



LAKE OL BOLOSSAT RAPID BIODIVERSITY & SOCIO-ECONOMIC ASSESSMENT SUMMARY REPORT

SUPPORTING THE DESIGNATION OF LAKE OL BOLOSSAT
AS KENYA'S 7TH RAMSAR SITE

MAY 2026



Disclaimer

This publication presents a summary of the key findings from the *Lake Ol Bolossat Rapid Biodiversity and Socio-economic Assessment Report*. The interpretations and conclusions presented in this publication are those of the authors and do not necessarily reflect the views of the JRS Biodiversity Foundation.

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Nancy Ogonje

Executive Director
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1. BACKGROUND

Lake Ol Bolossat is Kenya's highest-altitude lake and the only natural lake in the Central Highlands. It is a vital wetland ecosystem supporting biodiversity and livelihoods across the wider Laikipia-Isiolo landscapes. Designated as Kenya's 61st Important Bird and Biodiversity Area (IBA) and classified as a Key Biodiversity Area (KBA), the lake has long been recognized as a site of national and global significance.

However, the report highlights increasing pressure on the ecosystem from human activities, including land conversion, water abstraction, and resource use, alongside declining environmental conditions such as reduced water inflows and habitat degradation.

1.1 Project Overview

The East African Wild Life Society (EAWLS), in partnership with Wangari Maathai Institute for Peace and Environmental Studies, University of Nairobi (WMI-UoN) and Wildlife Research and Training Institute (WRTI), with funding from the JRS Biodiversity Foundation, implemented the project:

“Unlocking Biodiversity Data to Facilitate Designation of Lake Ol Bolossat as the 7th Ramsar Site in Kenya (2023-2026)”

Objectives

- Generate baseline biodiversity data to support Ramsar designation
- Inform conservation actions, management strategies and policy decisions

1.2 Scope & Rationale

Despite its ecological importance, the lake is facing escalating anthropogenic threats that undermine its ecological integrity and the livelihoods of surrounding communities that depend on it for water, pasture, fisheries and other ecosystem services. The lake was also listed by the Government of Kenya as one of the priority wetlands for Ramsar designation by 2024. However, lack of adequate and reliable biodiversity data hindered the designation process and constrained the effective implementation and monitoring of biodiversity conservation strategies and action plans.

Under this project, a 9-day multi-taxa rapid assessment was conducted in November 2023 across six administrative wards spanning lake-adjacent habitats, upstream inflow systems, and surrounding production landscapes: Shamata, Rurii, Central, Weru, Gatimu and Kiriita

1.3 Approach

The study integrated ecological field surveys with socio-economic assessments to provide a holistic evaluation of the system. Biodiversity inventories were conducted across multiple taxa: plants, fungi, reptiles and amphibians, mammals,

invertebrates, birds, fish, complemented by water quality analysis and land use assessments.

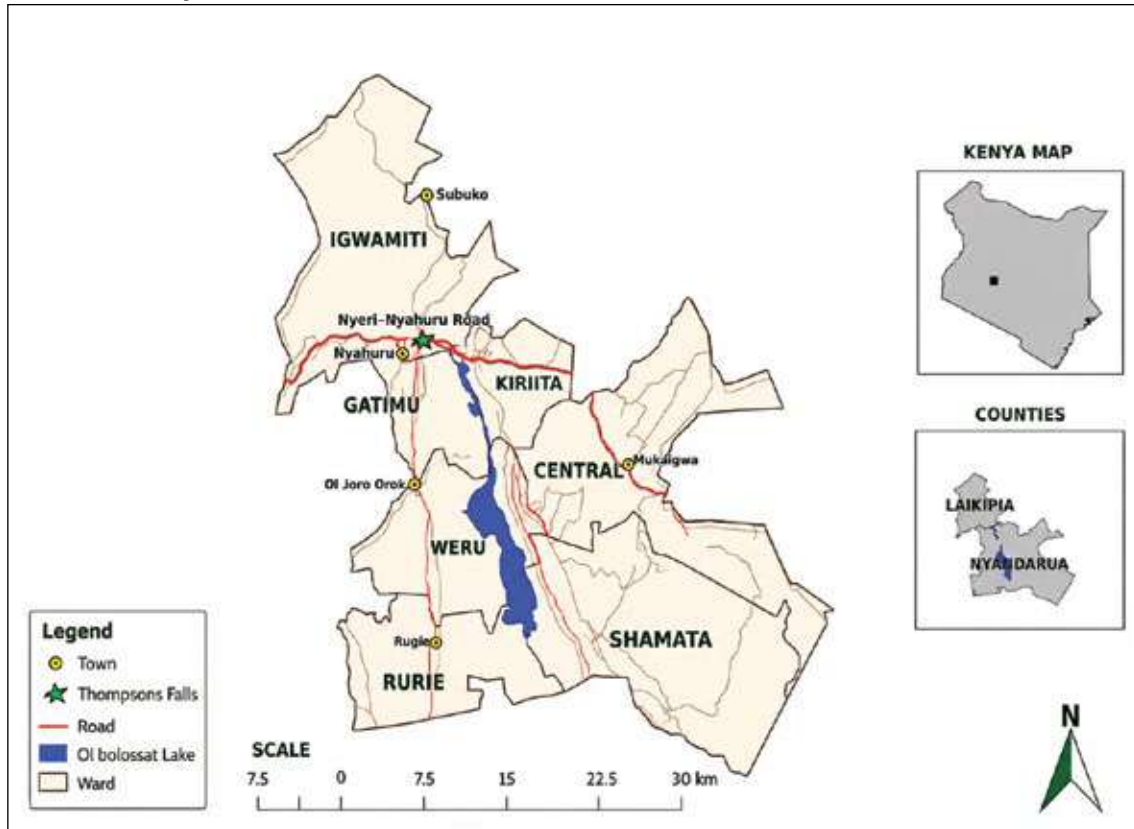
Socio-economic data were collected through household surveys and key informant engagement, providing insight into livelihood strategies, resource use patterns, and governance structures influencing the sustainability of the ecosystem.

The findings reveal a wetland of exceptional biodiversity value that is under anthropogenic pressure, making the case for its urgent designation as a Ramsar Site and the immediate strengthening of its conservation and governance frameworks.



2. ABOUT LAKE OL BOLOSSAT

Location & Physical Characteristics



Source: L. Ol Bolossat Integrated Management Plan 2023-2033

Coordinates	0° 09'S, 36° 26'E — ~195 km north of Nairobi
County	Nyandarua County, Central Kenya
Altitude	2,340 m above sea level
Total Area	43.3 km ² (39.3 km ² grassland + 4 km ² open water)
Drainage Basin	Upper Ewaso Ng'iro — headwaters of the basin
Sub Basin	Engare Narok-Melghis
Mean Water Depth	~0.75 m (range: 0.20–1.60 m)
Water Chemistry	Slightly alkaline (avg. pH 7.48); moderately saline

Ecological & Socio-Economic Importance

- Provides water for over two million people, livestock, and wildlife in Nyandarua, Laikipia, Samburu, Wajir and Isiolo counties
- Supports a rich diversity of flora and fauna, including endangered and endemic species
- Kenya's 61st Important Bird and Biodiversity Area (IBA) and a classified Key Biodiversity Area (KBA)
- Critical habitat for hippopotamus (126 individuals counted) - a keystone species
- Supports local livelihoods through agriculture, livestock, fisheries, ecotourism, water supply and climate moderation
- Part of the Upper Ewaso Ng'iro drainage system, regulating regional hydrology

Governance & Protection Status

- Gazetted as a Protected Wetland under EMCA (2018)
- Active Integrated Management Plan (IMP) in force: 2023–2033
- Lake Ol Bolossat Catchment Protection Area Order, Legal Notice No. 116 of 2023
- Nyandarua County is advancing gazettement as a National Reserve
- Proposed listing as a Ramsar Site and UNESCO Man and Biosphere (MAB) Reserve

3. THREATS AND CHALLENGES

The lake ecosystem faces severe and accelerating pressures from multiple interacting anthropogenic and climatic drivers.

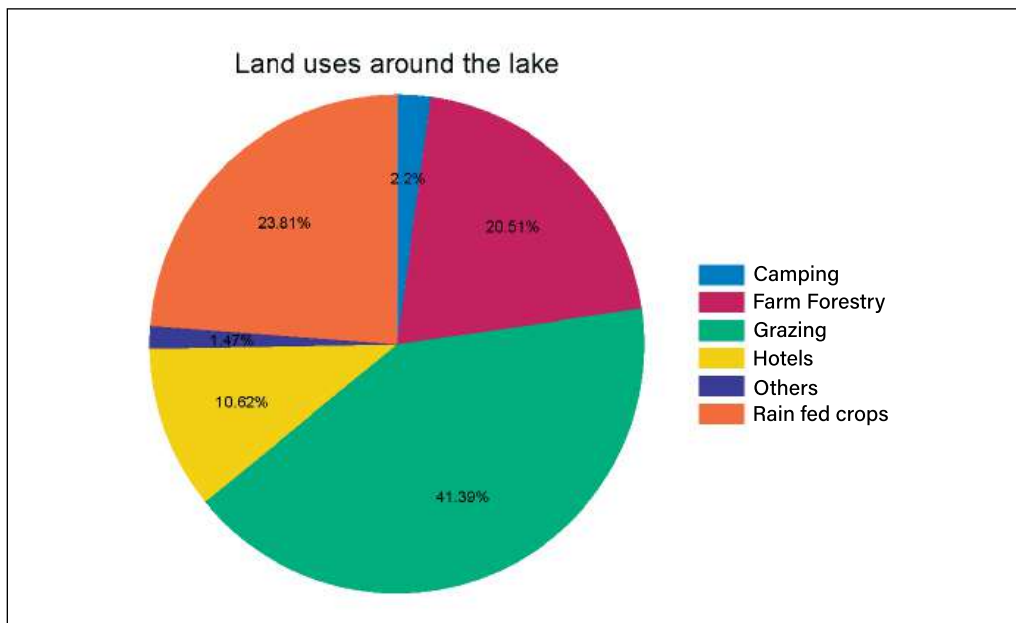
Threat Category	Key Pressures	Observed Impact
Agricultural Encroachment	Rain-fed and irrigated farming, pesticide and inorganic fertilizer runoff, irrigation water abstraction	Lake siltation, water pollution, reduced recharge
Overgrazing & Livestock	Free-range livestock including external herds during dry season; 126 hippos competing for grazing	Riparian habitat loss, bird breeding disruption, soil erosion
Water Abstraction	Diversion of springs and streams for irrigation and domestic use by growing population	Declining lake levels; spring flows rated 'scarce' in 2010s vs. 'high' in 1970s
Invasive Species	65 plant species recorded as invasive including <i>Salvinia molesta</i> , <i>Cirsium vulgare</i> (most aggressive)	Displacement of native flora, and fauna
Land Use Change	Forest, thicket loss, tussock grassland conversion to cropland, rapid fragmentation (3,395 to 219,137 fragments: 1973-2019)	Loss of species habitat and biodiversity connectivity
Illegal Exploitation	Hunting of hippopotamus (<i>Hippopotamus amphibius</i>) and Grey Crowned Cranes (<i>Balearica regulorum</i>), collection of bird eggs, overfishing, peat and salt lick mining, stone extraction	Biodiversity loss, disruption of food web
Pollution	Agrochemical runoff (elevated nitrate and phosphate levels); poor sanitation (75% pit latrine use, no sewage), poor solid waste disposal	Water quality degradation, eutrophication risk
Governance Gaps	Weak Integrated Management Plan (IMP) implementation; unclear inter-agency mandates; inadequate financing; low community awareness (only 17% were aware of IMP) Unclear lake boundaries	Insufficient enforcement; conservation fragmentation

4. KEY FINDINGS

4.1 Socio-Economic Findings

Land Uses Around the Lake

The Lake Ol Bolossat catchment supports livelihood systems dependent on natural resources, with land primarily used for grazing, rain-fed agriculture, and farm forestry. This underscores the wetland's central role in sustaining local economies. However, these systems are increasingly under strain due to declining productivity, environmental degradation, and weak institutional coordination.



Among the 255 households surveyed, the average distance from homesteads to the wetland boundary was 2.2 km, with a minimum of 0 km and a maximum of 8 km.

Average distance from the wetland boundary by ward

Ward	Household distance to wetland in km (mean)
Central	2.13
Gatimu	2.01
Kiriita	1.18
Rurii	1.70
Shamata	3.63
Weru	2.60

Livelihoods and Land Use Pressures

Farming is dominated by monocropping, with a clear long-term decline in crop productivity, from high yields 30–45 years ago to very low levels in the past 1–5 years. This decline is directly linked to poor land management practices, leading to top soil erosion, which contributes to siltation of the lake and loss of soil fertility. At the same time, reliance on agrochemicals (fertilizers and pesticides) in crop production is widespread and often unregulated, contributing to water pollution and ecosystem degradation.

Water Resources and Hydrological Trends

Water availability in the catchment has declined significantly over time. Rivers and springs that feed the lake were historically abundant in the 1970s–1980s, but are now described as scarce. This trend is attributed to increased water abstraction and diversion for domestic use and irrigation, reducing inflows and recharge to the lake. Only 31% of respondents reported the presence of such water sources, reinforcing their declining availability.

Water governance and knowledge dissemination are shared between actors, with 52% of respondents receiving water management information from the private sector and 48% from government, indicating a split but still fragmented advisory system.

Energy Sources and Resource Dependence

Household energy use is overwhelmingly dependent on biomass, with firewood, charcoal, and farm residues as the main sources. Access to alternative energy (e.g., gas, electricity, biogas) remains limited.

Firewood sourcing patterns highlight direct pressure on the landscape:

- 84% of households collect firewood from their own farms
- 12% obtain it from neighbours
- 4% source from forests, particularly Githima and Githinguchu

This indicates that while forest extraction is relatively low, farm-based wood harvesting is extensive, reflecting high reliance on on-farm tree resources and contributing to vegetation pressure within the catchment.

Human-Wildlife Interactions

Human-wildlife conflict is a growing issue, with 42% of respondents experiencing conflict and 53% reporting crop damage. These conflicts have intensified over time, shifting from rare occurrences in earlier decades to frequent events in recent years, reflecting increasing competition over space and resources.

Among wildlife species, the hippopotamus is the primary driver of agricultural losses, accounting for 79% of all reported crop damage. The economic burden of crop damage by wildlife on affected households average annual losses estimated at KES 122,325 (190.96 USD) per household.

Extension Services and Institutional Support

Agricultural extension services are predominantly delivered by the private sector (61%), with limited government presence (21%) and NGO involvement (18%). Only 20% of respondents reported access to government extension services, indicating limited public sector engagement in supporting sustainable land and resource management.

Governance, Stakeholder Coordination, and Participation

Despite the lake's designation as a Wetland Protected Area and an Important Bird and Biodiversity Area, management effectiveness remains low. Key governance challenges include poor coordination among government agencies, unclear institutional mandates, inadequate financial resources, and limited community involvement in decision-making. These constraints have undermined the implementation of the Integrated Management Plan (IMP), contributing to continued encroachment, unsustainable resource use, and ecosystem degradation.

Stakeholder engagement structures such as Water Resource Users Associations (WRUAs) play a role in local water governance; however, participation remains uneven. The study showed that WRUAs are predominantly male-dominated, highlighting gender imbalances in decision-making spaces. More broadly, limited inclusivity and weak coordination among stakeholders continue to constrain effective community participation in conservation and management of the lake.

4.2 Biodiversity Hotspot & Land use Change

Analysis of satellite imagery across three time periods, 1973, 1986, and 2019, reveals dramatic and accelerating landscape transformation within the Lake Ol Bolossat basin. Open water extent declined from 2,886 ha in 1973 to zero during the 1986 desiccation event, recovering to 2,237 ha by 2019, with the 2023 desiccation event representing a further and unprecedented regression.

Tussock grasslands, which provide critical habitat for endemic grasshoppers, Sharpe's Longclaw, Grey Crowned Crane, and numerous other species, have declined by approximately 10,137 ha since 1973, with 47% of remaining tussock converted to short grass and much of the original tussock reduced to small, fragmented patches. Forest and thicket cover has contracted from 1,208 ha in 1973 to 485 ha in 2019, persisting mainly as small clusters along the eastern Satima Escarpment.

LULC Type	Area (ha.)		
	1973	1986	2019
Forest/Thickets	1208	783	485
Built-up area	57	170	292
Wetland: Sedges	1207	2846	1900
Wetland: Water area	2886	0	2237
Grassland	0	1328	9335
Grassland: Tussocks	10840	12715	5643
Farmland/Ranch	11304	0	0
Farmland/Cropped	0	8761	5825
Muddy Soil	0	827	0
Eucalyptus Plantation	0	177	1920

The conversion of natural habitats to agricultural and human settlement uses has been rapid and extensive. Farmland, essentially absent as a discrete land-cover class in 1973, expanded to 8,761 ha by 1986 and 5,825 ha by 2019.

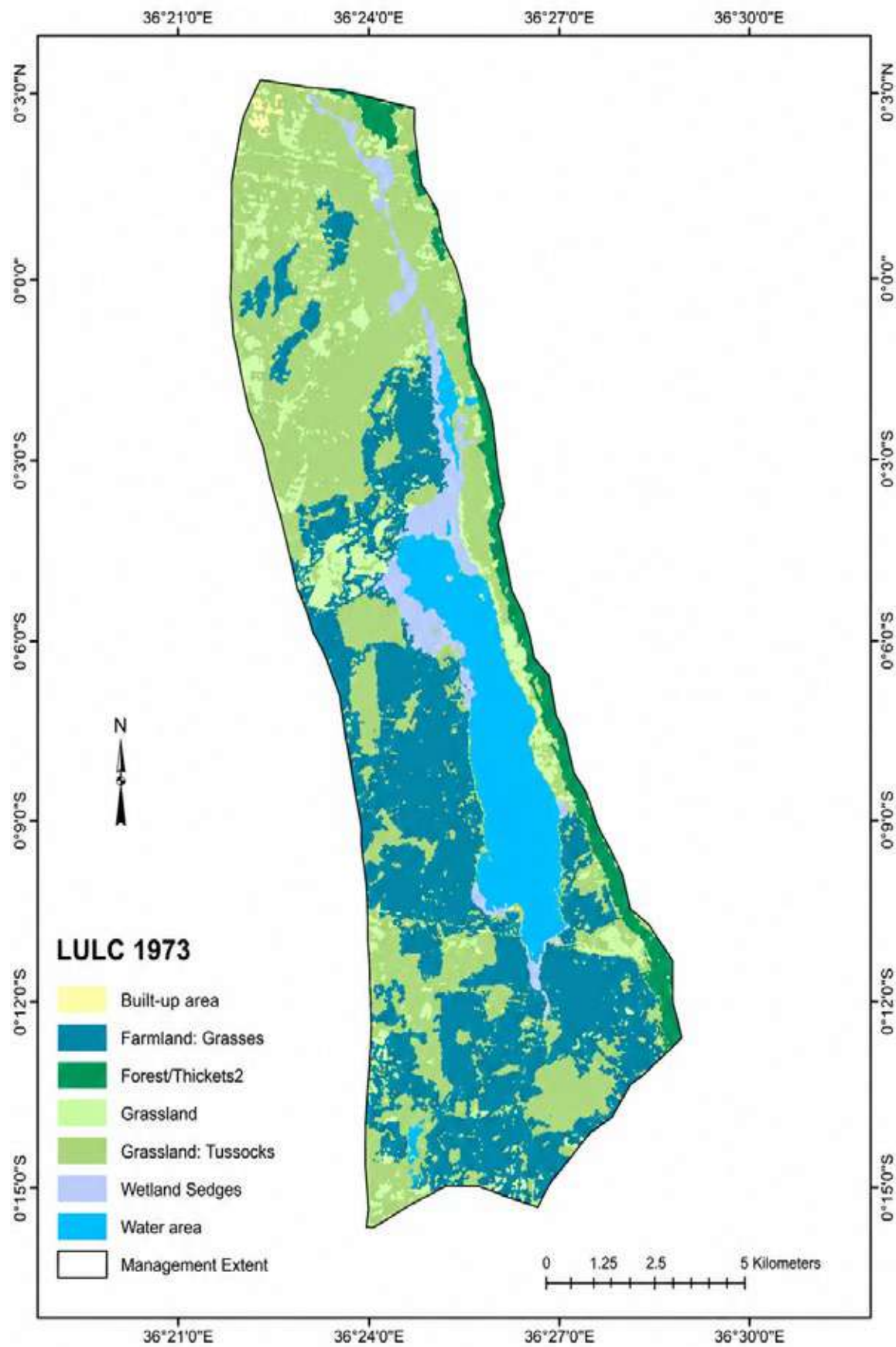
Eucalyptus plantations, absent in 1973, at the time of the research occupied 1,920 ha, replacing native woodland with a habitat type that supports substantially lower biodiversity across most taxa. Built-up areas expanded from 57 ha in 1973 to over 300 ha by 2019, with approximately 158 ha of this expansion occurring at the expense of former grassland and 41 ha from sedge-dominated wetlands.

The number of landscape fragments increased from approximately 3,316 in 1973 to 219,173 by 2019, a 65-fold increase representing one of the most pronounced fragmentation trajectories documented for any Kenyan wetland system.

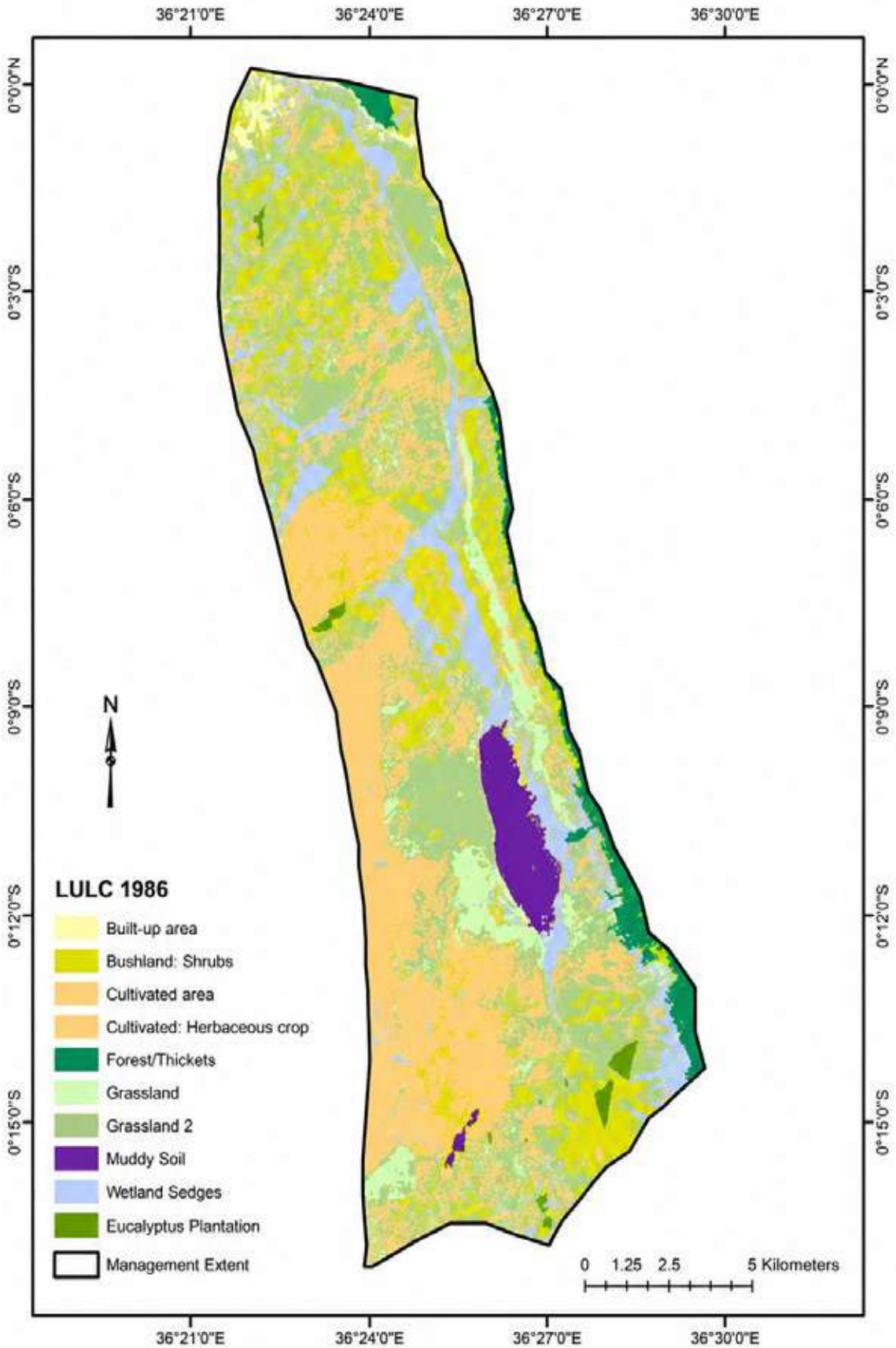
Biodiversity hotspot modelling, integrating species richness data with spatial predictors including vegetation cover, spring density, slope, road density, and proximity to urban centres, identified approximately 12% of the Lake Ol Bolossat Management Plan area as 'very hot' for biodiversity conservation, requiring immediate priority attention.

A further 31% falls within the 'moderately hot' category. Weru Ward contains 44% of all 'very hot' areas and the largest contiguous priority patch at 34.56 ha, followed by Shamata (16%) and Rurii (13%). These hotspot designations provide a spatial evidence base for prioritising conservation investment and zoning decisions.

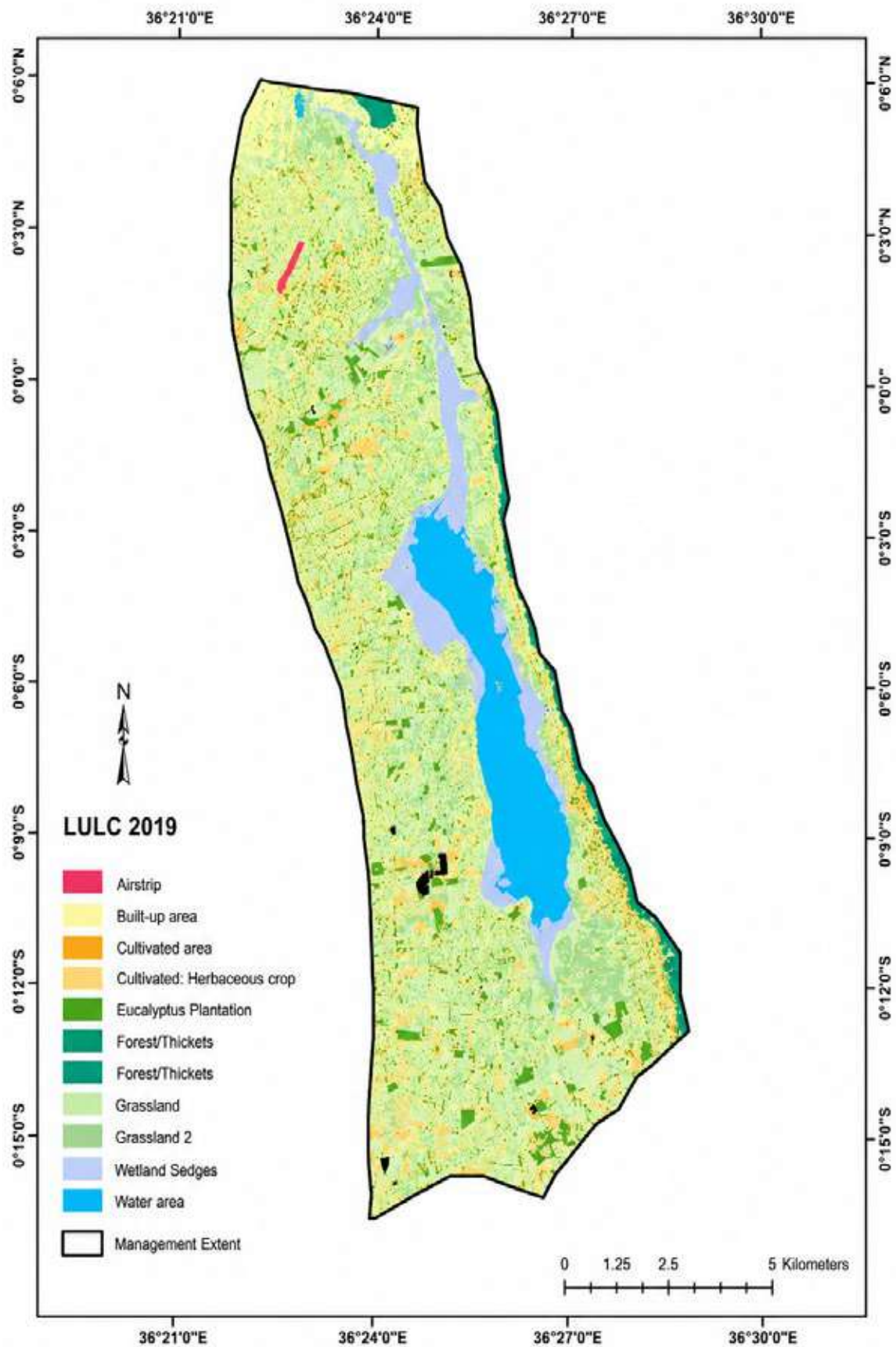
Land Use / Land Cover (LULC) Changes 1973



Land Use / Land Cover (LULC) Changes 1986



Land Use / Land Cover (LULC) Changes 2019

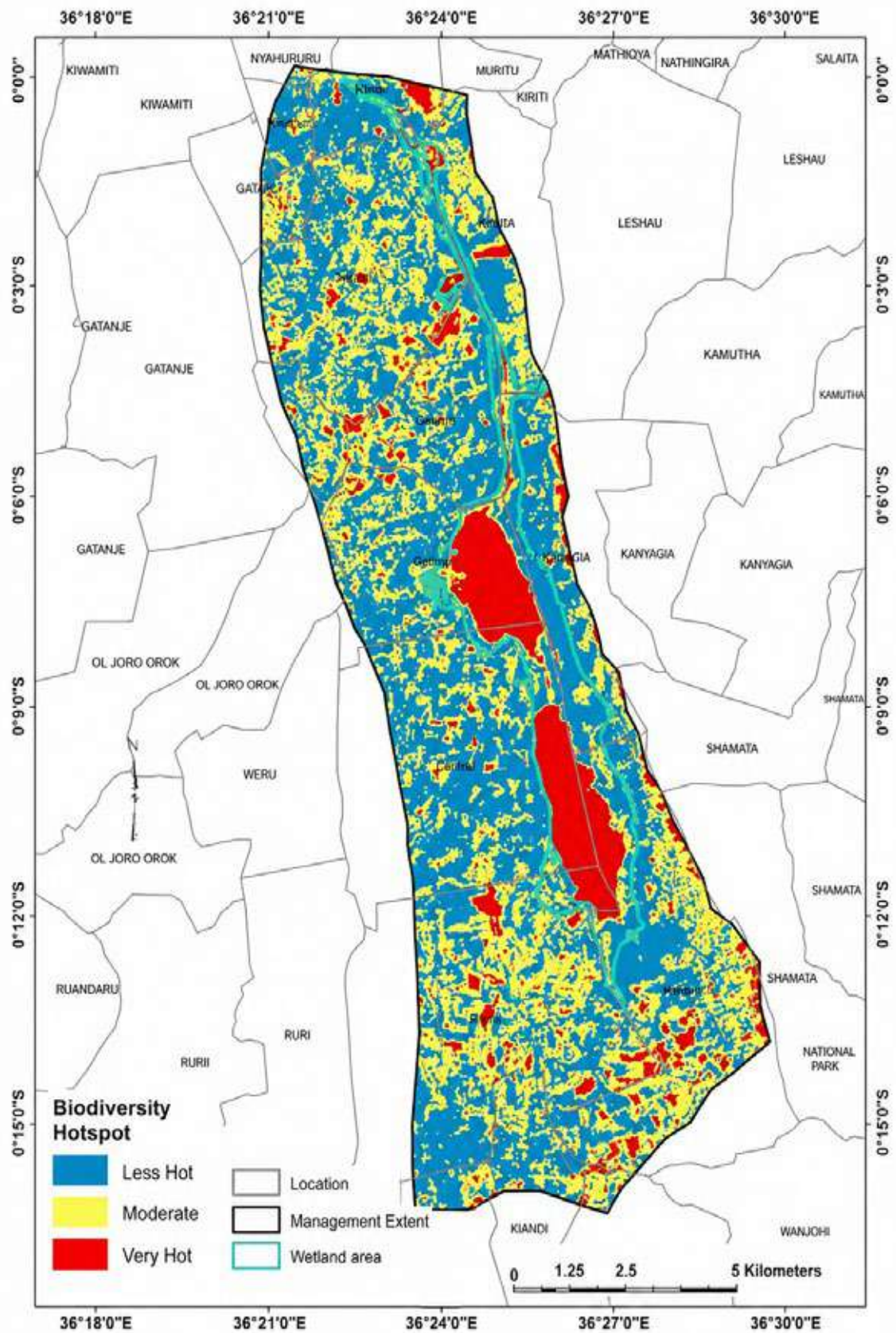


Analysis of satellite imagery reveals dramatic landscape transformation over five decades:

Open Water	Declined from 2,886 ha (1973) to 0 ha (1986, desiccation event) to 2,237 ha (2019)
Tussock Grassland	Lost ~10,137 ha to cropland and other uses; 47% converted to short grass
Forest / Thicket	Declined from 1,208 ha (1973) to 485 ha (2019)
Farmland	Absent as a discrete class in 1973; expanded to 8,761 ha (1986) and 5,825 ha (2019)
Eucalyptus Plantations	Absent in 1973; cover 1,920 ha
Built-up Areas	Expanded from ~57 ha (1973) to 292 ha (2019)
Landscape Fragmentation	Fragment count increased from 3,316 (1973) to 219,173 (2019)- a 65-fold increase; increase suggests intensifying anthropogenic pressures and uncoordinated land use transitions.



Biodiversity Hotspot Classification



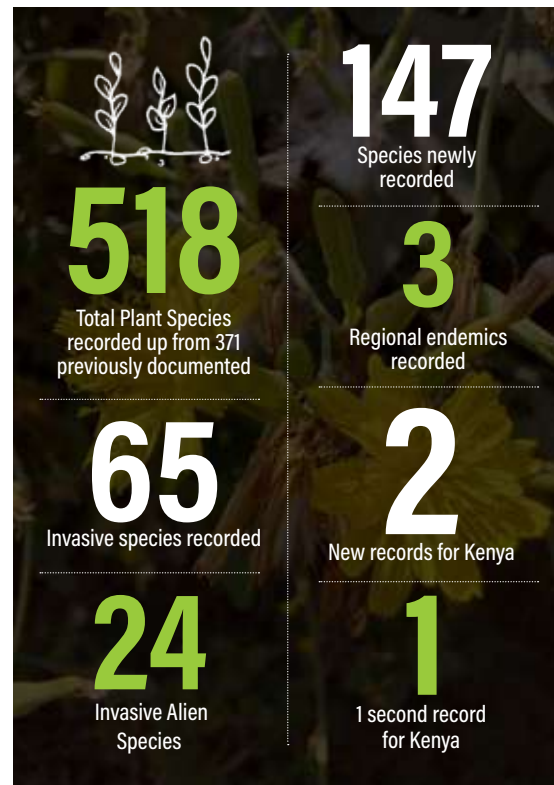
4.3 Ecological Insights by Taxa

Flora

The botanical survey recorded a total of 518 plant species, classified into 329 genera and 99 families, a 40% increase on the 371 species documented previously. Of these, 147 species were new records for the Lake Ol Bolossat ecosystem, comprising both indigenous and exotic taxa. The most species-rich families were Asteraceae (88 species), Poaceae (52), and Fabaceae (39), reflecting the dominance of open grassland and disturbed vegetation communities across the study area.

Two plant species were recorded in Kenya for the first time: *Calceolaria tripartita*, a subshrub native to Mexico and South America whose collection may represent the first record for the African continent according to Plants of the World Online, and *Lactuca serriola*, a biennial herb with a native range extending from Europe to North Africa. A second collection of *Oenothera tetraptera* was also made. These discoveries highlight the remarkable and still-incompletely documented botanical diversity of this highland wetland ecosystem.

Of particular conservation significance, the assessment confirmed the presence of five taxa of elevated conservation concern: one Kenyan endemic, *Kenyacanthus*



***Calceolaria tripartita* (First record-potentially first record for Africa)**



***Lactuca serriola* (First record for Kenya)**



Oenothera tetraptera



Kenyacanthus ndorensis

ndorensis, recorded in Weru Ward, Kalandi sub-location; two species classified on the IUCN Red List, *Prunus africana* (Vulnerable) and *Senecio pseudosubsessilis* (Endangered); and two infraspecific taxa endemic to eastern Africa, *Dicliptera maculata* subsp. *usambarica* and *Impatiens meruensis* subsp. *cruciata*.

The assessment also documented 65 weedy and invasive plant species, of which 24 were formally classified as Invasive Alien Species (IAS). The most ecologically damaging of these, *Cirsium vulgare* (spear thistle), a biennial herb native to Europe and western Asia, has colonised large areas of the lake basin, particularly its wetter margins, forming dense, spiny thickets that suppress native vegetation, alter soil seed banks, and reduce habitat suitability for both wildlife and livestock. Other IAS of concern include *Salvinia molesta* (an aquatic floating fern now present in the lake), *Datura stramonium*, *Senna didymobotrya*, and *Echium plantagineum*. The presence and spread of IAS represents a significant and ongoing threat to the floristic integrity of the ecosystem, with documented negative cascading effects on other taxa groups including invertebrates and fish.



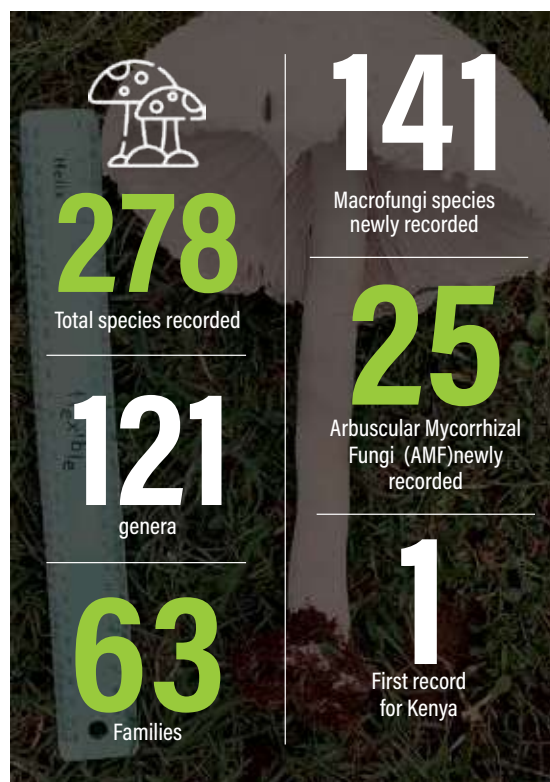
***Cirsium vulgare* (Spear thistle)**



Fungi

The fungal component of the survey produced one of the most striking biodiversity increases recorded across all taxa. The combined field survey and literature review identified a total of 278 fungal species across 121 genera and 63 families, an eightfold increase from the 35 species previously documented in the ecosystem. The current survey alone recorded 218 species distributed across 78 genera, 35 families, and two divisions, *Basidiomycota* and *Glomeromycota*. Of these, 141 macrofungi and 25 arbuscular mycorrhizal fungi (AMF) species were recorded for the first time in the Lake Ol Bolossat ecosystem.

The macrofungal community was dominated by humicolous (humus-inhabiting) species, which accounted for 72% of all species recorded, with the family Agaricaceae contributing the greatest species richness (68 species). This dominance of decomposer fungi indicates a robust detrital food web and a well-



developed soil organic layer, ecological functions that are critical to nutrient cycling and ecosystem productivity. The AMF component recorded 42 species across 13 genera and five families, with Acaulospora showing the highest spore abundance (33% of total spores), consistent with soils of moderate acidity characteristic of the highland ecosystem.

Among the most notable findings was the collection of *Myriostoma cf. coliforme*, a member of the family Geastraceae, from mixed Chaparungu woodland, a natural forest remnant within the lake ecosystem. This species is currently listed as Critically Endangered in Britain and has not previously been recorded in Kenya. Its discovery in an already degraded remnant forest underscores the potential for irreversible loss of undocumented fungal diversity as habitat degradation continues.

Natural forests supported the highest macrofungal species richness and diversity across all land-use types, followed by natural grasslands. In contrast, farmlands and lake-adjacent wetlands recorded the lowest richness, density, and diversity, a direct reflection of habitat simplification and anthropogenic disturbance. Fungal diversity was also notably lower in wards with greater proximity to urban centres, such as Kiriita, compared to more remote wards such as Shamata and Rurii, further linking human pressure gradients to biodiversity outcomes.



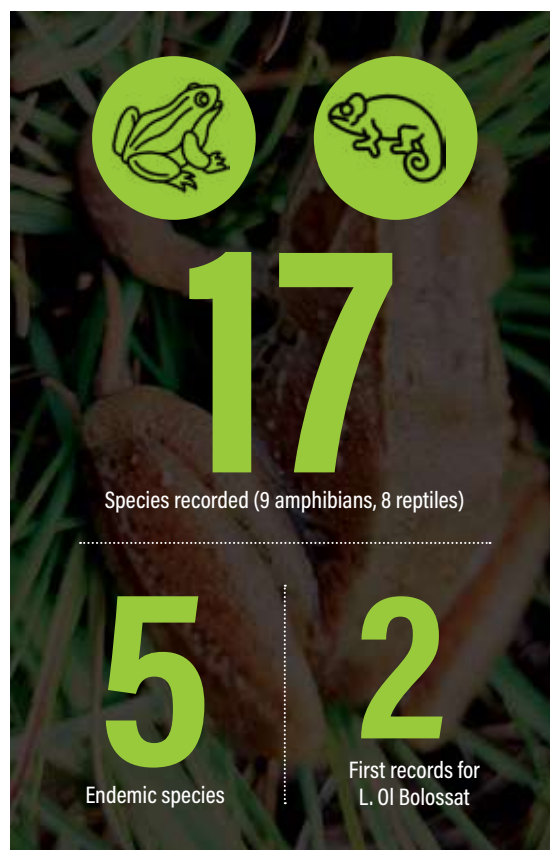
***Myriostoma cf. coliforme*. First record for Kenya**



Herpetofauna (Reptiles and Amphibians)

The herpetofauna survey documented a total of 17 species: nine amphibians and eight reptiles. From a checklist of 29 species known or expected to occur in the area, this survey confirmed fewer than 60%, a figure that, combined with non-plateauing species accumulation curves, indicates that the full herpetofaunal richness of the site remains under-sampled and that extended multi-seasonal surveys would yield additional records.

Two species were recorded for the first time at this site: *Amietia nutti* (Nutt's river frog) and *Psammophylax multisquamis* (Kenyan striped skaapsteker). Five of the 17 species recorded are Kenyan endemics, including *Cacosternum kinangopensis* (Kinangop dainty frog), *Ptychadena mahnerti* (Mahnert's ridged frog), and *Mertensophryne lonnbergi* (Lönberg's earless dwarf toad), the latter classified as Vulnerable on the IUCN Red List. The Kenyan horned viper (*Bitis worthingtoni*), listed as Vulnerable (IUCN) and in Appendix II of CITES, was not detected during the survey but is known from the broader region and may occur in rocky habitats near the lake.





Kinangop Puddle Frog (endemic)



Kinangop dainty frog (endemic)



Kenyan striped skaapsteker



Nutt's river frog

A particularly telling ecological signal was the observed habitat plasticity displayed by several species in response to deteriorating environmental conditions. Peter's reed frog (*Hyperolius glandicolor*), which naturally perches and breeds on floating aquatic vegetation such as water lilies, was repeatedly observed using exotic tree species, eucalyptus, pine, and bottle brush, as substitute perch and breeding substrate. This behavioral shift reflects the loss of native aquatic vegetation following the severe lake desiccation of 2023 and ongoing habitat degradation, and while it may offer short-term survival, it signals a deeper decline in habitat quality and ecological function. Similarly, Bubbling Kassina (*Kassina senegalensis*) was frequently found sheltering in ground holes rather than in its preferred habitat of emergent aquatic grasses, a drought-survival behavioral adaptation with implications for breeding success and population dynamics. These behavioral shifts underline the sensitivity of herpetofauna as bioindicators: they are among the first taxa to exhibit measurable responses to changes in water availability, vegetation structure, and land use, making them critical monitoring targets for ongoing ecosystem health assessment at Lake Ol Bolossat.



Mammals

The mammal survey recorded 29 individuals representing seven species from five orders. The most ecologically significant finding was the continued presence of *Hippopotamus amphibius*, with 126 individuals counted across the lake system. The hippopotamus is a keystone wetland species whose grazing and wallowing behaviour creates and maintains habitat heterogeneity critical for numerous other taxa. Its population size at Lake Ol Bolossat is a positive indicator of residual wetland function; however, it is also a source of escalating human-wildlife conflict, with hippopotami responsible for 79% of reported wildlife crop damage in surveyed households.



Other species recorded were largely small mammals including the montane climbing mouse (*Dendromus insignis*) which is typically associated with upland habitats, was recorded in riverine heath and moor vegetation, possibly reflecting changes in woody cover; the Cape hare (*Lepus capensis*); Smoky white-toothed shrew (*Crocidura fumosa*); mole rat (*Tachyoryctes ibeanus*); and spotted hyena (*Crocuta crocuta*). The presence of the house mouse (*Mus musculus*) is ecologically significant as an indicator of disturbance and urban proximity rather than natural mammal community health. All non-hippopotamus species were represented by very few individuals, reflecting both the limitations of indirect survey methods and the genuinely low density of medium and large mammals in a heavily human-modified landscape.

The low species richness and abundance of the non-hippopotamus mammal community, combined with reported historical declines in wildlife and increasing human-wildlife conflict, reflects the progressive simplification of the ecosystem driven by agricultural encroachment, overgrazing, and the loss of natural cover. The mammal community is therefore both a consequence and an indicator of broader landscape degradation trends documented across all taxa in this assessment.

Invertebrates

The invertebrate survey recorded 206 species across 16 taxonomic orders, making it the second most species-rich taxon group documented. The orders with the highest species richness were Coleoptera (beetles), Hymenoptera (bees, wasps, ants), and Hemiptera (true bugs), reflecting the functional diversity of the invertebrate community across terrestrial and aquatic habitats. Notably, invertebrate diversity and abundance were substantially reduced in areas of the lake covered by *Salvinia molesta*, compared to areas retaining native aquatic vegetation, a direct and measurable impact of invasive plant spread on aquatic ecosystem function.

Three species of particular conservation and scientific significance were documented. Two endemic grasshoppers, *Parasphena kinangopa* (a gaudy grasshopper in the family Pyrgomorphidae) and *Pezocatantops impotens* (a short-horned grasshopper), represent taxa with highly restricted distributions, their presence indicating the residual ecological value of the lake's grassland habitats. A crustacean species, identified as a horseshoe or tadpole shrimp, was recorded for the first time at Lake Ol Bolossat; this organism is typically associated with ephemeral wetlands that periodically desiccate completely, and its occurrence is consistent with the dynamic hydrological regime of the lake.



The endemic *Parasphena kinangopa* (left) and *Pezocatantops kinangopi* (right)



A Horseshoe or Tadpole shrimp

The Red-veined Darter dragonfly (*Sympetrum fonscolombii*), considered rare in East Africa based on its limited known distribution and typically associated with standing water bodies supporting aquatic vegetation, was observed in what the authors describe as the largest population ever recorded. The cold-adapted mosquito *Anopheles christyi* was also recorded at high density, a finding of potential significance for public health research in montane systems. An additional invertebrate finding with important conservation implications was the spread of the Louisiana crayfish (*Procambarus clarkii*), an introduced species originally introduced to Lake Naivasha, which has now been reported in Lake Ol Bolossat, posing risks to native invertebrate, amphibian, and fish communities through predation and competition.

Vegetation loss and habitat simplification are also altering invertebrate behaviour in functionally important ways. In the absence of large native trees with natural cavities, four African honey bee (*Apis mellifera*) colonies were observed nesting in the ground near the lake, an atypical nesting behaviour reflecting the loss of arboreal nesting habitat. This shift has potential downstream consequences for pollination services and honey production, both of which are ecologically and economically important to local communities.



**Louisiana crayfish
(*Procambarus clarkii*)**



Red-veined darter dragonfly



Colonies of the African honey bees on the ground in Lake Ol Bolossat

Birds

The avifaunal survey recorded 779 individual birds representing 162 species, using a combination of point counts, timed species counts, and opportunistic observation over nine days. Species accumulation modelling projects that the total avian richness of the Lake Ol Bolossat system may lie between 200 and 375 species with extended survey effort, an estimate that, if confirmed, would substantially enhance the site's case for Ramsar designation under Criterion 5 (waterbird abundance thresholds) and Criterion 3 (biodiversity support).

The grassland habitats adjacent to the lake supported the highest bird species richness and abundance, while bushed-grassland with secondary forest and riverine habitats exhibited relatively lower richness, though higher species evenness, reflecting the more balanced distribution of individuals across species in structurally complex habitats. The dominance of the grassland community by a relatively small number of species, alongside the scarcity of forest-dependent (FF or F) species, is ecologically meaningful: it confirms the loss of intact forest cover from the landscape and the resulting simplification of the bird community towards open-country and farmland generalists.



Sharpe's Longclaw (*Macronyx sharpie*)



Grey Crowned Crane (*Balearica regulorum*)



Tawny Eagle (*Aquila rapax*)

Twenty-four bird species of conservation concern were recorded, including three globally Endangered species: Sharpe's Longclaw (*Macronyx sharpei*), a grassland specialist endemic to the Nyandarua and select Kenyan highland grasslands; the Steppe Eagle (*Aquila nipalensis*); and the Grey Crowned Crane (*Balearica regulorum*). Two Vulnerable species, the Tawny Eagle (*Aquila rapax*) and the Woolly-necked Stork (*Ciconia episcopus*), were also recorded. Additionally, one invasive species, the House Sparrow (*Passer domesticus*), was documented.

The area also supports 20 Palearctic migrant species and two intra-African migrants, one of which is listed as Vulnerable. The Pallid Harrier (*Circus macrourus*) - Near Threatened was among the notable Palearctic migrants observed. The concentration of endangered, endemic, and migratory species within a single wetland system confirms Lake Ol Bolossat's outstanding significance for avian conservation at national and international scales.



Pallid Harrier (Near-Threatened)



Steppe Eagle



Woolly-necked Stork



House sparrow (*Passer domesticus*)

Fish & Water Quality

Four fish species were recorded during the survey, a decline from eight species historically documented at the lake, with the reduction attributed primarily to the catastrophic lake desiccation event of 2023. This event collapsed the aquatic ecosystem, eliminating fish populations and severely disrupting invertebrate and amphibian communities that depend on permanent water. The recolonisation of the lake following water level recovery is ongoing but incomplete, and the fish assemblage documented in this survey likely represents an impoverished post-disturbance community rather than the lake's potential carrying capacity.



Pseudocrenilabrus multicolour victoriae

An important conservation concern identified in the fish survey is the presence of *Pseudocrenilabrus multicolor victoriae*, an introduced cichlid species likely originating from the Lake Victoria basin, possibly via the ornamental fish trade. Its presence poses a risk to native biodiversity and ecosystem balance through predation on native aquatic organisms and competition with indigenous fish species.

Water quality measurements revealed significant spatial variation in several key parameters. Elevated electrical conductivity (EC) and total dissolved solids (TDS) were recorded on the western side of the lake, particularly at ground zero and Rurii sites, attributed to the dissolution and transport of soluble salts from anthropogenic activities in the catchment.

Nitrate concentrations showed high spatial variability, ranging from 3.26 ppm at Ol Joro Orok stream to 0.4 ppm at a Shamata stream. Njunu Springs, a key natural inflow point, recorded elevated nitrates at 2.66 ppm, indicating nitrate leaching from surrounding agricultural soils into the natural spring system. Within the lake, average nitrate concentration was 1.09 ppm, while river systems averaged 1.26 ppm, indicating an active pathway of agriculturally derived nutrient loading through inflowing rivers.

Phosphate concentrations were generally lower and more spatially stable, with elevated levels recorded only at Rurii and Kereita within the lake. These patterns are consistent with progressive eutrophication driven by agricultural runoff, and constitute an early warning signal for long-term water quality decline and aquatic biodiversity loss.

4

Species
recorded down
from 8 species
previously
recorded

1

Introduced species
recorded

5. RECOMMENDATIONS

Recommendations are clustered into four thematic areas for coordinated and actionable implementation.

Governance and Policy

- Gazette Lake Ol Bolossat as a National Reserve to establish clear institutional mandates and enforcement authority for protection and management
- Advance designation as Kenya's 7th Ramsar Site to unlock international conservation funding and elevate the lake's global profile
- Accelerate UNESCO Man and Biosphere (MAB) Reserve application to complement Ramsar status
- Strengthen implementation and enforcement of the Integrated Management Plan 2023–2033 with dedicated, multi-agency financing
- Increased budget allocation to support conservation and management of the ecosystem
- Clarify inter-agency responsibilities between Kenya Wildlife Service (KWS), Kenya Forestry Service (KFS), County Government, National Environmental Management Authority (NEMA), and Water Resource Authority (WRA) to eliminate jurisdictional gaps
- Operationalize the Lake Ol Bolossat Catchment Protection Area Order (Legal Notice No. 116 of 2023) through active enforcement
- Designate a sanctuary zone within the lake ecosystem where grazing and disruptive human activities are prohibited, to protect Sharpe's Longclaw, Grey Crowned Crane, and other threatened species
- Strengthen the Beach Management Unit (BMU) for co-management of fisheries under the Fisheries Management and Development Act, 2016

Ecosystem Conservation and Restoration

- Protect and restore springs and streams on the southeastern side of the lake, the primary freshwater inflows critical for aquatic biodiversity recovery
- Implement controlled and regulated grazing regimes to protect riparian habitats, bird breeding sites, and hippopotamus feeding areas
- Restore native tussock grasslands and riparian vegetation to improve habitat quality, reduce erosion, and re-establish fish spawning and nursery grounds
- Conduct urgent, coordinated control of invasive species using evidence-based removal methods
- Control and eliminate agrochemical use and discharge from large-scale flower farms (e.g., operations near Dundori Ridge) and small-scale farms to reduce nitrate and phosphate loading
- Protect remaining forest patches along the Satima Escarpment, the primary remnant native forest habitat
- Restore marshy zones to support invertebrate biodiversity recovery, including fireflies as wetland health indicators
- Monitor hippopotamus population closely.

- Address human-wildlife conflict through community-led strategies and compensation mechanisms

Community Engagement and Livelihoods

- Institutionalize citizen science in biodiversity monitoring, with structured capacity building for local data collection and interpretation
- Promote sustainable land management: agroforestry, conservation agriculture, organic farming, integrated pest management (IPM), cover cropping, and closed-loop agriculture
- Develop an equitable, participatory benefit-sharing mechanism allowing communities to benefit from ecotourism, with regulated access to lake resources
- Develop ecotourism potential: birdwatching, sport fishing, boat rides, and guided nature experiences, the lake's 162+ bird species and IBA status position it as a premier birding destination
- Promote conservation-linked livelihoods such as community beekeeping, which supports pollinator conservation and provides direct income incentives
- Strengthen Water Resource Users Associations (WRUAs), Community Forest Associations (CFA) and water governance, with shared water intakes for irrigation to reduce individual diversions
- Ensure gender equity in conservation and livelihood programs; women dominate irrigation activities and play significant roles in household resource management
- Increase community awareness of the IMP, Ramsar processes, and conservation rules through targeted outreach, currently only 17% of households are aware of the IMP

Research and Monitoring

- Establish a long-term, multi-taxa biodiversity monitoring program with standardized protocols, building on this assessment as the baseline
- Conduct seasonal surveys (wet and dry) for all taxa, particularly fish, invertebrates, and herpetofauna, to capture temporal dynamics
- Implement a water quality monitoring program tracking pH, TDS, EC, salinity, nitrates, and phosphates.
- Develop and maintain permanent sample plots and transects for vegetation, bird, and invertebrate monitoring
- Investigate sources of elevated TDS and EC on the western side of the lake, with special attention to flower farm effluent discharge
- Use birds, herpetofauna, dragonflies, and fireflies as ecosystem health indicators in routine monitoring
- Upload all biodiversity data to Global Biodiversity Information Facility(GBIF) and other open-access platforms to support future research and policy development
- Support postgraduate research and citizen science programs to build local capacity in biodiversity monitoring
- Track Land use and land cover change dynamics every 5 years using remote sensing to monitor landscape fragmentation and encroachment trends

6. ASSESSMENT OF POTENTIAL RAMSAR SITE CRITERIA

The findings of this assessment provide substantial evidence of the ecological importance of Lake Ol Bolossat and support its eligibility for designation as a Ramsar Site. The available biodiversity, ecological and hydrological evidence demonstrates that the lake meets several Ramsar Criteria.

Ramsar Criterion	Criterion Description	Evidence from This Assessment	Assessment Status
Criterion 1	Representative or unique wetland type	Kenya's only natural high-altitude lake in the Central Highlands; unique alkaline chemistry; seasonally dynamic hydrology with periodic desiccation and recharge.	Meets
Criterion 2	Supports threatened species and ecological communities	24 bird species of conservation concern including 3 endangered; 5 endemic herpetofauna; endemic invertebrates (<i>Paraspena kinangopa</i>); critically endangered fungus (<i>Myriostoma cf. coliforme</i>); endemic plant, <i>Kenyacanthus ndorensis</i> .	Meets
Criterion 3	Biodiversity support	518 plant species, 278 fungal species, 162 bird species (projected 200–375 species), 206 invertebrate species across 16 orders; multi-taxa richness and endemism across a single wetland system.	Meets
Criterion 4	Support to species in critical life cycle stages	Key wintering and stopover site for 20 Palearctic migrant birds and 2 intra-African migrants; hippopotamus (126 individuals) breeding habitat; bird nesting sites (Grey Crowned Crane, Sharpe's Longclaw)	Meets

[illegible]

NOTES

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