributed to the increasing forest degradation (Metcalfe *et al*. 2009). COVID-19 has exacerbated ongoing degradation causing an estimated 2-4 fold increase in use due to economic hardship. |

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS
- Increased resources to support the management of the Kaya forests - Urgent patrols are needed for some Kaya forests e.g. Kaya Fungo - Address livelihood needs and provide communities with resilience against economic hardship - Increase availability of threatened tree species for restoration activities

IMMEDIATE NEXT STEPS	ACTION LEAD
- Establish emergency COVID-19 support fund to protect Kaya forest in the short-term. - Train local communities to collect seed from threatened tree species for planting in homesteads, seed orchards and for restoration. - Engagement with the local community to determine suitable and sustainable long-term conservation actions. - Engagement of partners to support Kaya forest conservation. - Source funding to increase resources to support Kaya forest management.	Coastal Forest Conservation Unit

ADDITIONAL COLLABORATORS AND STAKEHOLDERS
Kaya communities and Kaya Elders Council UNESCO WWF Kenya office Nature Kenya

| County Culture and Environment Office |
| KFS |
| KEFRI |
| Mandhari Plants (a landscaping company interested in helping to plant threatened Kaya species into landscaping projects) |

3.2.4 Additional priority strategies

A number of additional priority strategies were highlighted throughout workshop discussions, which are explored in detail below.

Addressing data gaps

ISSUES
There is currently no centralised resource hub for coastal threatened tree species, which in some cases has resulted in efforts being duplicated unnecessarily. Lots of useful information is scattered in different sources, such as in grey literature, which hasn't yet been systematically compiled. Resources to encourage building developers and farmers to integrate more threatened species into planting need to be developed. These resources can feed into the Kenyan government commitment for 10% tree cover in the country by 2030. Additionally, knowledge gaps (e.g. life history and reintroduction methodologies) of threatened tree species need to be researched.   There are also still many areas along the coast which are understudied and require botanical surveys to provide up to date information on distribution, population size and threats.

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS
- Develop a centralised information hub (ideally with a designated coordinator) - Mobilise resources to support increased use of threatened species on building developments and farms - Improved knowledge of life history, physiology and phenology of threatened trees - Increased research on optimising conditions for restoration of trees in coastal environments - More surveys particularly in understudied areas which can be used to update Red List assessments and raise awareness of the threats facing coastal forest tree species

IMMEDIATE NEXT STEPS	**ACTION LEAD**
- Develop a website for Kenya's threatened trees which can act as a resource hub	BGCI
- Compilation of data from different sources	All

COLLABORATORS AND STAKEHOLDERS
LEAF Pwani University KEFRI KFS Kivukoni Indigenous Tree Nursery

Community engagement

ISSUES

Educational activities with children are needed to raise awareness of the biodiversity of the coast and its importance. Some work has already been done to contribute towards this, for example, Friends of Arabuko-Sokoke Forest worked with KWS, running school engagement activities. There have also been discussions between Pwani University and A Rocha to integrate Kenyan native flora & fauna into the everyday curriculum.

Adults also need to be engaged and reignite their appreciation of the value of trees. The older generation has a lot to share with younger people. A platform for these discussions is needed.

Different media can be utilised to engage with people. An inspirational video could be a useful tool, one has already been developed for the Tanzanian coast which could be used as a model (https://vimeo.com/254352718).

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS

- Integrate Kenyan native flora & fauna into local curriculum
- Establish a communication platform for discussions and engagement
- Develop a public awareness campaign which could use an inspirational video

IMMEDIATE NEXT STEPS	ACTION LEAD
- Set up discussions with the Ministry of Education, Science and Technology to explore the possibility of greater integration of native species, particularly threatened tree species, into the regional curriculum	Pwani University

COLLABORATORS AND STAKEHOLDERS

Ministry of Education, Science and Technology
Friends of Arabuko-Sokoke Forest
KWS
A Rocha

Establishing *ex situ* collections

ISSUE

Ex situ conservation = "off site" conservation. Protecting a species outside its natural habitat. This provides protection in case the species goes extinct from its natural habitat. *Ex situ* conservation is particularly important for species with a small number of individuals or known from a single / small number of sites. Over 70% of threatened coastal forest tree species are not currently known to exist in *ex situ* collections. There is a need to fully assess the current status of living and seedbank *ex situ* collections and develop a plan to address gaps, to ensure collections are duplicated and capture the genetic diversity of wild populations.

CONSERVATION NEEDS IDENTIFIED DURING DISCUSSIONS	
- Building linkages with nurseries inside and outside the region - Research projects to develop propagation protocols - Develop list of safe sites	

IMMEDIATE NEXT STEPS	ACTION LEAD
- KEFRI and NMK to share existing data on propagation techniques	KEFRI
- Research projects on propagating little known threatened species developed	Pwani University & LEAF
- Connect with nurseries along the south coast	Coastal Conservation Forest Unit
- Develop list of safe sites	All
- Identify areas for seed collection and begin collection of material for *ex situ* conservation	All

COLLABORATORS AND STAKEHOLDERS
Kivukoni Indigenous Tree Nursery Mandhari Plants

3.3 NATIONAL ACTIONS

In the final workshop, participants voted on which actions identified as required for the two regions should be elevated to the national level and delivered as a priority. The most popular actions were;

- Establish a national conservation consortium for Kenya's threatened trees
- Plant threatened trees in safe sites *ex situ* as a security measure against extinction
- Identify key sites for conservation and protection *in situ*
- Restore degraded sites with threatened tree species.

4. NEXT STEPS

4.1 ORGANISATIONAL PLEDGES

In the final workshop, participants were asked to pledge actions that their organisations can play a role in delivering, that would support achievement of each goal. These are summarised under each goal below, with detail provided against each organisation in Appendix I.

Goal 1: Key sites occupied by a high number of threatened tree species are identified, protected and restored

Pledges made under this goal included collaboratively working to identify, designate and raise funds for protection and restoration of priority areas for threatened tree species conservation, including in the Taita Hills, coastal forests and other areas. This included a pledge from KWS to protect threatened tree species found within existing protected areas that they manage, and, as per their mandate, focus particularly on species protected under the Convention on International Trade in Endangered Species (CITES).

Goal 2: Genetically representative and duplicated ex situ conservation collections are established for all threatened tree species, acting as an insurance against extinction (including in botanic gardens, farms, private plots and landscaping)

Multiple organisations pledged to contribute to *ex situ* conservation of threatened tree species through seed banking, establishment of living collections and seed orchards, as well as to develop propagation protocols to enable species recovery and restoration programmes. This included KEFRI, ICRAF, African Forest, Brackenhurst Botanic Garden and Forest, KITN, Pwani University and LEAF.

Goal 3: Knowledge and understanding of threatened tree species is increased, and all data and information is stored and tracked in a central system, facilitating coordinated conservation action

Organisations including the International Tree Foundation, KEFRI and Natural Africa Concern pledged to sharing information, including propagation protocols, with community partners and Community Forest Associations. BGCI pledged to track conservation action for Kenya's threatened trees using a modified version of BGCI's global conservation action tracking tool, that conservation actors in Kenya can provide information to. This action was agreed with KFS prior to the final workshop, to support KFS with national monitoring.

Goal 4: Kenyans, including local communities and key conservation delivery agencies, have a sense of pride and responsibility towards protecting the country's threatened trees and are acting as custodians

Participants pledged to continue co-working as a group to identify and implement priority actions for threatened tree species and share the knowledge gained during the workshops with additional stakeholders. This included a pledge from an independent consultant to talk with religious stakeholders in coastal Kenya, including the Catholic Archdiocese of Mombasa, to encourage them to plant indigenous and threatened trees on their land. There was also a pledge from KEFRI to integrate awareness and promotion of planting threatened tree species on farms in their field days and open days.

Goal 5: Threatened tree species are sustainably utilised as alternatives to exotic species, providing timber and Non Timber Forest Products

Participants pledged to initiate or continue research on native and threatened tree species, collaborate with other stakeholders, and continue to promote the planting of native and threatened tree species as an alternative to exotic species. This included a pledge from Pwani University to continue research on physiology and morphological growth traits of important tree species, in collaboration with other interested research teams, an interest from Brackenhurst Botanic Garden and Forest to work with national and international partners to highlight indigenous tree values compared to exotic species on an ecosystem services level, and a pledge from KITN to continue to advocate for indigenous species with major tree planting initiatives in Kilifi which could have knock-on effects on threatened species. LEAF will trial different techniques for reforestation, using experiments to optimise tree survival.

4.2 COORDINATING AND TRACKING ACTION

A website for conservation action for Kenya's threatened trees was launched to provide a central hub for resources related to the planning process and to track action and impact: https://sites.google.com/view/planningactionforkenyastrees/home

Two regions (Taita Hills and the coastal forests) had specific conservation planning sessions. It is recommended that conservation planning sessions are organised and carried out for additional regions, particularly those with a high number of threatened tree species.

Future work will focus on the submission of collaborative funding applications to address priority actions identified during the workshops, as detailed in this report.

Participants of the Planning Conservation Action for Kenya's Threatened Trees Workshops have formed a Kenya Threatened Tree Conservation Consortium, which will be jointly co-ordinated by KFS and BGCI, who will continue to convene regular meetings, oversee progress on the continuation of conservation planning for Kenya's threatened trees, and monitor implementation of identified actions to conserve Kenya's threatened trees.

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APPENDIX I

Participants and pledges from "Planning conservation actions for Kenya's Threatened Trees" workshops, 1st October - 5th November 2020

	INSTITUTIONAL PLEDGES								
ORGANISATION	**Goal 1**	**Goal 2**	**Goal 3**	**Goal 4**	**Goal 5**	**NAME**	**NATIONAL**	**TAITA**	**COAST**
African Forest		Lead an expedition to the Shimba Hills in November 2020 to collect propagation material from threatened trees				Kenya Mutiso	Y	Y	
A Rocha Kenya						Lennox Kirao			Y
BGCI		Working with the Kenya Horticultural Society to identify safe sites for threatened trees. C. 30 sites identified in Nairobi so far and this approach will be scaled up nationally	Track conservation action for Kenya's threatened trees using a modified version of BGCI's global conservation action tracking tool that everyone can contribute to. Information will be shared with KFS	Continue to co-lead a conservation consortium for Kenya's threatened trees to ensure momentum continues		Alex Hudson	Y		
						Kirsty Shaw	Y	Y	
						Yvette Harvey-Brown	Y		Y
						Hebert Migiro	Y	Y	

Brackenhurst Botanic Garden and Forest / Plants for Life International at Brackenhurst		Committed to expand its collection of threatened trees of the Taita Hills	Continue to collect threatened species with local communities in largely unassessed areas of Kenya for *ex situ* cultivation in sites across Kenya		Work with national and international research partners to highlight indigenous tree's value in comparison to exotic species on an ecosystem services level.	Jonathan Jenkins	Y		
						Mark Nicholson	Y	Y	
Consultant				Discuss with religious stakeholders to plant indigenous trees on their land (e.g catholic archdiocese of Mombasa)		Peter Borchardt	Y		
Consultant	Focus on finding funding pathways and collaboration for Mwangea Hill conservation	Assist in planning for Pwani University BG				Galena Woodhouse	Y		Y
Conservation Planning Specialist Group (CPSG)						Caroline Lees	Y		Y
						Claudine Gibson	Y	Y	
East African Plant Red List Authority (EAPRLA)						Quentin Luke	Y		
ICRAF						Alice Muchugi	Y		
International Tree Foundation				Sensitize the communities awareness creation and actual planting of threatened species with communities		Teresa Gitonga	Y		

Organization						Name			
Kenya Water Towers Agency / TOTAL Kenya						Robert Mutuma Njeru			
Kenya Forest Service (KFS)				Continue to co-lead a conservation consortium for Kenya's threatened trees to ensure momentum continues		George Wara			Y
						James Mwang'ombe	Y		Y
KFS				Continue to co-lead a conservation consortium for Kenya's threatened trees to ensure momentum continues		Andrew Soi	Y	Y	
						Jane Wamboi	Y		
Kenya Wildlife Service (KWS)	Committed to the protection of threatened tree species found within the protected areas and those protected under CITES		To sensitize communities on threatened tree species and their conservation			James Mathenge	Y		
Kenya Forestry Research Institute		Committed to helping develop and document propagation protocols for threatened trees	To train Community members and CFAs on propagation protocols of the threatened species	Integrate awareness and promotion of planting threatened tree species on farms in the field days and open days		William Omondi	Y		
						Chemuku Wekesa	Y	Y	
KITN	KITN and the surrounding 3 acre property in Kilifi will continue to be a site for the establishment of *ex situ* populations of threatened tree species, and as an	Lead expeditions to collect propagation material from threatened trees of the coastal forests in the current rains. Will continue to			Continue to advocate for indigenous species with major tree-planting initiatives in Kilifi (eg Komaza), which could have knock-	Norbert Rottcher	Y		Y

Organization						Name			
	accessible rewilding demonstration (site was a sisal field until 10 years ago). 330 species already brought in, of which about 20% are threatened.	propagate threatened species for distribution into school planting programmes, private gardens and large-scale restoration projects including Pwani University and sites in Kilifi and Vipingo.			on effect on threatened species.				
Kijabe Forest Trust						Mike Adkins	Y		
The Little Environmental Action Foundation (LEAF)	Provide trees for restoring degraded sites in the Coastal Forest Region	Expand a seedling nursery in collaboration with Pwani University. Improve restoration techniques via research on *ex situ* collections in Pwani University.				Harry Fonseca Williams			Y
						David Bartholomew	Y		Y
Natural Africa Concern			Create awareness and training on identification of threatened and endemic species in the Taita Hills			Lawrence Wagura	Y		
National Museums of Kenya (NMK)						Agnes Lusweti	Y		
						Joyce Jefwa	Y		
						Geoffrey Mwachala	Y	Y	
						Paul Mutuku Musili	Y		
						Paul Muigai Kirika	Y		

						Peris Kamau	Y		
Pwani University	Contribute towards data collection to help identify areas and contribute to conservation of Mwangea hill among other threatened habitats				Continue research on physiology and morphological growth traits of important tree. Willing to collaborate with other research teams	Rose Kigathi	Y		Y
Wildlife Works						George Thumbi	Y	Y	
Women in Conservation						Rose Wamalwa	Y		
						Elizabeth Cassidy			
						Nzilani			
						PMKIR			

APPENDIX II

Threatened tree species of the Taita Hills

TAXON NAME	IUCN RED LIST STATUS
Meineckia ovata	Critically Endangered*
Aloe ballyi	Endangered
Coffea fadenii	Endangered
Encephalartos kisambo	Endangered
Polyscias stuhlmannii	Endangered
Psychotria crassipetala	Endangered
Psychotria petitii	Endangered
Psychotria taitensis	Endangered
Turraea barbata	Endangered
Memecylon teitense	Vulnerable
Ocotea kenyensis	Vulnerable
Pavetta teitana	Vulnerable
Psychotria alsophila	Vulnerable
Psychotria pseudoplatyphylla	Vulnerable
Rytigynia eickii	Vulnerable
Sorindeia calantha	Vulnerable
Vepris fadenii	Vulnerable
Bridelia taitensis	Vulnerable*
Macaranga conglomerata	Vulnerable*

APPENDIX III

Threatened tree species of the coastal forests

TAXON NAME	IUCN RED LIST STATUS
Cola porphyrantha	Critically Endangered
Vangueriopsis shimbaensis	Critically Endangered
Afrocanthium kilifiense	Endangered
Afrocanthium peteri	Endangered
Anisotes ukambensis	Endangered
Bauhinia mombassae	Endangered
Cleistanthus beentjei	Endangered
Cola octoloboides	Endangered
Combretum tenuipetiolatum	Endangered
Cordia torrei	Endangered
Croton megalocarpoides	Endangered
Elaeodendron aquifolium	Endangered
Euphorbia wakefieldii	Endangered
Gigasiphon macrosiphon	Endangered
Multidentia sclerocarpa	Endangered
Newtonia erlangeri	Endangered
Psychotria crassipetala	Endangered
Strychnos xylophylla	Endangered
Turraea barbata	Endangered
Uvaria faulknerae	Endangered
Uvariodendron gorgonis	Endangered
Vepris sansibarensis	Endangered
Warburgia stuhlmannii	Endangered
Ziziphus robertsoniana	Endangered
Aidia abeidii	Vulnerable
Allophylus zimmermannianus	Vulnerable
Angylocalyx braunii	Vulnerable
Buxus obtusifolia	Vulnerable
Campylospermum sacleuxii	Vulnerable
Cordia somaliensis	Vulnerable
Croton talaeporos	Vulnerable
Cynometra greenwayi	Vulnerable
Diospyros amaniensis	Vulnerable
Diospyros occulta	Vulnerable
Dovyalis keniensis	Vulnerable

Ficus faulkneriana	Vulnerable
Gardenia posoquerioides	Vulnerable
Guibourtia schliebenii	Vulnerable
Isolona cauliflora	Vulnerable
Julbernardia magnistipulata	Vulnerable
Memecylon verruculosum	Vulnerable
Micrococca scariosa	Vulnerable
Mkilua fragrans	Vulnerable
Ochna apetala	Vulnerable
Parkinsonia anacantha	Vulnerable
Pavetta linearifolia	Vulnerable
Pleioceras orientale	Vulnerable
Populus ilicifolia	Vulnerable
Psydrax polhillii	Vulnerable
Rothmannia macrosiphon	Vulnerable
Sapium triloculare	Vulnerable
Synsepalum subverticillatum	Vulnerable
Tarenna drummondii	Vulnerable
Uvariodendron kirkii	Vulnerable
Vangueria pallidiflora	Vulnerable
Vepris robertsoniae	Vulnerable
Vitellariopsis kirkii	Vulnerable
Vitex keniensis	Vulnerable
Warneckea amaniensis	Vulnerable
Warneckea maritima	Vulnerable
Xylopia arenaria	Vulnerable
Sterculia schliebenii	Data Deficient