Impacts of Agricultural Activities on the Conservation of Grey Crowned Crane in Uasin Gishu County, Kenya

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.909000297

Received: 01 September 2025; Accepted: 07 September 2025; Published: 09 October 2025

ABSTRACT

Birds provide crucial ecological, cultural, and economic benefits, from pollination and seed dispersal to pest control and serving as indicators of ecosystem health. In Africa, the Grey Crowned Crane (*Balearica regulorum*) is both a cultural emblem and an ecological sentinel. Yet, its population in Kenya has declined by over 80% since the 1980s, driven largely by wetland loss, agricultural expansion, grazing pressure, and urban development. Uasin Gishu County, with its mosaic of productive farmland and wetlands, supports about 21% of the national crane population, making it a critical site for conservation. This study explored how agricultural activities influence Grey Crowned Crane conservation, aiming to provide insights for sustainable habitat management. A mixed-methods approach was employed, combining household questionnaires, field observations, participatory mapping, and checklists. Stratified sampling targeted 400 households across six sub-counties, with proportional allocation and systematic selection around wetlands. A pilot survey in Trans Nzoia County helped refine the questionnaire, ensuring clarity and relevance. Reliability testing yielded Cronbach's alpha values above 0.80. Quantitative data were analyzed using SPSS Version 21, with percentages, frequencies, and chi-square tests applied to explore links between agricultural practices and crane conservation. Ethical approval was obtained from NACOSTI, with voluntary participation and strict confidentiality maintained throughout. Of 324 questionnaires administered, 316 were returned (97.5%). Most respondents were male (66.1%) and over 36 years old (65.1%), with crop farming being the dominant occupation (41.5%). About 60% reported crane breeding in their areas, primarily in wetlands (80.3%; $\chi^2 = 124.93$, df = 2, $p < 0.001$). Cranes were most often seen in agricultural fields (48.9%) and seasonally flooded wetlands (31.1%; $\chi^2 = 48.20$, df = 3, $p < 0.001$), engaging mainly in feeding (77.3%), breeding (13.0%), and roosting (8.5%; $\chi^2 = 147.05$, df = 3, $p < 0.001$). More than half of respondents (51.1%) observed declining populations, with cranes exhibiting local and seasonal movements (79.6%; $\chi^2 = 36.0$, df = 1, $p < 0.001$). Key threats included wetland conversion, chemical poisoning, fires, overgrazing, and tree cutting. The findings highlight that agricultural expansion and related activities are major pressures on crane habitats and breeding success. Effective conservation requires protecting wetlands, regulating chemical use, and engaging communities in sustainable land management. Aligning crane conservation with agricultural practices can safeguard both biodiversity and rural livelihoods in Uasin Gishu County.

Keywords: Grey Crowned Crane, agricultural impacts, wetland conservation

INTRODUCTION

Birds are among the most diverse and ecologically important vertebrate groups, with more than 11,000 species distributed across nearly every biome on Earth (Gill et al., 2021). They sustain ecosystems by dispersing seeds, pollinating plants, regulating insect populations, cycling nutrients, and removing carrion (Şekercioğlu et al.,

2004). These ecological roles not only maintain natural systems but also support human needs, including food production and biodiversity conservation. Birds also underpin major economic sectors: in the United States, birdwatching contributes over $41 billion annually (Bonacquist-Currin, 2020), while in Europe, avitourism is valued at €10 billion (BirdLife International, 2017). In Africa, despite being less developed, bird-based tourism holds immense potential, particularly in countries such as Kenya, Uganda, and Tanzania, which host globally significant avifaunal diversity (Kabir et al., 2024). Beyond economics, birds remain deeply embedded in African cultures, where their calls, feathers, and seasonal movements are often tied to symbolism, rituals, and indigenous knowledge systems (Coetzee et al., 2014; Koki, 2021).

Yet, despite these contributions, bird populations worldwide face accelerating declines. Habitat loss through land conversion, pollution, climate change, and expanding agriculture continues to erode critical ecosystems (Buechley et al., 2015; Davidson et al., 2019). Wetlands are particularly affected and, as some of the most degraded ecosystems globally, their loss has severe consequences for wetland specialists such as cranes (Davidson et al., 2019). Cranes hold a special position in African landscapes four species occur on the continent, including the Grey Crowned Crane (*Balearica regulorum*), which has long been a cultural symbol and an ecological sentinel (Meine & Archibald, 1996). Because they are sensitive to disturbance, crane populations often provide an early signal of environmental decline.

The Grey Crowned Crane, once common across East Africa, has undergone dramatic declines and is now listed as Endangered by the IUCN (BirdLife International, 2023). In Kenya, its population has fallen from an estimated 35,000 individuals in the 1980s to fewer than 10,000 today, an over 80% reduction (SWARA, 2019; Citizen Digital, 2023). Two subspecies are recognized: *B. r. gibbericeps* in East Africa and *B. r. regulorum* in southern Africa (Meine & Archibald, 1996). Both rely on shallow wetlands and grasslands for breeding and feeding. However, these habitats are rapidly shrinking due to agricultural expansion, intensified grazing, wetland drainage, and urban growth (Wamiti et al., 2021).

In Kenya, Uasin Gishu County stands out as one of the strongholds of the Grey Crowned Crane, with its mosaic of wetlands and croplands. Kenya's first national crane census in 2019 recorded 1,650 individuals in the county, about 21% of the national population (Wamiti et al., 2020). But the same wetlands that sustain cranes are increasingly being converted to cropland, particularly for maize and wheat, placing enormous pressure on breeding sites and fragmenting habitats. Evidence from ecological studies shows that crane nesting success depends heavily on hydrological conditions, vegetation structure, and the availability of undisturbed areas, factors that are directly affected by farming practices (Wamiti et al., 2021). Conservation programs such as the African Crane Conservation Programme have made important strides through education and community engagement (EWT/ICF, 2020), yet these efforts are undermined by weak enforcement, competing land uses, and the lack of integration between biodiversity priorities and agricultural policies (Odiwuor, 2023). This ongoing conflict between expanding agriculture and wetland conservation represents one of the most urgent challenges to the species' survival. Although the Grey Crowned Crane is both culturally revered and ecologically important, conservation strategies often remain piecemeal, focusing on symptoms rather than addressing the root causes of decline.

The present study seeks to fill this gap by examining the impacts of agricultural activities on Grey Crowned Crane conservation in Uasin Gishu County. Specifically, it aims to assess how different farming practices within wetland landscapes shape crane habitats and populations. By grounding the research in one of Kenya's most agriculturally productive regions, the study provides an opportunity to understand how cranes persist in human-dominated environments and what conservation strategies may prove effective. The significance of this research lies not only in conserving a single species but also in what cranes represent. As ecological indicators, they mirror the broader health of wetland ecosystems, making their decline a warning sign of environmental degradation. Findings from this work will inform targeted management plans for the species, contribute to Kenya's National Biodiversity Strategy and Action Plan (NBSAP), and support global conservation frameworks such as the Convention on Biological Diversity (CBD). Most importantly, by highlighting the intersections between agriculture, community livelihoods, and wetland health, the study aims to promote practical pathways that balance human needs with biodiversity conservation, ensuring the long-term survival of the Grey Crowned Crane.

MATERIALS AND METHODS

Study area

Uasin Gishu County, located in Kenya's former Rift Valley Province, stretches between latitudes 0°03′ S and 0°55′ N and longitudes 34°50′ E and 35°37′ W, covering about 3,345 km². The county lies within the western highlands and enjoys a cool, semi-humid climate, with rainfall ranging from 625 to 1,560 mm annually, most of it falling between March and September with peaks in May and August. Temperatures are generally mild, averaging 15 to 18°C, though they can dip to 3°C in July or rise to around 24°C in February (Osundwa et al., 2013). The geology is largely volcanic, producing deep, fertile clays that support intensive maize and wheat farming, while the valley bottoms and swampy areas hold alluvial deposits that sustain wetland habitats (Osundwa et al., 2013; Lombrum, 2014). Topographically, Uasin Gishu is dominated by a gently rolling plateau that slopes westward toward Ziwa, with prominent features such as the Sergoit Hills and the higher elevations of Timboroa and Ainabkoi, which receive cooler, wetter conditions. This combination of soils, climate and terrain has shaped the county into one of Kenya's most productive agricultural regions, while also influencing settlement and land-use patterns (Osundwa et al., 2013; Ngunjiri et al., 2020).

Research design

This study employs a mixture of methods, integrating both quantitative and qualitative approaches to address complex research objectives. As Rahi *et al*. (2019) explain, such designs provide comprehensive insights by combining statistical analysis with contextual nuance, thereby enhancing the validity and interpretability of findings (Rahi *et al*., 2019; Stainton & Iordanova, 2016). The mixed methods strategy is especially suited to this study's objectives mapping crane distribution, assessing diet and habitat, evaluating agricultural impacts and gauging community perceptions by enabling triangulation across ecological and social dimensions.

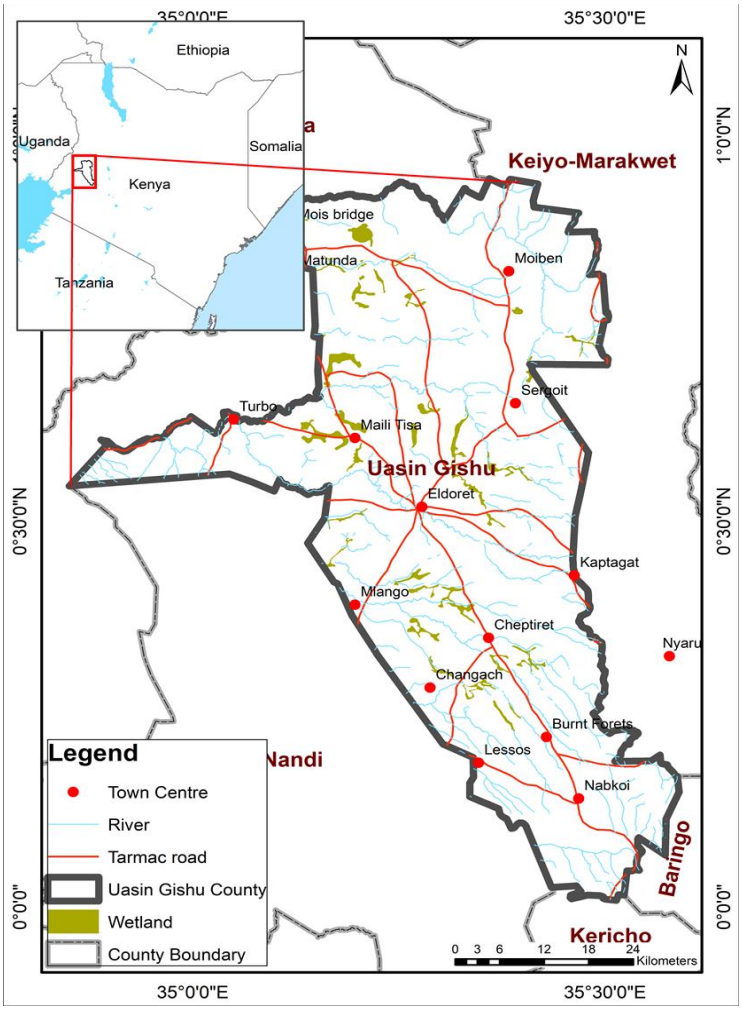

Figure 1: Map showing Uasin Gishu County and neighboring Counties (Map drawn by Haruki, 2024).

Study Population

The study was carried out in Uasin Gishu County, an area where land-use pressures make encounters between people and Grey Crowned Cranes particularly common. According to the 2019 Kenya Population and Housing Census, the county had 1,163,186 residents, spread across six sub-counties: Turbo (304,943), Kapseret (196,863), Moiben (165,127), Soy (162,568), Kesses (148,798) and Ainabkoi (137,117) (KNBS, 2020). These sub-counties capture both rural and peri-urban settings, providing a useful lens for understanding how population dynamics and land use shape interactions with cranes and influence conservation challenges

Sampling Technique and Sample Size

To achieve balanced representation, stratified sampling was applied by treating each of the six sub-counties (Turbo, Kapseret, Moiben, Soy, Kesses and Ainabkoi) as separate strata (Table 1). Sample size was then determined using Yamane's (1967) formula cited in Hasan & Kumar (2024) for large populations at a 95% confidence level and 5% margin of error, as shown below:

$$n= \frac{N}{(1+(N)e^2}$$

Where;

n = sample size

N = population size (1,163,186)

e = margin of error (0.05)

$$n= \frac{1,163,186}{(1+(1,163,186)0.05^2} =399.86=400$$

From this figure, proportional allocation was used to determine how many respondents to select from each sub county. Using proportional allocation, the sample was distributed based on the population size of each sub county:

Table 1: Sampling table showing proportions

Subcounty	Population (census 2019)	County population census 2019	Sample size (Estimated using Yamane from the county population	Proportion= ($N_{(sub\ county)}/N_{(county)}$*sample $_{(county)}$
Turbo:	304943	1163186	400	304943/1163186×400=105
Kapseret:	196863	1163186	400	196863/1163186×400=68
Moiben:	165127	1163186	400	165127/1163186×400=57
Soy:	162568	1163186	400	162568/1163186×400=56
Kesses:	148798	1163186	400	148798/1163186×400=51
Ainabkoi:	137117	1163186	400	137117/1163186×400=47

In each sub county, one wetland area was selected and systematic sampling was used to pick households for the study selecting every fourth household from a random starting point.

Data Collection Methods and tools

To understand the factors shaping Grey Crowned Crane presence and conservation, the study combined several approaches: household questionnaires, direct field observations, participatory mapping and checklists, each tied to specific objectives. Questionnaires gathered insights on land use, farming practices, community views on crane conservation and perceived threats. They included both closed and open-ended questions, with face-to-face administration helping ensure accuracy and richer responses.

Pilot Study, Validity and Reliability

A pilot survey was first carried out with 32 households in Trans Nzoia County, chosen for its similar farming systems, settlement patterns and wetlands to Uasin Gishu. This allowed the research team to spot unclear questions, check the flow and ensure respondents understood the items. Experts in avian ecology, land use and rural livelihoods also reviewed the questionnaire, helping refine its wording, structure and relevance. The tool's reliability was confirmed using Cronbach's alpha, which exceeded 0.80, showing the questions consistently captured community perceptions, land use practices and conservation-related insights (Heale & Twycross, 2015).

Data Analysis and Ethical Considerations

The study combined quantitative, spatial and qualitative methods to assess how agricultural activities affect Grey Crowned Crane conservation. Questionnaire responses were analyzed in SPSS Version 21 using percentages, averages and frequency tables, with chi-square tests identifying links between farming practices and crane conservation. Ethical approval was obtained from NACOSTI and participants gave voluntary, informed consent. Confidentiality was maintained and all interactions respected local cultural norms and participants' dignity.

RESULTS

Socio-demographic Characteristics of Respondents

There were three hundred and twenty-four (324) questionnaires administered to the residents in Uasin Gishu County. Three hundred and sixteen (316) questionnaires out of the total three hundred and twenty-four (324) administered were filled and returned giving a response rate of 97.5% Most of the respondents (66.1%) comprised of males while females represented 33.9%. A large proportion of the respondents (65.1%) were aged above 36 years, whereas 34.9% were below 36 years. In terms of marital status, 237 of the respondents were married (75.0%), 74 were single (23.4%), while only 5 were widowed (1.6%). In terms of education level, all the respondents (100.0%) had formal education, with 56 respondents (17.7%) having degree, 115 (36.4%) having attained college certificate, 100 (31.6%) secondary level education while 45 (14.2%) having attained primary education. In terms of residency, 73 respondents (23.1%) had resided in the study area for a period of less than 10 years, 182 (57.6%) between 11 and 32 years, while 61 (19.3%) had residency above 33 years. In terms of the occupation, local residents practicing crop farming constituted the highest proportion of the respondents at 131 (41.5%), followed by employed 92 (29.1%), business 49 (15.5%), students 24 (7.6%), animal farming 13 (4.1%), housewife 3 (1.0%) athletes 2 (0.6%) while casual laborer were also 2 (0.6%). Table 4.3 gives a summary of results described above.

Breeding Ecology in Farmland-Dominated Landscapes

Slightly over sixty percent (60.2%) of the respondents indicated that Grey Crowned Crane (*Balearica regulorum)* bred in their areas of residence with a significant difference from those who said no ($\chi^2 = 4.0$, df. =1, p= 0.0455). Gender, age and occupation of the respondents did not influence respondents' knowledge of where cranes bred. For those who were aware of where the cranes bred, majority (80.3%) added that they bred in wetlands with a significant difference from those who indicated alongside grass and edges of water bodies ($\chi^2 = 124.93$, df. =2, p= 0.0000) as illustrated in table 4.3. Respondents further indicated that the time of the year when cranes bred were April to September (33.9%), while 27.9% indicated that they did not know. These results were different from those of respondents who indicated rainy season (13.7%), planting season (1.6%) and harvesting season (1.6%) as illustrated in Table 2. In addition, other respondents indicated that they were not in position to estimate the number of breeding adults although they ranged from 1-10 individuals.

Table 2: Breeding of Grey crowned crane *(*Balearica regulorum)

Question	Parameter	Frequency	Percent	Chi square (χ^2)
Do GCC breed?	Yes	183	60.2	$\chi^2 = 4.0$
	No	121	39.8	df. =1
	Total	304	100.0	p= 0.0455

Where cranes breed	Wetlands	147	80.3	χ^2 = 124.93
	alongside grass edges	16	8.7	df. =3
	edges of water bodies not known Total	8 12 183	4.4 6.6 100.0	p= 0.0000
Time cranes breed	January-April	0	0.0	χ^2 = 58.82
	April-September	62	33.9	df. =6.
	September-December	39	21.3	p= 0.0000
	not known	51	27.9	
	rainy season	25	13.7	
	planting season	3	1.6	
	harvesting season	3	1.6	
	Total	183	100.0	
Number of breeding adults	1-10	142	60.9	χ^2 = 159.7
	11-21	19	8.2	df. =5.
	22-32	9	3.9	p= 0.0000
	33-43	3	1.3	
	44 and above	8	3.4	
	not known Total	52 233	22.3 100.0	

Habitat Use and Movement

Respondents were asked to state whether Grey crowned crane *(Balearica regulorum)* occur in their area. Majority (305) stated yes (96.5%) with a significant difference (χ^2 = 96.04, df.=1, p = 0.0000) from those who indicated no. For those who indicated yes, majority which is 149 (48.9%) added that the birds were found in agricultural fields followed by those in seasonally flooded wetlands,95 (31.1%), 37 respondents (12.1%) stated they were found in edges of water bodies in large while 24 (7.9%) respondents stated large flood plain with a significant difference (χ^2 = 48.20, df. =3, p = 0.0000) as illustrated in Figure 2.

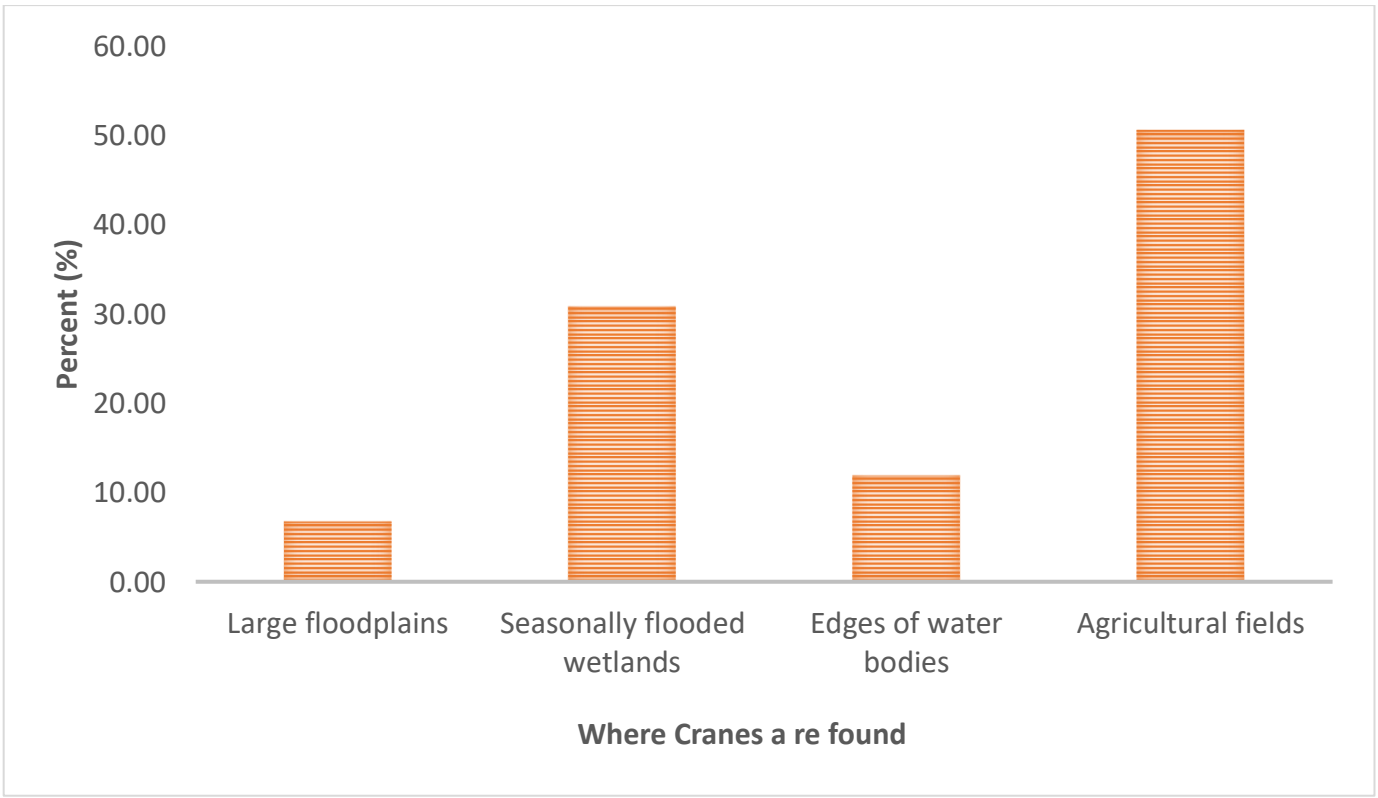

Figure 2: Where cranes are found in Uasin Gishu County

Activities of Grey Crowned Crane

Respondents indicated they observed different activities undertaken by cranes. These included feeding (77.3%), breeding (13.0%), roosting (8.5%) as well as migrating (1.2%) with a statistically significant difference (χ^2 = 147.05, df. =3, p = 0.0000). Cross-tabulation results based on the occupation of respondents revealed that the majority of the crop farmers and animal farmers were aware of different activities performed by cranes in comparison with other respondents from other occupations (χ^2 = 43.16, df. =19, p = 0.0008) as illustrated in Figure 3.

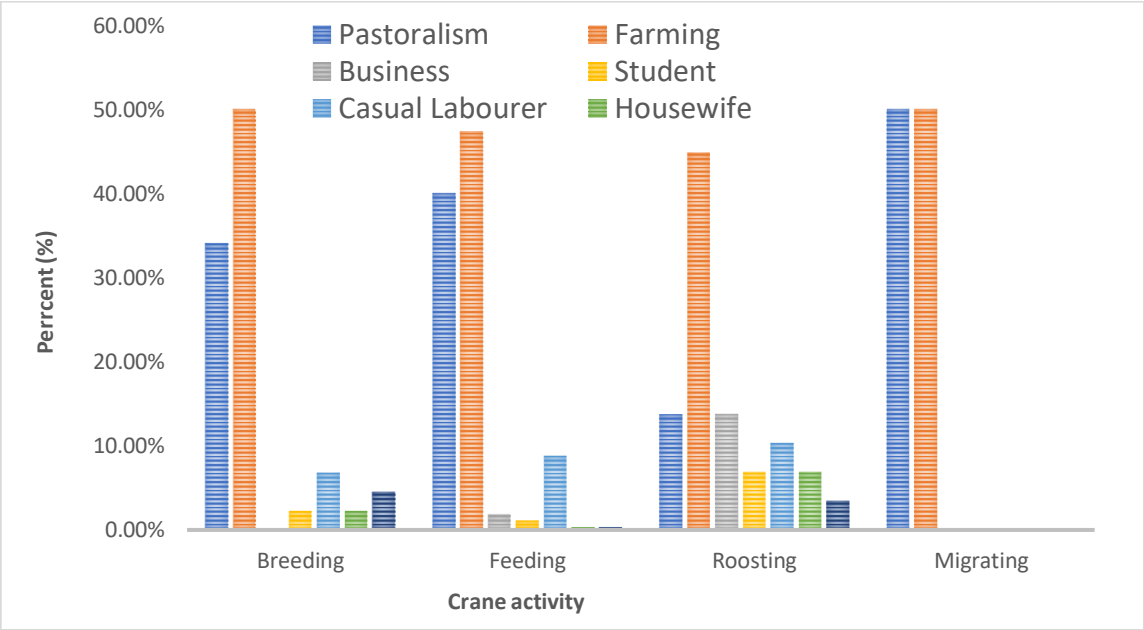

Figure 3: Activities of Grey Crowned Crane (*Balearica regulorum)*

Population Trends and Movement Patterns

Respondents were asked to estimate the number of individual cranes they normally see in their areas of residence. A large proportion (53.0%) indicated they normally come across less than 10 individual cranes followed by those who see them in a group of between 10 and 50 (39.0%), then 50 to 100 (5.0%) while few (3.0%) indicated they come across aggregations of between 100-500 birds with results showing a significant difference (χ^2 = 74.56, d.f.=3, p = 0.0000) as illustrated in Figure 4. Age, gender and education level of respondents did not influence the response behaviour in regard to the number of individual cranes normally seen by respondents.

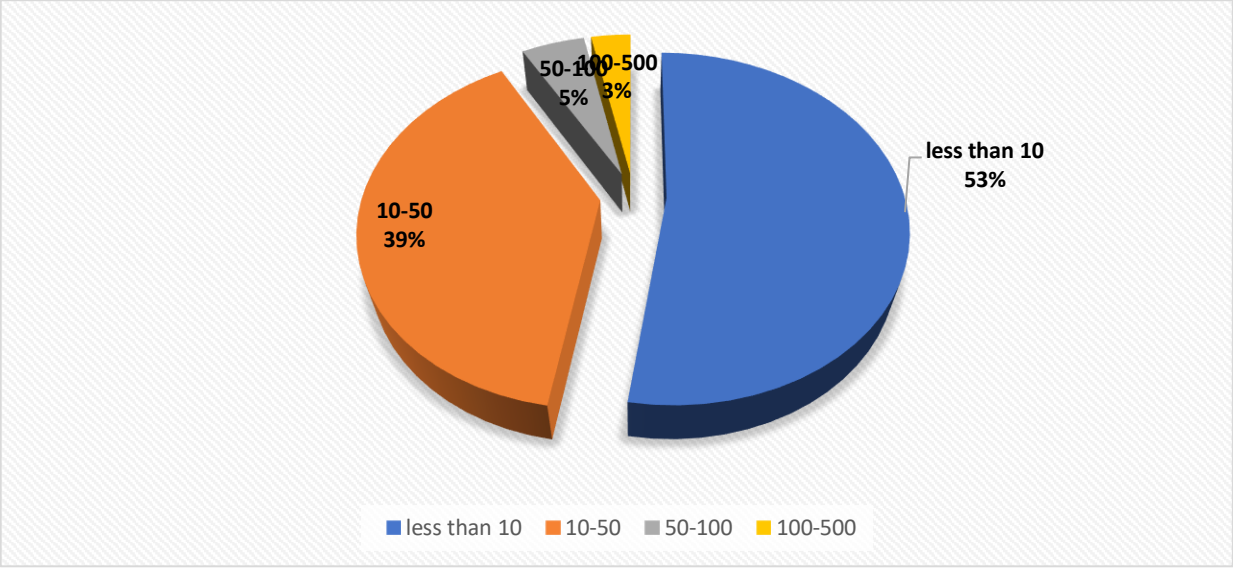

Figure 4: Individual number of birds normally seen by respondents

Respondents were also asked to state whether Grey crowned crane *(Balearica regulorum)* in their region were showing any noticeable trend in number. From the survey, slightly more than half of the respondents (51.1%) indicated that the population was declining followed by 32.5% who indicated that the population was increasing and 8.9% indicated that the population was stable, while a significantly low number (7.5%) of the respondents pointed out that the state of the population was unknown to them as illustrated in Table 4.5. Consequently, 63.0% of the respondents also stated that the reported trend has been there for a period of 1-10 years, 25.9% a period of 11-21 years, 9.0% 22-32 years with 2.1% indicating above 33 years (χ^2 = 134.55, df. =4, p= 0.0000).

Respondents were asked whether cranes were moving or migrating from the area. Majority of the respondents (86.6%) indicated yes while the rest (13.4%) indicated no (χ^2 = 54.76, df. =1, p = 0.0000). For those who indicated yes, majority (77.3%) added that they did not have any idea where the cranes moved to when they migrate. They also stated that the cranes were present in their region in different seasons of the year particularly during the rainy season, but moved locally as shown in Table 4.4. The cranes movement was recorded as locally but also seasonally by majority of the respondents (79.6%) with a significant difference (χ^2 = 36.0, df. =1, p= 0.0000). Places that cranes were assumed to move to included mainly areas newly cultivated (31.1%) and other wetlands (15.1%) with majority of respondents (51.1%) not knowing where they move to as illustrated in Table 3.

Table 3: Cranes population trends and movements

Question	Parameter	Frequency	Percent	Chi square (χ^2)
Is the Grey crowned crane in the area showing any noticeable trend in number? Are they?	Stable	27	8.9	χ^2 = 51.4 df. =3 p= 0.0000
	Increasing	99	32.5	
	Declining	156	51.1	
	Unknown	23	7.5	
	Total	305	100.0	
Years over which trend has occurred	1-10 years	178	63.0	χ^2 = 134.55 df. =4 p= 0.0000
	11-21 years	73	25.9	
	22-32 years	25	9.0	
	33-43 years	1	0.5	
	Above 43 years	5	1.6	
	Total	282	100.0	
Do the cranes migrate to other areas at certain times of the year?	Yes	264	86.6	χ^2 = 54.76 df. =1 p= 0.0000
	No	41	13.4	
	Total	305	100.0	
Idea of where they are found when absent	Yes	69	22.7	χ^2 = 29.16 df. =1 p= 0.0000
	No	236	77.3	
	Total	305	100.0	
When are they present in your region? (Months or season)	Harvesting season	65	21.3	χ^2 = 24.32 df. =4 p= 0.0010
	All seasons	49	16.0	
	Rainy season	97	31.8	
	Planting season	53	17.3	
	Dry season	41	13.4	
	Total	305	100.0	
Do the cranes move locally?	Yes	254	83.3	χ^2 = 36.0 df. =1 p= 0.0000
	No	51	16.7	
	Total	305	100.0	
If yes how?	Daily	52	20.4	χ^2 = 36.0 df. =1 p= 0.0000
	Seasonally	202	79.6	
	Total	254	100.0	
Place they move to if known	To areas newly cultivated	70	31.1	χ^2 = 127.4 df. =5
	Other counties	2	0.9	

	To other wetlands	34	15.1	p= 0.0000
	Not known	115	51.1	
	To other rainy places	2	0.9	
	To other places with ready maize and wheat	2	0.9	
	Total	225	100.0	

Identified Threats from Agricultural Practices

Concerning threats that affected the Grey crowned crane *(Balearica regulorum)*, the majority of the respondents (94.7 %) indicated that they were aware of the threats which included the conversion of wetlands to other land uses (13.4%), overgrazing (9.5%), changes in agricultural land use and impacts of other agricultural activities (7.6%), dams and water diversion (4.3%), cutting of roosting trees (12.1%), direct poisoning to protect crops (10.6%), indirect poisoning due to use of agricultural chemicals (15.6%), fires used for land clearing (14.3%), live trapping cranes for domestication (4.9%), power lines and transmission poles (6.3%) and fences (1.4%) as summarized in Figure 5.

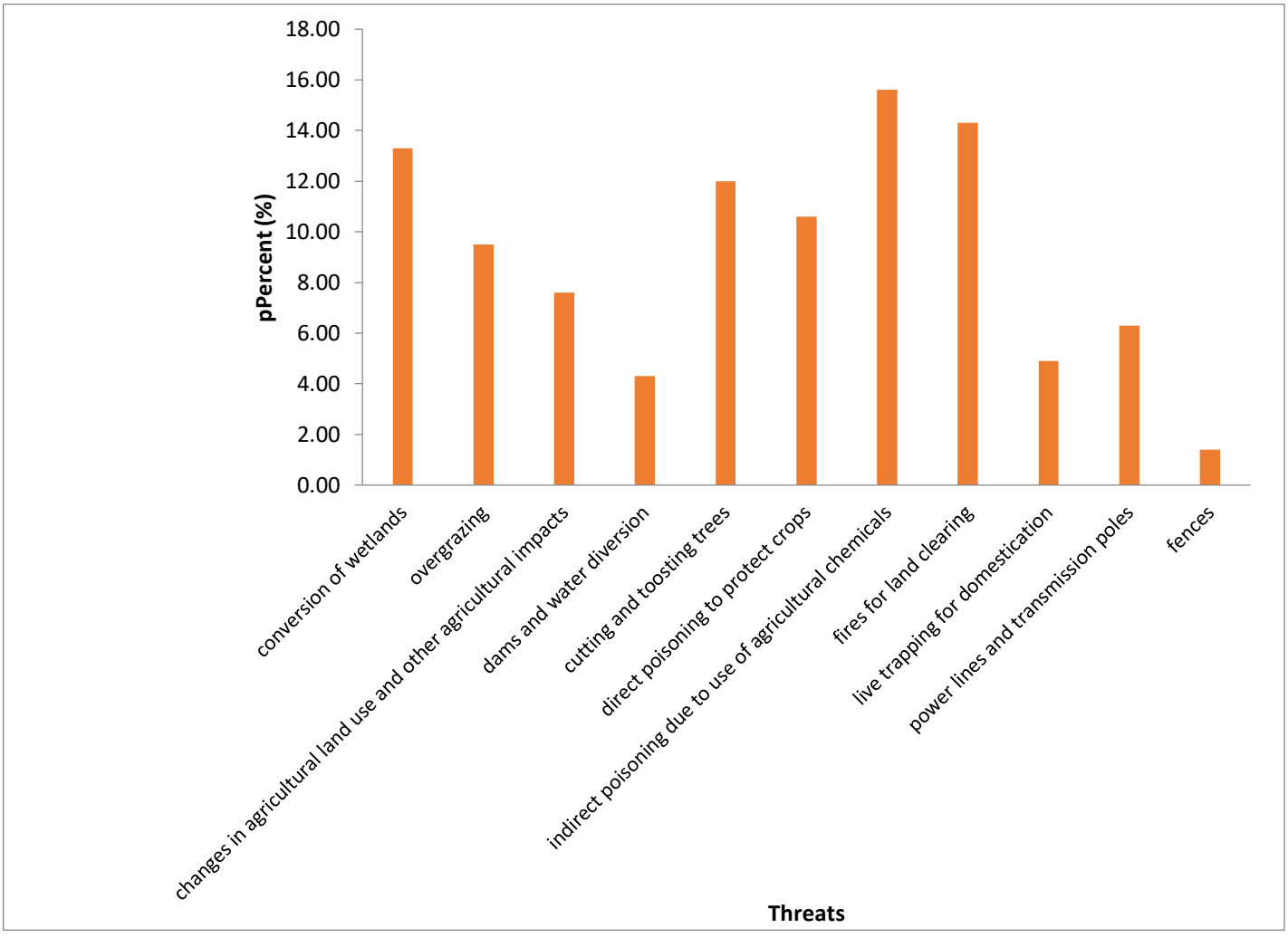

Figure 5: Threats to Grey crowned cranes

DISCUSSION

Breeding Ecology in Farmland Dominated Landscapes

Community members widely reported that Grey Crowned Cranes breed within their localities, with a clear indication that wetlands both permanent and seasonal are the preferred nesting sites. A few others pointed to alternative sites such as grasslands and water edges. There was also mixed understanding of the timing of

breeding, with some identifying specific months and others associating it loosely with the rainy season or agricultural calendar.

These insights suggest that despite increasing human activity, especially farming, wetlands remain central to the reproductive ecology of this species. However, uncertainty about the number of breeding adults or specific timing highlights a gap in detailed ecological monitoring at the community level. This is not unusual in rural landscapes where species are familiar but not formally studied. Similar observations have been made across East Africa regarding the breeding ecology of Grey Crowned Cranes in human modified landscapes. In Rwanda, conservation studies have shown that the species' reproductive success is closely linked to the presence of undisturbed wetlands. Although farmers often notice cranes nesting along the edges of wetlands, they are typically unaware of the outcomes, as seasonal ploughing disrupts nests before chicks can fledge (International Crane Foundation & EWT, 2022).

In Uganda, crane nesting has been reported in rice paddies and temporary swamps, yet agricultural activities during the breeding period frequently led to nest destruction and chick mortality (International Crane Foundation, 2021). Similar findings have been documented in Kenya's Lake Ol' Bolossat basin, where Wamiti (2022) found that nests located near intensively farmed areas had lower survival rates. The study attributed this to frequent disturbances from tillage, livestock and machinery, which compromise nest stability and expose eggs or chicks to predation.

These patterns underscore the importance of harmonizing agricultural practices with the crane's breeding cycle. Adjusting the timing of land preparation and increasing local awareness could significantly reduce breeding failures and promote coexistence between farming and crane conservation.

Habitat Use and Movement

Most residents confirmed regular sightings of cranes in their neighborhoods, especially in cultivated fields and wetland areas. Interestingly, respondents also noted the birds' presence in floodplains and at the fringes of water bodies, underscoring their ability to exploit a variety of habitats in agricultural landscapes. This pattern reflects the cranes' behavioral flexibility. Their increased visibility in farmlands is likely driven by shrinking natural habitats, forcing them to adapt to altered ecosystems. Yet, this adaptation comes at a cost. Farmlands often lack the safety; food diversity and nesting cover that wetlands provide. In many cases, what appears to be habitat expansion is actually a sign of habitat compression and ecological stress.

A comparable scenario is described by Mugatha et al. (2024) who investigated the impacts of land use change on wetland birds in central Kenya. They found that birds increasingly used maize and pasture fields not because these were preferred, but because natural wetlands were degraded or lost altogether. Austin (2018) added that in western Kenya, cranes showed increasing dependence on manmade dams and irrigation canals further evidence that human modified habitats are becoming substitutes for natural ones. The growing overlap of crane activity with agricultural land highlights the urgent need to harmonize farming practices with conservation goals. For example, retaining vegetative buffers around seasonal wetlands and adjusting crop cycles could allow for both productivity and biodiversity conservation.

Activities of Grey Crowned Crane

Feeding was the most frequently observed activity, followed by breeding and roosting. Very few respondents had observed cranes migrating, suggesting that long distance movements may be less visible or misunderstood. Farmers, particularly those engaged in crop and livestock farming, demonstrated deeper awareness of crane behavior, likely because of their daily presence in the field. This underscores a key insight: those who share land directly with cranes have firsthand knowledge of their habits. Such knowledge, while informal, is invaluable for conservation. For instance, farmers could identify seasonal changes in feeding patterns, alerting researchers to shifts in resource availability or habitat use.

Local observations in Uasin Gishu County align with regional studies on the feeding behavior of Grey Crowned Cranes. For instance, Wamiti *et al*. (2022) observed that after harvest seasons around Lake Ol' Bolossat in

Kenya, cranes consistently foraged in farmlands, particularly targeting leftover maize and sorghum grains. Similarly, research by Fakarayi *et al*. (2016) in Zimbabwe highlighted that Grey Crowned Cranes frequently fed on tubers such as *Cyperus esculentus* in newly cultivated wetland areas, indicating their opportunistic use of modified habitats. In western Kenya, Hiron *et al*. (2014) reported significant grain losses in sorghum fields due to granivorous birds, including cranes, demonstrating how agricultural landscapes have become crucial feeding zones for these species.

Although these behaviors may suggest that cranes are adapting to changing land uses, such increased reliance on farmlands likely reflects habitat displacement rather than genuine ecological success. Their growing presence in cultivated areas should be interpreted as a sign of shrinking natural habitats, emphasizing the urgent need for land use planning and conservation strategies that can balance agricultural productivity with the preservation of critical crane habitats.

Population Trends and Movement Patterns

There was widespread agreement that the number of cranes seen in local areas had declined in recent years. Most people reported seeing small groups, while sightings of larger flocks were rare. Respondents noted that cranes move from place to place depending on the season, but the majority could not identify where the birds go. This points to a worrying trend of localized decline, likely driven by habitat loss, disturbance and exposure to agrochemicals. The lack of knowledge about migration destinations further suggests that crane movements are not being tracked or understood at the grassroots level. This limits conservation responses, especially when critical stopover sites or dry season refuges go unprotected.

Evidence from recent studies suggests that Grey Crowned Crane populations in East Africa are increasingly experiencing fragmentation and reduced mobility. In Lake Ol' Bolossat, Kenya, Wamiti *et al*. (2021) observed that crane flocks were generally small most comprising fewer than 50 individuals and that sightings of previously ringed juveniles outside the basin were rare. This pattern indicates limited movement between wetlands, pointing to weakened ecological connectivity across the landscape (Austin, 2018; Wamiti *et al*., 2021).

Similarly, Mabhachi (2021) emphasized the role of local communities in enhancing conservation outcomes through participatory monitoring. Her study demonstrated that community involvement in tracking crane movement not only builds ecological understanding but also supports locally grounded conservation strategies (Mabhachi, 2000; 2021). Moreover, historical patterns of large crane roosts are now rarely observed. Wamiti *et al*. (2022) noted that traditional communal roosting has diminished, largely due to habitat fragmentation and increased human activity, particularly wetland conversion for agriculture. These changes suggest that cranes are being pushed into smaller, more isolated groups, threatening their breeding success and long-term survival (Olupot 2016; Wamiti *et al*., 2022).

Identified threats from agricultural practices

Respondents identified a wide range of threats to the Grey Crowned Crane, with the most prominent being wetland conversion, use of agricultural chemicals, fire and cutting of trees. Poisoning both intentional (to deter cranes from feeding on crops) and unintentional (from chemical runoff) was particularly noted. Less frequently cited but equally concerning were threats like trapping for domestication, collision with power lines and habitat fragmentation from fencing. These threats are deeply rooted in unsustainable land management. Wetland drainage for crop expansion not only displaces cranes but also disrupts water tables and soil quality, affecting broader ecosystem health. Chemical exposure especially from herbicides and pesticides can reduce insect populations, which are an essential food source for chicks and lead to direct toxicity in adult birds.

Recent studies emphasize that although agricultural landscapes can offer foraging opportunities for Grey Crowned Cranes, they also present significant ecological risks. For instance, Olupot (2016) observed that habitat conversion, nest disturbance, poisoning and egg harvesting have become prevalent threats in agricultural zones of eastern Uganda, where cranes often nest in close proximity to human activity. Similarly, widespread incidents of crane poisoning have been reported in southern Uganda, particularly during planting seasons when birds forage in croplands suggesting exposure to harmful agrochemicals (International Crane Foundation, 2021).

Additionally, Morrison *et al*. (2019) and Galloway Griesel *et al*. (2023) documented a concerning number of crane fatalities due to collisions with uninsulated power lines, underlining the hazards posed by poorly planned infrastructure.

In conclusion, Grey Crowned Cranes in Uasin Gishu County continue to depend on wetlands for breeding and foraging, despite the dominance of farmland. Their presence in agricultural fields mainly reflects habitat loss and fragmentation rather than successful adaptation. Local observations point to declining populations, smaller flocks, and restricted movement, driven by wetland conversion, agrochemical use, fires, tree cutting, and other unsustainable farming practices, highlighting both species vulnerability and broader ecosystem degradation. To mitigate these threats, crane-friendly measures should be promoted, including adjusting land preparation to avoid breeding periods, conserving key wetlands and roosting trees, and reducing harmful chemical use. Community participation in monitoring and awareness campaigns can enhance stewardship, while integrating conservation priorities into agricultural planning will support the long-term survival of Grey Crowned Cranes.

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