ENARAU CONSERVANCY QUARTER FOUR 2024 REPORT

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SUMMARY REVIEW

This report highlights the ongoing research, restoration, conservation efforts, and community engagement at Enarau Conservancy for the fourth quarter of 2024. It emphasizes research activities, restorative conservation practices, technological advancements, and community well-being, all aimed at promoting ecological health and sustainability. Key activities during this quarter included biodiversity surveys, wildlife monitoring, ranger training, and youth empowerment initiatives that have contributed to habitat protection and local community development.

Research focused on assessing ecological health through biodiversity surveys at the Aqua Nirvana Foundation (ANF) restoration site. These include bird surveys, insect counts, herpetofauna monitoring, and vegetation baseline data collection. The Smithsonian-NASA project contributed valuable data on wildlife populations, helping to inform habitat conservation strategies. Restorative conservation efforts included ranger training to enhance wildlife protection and anti-poaching skills in our conservancy, native tree nursery management, and implementation of the grazing plan. Additionally, one major activity happened in the fourth quarter of 2024, the Ultra Marathon for elephant conservation, organized and facilitated by key stakeholders in the Greater Mara landscape. On community wellbeing, a youth empowerment program hired local Maasai and Kalenjin youth to clear research plots, providing them with work experience and earning income. Leased lands profiling happened at the end of quarter four.

Technology cuts across all three pillars. This includes Earth-ranger and digital weather stations, which provide monitoring data for biodiversity, climate, and ranger movement.

1.0 RESEARCH

Enarau Conservancy, in collaboration with partners such as the Centre for Ecosystem Restoration Kenya (CERK), Nottingham Trent University (NTU), and the Smithsonian Institution, undertook the following research initiatives. This work happened through their valued support.

1.1 Aqua Nirvana Foundation (ANF) Restoration Site Biodiversity Survey.

The activities during this period focused on assessing biodiversity at the ANF restoration site through the following methods:

1.2 Bird survey

Conducted visual and auditory surveys to document species diversity, nesting behaviour, and habitat use.

We applied the point count through an 800M transect across the ANF site and identified different avian species.

Here is a list of some of the avian species identified during the count and they are categorized based on their feeding behavior, family, scientific and common names.

Common Name	Scientific Name	Family	Feeding Behaviour
White-browed Scrub-Robin	Cercotrichas leucophrys	Muscicapidae	Insectivore
White-browed Robin-Chat	Cossypha heuglini	Muscicapidae	Insectivore/Omnivore
Ring-necked Dove	Streptopelia capicola	Columbidae	Granivore (seeds)
Emerald-spotted Wood Dove	Turtur chalcospilos	Columbidae	Granivore
African Citril	Serinus citrinelloides	Fringillidae	Granivore/Herbivore

Black-headed Oriole	Oriolus larvatus	Oriolidae	Omnivore (fruits,insects)
Tropical Boubou	Laniarius aethiopicus	Malaconotidae	Insectivore
Yellow-spotted Bush Sparrow	Petronia pyrgita	Passeridae	Omnivore (seeds, insects)
African Paradise Flycatcher	Terpsiphone viridis	Monarchidae	Insectivore
Common Bulbul	Pycnonotus barbatus	Pycnonotidae	Omnivore (fruits, insects)
African Grey Flycatcher	Bradornis microrhynchus	Muscicapidae	Insectivore
White-browed Coucal	Centropus superciliosus	Cuculidae	Omnivore (insects, small vertebrates)
Northern Red-fronted Tinkerbird	Pogoniulus uropygialis	Lybiidae	Omnivore (fruits, insects)
Rufous-naped Lark	Mirafra africana	Alaudidae	Omnivore (seeds, insects)
Yellow-breasted Apalis	Apalis flavida	Cisticolidae	Insectivore
Crowned Lapwing	Vanellus coronatus	Charadriidae	Insectivore/Carnivore (invertebrates)
Red-billed Oxpecker	Buphagus erythrorhynchus	Buphagidae	Symbiotic (parasites, insects)
Willow Warbler	Phylloscopus trochilus	Phylloscopidae	Insectivore
Purple Grenadier	Granatina ianthinogaster	Estrildidae	Granivore
Egyptian Goose	Alopochen aegyptiaca	Anatidae	Herbivore (grasses, aquatic plants)
Plain-backed Pipit	Anthus leucophrys	Motacillidae	Insectivore
Northern Wheatear	Oenanthe oenanthe	Muscicapidae	Insectivore
D’Arnaud’s Barbet	Trachyphonus darnaudii	Lybiidae	Omnivore (fruits, insects)

Speckled Mousebird	Colius striatus	Coliidae	Herbivore (fruits, leaves)
Hadada Ibis	Bostrychia hagedash	Threskiornithidae	Omnivore (insects, worms, small vertebrates)
Black-crowned Tchagra	Tchagra senegala	Malaconotidae	Insectivore
Slate-colored Boubou	Laniarius funebris	Malaconotidae	Insectivore
Black Saw-wing	Psalidoprocne pristoptera	Hirundinidae	Insectivore (aerial)
Rattling Cisticola	Cisticola chiniana	Cisticolidae	Insectivore
Yellow-billed Duck	Anas undulata	Anatidae	Omnivore (plants, invertebrates)
Blue-naped Mousebird	Urocolius macrourus	Coliidae	Herbivore
Western Cattle Egret	Ardea ibis	Ardeidae	Carnivore (insects, small animals)
Spectacled Weaver	Ploceus ocularis	Ploceidae	Omnivore (seeds, insects)
White-fronted Bee-eater	Merops bullockoides	Meropidae	Insectivore (bees, wasps)
Yellow Bishop	Euplectes capensis	Ploceidae	Granivore/Insectivore
Holub's Golden Weaver	Ploceus xanthops	Ploceidae	Omnivore (seeds, insects)
Klaas's Cuckoo	Chrysococcyx klaas	Cuculidae	Insectivore (brood parasite)
Northern Fiscal	Lanius humeralis	Laniidae	Carnivore (insects, small vertebrates)
Sulphur-breasted Bushshrike	Telophorus sulfureopectus	Malaconotidae	Insectivore
Cinnamon-chested Bee-eater	Merops oreobates	Meropidae	Insectivore

Woodland Kingfisher	Halcyon senegalensis	Alcedinidae	Carnivore (fish, insects)
Striated Heron	Butorides striata	Ardeidae	Carnivore (fish, crustaceans)
Lesser Honeyguide	Indicator minor	Indicatoridae	Omnivore (beeswax, insects)
Green-backed Camaroptera	Camaroptera brachyura	Cisticolidae	Insectivore
Black Crake	Zapornia flavirostra	Rallidae	Omnivore (plants, invertebrates)
Common Moorhen	Gallinula chloropus	Rallidae	Omnivore
Little Grebe	Tachybaptus ruficollis	Podicipedidae	Carnivore (aquatic invertebrates)
Yellow-billed Stork	Mycteria ibis	Ciconiidae	Carnivore (fish, frogs)
Reed Cormorant	Microcarbo africanus	Phalacrocoracidae	Piscivore
Malachite Kingfisher	Corythornis cristatus	Alcedinidae	Carnivore (fish, insects)
Common Reed Warbler	Acrocephalus scripaceus	Acrocephalidae	Insectivore
Collared Sunbird	Hedydipna collaris	Nectariniidae	Nectarivore/Insectivore
Black-backed Puffback	Dryoscopus cubla	Malaconotidae	Insectivore
Superb Starling	Lamprotornis superbus	Sturnidae	Omnivore (insects, fruits)
Bare-faced Go-away-bird	Crinifer personatus	Musophagidae	Herbivore (fruits, leaves)

Fig 1: Julius Njuguna (research assistant) recording bird species at the ANF site.

1.3 Insects

We deployed pitfall traps across the site to capture the crawling insects and used sweep nets for flying insects to sample populations across the restoration site. Preliminary data showed high diversity, including pollinators and pest controllers. Below are the results of the generated from the survey;

Species	Order	No.
Cricket	Orthoptera	80
Grasshopper	Orthoptera	4
Beetle	Coleoptera	77
Cockroach	Blattodea	15
Fly	Diptera	17
Earwig	Dermaptera	4
Catapilar	Lepidoptera	6
Pilbug	Isopoda	5
Ant	Hymenoptera	31
Spider	Aranae	80

Fig 2: Enarau and CERK team (Jesse, Julius, and Antony) setting up pitfall traps at the ANF site.

1.4 Herpetofauna

Drift fences were installed across the site to capture reptiles and amphibians around the site.

Cover boards were used to monitor reptiles, amphibians, and soil invertebrates. Several species were identified, indicating healthy microhabitats.

Fig 3: (a) Snake trapped inside a pit, (b) a drift fence that blocks and directs crawling into a pit [c] Snake trapped placed on white board for identification.

1.5 Vegetation Baseline Survey

Mapped plant populations via transects and quadrants, recording species composition and density. LDSF protocol was applied to identify the types of grass species, forbs, trees, and shrubs. Early succession species dominated, suggesting passive restoration progress.

1.2 Exploring the use of Land Degradation Surveillance Frame and Soundscapes as a land degradation and ecosystem restoration monitoring tool.

Species	Common name	Local Name
Warbugia ugadensis	African greenheart tree	Osokonoi
Vachellia gerradii	Gerrad's acacia	Ornguonguonyi
Vachellia kirkii	Kirkk's acacia	Olerai-orok
Vachellia nilotica	Egyptian thorn	Ol-kiloriti
Vachellia tortilis	Umbrella thorn	Ol-tepesi
Vachellia xanthophloea	Fever tree	Olerai-orok
Vachellia lahai	Red thorn acacia	Ol-tepesi
Acokanthera oppositifolia	Poison arrow tree	Ol-morijoi
Acokanthera schimperi	Arrow poison tree	Ol-morijoi
Balanite aegyptiaca	Desert date	Olngoswa
Boscia angustifolia	Leopard tree	Oloirerio
Combretum molle	Velvet-leaved combretum	Ol-maroroi
Commiphora africana	Commiphora	Osilalei
Cordia monoica	Sandpaper tree	Oseki
Croton megalocarpus	Silvery-leafed croton	Olorkin
Cussonia holstii	Cabbage tree	Oloiurrurr
Diospyros abyssinica	Giant diospyros	Illchartuyan
Dombeya goetzenii/ torrinda	Forest dombeya	Ol-subukiai
Elaeodendron buchananii	Elaoedendron	Osoket
Erythrina abyssinica	Flame tree	Oloponi
Euphobia bussei	Euphorbia	Ol-kushurui
Euphorbia candelabrum	Candelabra euphobia	Ol-popongi

Euclea divinorum	Euclea	Olkinyei
Ficus sur	Cape fig	Engaboli
Ficus sycomorus	Sycamore fig	Orngaboli
Ficus thonningii	Wild fig	Oreteti
Gardenia volkenzii		
Jacaranda mimosifolia	Jacaranda	Oltakururiet
Juniperus procera	African pencil cedar	Oltarakwai
Ocotea usambarensis	Camphor tree	
Olea europea	Wild olive	Olorien
Pappea capensis	Cape pappea	
Pittosporum viridiflorum	Pittosporum	Olengararai
Rauvolfia caffra	Quinine tree	Olemudongo
Rawsonia lucida	Rawsonia	
Vempris simplicifolia	Teclea	Orgilai
Ximenia americana	Wild plum	Olamai
Zanthoxylum usambarense	Knob wood	Oloisugi
Vangueria madagarscarensis	River medler	Olgumi

Shrubs

Species	Common name	Local Name
Scientific Name	Common Name	Local Name
Albutilon mauritanium	Albutilon	Oldadai
Vachellia brevispica	Wait-a-bit acacia	OLlgirgiri orok
Acalypha fruiticosa		Shaiti
Achyranthes aspera		
Acanthus eminens	Bliue -flowered acanthus	
Asclepias fruticosa	Milkweed	
Balanites glabra	Drooping-branched balanites	Olngoswa
Balanites pedicellaris	Balanites	
Balanites aegyptica	Desert date	Olngoswa
Cadaba farinosa	Cadaba	Enchani oosirkon

Caesalpinia decapelata	Mauritius thorn	Oiti orok
Caesalpinia spinosa	Wattle chestnut	
Calotropis procera	Dead Sea fruit	
Capparis tomentosa	Prickly bush capparis	Olaturdei
Carrisa spinarum	Carissa	Olamuriaki
Croton dichogamus	Orange-leafed croton	Olakirdingai
Dichrostachys cinerea	Sickle bush	Olmerumori
Dodonaea viscosa	Sand olive	Olgeturai
Dombeya burgessiae	Pink wild pear	Ol-subukiai
Dovyalis caffra	Kei apple	Olmorogi
Dovyalis abyssinica	Kei apple	
Euphobia tirucalli	Milk bush	Ol-loilei
Gardenia ternifolia	Large-leafed gardenia	Geniyet
Gardenia volkensii	Large-leafed gardenia	
Grewia similis	Grewia	Oirri
Grewia bicolor	Grewia	Ositeti
Hibiscus calyphllus	Hibiscus	
Ipomoea hilderbrandtii	Purple morning glory	Oltiameletei
Ipomoea kituiensis	Morning glory	
Ipomoea spathulata	Morning glory	
Lannea alata	Lannea alata	
Lantana trifolia	Sage bush	Enkurma oonkayiok
Leonotis mollissma	Orange leonotis	Ol-bibi
Lippia javanica	Fever tea	Osinoni
Maerua decumbens		
Maytenus heterophyla	Common spike thorn	Olaimurunyai
Maytenus senegalensis	Confetti bush	Olaimurunyai
Obentia pinnatifida	Stinging nettle tree	
Ocimum gratissimum	Ocimum	Olemuran
Osyris lanceolata	East African sandlewood	Olesesiai
Plectranthus barbatus	Plectranthus	
Psiadia punctulata		

The Enarau Conservancy, in collaboration with the CERK research team and a PhD candidate at Nottingham Trent University, collected ecological biodiversity data. Their methodology employs the Landscape Degradation Surveillance Framework (LDSF), soundscape technology, and bird surveys. Data collection, which includes vegetation, bird, and bat surveys, spans the conservancy and its wildlife corridor to establish a degradation gradient across degraded, semi-degraded, conserved, and restored areas. Below is a list of identified

Fig 4: Enarau and CERK Research team during vegetation survey using the LDSF method at the ANF site

1.6 An Ecological Toolbox to Inform Livestock Grazing Allotments Across Wildlife Conservancies in Kenya

The objective of the Smithsonian NASA project is to monitor wildlife populations within the Enarau conservation area through a standard protocol. This project utilizes Earth Ranger (ER) software to collect data on wildlife population and diversity. Mammal transects, which are 1km long, were

developed and uploaded to the ER software, where the research team collects data. Enarau Conservancy uploaded seven mammal transects within and outside the conservancy, where data is collected every three months. The research team drives along the transect, doing distance sampling of mammals of fifteen kg and above; this exercise happens after three months.

The data collected during this survey supports NASA's remote sensing analysis, which aims to model habitat fragmentation and wildlife-livestock densities. This collaborative effort will help enhance our understanding of the landscape's ecological integrity and contribute to more informed conservation strategies.

Fig 5: Distance sampling at mammal transect 3, the former farmland.

1.7 Camera trapping

Camera trap technology highlights Enarau Conservancy's potential as a diverse wildlife habitat. Data from these traps demonstrate the success of conservation efforts through observed increases in wildlife populations and diversity. Additionally, the cameras serve as a crucial

surveillance tool for rangers and management, capturing nocturnal illegal activities. The conservancy and its wildlife corridors are monitored using a camera trap grid. These camera traps are systematically moved to new grid locations approximately every three weeks.

Fig 11: (a) a young male cape buffalo captured on a camera trap, (b) a genet cat, among the cat family present abundantly in our conservancy.

2.3.1 Weather station

Enarau Conservancy accesses weather data from a digital weather station installed by the TAHMO. This station records atmospheric pressure, precipitation, soil and surface air temperature, soil moisture content, and relative humidity. This data can be retrieved from the TAHMO digital portal, we can view and export it.

This data is very fundamental to our regular research activities within the conservancy. It helps in real-time climate monitoring, wildlife behaviour analysis, disaster preparation, soil erosion, and land degradation monitoring.

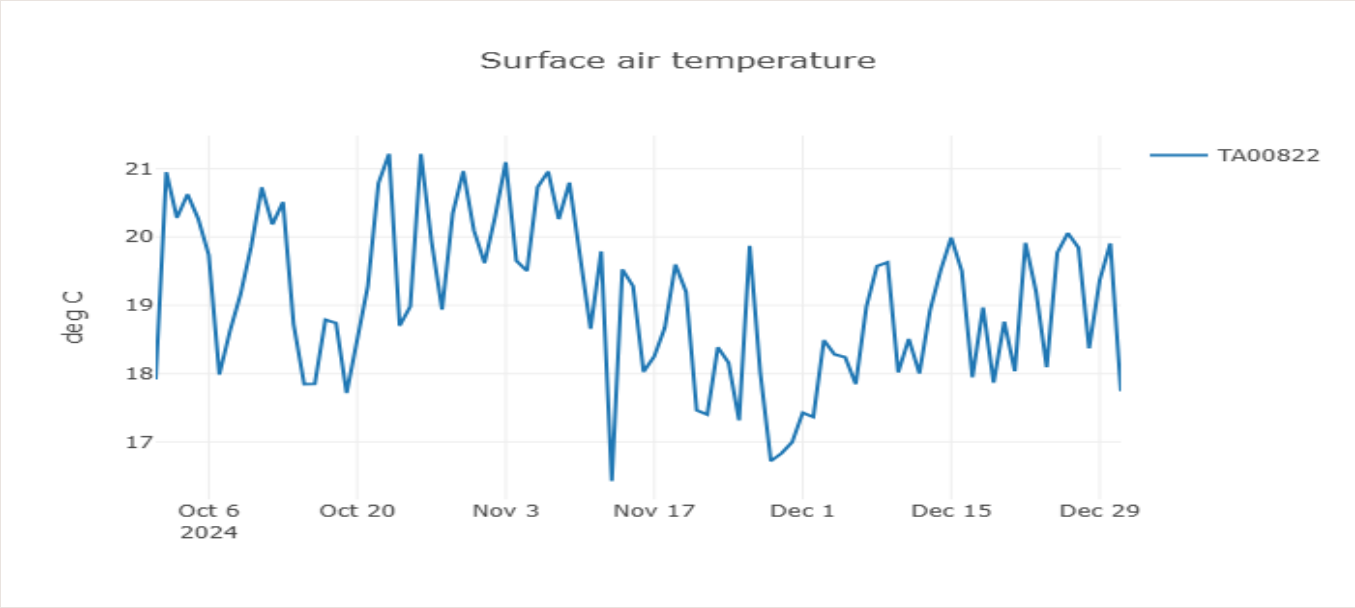


Fig 8 (a) Surface air temperature.

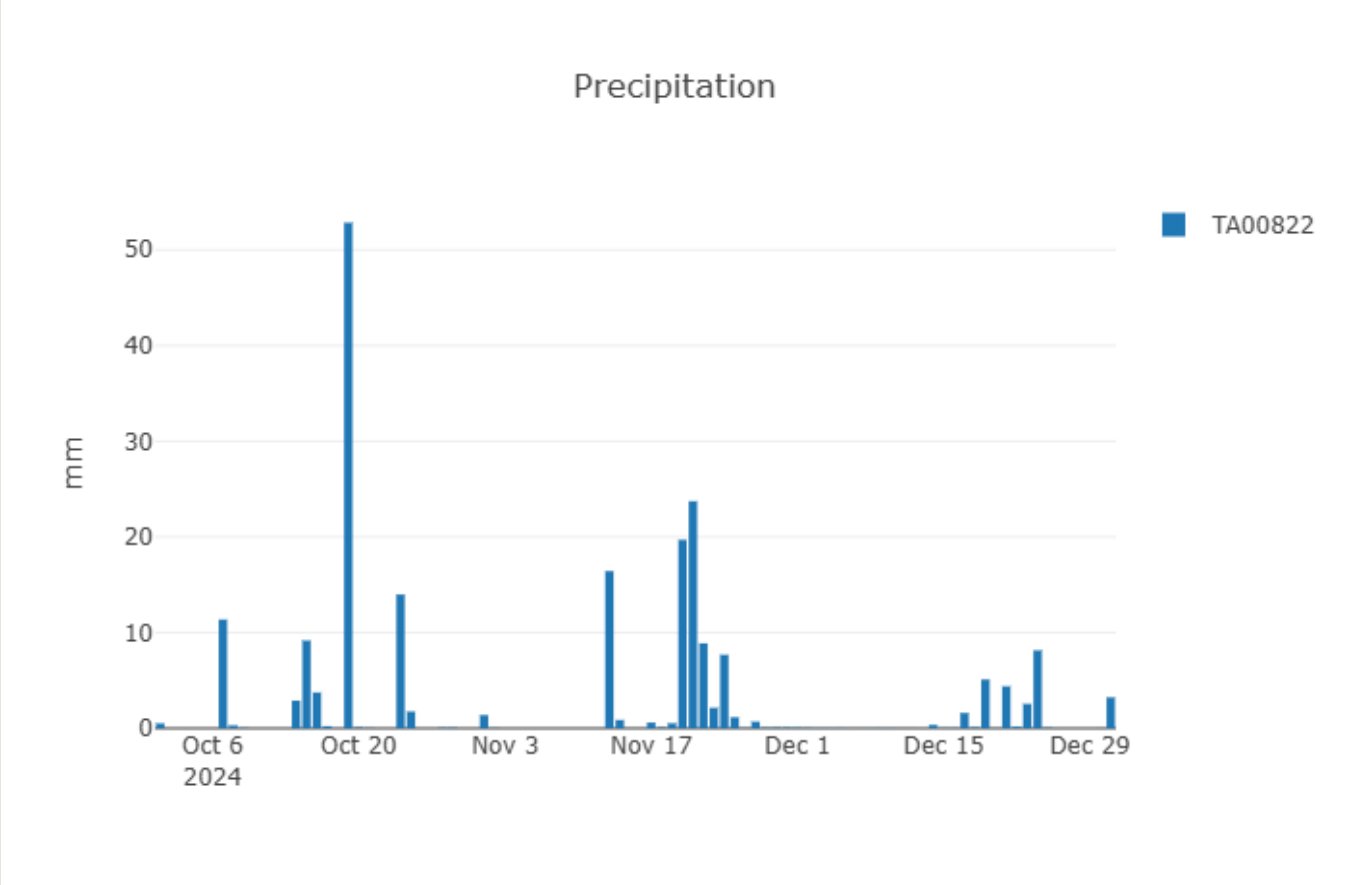


Fig 8: (b) Precipitation data

2.0 RESTORATIVE CONSERVATION

2.1 Earthranger (ER)

The ER monitoring system has proved reliable in transferring data from the field to the administration's back-end at the station.

Earth Ranger reports incidents on the field, such as wildlife sightings, illegal grazing, illegal logging, charcoal burning, wildlife traps, fire incidents, ranger real-time patrols, and ranger tracks. Ranger real-time patrols and ranger tracks are key in monitoring the movement within the conservancy.

Several improvements were initiated on the Earth-ranger and its use, which include continued training of our rangers on how they are expected to report events and patrols while minimizing errors. This has improved the quality of data being reported daily. Reporting events and sightings from both stations concurrently has maximized the number of events that can be reported. We also configured our reporting sources to include the camera trap deployed within the conservancy. Currently, we are configuring and loading the trackers on the livestock to our ER instance. Once this is achieved, we will monitor the movement of the livestock within the conservancy in real-time.

2.2 Patrols' tracks

Patrols by our rangers are tracked and reported through the Earth-ranger (ER) system. This makes it easier to plan for patrols as required.. During this quarter, about 91 patrols were reported to the Earth-ranger via the mobile ER instances from both Alpha and Bravo stations. The total track distance covered by the rangers over this quarter translated to 1,498.74 kilometres, with a slight increase from the previous coverage of 1210.13km

The patrols are carried out within the conservancy and the wildlife corridor areas on foot and by motorcycle.

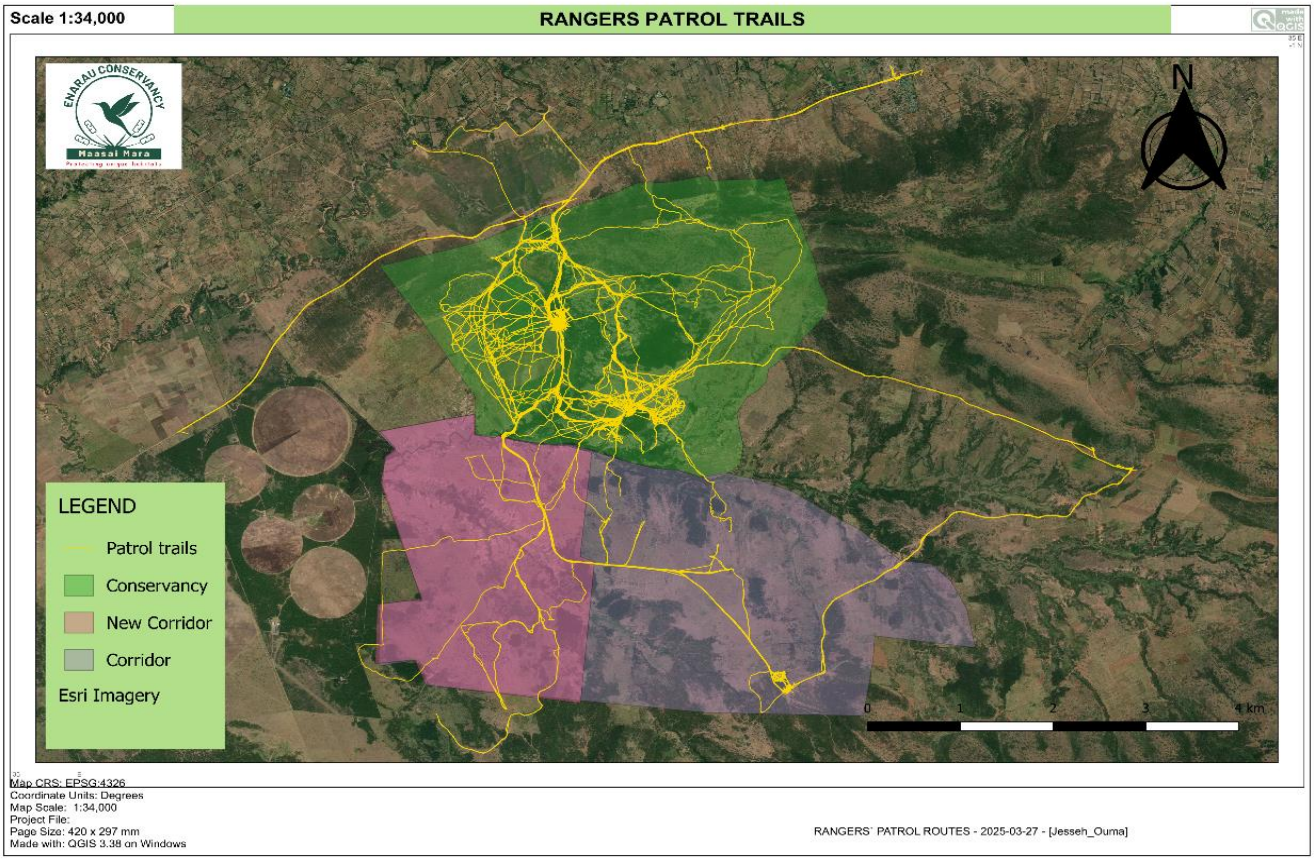


Fig 10 (a): Rangers' tracks within and outside Enarau Conservancy

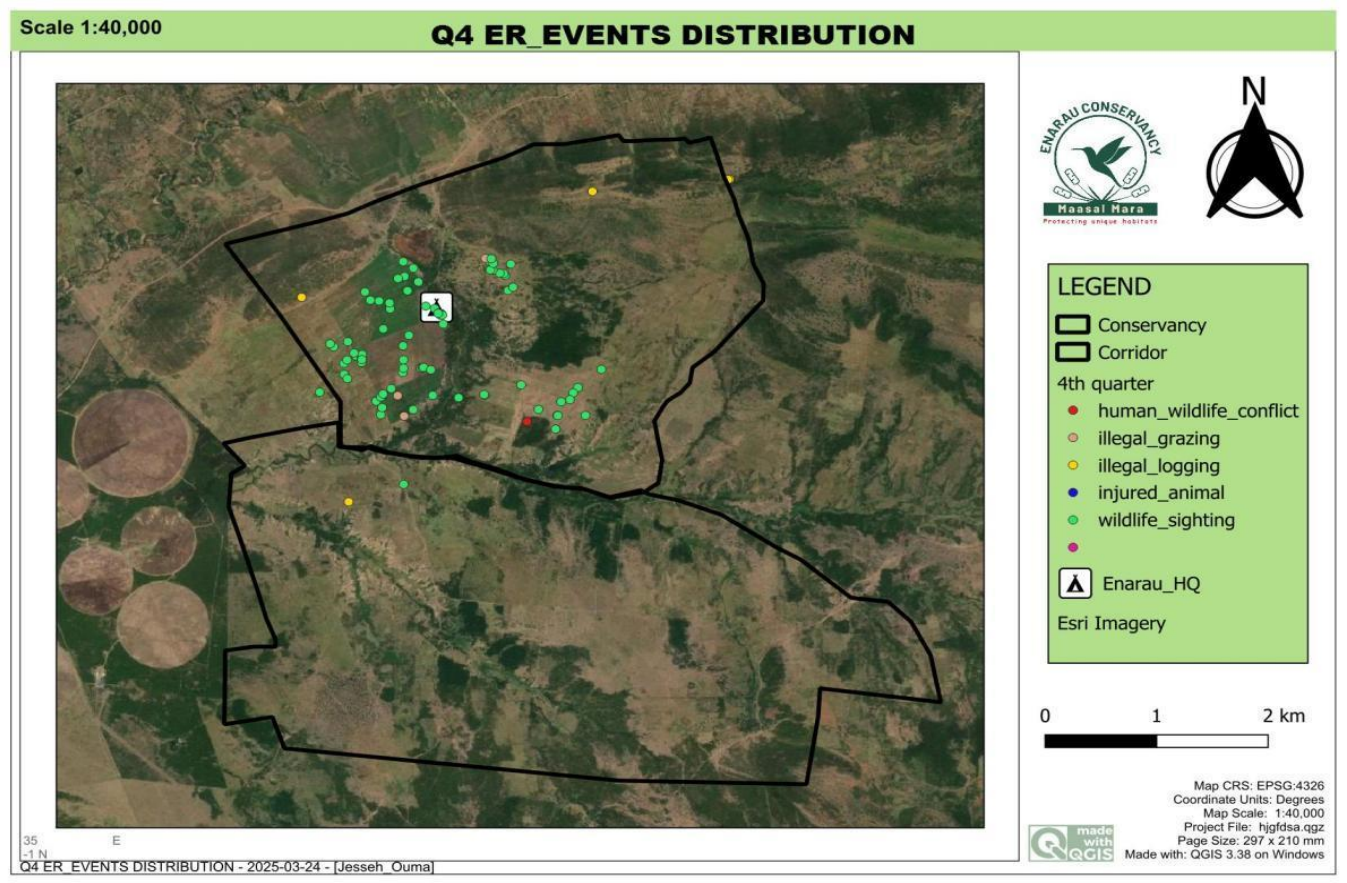


Fig 10 (b) Showing specific locations for different activities reported.

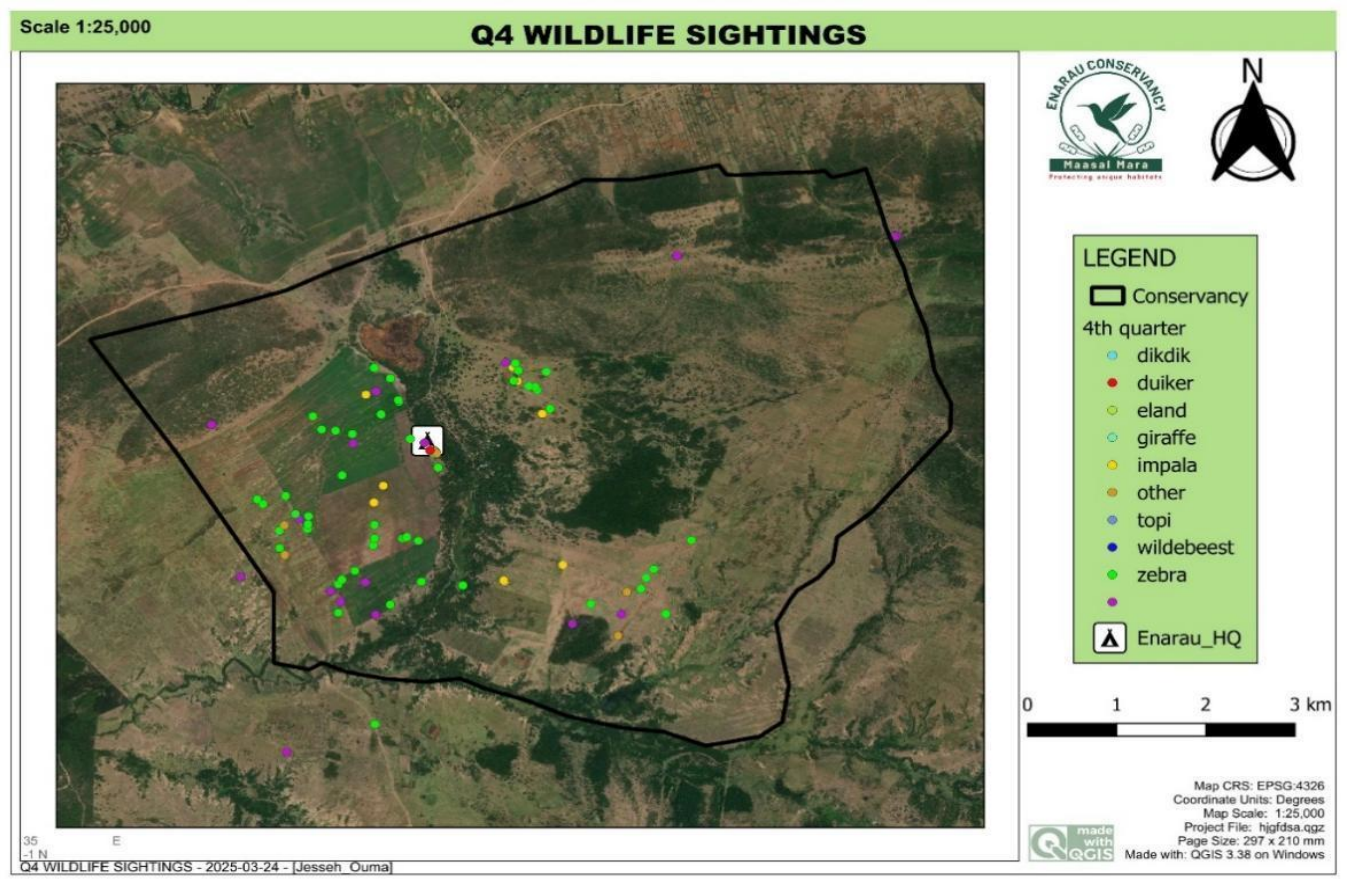


Fig 10 (c): Wildlife sightings from the ER

2.1 Rangers Training at Olchoro Conservancy

Three rangers attended a comprehensive ranger training course at Olchoro Conservancy in November 2024. The training focused on enhancing their skills in wildlife protection, anti-poaching tactics, ambushes, discipline, and community engagement. Other trainings happened at the Mara Elephant Project on elephant conservation and mitigation of human-wildlife conflict (HWC). The training included strategies for tracking elephant movements, de-escalating conflict situations, and using data-driven approaches to protect elephant populations. The program also emphasized the importance of community education in reducing HWC incidents.

Fig 6:(a) Rangers at the pass out parade at Olchoro Oirowua, (b)Enarau Conservancy team posing with the three trained rangers© Olchoro Oirowua and Enarau Conservancies rangers parading at their passing out

2.2 Ultra Marathon at Mara Elephant Project

Our rangers attended the Maasai Mara UltraMarathon, organized by The Mara Elephant Project to raise awareness and funds for elephant conservation. The event attracted participants from around the globe and served the key purpose of making the public aware of the challenges facing elephant populations. Funds raised will support anti-poaching initiatives, community outreach programs, and research efforts to ensure the long-term survival of elephants in the region.

Fig 7: Enarau staff and our Ultramarathon participants at the finish line

2.3 Technology in restorative conservation

3. COMMUNITY WELLBEING

In the fourth quarter of 2024, our focus on community well-being remained steadfast, despite a relatively low volume of activities. The limited engagements were meant to strengthen conservation efforts with our community at the centre. Working collectively with our community reinforces the importance of shared responsibility and collective action.

3.1 LEASED LANDS PROFILING.

Leased land profiling activity was conducted this quarter to understand their state, which will later inform the best approaches to bolster conservation. These will include varied practices such as identifying the conservation measures in place, wildlife management, water resources, and any environmental threats. Environmental threats in some parcels of land included bush clearing for farming and charcoal burning. This calls for more community forums to educate them on the importance of sustainable conservation.

3.2 YOUTH EMPOWERMENT

In the final two months of this quarter, we launched a small youth empowerment initiative where the Conservancy management hired 10 young men from both the Maasai and Kalenjin communities as casual workers. Their task was to clear buffer zones for 200 permanent research plots designated for research and restoration. This initiative provided them valuable work time, income, and a sense of ownership in conservation efforts. Job creation cements a conservation partnership with the community around it. Job creation as an approach not only contributes positively to the environment but also invests in the future by empowering the local communities.

4. FINANCIAL REPORT

This financial report provides an overview of Enarau Conservancy's financial performance for the fourth quarter of 2024. It includes detailed analysis and insights into our income, expenditure, and variance analysis.

INCOME

Enarau Conservancy realized a total income of KES. 7,978,272. Donations constituted the majority revenue source, amounting to KES. 7,498,460 and representing 82% of the total income. Funding from Nottingham Trent University contributed KES. 142,740, which accounts for 5% of the revenue. The sale of nursery tree seedlings generated KES. 1,400, equivalent to 0.33% of the total income. Deferred income comprised KES. 478,412, representing 8% of the total revenue.

EXPENDITURE

The following expenditure was incurred in the fourth quarter of 2024.

1. SALARIES AND HUMAN RESOURCES COSTS

A total of KSh 1,340,288.50 was allocated to salaries during this quarter. This disbursement covered compensation for 16 staff members and two interns.

2. FOOD COST

The expenditure on food encompassed all expenses related to food supplies for 24 individuals stationed at the Enarau Conservancy Headquarters and the Rangers Outpost station. The aggregate cost for this period amounted to KES. 364,805.

3. ADMINISTRATION COST

The expenditure includes all the costs incurred in the organization's operation, including internet, logistics, and other administrative activities. The cost incurred for the period is KES 544,122.

4. NURSERY DEVELOPMENT AND RESEARCH PLOTS

The expense of KES. 89,550 covers casual labor wages, nursery enhancements and development, and seed procurement.

5. LEASES

The expenditure includes costs associated with land leasing for the conservancy. These represent payments made to landowners. A total of KES 458,375 was incurred for leasing activities.

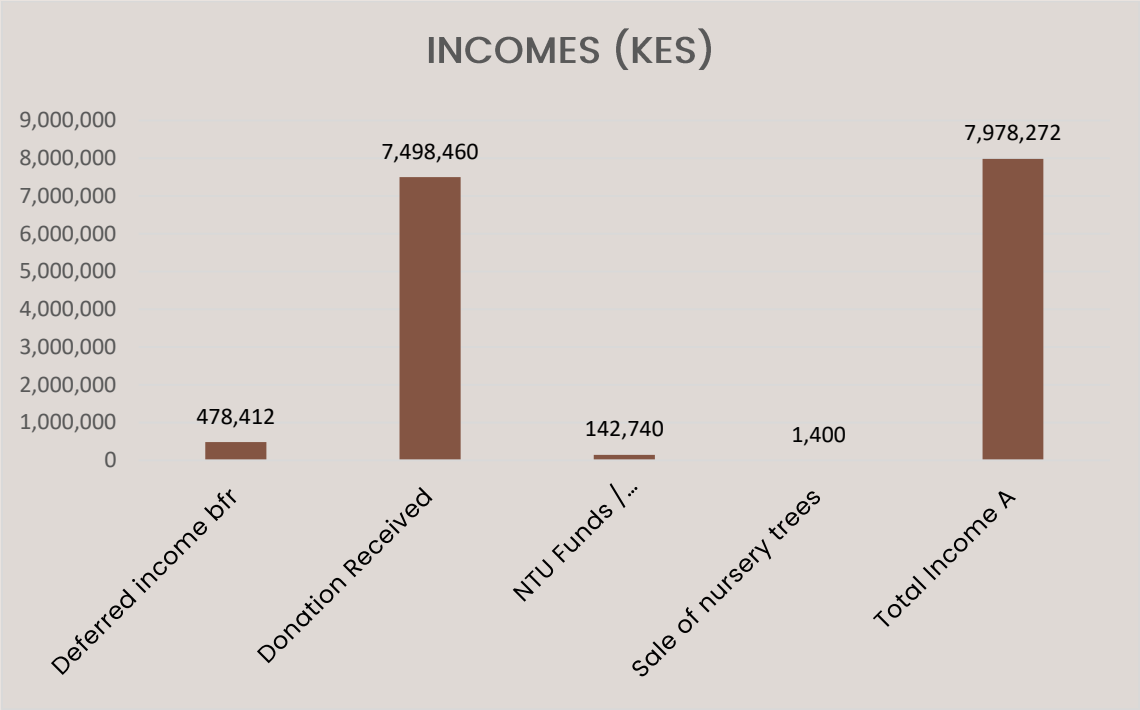
6. CAPEX

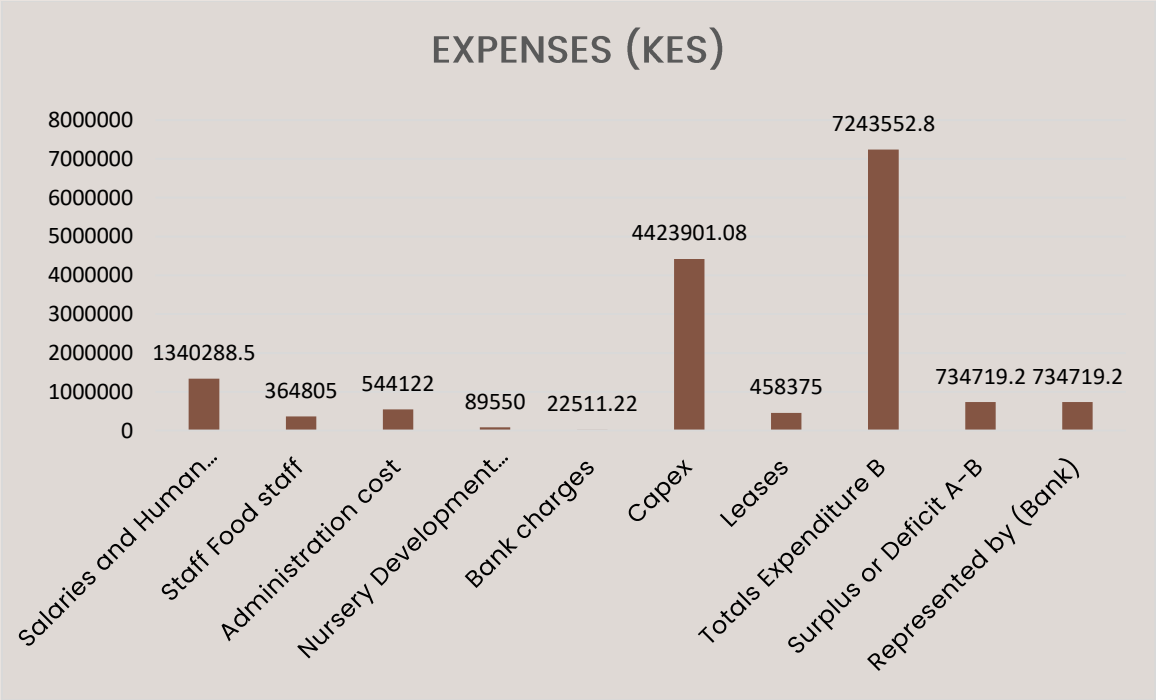
The capital expenditures for the quarter include the construction of Research Unit 3, Research Unit 2, the renovation of Research Unit 1, water system improvements, and furniture for the Research Units, totaling KES 4,423,901.

7. BANK AND MPESA CHARGES

The cost encompasses expenses incurred during financial transactions. A total of KES 22,511 was expended on these charges.

Enarau Conservancy Financial Statement for the Fourth Quarter Ending December 31st.





Surplus

The financial statement reflects a surplus of **KES 734,719.20**, resulting from total income exceeding total expenditure. This surplus is held entirely in the bank.

Budget vs Actual

This report provides a summary of actual expenditures alongside their respective budget lines.