Conserving Threatened Birds and Capacity for Climate Resilience of People and Nature in Kiang'ombe Hill Forest

Technical Report

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March 2025

African Bird Club
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EXECUTIVE SUMMARY

Beyond their ecological importance,birds act as indicators of environmental change, the presence of certain species communicate the health of an ecosystem while the absence of others signal deterioration in habitat quality. Thus understanding the diversity of birds in a given ecosystem is important for monitoring changes such as climate and land cover changes. With support from African Bird Club we conducted bird surveys at Kiang'ombe hill forests and its surrounding shrubland between 4th and 10th February 2025. The project aimed at survey and assess the population of Hinde's Babbler *Turdois hindei* (a Vulnerable Kenyan endemic bird species) in Kiang'ombe hills ecosystem. With the involvement of local community members, other birds were also surveyed thereby strengthening local capacity on bird identification as well as advocacy for habitat conservation and restoration. The avifauna of Kiang'ombe hill is characteristic of the forests of central highland and the Somali-Maasai biome species. During this survey, a total of 82 bird species within 36 families were recorded, with a mean of 11 species per sampling point. They included a total of 41 Hinde's Babblers were recorded within Kiang'ombe hills in ten different groups. Like in many other sites, part of the Hinde's Babbler population in Kiang'ombe hills occur within the protected forest area while other populations occur on private land near the slopes of hills. Occurrence of Hinde's Babbler on privately owned land presents a conservation challenge for this species since such habitats are prone frequent clearing for cultivation or settlement. Although this study was rather rapid, it has generated new data on Hinde's Babbler populations (as well as other bird species) that had not been documented before. The study therefore, provides a useful baseline against which future surveys and monitoring can be based.

Like in many other sites, part of the Hinde's Babbler population in Kiang'ombe hills occur within the protected forest area while other populations occur on private land near the slopes of hills. Occurrence of Hinde's Babbler on privately owned land presents a conservation challenge for this species since such habitats are prone frequent clearing for cultivation or settlement. There is need to support the communities to adopt livelihood activities that support their resilience to climate change while enhancing conservation of Hinde's Babblers' riparian habitats such as bee keeping. Other key action should include restoration and re-forestation of degraded parts of the hills while creating awareness and enforcement against illegal logging, charcoal burning and un-regulated grazing in the forest with the involvement of all stakeholders.

From this study skills on birds' identification and monitoring were transferred to local community members and county government staff who participated in the survey. We recommend establishment Key Biodiversity Area (KBA) with a robust monitoring program for Hinde's Babbler and other birds in Kiang'ombe Hills ecosystem which can eventually be sustained by the Community Forest Associations (CFAs) encouraging the participation of school children in order to inculcate a long-term care for the environment in the community for a sustainable future.

Table of Contents

LIST OF TABLES

LIST OF PLATES

LIST OF APPENDICES

1.0 INTRODUCTION

Birds are an important component of the ecosystem and help in maintaining its ecological balance and health (Huston 1994, Sekercioglu 2006). Beyond their ecological importance, birds are also of cultural and economic significance, contributing to tourism and providing aesthetic value through their vibrant plumage and distinct calls (Sekercioglu 2006). As indicators of environmental change, the presence of certain species communicates of ecosystem health while the absence of others will signal deterioration in habitat quality (Furness and Greenwood 1993, Matiku and Mulwa 2006). Thus understanding the diversity of birds in a given ecosystem is important for monitoring changes such as climate and land cover changes (Habel et al 2014).

One of Kenya's bird species of particular interest is the Hinde's Babbler (*Turdoides hindei)*, which is globally threatened and has a restricted range and is endemic to Kenya (Bennun and Njoroge 1999). The species occurs as fragmented populations within a range of 1900km^2 in central Kenya from 1300 to 1500m above sea level (Stevenson and Fanshawe 2002). Known populations occur in 1. Meru, 2. Mukurweini, and Murangá, 3. Thika and Kiambu around coffee bushes; in central Kenya and 4. Embu, 5. Machakos Valleys, 6. Makueni hill slopes and 7. Kitui hills to the east. The species is a group-territorial cooperative breeder occurring as small groups of 4-6 birds in thickets and woodland within semi-arid areas, and moist, fertile land largely cleared for agriculture but with fragmented of scrub often including exotic *Lantana camara* (Teucher et al 2015). They cannot tolerate high temperature or open areas without thickets and litter cover. They retreat through riparian thickets into or nearer to the hill forest scrub during dry season and descend into the lower altitudes mostly into community land during rainy season when leafy cover increases and it is wet. The hills are important sources of water that maintains the cool riparian thickets (Mulwa et al 2024).

Threats to *Turdoides hindei* include decline in suitable habitat patches for breeding and cover, and the fast-changing land use patterns in range regions. Changing climatic conditions characterized by frequent prolonged droughts, forest fires, and encroachment form the serious threat to survival of *T. hindei* in its restricted range and shrinking habitats. Enhanced capacity and awareness of local people towards the willingness to maintain and restore suitable habitats is among key strategies to secure the future of Hinde's Babbler within their natural range in Kenya.

Although rapid avifaunal surveys have confirmed presence Hinde's Babbler in the Maranga, Murinduko, and Kiang'ombe hill forests, the species population, and distributional mapping of micro-habitats has never been documented for Kiang'ombe Hills. The documentation of its seasonal habitat use patterns in this forest is critical to mitigate habitat loss and degradation. This project aimed to survey and assess the population of Hinde's Babbler *Turdois hindei* and map its habitat patches in Kiang'ombe hill forest. Furthermore, we assessed the abundance and diversity of other bird species present in the area in order to establish a baseline for monitoring. Birds recorded here were also characterized into different IUCN threat categories, migration patterns, as well as forest

dependence habitat guilds. By involving local community (Community Forest Association -CFA) members in the surveys we enhanced their capacity and awareness on conservation of Hinde's Babbler as well as other birds and their habitats.

2.0 OBJECTIVES

The project aims to survey and assess the population of Hinde's Babbler *Turdois hindei* and map its habitat patches in Kiang'ombe hill forest, and strengthening capacity among local community on bird identification as well as advocacy for habitat conservation and restoration.

The project sought to achieve the following objectives:

1. Assess population and distribution of Hinde's Babbler in Kiang'ombe hills forest

2. Assess habitat preferences by Hinde's Babbler in Kiang'ombe hills forest

3. Profiling threats to survival of Hinde's Babbler in its habitats in Kiang'ombe hill forest

4. To survey and characterize bird communities in Kiang'ombe into relative abundances, species richness and diversity classifying them according to their habitat guilds

4. Involve local community members in the survey thereby strengthening their capacity on bird identification as well as advocacy for habitat conservation

OUTCOMES:

The project aims at the following valuable conservation outcomes:

1. Knowledge about Hinde's Babbler population and distribution, habitat use and threats in Kiang'ombe hill forest is documented

2. Capacity of local community on bird identification as well as advocacy for habitat conservation enhanced

3. Capacity among local community on climate resilience best practices is enhanced

3.0 METHODOLOGY

STUDY AREA

Kiang'ombe is a 2,104ha hilltop forest located at -0.565482°, 37.704381° within the Mt. Kenya ecosystem side of Embu County. Kiang'ombe hill forest is one of the biodiversity-rich dryland hilltop forest ecosystems at the drier side of Mt. Kenya. This forest is a potential Key Biodiversity Areas (KBA) surrounded by a growing rural agrarian human population that is increasingly

accelerating its degradation and destruction. The forest is rich in biodiversity including plants, birds, mammals, insects, reptiles and amphibians among others which are not well documented.

The hilltop forest is critical as water source, climate moderation and flood regulation among other forest ecosystem services to the local communities. The forest is threatened by several anthropogenic pressures as a result of rapid population growth and the increasing poverty, which has triggered encroachment into the forest for settlements, farming, timber, charcoal, firewood and grazing.

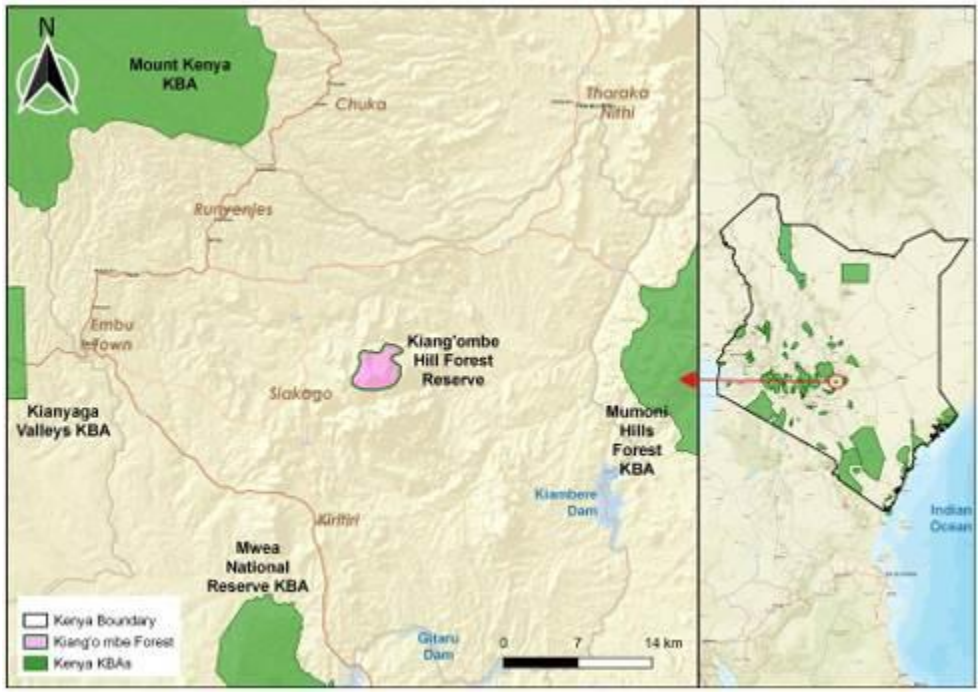

Figure 1: map showing the location of Kiang'ombe Hills forest

3.1 Survey Methodology

Various methods were used to survey birds and assess habitat status and threats at different sampling areas within Kiang'ombe hill forest. For Hinde's Babbler surveys, the study followed methods previously applied in Mukurweini, Kianyaga and Machakos by Shaw et al. (2002) in order to ensure consistency and repeatability in future monitoring.

3.1.1 Acoustic surveys

Play-back surveys were used to ascertaining the presence of Hinde's Babbler since despite occurring in low densities and having a cryptic behavior – they readily respond to their calls (Shaw et al., 2002). The playback stations or points were placed at intervals of 250m apart along riparian vegetation along stream valleys where the species is expected to occur

At each census point, the observer(s) would quietly listen for Hinde's Babbler calls or movements among bushes for the first five (5) minutes. If the target species is not detected, their calls were

played back in bursts of 30 seconds from a mobile application (eGuide to Birds of East Africa) installed in a smart phone that was connected through Bluetooth to an amplifying speaker. The observers remained at the playback point for a further 10 minutes making play backs after 2-3 minutes. Where Hinde's Babbler groups were observed GPS points were taken for future monitoring.

3.1.2 Point Counts (PCs)

The **PC** surveys were conducted in riparian vegetation along stream/river valleys and other habitats (such as bushland and canopy forest) in combination with Hinde's Babbler Acoustic surveys. Point Counts (PCs) method entailed standing at a particular point, recording all birds seen or heard up to 50m from the point (Pomeroy 1992). A minimum distance of 250 m was maintained between consecutive points (Bibby *et al.* 2000). Observers remained at one point for 10 minutes before moving to the next point count station. Sampling was carried out between 0700h and 1100h.

3.1.3 Mist netting

Mist-nets were used to compliment the point counts method and especially to catch Hinde's Babbler. Several 12m standard mist-nets (4 paneled and 3m high) were laid within the transect areas along existing small paths and trails to limit possible habitat destruction. For each site, net lines will be opened at 6:00am and closed at 10:30am and re-opened again at 04:30pm – 06:30pm when the birds are known to be active.

3.1.4 Point Observations (VPOs)

Vantage point observations (VPOs) entailed staying on a raised ground and having as close to 360^0 open fields of view as possible from where observers recorded large birds flying or soaring in the sky especially raptors. Observations lasted at least two hours, in the hot afternoons between 12:00 and 16:00 hours, when heavy birds tend to soar using thermal currents.

3.1.5 Opportunistic Observations

To enrich the site species checklist, birds observed outside the systematic sampling protocol were recorded and their associated habitats noted.

3.1.6 Parameters Gathered

Data on the following parameters were collected; bird abundance, species richness and species diversity index. All birds recorded were classified in to three forest dependence guilds based on Bennun *et al.* 1996. Thus; Forest specialist species (**FF species**); Forest generalist species (**F species**) and Forest visitors (**f species**). Furthermore, the birds' IUCN conservation and migration status were noted.

3.1.7 Sampling Strategy and Effort

This rapid survey was conducted for a period of 6 days (between 4th and 10th February 2025). A total of 28 point-counts and acoustic sampling points were conducted. Equipment used included binoculars (10x42), field guide books (e.g. Zimmermann *et al* 1996, Steven & Fanshawe 2002), mobile phone apps, GPS unit and previous experience of the bird calls aided identification.

3.1.8 Local community involvement

This survey involved local community members from various Community Forest Associations (CFAs) around the hills whose indigenous knowledge and experiences was instrumental in locating

Hinde's Babbler and understanding their imminent threats. Additionally the exercise benefited from the presence of an officer for the Ministry of Environment, Embu County.

3.1.9 Data Analysis

All data from the survey were entered and processed in excel spreadsheet and means for various parameters obtained and presented in tables.

4.0 RESULTS

4.1 Hinde's Babbler Population

A total of 41 Hinde's Babblers were recorded within Kiang'ombe hills forest in ten different groups. Tables 1 below give details of HB sightings during this survey.

Table 1: Hinde's babbler groups and numbers observed in Kiang'ombe hills

Sighting No.	Location	Area Name	Number of Individuals
1	S: 00°32'13.91"; E: 37°41'35.9"	Snake Road Bridge	5
2	S: 00°32'08.37"; E: 37°41'39.61"	Snake road	3
3	S: 00°33'04.35"; E: 37°41'18.6" 1252m	Picknic Site (near Nursery)	4
4	S: 00°32'29.21"; E: 37°41'57.38"	Marivwe Stream	4
5	S: 0.54132301; E: 37.9932869 1128m		4
6	S: 00°32'39.76"; E: 37°42'13.55" 1151m	Kuui Primary School	6
7	S: 00°31'39.05"; E: 37°39'56.63" 1082m	Mutou Stream	4
8	S: 00°32'31.06"; E: 37°42'25.1" 1094m	After Kuui Pr Sch.	3
9	S: 00°32'23.46"; E: 37°41'50.61" 1120m	Snake road to Marivwe	4
10	00'32'47.73"S 37 42'10.35"E Alt: 1120m	Kuui area near water tank	4
	Total		**41**

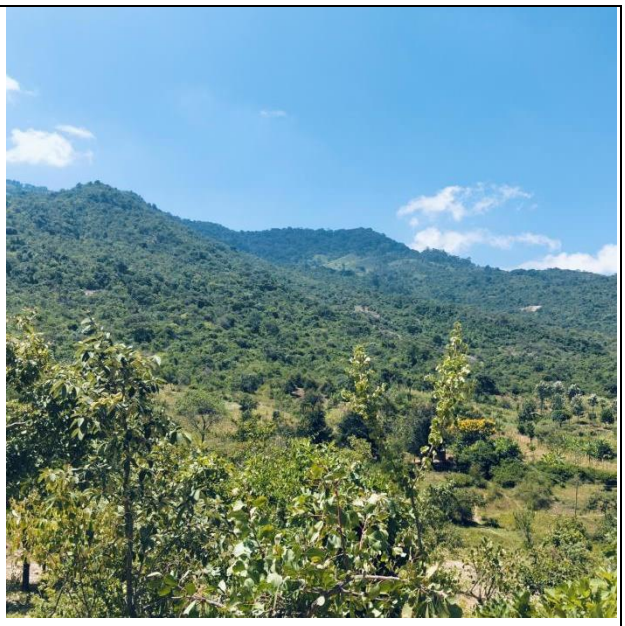

Plate 1: Hinde's Babbler and preferred habitats along valleys on the hill's lower slopes

4.2 Hinde's Babbler Habitats conditions and threats

The major threat to T. *hindei* is the rapid decline in suitable habitat patches for foraging, breeding and concealment cover. This is as a result of the fast-changing land use patterns in their range regions. Changing climatic conditions characterized by frequent prolonged droughts, bush fires, and encroachment are additional challenges that affect the survival of T. *hindei* in most of its range (Bennun and Njoroge 1999).

Like in many other sites, part of the Hinde's Babbler population in Kiang'ombe hills occur within the protected forest area while other populations occur on private land near the slopes of hills. Occurrence of Hinde's Babbler on privately owned land presents a conservation challenge for this species since such habitats are prone frequent clearing for cultivation or settlement.

The ongoing incidences of illegal logging and charcoal burning in the gazetted forest area at high elevations water catchment may not only result in water scarcity for local community around the hills, but this affects Hinde's Babbler hill slopes habitats whose moist conditions rely on the forest being able to continually release water down the streams.

Plate 1 below shows anthropogenic habitat disturbance in both protected forest area and privately owned land which adversely affect biodiversity and the quality of ecosystem services for the local community around the hills.

Illegal charcoal burning in the gazetted forest area at high elevations water catchment and source of water springs

Land use changes on privately owned lowlands - constantly reduces HB habitat size

Plate 2: Threats to Hinde's Babbler habitats in Kiang'ombe hills

4.3 Avifauna Parameters Assessed

4.3.1 Species Richness

The avifauna of Kiang'ombe hill is characteristic of the forests of central highland and the Somali-Maasai biome species. During this survey, a total of 82 bird species within 36 families were recorded , with a mean of 11 species per sampling point. See Table 3 below

4.3.2 Bird Abundance

A total of 687 individual birds were recorded during this assessment, with a mean of 24 birds per sampling point. See Table 3 below

4.3.3 Diversity index

Mean Shannon Wiener Species Diversity Index (H') between the 28 sample points was 2.23. See Table 2 below

Table 2: Key avifauna parameters assessed in kiang'ombe hills

Parameter	**Value**
Species Richness	82 (Mean = 11, n=28 points)
Abundance	687 (Mean = 24, n=28 points)
Shannon-Wiener Species Diversity Index (H')	Mean H' = 2.23 (n=28 points)

4.3.4 Species Relative abundance

Assessment of encounter rate (based on number of pint counts = 28), relative abundance (abundance of each species *viz a viz* number of all bird observed) reveals that certain species were consistently more common and also abundant in Kiang'ombe hills. The most common species include; Purple-crested Turaco; Grey-backed Camaroptera, Red-eyed Dove, Eastern Nicator and

Common Bulbul. On the other hand Narina Trogon, Ashy Flycatcher, Cape Robin Chat, Red-headed Weaver were among the least common species at this site. See Appendices 2.

4.3.5 Species of Conservation Concern

The only threatened species (based on IUCN red list) recorded during this survey was Hinde's Babbler, which a Kenyan Endemic rated by IUCN as Vulnerable. However, with increased survey effort covering different seasons, other threatened species may be recorded here especially raptors.

4.3.6 Migratory species

Although the survey was conducted during regular migration period few migratory species were recorded thus; four palearctic migrants namely Thrush Nightingale, Eurasian Bee-eater, Common Buzzard and Plain Nightjar (partial). Similarly four Afro-tropical migrants (within Africa) were observed alongside the resident birds. These include: Red-capped Robin Chat, African Paradise Flycatcher, Grey-headed Kingfisher and Plain Nightjar (partial).

4.3.7 Bird Community composition

The bird community recorded during the survey had many representative species typical of Somali-Masai biome and few afro-montane forest biome species. The distribution of bird species according to different habitat guides in terms of forest dependence is outlines in Table 3 below and Appendix 1.

Table 3: Different Species habitat guilds recorded in Kiang'ombe hills

Forest Habitat Guild Category	**Number**
Forest specialists (FF)	2
Forest generalists (F)	10
Forest visitors (f)	24
Non-forest Species	46 (55%)
Total	**82**

4.4 Other unique Biodiversity of Kiang'ombe hills forest

During this survey encountered a cave inhabited by thousands of fruit bats stretching over 100m deep. The bat colony does not seem to migrate from the area and local communities reportedly visit the cave to collect guano as organic manure for their farms. Furthermore, a green millipede possibly in the family *Paradoxosomatidae*, was encountered on a tree bark of the high canopy forest at the hill top.

This calls for extensive multi-taxa biodiversity surveys in this unique cloud forest - since there is no comprehensive biodiversity data for Kiang'ombe Hills.

Plate 3: Thousands of bats in a cave and un-identified green millepede encountered in Kiang'ombe hills forest

4.5 Sustainable livelihood options for local communities around Kiang'ombe Hills

Kiang'ombe hills offer numerous ecosystem goods and services if harnessed sustainably. There is need to promote community livelihoods alternatives that are ecosystem-based and that support resilience and adaptation to climate change also with benefits to threatened biodiversity such as *T. hindei* within and around Kinagombe hills. Some of the viable ecosystem service optimization activities for the local community include, bee keeping, water harvesting from the forest, ecotourism among others. These will help motivate communities to stop unsustainable livelihood practices such as charcoal burning, logging, which only aggravate climate related risks and vulnerabilities for the area.

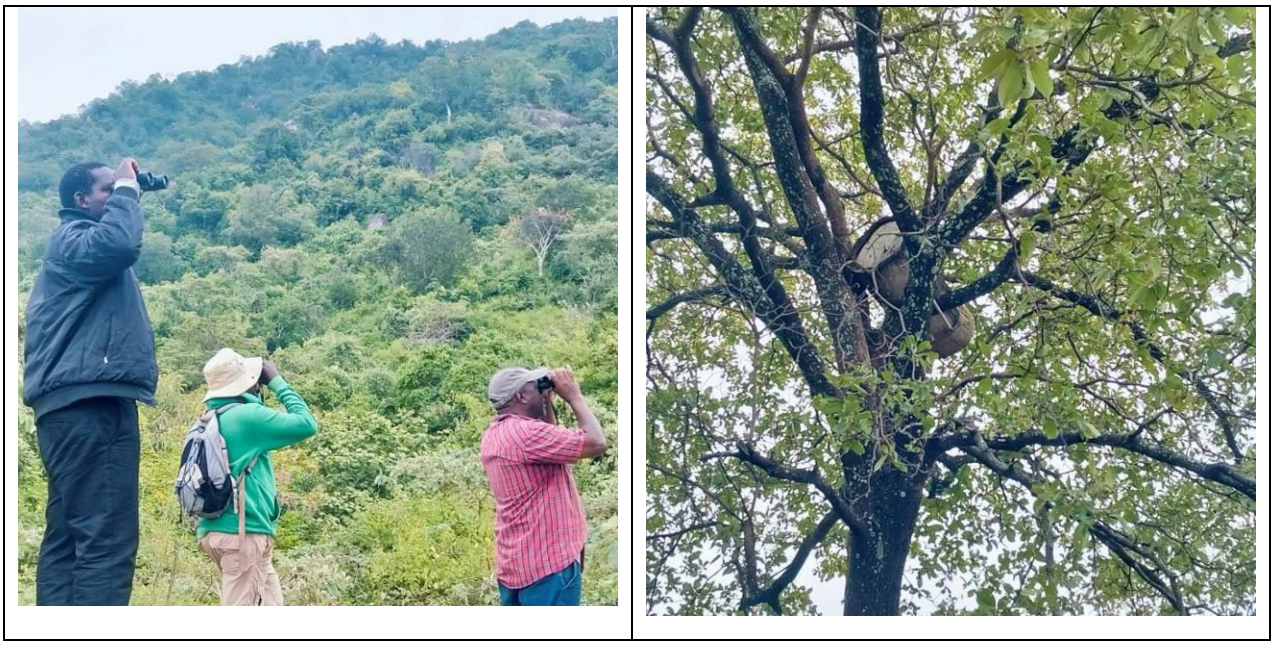

Plate 4: Nature-based Enterprise options for Kiang'ombe hill forest

5.0 CONSERVATION AWARENESS CREATION

Kiang'ombe Hill Forest has been experiencing rapid degradation due to human activities such as illegal logging, agricultural encroachment, and charcoal burning. These activities have led to extensive deforestation, loss of biodiversity, soil erosion, and a decline in the forest's capacity to provide essential ecosystem services such as water retention and carbon sequestration. The depletion of forest resources has also negatively impacted local communities that rely on the forest for their livelihoods. Additionally, weak enforcement of environmental policies and lack of awareness among the public have further exacerbated the situation. Without immediate conservation and restoration efforts, the forest risks irreversible damage, threatening both ecological balance and human well-being.

Conservation awareness was conducted for school going children, community members living adjacent to the forest, and law enforcement agencies responsible for protection and safeguarding Kiangómbe Hill Forest. Conservation and sustainable living messages shared included adoption of ecosystem-based approaches where safeguarded natural ecosystem supports adaptation of communities, their culture, farms and critical goods and services derived from Kiangómbe. Messages were delivered though a banner, birds of Kiang'ombe poster, two Nature Kenya staff making presentations, and four chief's public fora organized onsite.

Nature Kenya staff making presentation forest ecosystem services and bird identification

Awareness creation for school children on forest restoration for forest ecosystem services

Plate 5: Photos of school children during conservation awareness creation

Awareness meetings were held at Kuui Primary school (S0.5399598, N37.6987018), Nthawa, Muminji, Kiangómbe, and Kerie locations adjacent to Kiangómbe forest. Overall, 337 school going boys and girls were reached, and 283 (126F; 157M) people attended the awareness meetings. The main highlight is that based on discovery of forest destruction actiivties inside the forest during avifaunal surveys, the Deputy County Commissioner (DCC) of Mbeere North mobilized key stakeholders including Kenya Forest Service, chiefs in four locations around the hill forest, Embu County Environment and Natural Resources department, and the community forest association (CFA) holding public gatherings that communicated forest safeguarding, restoration, smart farming methods, and protection messages. Community reached by this message pledged their support through the CFA, to protect and maintain the natural hill forest. Embu County representatives pledged to pursue with relevant departments and stakeholders to kick start discussion around promoting Kiangómbe Hill forest to be profiled as a Key Biodiversity area, which would not only safeguard the forest but all wildlife and people depending on its ecosystem services.

Conservation awareness creation at a village adjacent Kiangómbe forest - public baraza

Chief addressing conservation awareness creation at a village adjacent Kiangómbe forest - public baraza

Community Forest Association (CFA) members addressing community on importance of protecting Kiangómbe forest - public gathering

Community members around Kiangómbe forest listening to County Environment officer addressing protection of the hill forest during a public gathering by area Chief

Plate 6: Photos during conservation awareness creation through chief's fora around Kiangombe forest

6.0 DISCUSION AND CONCLUSION

Although this was the first most extensive surveys of the avifauna and especially Hinde's Babbler for Kiang'ombe hills forest, a fairly high diversity of bird species and *T. hindei* groups have been recorded. The study therefore, provides a useful baseline against which future surveys and monitoring can be based. However, this study took a short time and only covered the dry season and; more survey effort is required covering different seasons in order to attain more complete checklists of birds of Kiang'ombe hills forest.

Comprehensive biodiversity assessment covering all major flora and terrestrial fauna taxa (i. e. Plants, Mammals, Birds, Reptiles, Amphibians and Invertebrates) would further help understand the value of Kiang'ombe hills forest profiling the sites as an important site for biodiversity conservation or a Key Biodiversity Area in Kenya.

To address the ongoing threats affecting this ecosystem, more and concerted efforts to conserve the forest involving wider stakeholder network including Kenya Forest, County Government of Embu, Local communities, Civil Society Organizations etc. are required. Key action include restoration and

re-forestation of degraded parts of the hills while creating awareness and enforcement against illegal logging, charcoal burning and un-regulated grazing in the forest.

7.0 RECOMMENDATIONS

1. Further surveys and monitoring of Hinde's Babbler in these two sites are needed, to establish the number of groups in the area covering different sides of the hills during different seasons.

2. There is need to create awareness among the local community and school pupils/students on the conservation plight of Hinde's Babbler – since most of them do not know this rare and threatened species occurring in their area.

3. Involve land owners and local community in the restoration of the riparian vegetation along streams flowing from these hills to safeguard Hinde's Babbler's suitable habitats. This will not only enhance the habitat for Hinde's Babbler and other biodiversity but will also help sustain water flow from the hills to the local communities.

4. There is need to support the communities to adopt livelihood activities that enhance conservation of Hinde's Babblers' riparian habitats such as bee keeping

5. Establish a robust monitoring program for Hinde's Babbler in Kiang'ombe Hills forest which can eventually be sustained by the Community Forest Associations (CFAs)

6. Encourage the participation of school children in simple birds and habitat monitoring protocols in order to inculcate a long-term care for the environment in the community for a sustainable future.

7. Embu County Government and all relevant stakeholders work together to promote profiling of Kiangómbe hill forest as one of Kenya's Key Biodiversity Areas (KBA).

8.0 STUDY OUTPUTS

1. Skills on birds identification and monitoring were transferred to local community members and county government staff who participated in the study
2. Data obtained here was uploaded in the national bird atlas database - the Kenya Bird Map for conservation and ecotourism purposes.
3. The data from this assessment formed a baseline for comparison with future surveys.
4. Confirmation and mapping of new Hinde's Babbler groups in Kiang'ombe Hills

ACKNOWLEDGEMENTS

We wish to express many thanks to our Field Assistants and members of the Kiang'ombe hills Community Forest Association (CFA) who ably guided us through the forests. Robert Njiru, an Officer from the Environment Department of County Government of Embu, participated in the study providing immense support and logistical planning. This study would not have been possible without funding from African Bird Club (ABC). We are thankful to Nature Kenya for administrative support. We are indebted to the local administration around Kian'gombe forest who took the onus of organizing village public gatherings addressing conservation awareness creation and sustainable living.

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APPENDICES

Appendix 1: Checklist of bird species recorded in Kiang'ombe Hills Forest

Key on status: VU - Vulnerable, AM = Afrotropical migrant; PM = Palearctic migrant (Lower case am or pm = part of population is resident); Forest Dependence FF = Forest Specialists, F= Forest Dependent, f = Forest Visitors.

S.No.	**Family and Common name**	Scientific name	Status
	Numididae: guineafowl		
1	Helmeted Guineafowl	*Numida meleagris*	
	Accipitridae: diurnal birds of prey other than falcons		
2	African Harrier Hawk	*Polyboroides typus*	f
3	African Goshawk	*Accipiter tachiro*	f
4	Little Sparrowhawk	*Accipiter minullus*	f
5	Augur Buzzard	*Buteo augur*	
6	Common Buzzard	*Buteo buteo*	PM
	Columbidae: pigeons and doves		
7	Red-eyed Dove	*Streptopelia*	f
8	Laughing Dove	*Streptopelia*	
9	Emerald-spotted Wood Dove	*Turtur chalcospilos*	f
10	African Green Pigeon	*Treron calvus*	F
	Musophagidae: turacos		
11	Hartlaub's Turaco	*Tauraco hartlaubi*	**FF**
12	Purple-crested Turaco	*Tauraco*	f
	Cuculidae: cuckoos and coucals		
13	White-browed Coucal	*Centropus*	
	Caprimulgidae: nightjars		
14	Plain Nightjar	*Caprimulgus*	AM, (pm)
	Apodidae: swifts		
15	Horus Swift	*Apus horus*	
	Coliidae: mousebirds		
16	Speckled Mousebird	*Colius striatus*	
	Trogonidae: trogons		
17	Narina Trogon	*Apaloderma narina*	**F**
	Alcedinidae: kingfishers		
18	Grey-headed Kingfisher	*Halcyon leucocephala*	am f
	Meropidae: bee-eaters		
19	Cinnamon-chested Bee-eater	*Merops oreobates*	F
20	Eurasian Bee-eater	*Merops apiaster*	PM, f
	Bucerotidae: hornbills		
21	Crowned Hornbill	*Tockus*	f

22	African Grey Hornbill	*Tockus nasutus*	
	Capitonidae: barbets and tinkerbirds		
23	Red-fronted Tinkerbird	*Pogoniulus pusillus*	
24	Spot-flanked Barbet	*Tricholaema*	
25	White-headed Barbet	*Lybius leucocephalus*	
26	D'Arnaud's Barbet	*Trachyphonus*	
	Indicatoridae: honeyguides		
27	Wahlberg's Honeybird	*Prodotiscus regulus*	
28	Lesser Honeyguide	*Indicator minor*	f
	Picidae: wrynecks and woodpeckers		
29	Nubian Woodpecker	*Campethera nubica*	
	Platysteiridae: batises, wattle-eyes and relatives		
30	Chin-spot Batis	*Batis molitor*	
	Malaconotidae: helmetshrikes, bushshrikes, tchagras		
31	Grey-headed Bushshrike	*Malaconotus*	
32	Sulphur-breasted Bushshrike	*Chlorophoneus*	f
33	Brown-crowned Tchagra	*Tchagra australis*	
34	Black-backed Puffback	*Dryoscopus cubla*	F
35	Slate-coloured Boubou	*Laniarius funebris*	
36	Tropical Boubou	*Laniarius aethopicus*	f
	Laniidae: shrikes		
37	Northern White-crowned Shrike	*Eurocephalus*	
	Oriolidae: orioles		
38	Black-headed Oriole	*Oriolus larvatus*	f
	Dicruridae: drongos		
39	Common Drongo	*Dicrurus adsimilis*	
	Monarchidae: monarch flycatchers		
40	Blue-mantled Crested Flycatcher	*Trochocercus*	FF
41	African Paradise Flycatcher	*Terpsiphone viridis*	am, f
	Hirundinidae: saw-wings, swallows and martins		
42	White-headed Saw-wing	*Psalidoprocne*	f
43	Black Saw-wing	*Psalidoprocne*	f
44	Rock Martin	*Ptyonoprogne fuligula*	
45	Lesser Striped Swallow	*Cecropis abyssinica*	
	Cisticolidae: cisticolas and allies		
46	Tawny-flanked Prinia	*Prinia subflava*	f
47	Grey-backed Camaroptera	*Camaroptera*	f
	Pycnonotidae: bulbuls		
48	Common Bulbul	*Pycnonotus barbatus*	f

49	Zanzibar Greenbul	*Andropadus*	
50	Yellow-bellied Greenbul	*Chlorocichla*	F
51	Northern Brownbul	*Phyllastrephus*	f
52	Eastern Nicator	*Nicator gularis*	F
	Sylviidae: Old World warblers		
53	Red-faced Crombec	*Sylvietta whytii*	
	Timaliidae: illadopses, babblers and chatterers		
54	Hinde's Babbler	*Turdoides hindei*	Endemic ,VU
	Sturnidae: starlings and oxpeckers		
55	Red-winged Starling	*Onychognathus morio*	
	Turdidae: thrushes		
56	African Bare-eyed Thrush	*Turdus tephronotus*	
	Muscicapidae: chats, wheatears and Old World		
57	Thrush Nightingale	*Luscinia luscinia*	PM
58	Cape Robin Chat	*Cossypha caffra*	f
59	Rüppell's Robin Chat	*Cossypha semirufa*	F
60	Red-capped Robin Chat	*Cossypha natalensis*	am, F
61	Spotted Palm Thrush	*Cichladusa guttata*	
62	White-browed Scrub Robin	*Cercotrichas*	
63	African Grey Flycatcher	*Bradornis*	
64	Ashy Flycatcher	*Muscicapa*	F
	Nectariniidae: sunbirds		
65	Collared Sunbird	*Hedydipna collaris*	F
66	Amethyst Sunbird	*Chalcomitra*	f
67	Variable Sunbird	*Cinnyris venustus*	f
	Passeridae: sparrow weavers, Old World sparrows and		
68	Grey-headed Sparrow	*Passer griseus*	
69	Yellow-spotted Petronia	*Petronia pyrgita*	
	Ploceidae: weavers, bishops and widowbirds		
70	Baglafecht Weaver	*Ploceus baglafecht*	f
71	Village Weaver	*Ploceus cucullatus*	
72	Red-headed Weaver	*Anaplectes melanotis*	
73	Yellow Bishop	*Euplectes capensis*	
	Estrildidae: waxbills		
74	Red-cheeked Cordon-bleu	*Uraeginthus bengalus*	
75	Green-winged Pytilia	*Pytilia melba*	
76	Red-billed Firefinch	*Lagonosticta senegala*	
77	Purple Grenadier	*Granatina*	
78	Bronze Mannikin	*Spermestes cucculatus*	

	Viduidae: Parasitic Weaver, indigobirds and whydahs		
79	Eastern Paradise Whydah	*Vidua paradisaea*	
80	Village Indigobird	*Vidua chalybeata*	
	Fringillidae: canaries, citrils, seedeaters and relatives		
81	Reichenow's Seedeater	*Crithagra reichenowi*	
	Emberizidae: Old World buntings		
82	Golden-breasted Bunting	*Emberiza flaviventris*	

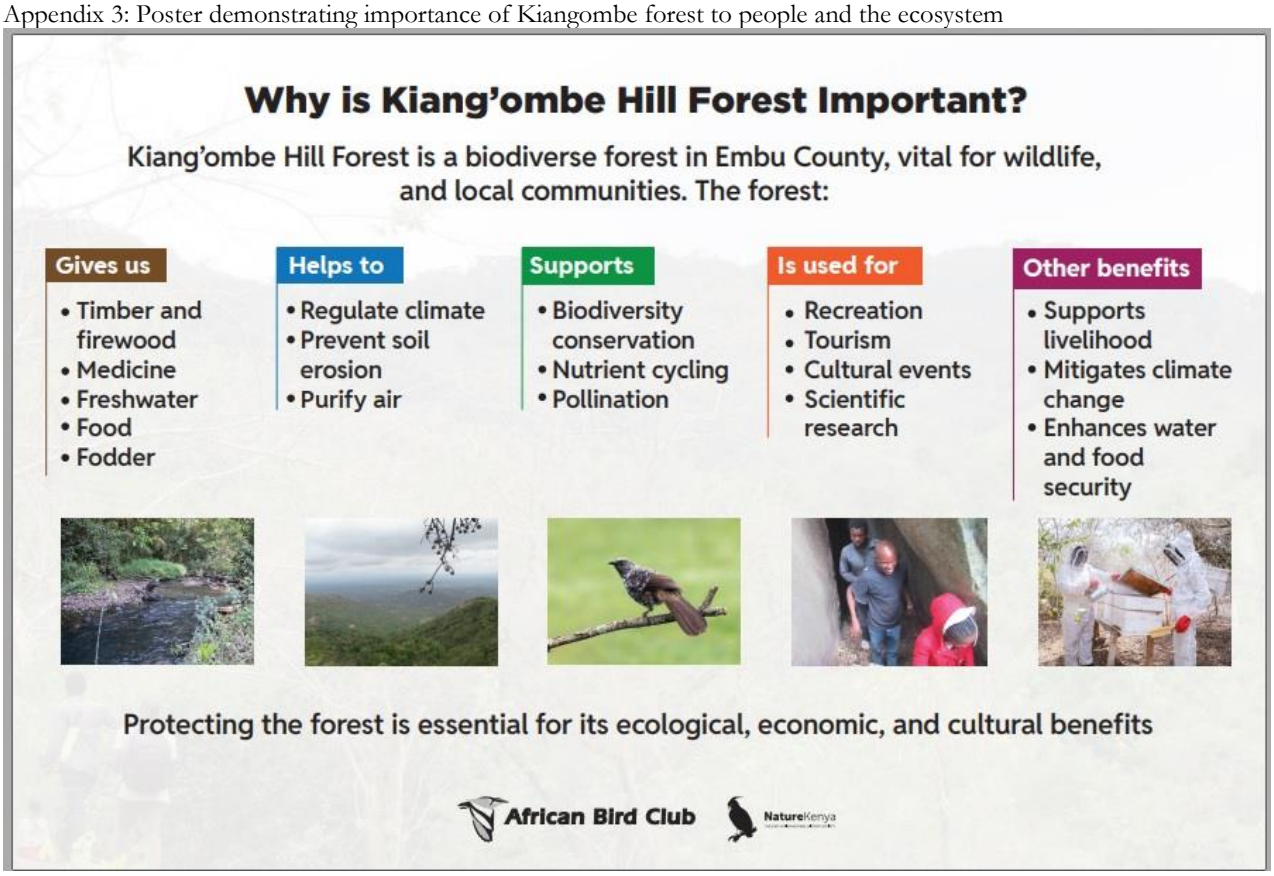
Appendix 2: Encounter Rate and Relative Abundance of different species in Kiang'ombe forest

S. No.	Species	Sighting Frequency (SF)	Encounter Rate (SF/28*100)	Abundance (Sample Count Total -SCT)	Relative abundance (SCT/687*100)
1	Purple-crested Turaco	17	61	30	4.4
2	Eastern Nicator	16	57	30	4.4
3	Grey-backed Camaroptera	16	57	36	5.2
4	Red-eyed Dove	16	57	28	4.1
5	Common Bulbul	13	46	30	4.4
6	Black-backed Puffback	11	39	20	2.9
7	Emerald-spotted Wood Dove	11	39	19	2.8
8	Common Drongo	9	32	14	2.0
9	Hinde's Babbler	9	32	42	6.1
10	Black-headed Oriole	8	29	15	2.2
11	Collared Sunbird	8	29	15	2.2
12	Yellow-bellied Greenbul	8	29	28	4.1
13	Zanzibar Greenbul	8	29	14	2.0
14	Northern Brownbul	7	25	22	3.2
15	Slate-coloured Boubou	7	25	16	2.3
16	Speckled Mousebird	7	25	23	3.3
17	Variable Sunbird	7	25	14	2.0
18	Spot-flanked Barbet	6	21	9	1.3
19	African Bare-eyed Thrush	5	18	5	0.7
20	Red-capped Robin Chat	5	18	8	1.2
21	Red-fronted Tinkerbird	5	18	8	1.2
22	Thrush Nightingale	5	18	13	1.9
23	White-browed Coucal	5	18	9	1.3
24	African Green Pigeon	4	14	14	2.0
25	Brown-crowned Tchagra	4	14	4	0.6
26	Red-cheeked Cordon-bleu	4	14	10	1.5
27	Rüppell's Robin Chat	4	14	5	0.7
28	Tropical Boubou	4	14	8	1.2
29	White-headed Barbet	4	14	9	1.3
30	African Paradise Flycatcher	3	11	3	0.4
31	Amethyst Sunbird	3	11	10	1.5
32	Chin-spot Batis	3	11	5	0.7
33	Eurasian Bee-eater	3	11	35	5.1
34	Hartlaub's Turaco	3	11	7	1.0
35	Tawny-flanked Prinia	3	11	5	0.7

36	White-browed Scrub Robin	3	11	3	0.4
37	African Grey Flycatcher	2	7	3	0.4
38	Augur Buzzard	2	7	2	0.3
39	Bronze Mannikin	2	7	12	1.7
40	Golden-breasted Bunting	2	7	2	0.3
41	Grey-headed Bushshrike	2	7	3	0.4
42	Grey-headed Kingfisher	2	7	2	0.3
43	Sulphur-breasted Bushshrike	2	7	2	0.3
44	Village Weaver	2	7	16	2.3
45	White-headed Saw-wing	2	7	6	0.9
46	African Goshawk	1	4	1	0.1
47	African Grey Hornbill	1	4	2	0.3
48	African Harrier Hawk	1	4	1	0.1
49	Ashy Flycatcher	1	4	1	0.1
50	Baglafecht Weaver	1	4	2	0.3
51	Black Saw-wing	1	4	2	0.3
52	Blue-mantled Crested Flycatcher	1	4	2	0.3
53	Cape Robin Chat	1	4	1	0.1
54	Cinnamon-chested Bee-eater	1	4	2	0.3
55	Common Buzzard	1	4	2	0.3
56	Crowned Hornbill	1	4	2	0.3
57	D'Arnaud's Barbet	1	4	2	0.3
58	Eastern Paradise Whydah	1	4	1	0.1
59	Green-winged Pytilia	1	4	1	0.1
60	Grey-headed Sparrow	1	4	2	0.3
61	Helmeted Guineafowl	1	4	6	0.9
62	Horus Swift	1	4	2	0.3
63	Laughing Dove	1	4	4	0.6
64	Lesser Honeyguide	1	4	1	0.1
65	Lesser Striped Swallow	1	4	4	0.6
66	Little Sparrowhawk	1	4	1	0.1
67	Narina Trogon	1	4	2	0.3
68	Northern White-crowned Shrike	1	4	2	0.3
69	Nubian Woodpecker	1	4	1	0.1
70	Plain Nightjar	1	4	2	0.3
71	Purple Grenadier	1	4	1	0.1
72	Red-billed Firefinch	1	4	2	0.3
73	Red-faced Crombec	1	4	1	0.1
74	Red-headed Weaver	1	4	1	0.1
75	Red-winged Starling	1	4	2	0.3

76	Reichenow's Seedeater	1	4	3	0.4
77	Rock Martin	1	4	6	0.9
78	Spotted Palm Thrush	1	4	1	0.1
79	Village Indigobird	1	4	1	0.1
80	Wahlberg's Honeybird	1	4	2	0.3
81	Yellow Bishop	1	4	2	0.3
82	Yellow-spotted Petronia	1	4	2	0.3
	Total			**687**	

Appendix 3: Poster demonstrating importance of Kiangombe forest to people and the ecosystem



Appendix 4: Poster of some of the birds of Kiang'ombe forest