STATUS OF THE UGANDA CLAWED FROG, *Xenopus ruwenzoriensis*, AMIDST CLIMATE CHANGE AND HABITAT DEGRADATION
Project 242535234

A project progress report submitted to The Mohamed bin Zayed Species Conservation Fund

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Executive Summary

This progress report presents the achievements to date under the project *"Status of the Uganda Clawed Frog, Xenopus ruwenzoriensis, Amidst Climate Change and Habitat Degradation."* The project aims to assess the presence, absence, and abundance of *X. ruwenzoriensis* in its habitats, evaluate habitat quality, examine how climate change is impacting its current and future distribution through species distribution modeling, and promote amphibian conservation by understanding community perceptions and conducting sensitization activities.

So far, field surveys have been successfully conducted in Semuliki National Park and neighboring communities, targeting key streams and wetlands known or expected to support the species. These surveys used multiple methods, including dip-netting, minnow traps, pitfall traps, and visual encounter surveys. In addition, household interviews and focus group discussions were conducted across three villages, engaging a total of 150 households and several community leaders to gather insights on local knowledge, perceptions, and attitudes toward amphibians. Sensitization meetings were held to raise community awareness about amphibian conservation and to strengthen local engagement.

While the project is still ongoing and data analysis is yet, this report summarizes the completed activities and highlights emerging threats identified during the fieldwork, such as agricultural pesticide use, oil manufacturing effluents, and negative community attitudes in some groups. The findings so far provide a strong foundation for the next project phases and point toward key conservation priorities moving forward.

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1. Introduction

1.1 Background

As climate change continues to manifest globally, its impacts on biodiversity have become increasingly evident (Chen1 et al., 2022; Vasconcelos et al., 2018). Specifically, amphibians are likely to be adversely affected (Alves-Ferreira et al., 2022; Lawler et al., 2010). Due to their fragile skin nature, amphibians have been found to be more sensitive to environmental changes as compared to other vertebrates (Bourke et al., 2018; Lawler et al., 2010), on addition, their unshelled and desiccation-prone eggs are highly affected by slight changes in temperature (Steigerwald, 2021), this has made them to be considered as environmental indicators for health ecosystems. According to Alves-Ferreira et al. (2022), climate change can impact amphibians in three ways; a) Pressuring them to relocate to new suitable habitats, b) necessitating adaptation to unfamiliar climatic conditions, or c) potentially leading to their extinction. It is estimated that 41% of world amphibians are threatened to extinction, with climate change worsening the situation by 30% for the already threatened species (IUCN SSC Amphibian Specialist Group, 2023). This study will investigate how climate change affects the spatial distribution of the Albertine endemic Uganda Clawed Frog using current and future climate scenarios and distribution models.

The Uganda Clawed Frog, *Xenopus ruwenzoriensis* Tymowska & Fishberg, 1973 is a dodecaploid anura species belonging to family Pipidae Gray, 1825 and it is the only polyploid in the family (Sammut et al., 2002; Schmid et al., 2015). *X. ruwenzoriensis* was first described by Tymowska & Fishberg in 1973 using chromosome complements, later, in 1978, Fishberg and Kobel described the species using exterior morphological structures. However, Tymowska & Fishberg (1973) was adopted as the author of *X. ruwenzoriensis* following taxonomic guidelines and Fishberg & Kobel (19 78) was taken to describe additional information relevant to the species (Reumer, 1986). The species is rare and endemic to the Albertine region. Its presence has only been recorded in Uganda and Democratic Republic of Congo with the former having majority of the records (IUCN SSC Amphibian Specialist Group, 2014; Masudi et al., 2019; Plumptre et al., 2017; Reumer, 1986). This region is experiencing significant changes in its climatic conditions (Carr et al., 2013; Plumptre et al., 2017) and it is estimated that 34.5% of the amphibian species in the region are threatened by climate change (Carr et al., 2013).

In Uganda, this species was previously known only from Semuliki National Park and Rwenzori Mountains National Park. However, a new record was reported from Masindi in 2019 (BBIF 2024). To date, there have been just thirty-seven (37) published records of the species in Uganda, most of them over 20 years old — except for the recent Masindi record. Despite these historical records, recent amphibian surveys did not record the species' continued presence in Semuliki or Rwenzori Mountains National Parks (Babyesiza et al., 2017).

There is a need to study the status of *Xenopus ruwenzoriensis* and understand how climate change, habitat degradation, and community perceptions affect its presence and survival in the Albertine region. This project aims to assess the species' presence, absence, and abundance in its habitats; evaluate habitat quality; examine how climate change is impacting its current and future

distribution through species distribution modeling; and promote amphibian conservation by understanding community perceptions and conducting sensitization activities. The findings will provide essential information to guide targeted conservation efforts and inform policymakers on measures needed to safeguard this species in a changing environment.

2. Methodology

2.1 Study area

The Albertine Rift constitutes the western segment of the African Rift Valley, starting from the northern extremity of Lake Albert to the southern end of Lake Tanganyika. It passes through six countries: the eastern region of the Democratic Republic of Congo, the western part of Uganda, Rwanda, Burundi, Tanzania, and the northern part of Zambia(Kanyamibwa, 2013). Its altitude ranges from 600m to 5,100m above sea level, the area has a diverse range of vegetation types. This includes lowland rainforest, medium-altitude semi-deciduous rainforest, savanna grasslands and woodlands, Miombo woodland, papyrus wetlands, Carex wetlands, montane forest, Sinarundinaria bamboo, Oxytenanthera bamboo, Hagenia-Hypericum woodland, giant heather, giant Senecio and Lobelia, alpine moorland, bare rock, and bare earth(Ayebare et al., 2013). Six landscape types have been identified in the Albertine rift valley, these include: Murchison-Semuliki landscape, Greater Virunga landscape, Maiko-Itombwe landscape, Congo – Nile Divide, The Gombe-Mahale Southern Highlands landscape, and Marungu-Kabobo landscape(Ayebare et al., 2013; Carr et al., 2013; Kanyamibwa, 2013). However, this study focuses on the Murchison-Semuliki landscape and the Greater Virunga landscape where the species has been recorded before.

The Murchison-Semuliki landscape links Murchison Falls National Park through Budongo and Bugoma Forest Reserves, Kagombe, Kitechura, Muhangi, Itwara Forest to the Toro-Semuliki Wildlife Reserve at the southern end of Lake Albert while the Greater Virunga landscape includes Virunga National Park in DRC, Rwenzori Mountains National Park and contagious protected areas in western Uganda, and Volcanoes National Park in Rwanda(Carr et al., 2013; Kanyamibwa, 2013).

According to Carr et al., (2013) areas situated at high altitudes (above 2,000 m) experience average daily mean temperatures of approximately 15–17°C, with minimum temperatures reaching 0°C and below. Intermediate altitude locations (1,500–2,000 m) typically have mean temperatures ranging from 18–21°C, while lower altitude regions often see temperatures consistently surpassing means of 21°C. Although temperatures may exhibit significant variability on a local scale, seasonal temperature variations within individual locations are minimal.

In terms of precipitation, regions close to the equator have the primary rainy seasons in early May and September. North of the equator, around Murchison Falls and Semliki National Parks (approximately 0.5°–2°N), a bimodal rainfall pattern persists, but the shifts between wet and dry periods are less pronounced. There is unexplained reduction in rainfall, lasting about a week in the center of the October maximum. In more southern locations, (approximately 2°S), there is a transition between bimodal and unimodal annual rainfall patterns. Here, an 8.5-month wet season (early September – mid-May) with peaks at the beginning and end is typically followed by a 3.5-month dry season with intermittent rains. Moving even further south, (approx. 6°S), rainfall patterns become predominantly unimodal, characterized by a distinct rainy period from October to mid-May(Carr et al., 2013).

Field surveys target slow moving streams and wetlands entering Semuliki National Park and the Northern side of Rwenzori Mountains National Park. These include Ssempaya river, Mbuga river, Ntoroko river, kirima stream, Sara stream, Mapongogi stream, Botwalinbo stream, nyakabasiri river, kanabogo river, Mpolya river and Tokwe river in Semliki.

The areas in Rwenzori mountains include Mpolya river, Nyaryopyo, Wasa river, Muhire river, Nyakatare river.

The selection of some specific sites is guided by the UWA field team depending on the reachability, security and other factors.

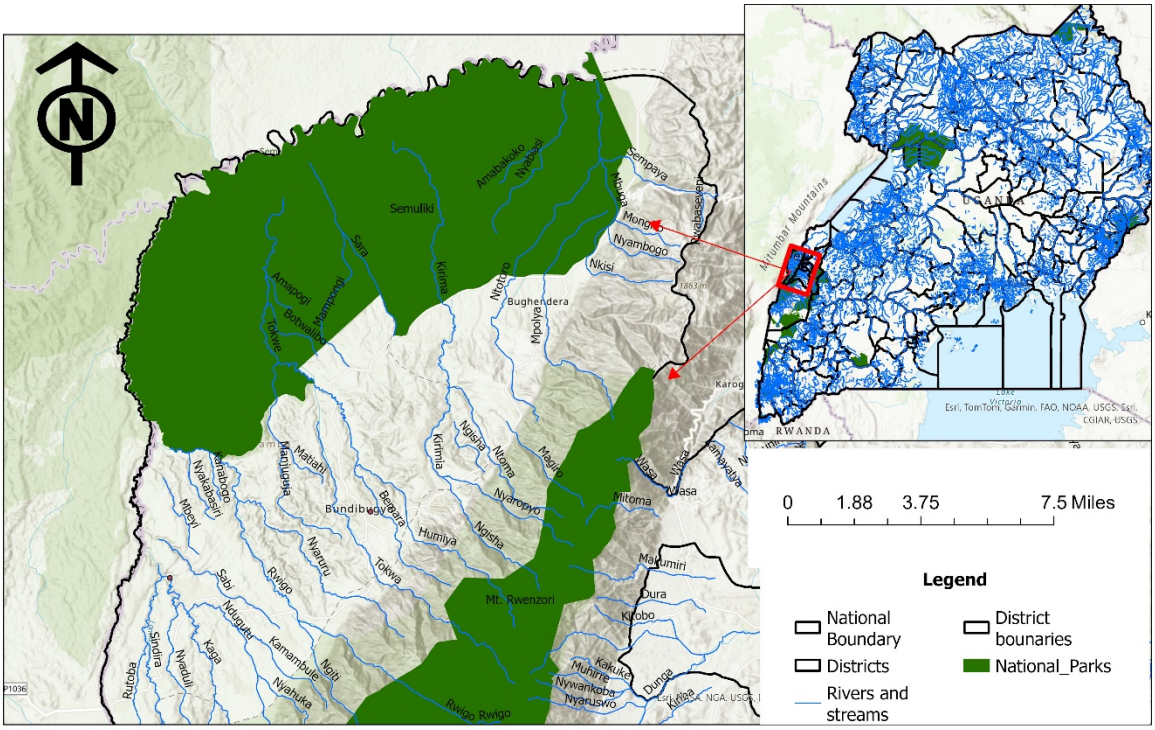

Figure 1Map of the project area showing the major Streams and Rivers for Data Collection

2.2 Data collection

Ecological Field Surveys:

We employed pitfalls with drift fences, dip nets, minnow traps and visual encounter surveys during day and during the night. Sampling sites were selected based on historical records, information from local interviews and any areas likely to support *Xenopus ruwenzoriensis* populations based on expert judgement. Environmental variables such as water temperature, vegetation cover, and land-use patterns were also recorded to assess habitat suitability.

Community perceptions

Information from the communities was collected using household surveys and focus group discussions. Household surveys were conducted using structured questionnaires to gather data on community perceptions, knowledge, and attitudes towards *Xenopus ruwenzoriensis* and amphibian conservation. Focus group discussions helped to capture collective views, cultural values, and potential barriers or opportunities for conservation action that may not emerge through household surveys.

3. Progress on Project Activities

This section provides an update on the progress made so far under the project's key activities. While the project is still ongoing and final data analysis has not yet been completed, significant milestones have been reached in field surveys, community interviews, focus group discussions, and sensitization efforts. Below is a summary of the activities conducted, the areas covered, and the engagement achieved to date.

3.1 Species Presence/Absence Surveys

- Field surveys were successfully conducted in Semuliki National Park and the neighboring communities targeting slow moving streams.
- Sampling activities included habitat searches, dip-netting, minnow trapping, pitfalls and environmental observations in key areas identified during the planning phase.
- Survey sites included Sempaya streams, Mongiro stream, Mbuga stream, Nkisi stream, Mpolya streams, Ntotoro stream Mampogi stream where field teams recorded observations and collected relevant presence/absence data.

Figure 2 Field survey with community members in Makere village (1), Researcher setting up pitfalls with a drift fence (2), Xenopus ruenzoriensis specimen (3), Hind limb of Xenopus ruwenzoriensis showing the 4 claws as one of the identification features (4)

3.2 Household Interviews and Focus Group Discussions (FGDs)

- Household interviews were conducted in communities neighboring Semuliki National Park, targeting households selected through random sampling.
- Structured questionnaires were administered to collect information on local knowledge, perceptions, and attitudes toward amphibians and wetland conservation.
- In total, one hundred and fifty (150) households were interviewed across three villages; Bulondo village, Ntandi East Cell and Makere Village.
- Additionally, focus group discussions were held with key community members, local leaders, and stakeholders to explore shared experiences, cultural beliefs, and conservation challenges related to amphibians in a way to complement the household surveys.

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Figure 3 A researcher conducting household interviews in Bulondo (1) and Makere (2) villages

3.3 Sensitization and Community Engagement Activities

- A Community sensitization meeting was organized in collaboration with local leaders and park authorities to raise awareness about the importance of amphibian conservation and the role of *Xenopus ruwenzoriensis* in local ecosystems.
- The sensitization session was held in Bulondo village, engaging community members, local leaders, and youth groups.
- The meeting covered topics such as the ecological role of amphibians, threats from habitat degradation and climate change, and the importance of community involvement in conservation efforts. Locals were also asked to suggest the role of amphibians in their culture and how best they can protect amphibians.
- Information materials (e.g., posters, leaflets) were distributed during these sessions to reinforce the conservation messages.

Figure 4 Photos during the community sensitization meeting in Bulondo village

3.2 Emerging Threats Identified During Fieldwork

i. Agricultural Threats

The largest known population of *Xenopus ruwenzoriensis* is located within Semuliki National Park. During the survey, the species was recorded in only two communities outside the park, with very low capture rates — a sign that the surviving population is primarily protected within the park. However, the surrounding areas are dominated by cocoa plantations, where some farmers reported using agrichemicals and pesticides to boost yields. As these plantations border and drain into the park, the amphibians inside are at risk, especially given their sensitivity to pesticides.

ii. Oil Manufacturing

Along the park boundaries, especially near the main road, there are several small palm oil manufacturing plants operating close to streams that flow into the park. These plants release effluents directly into the water, risking contamination of the streams and wetlands where amphibians live. There is a clear need to study whether these discharges have negative impacts on amphibian populations, particularly aquatic species.

Figure 5 Oil manufacturing plant in Makere village

iii. **Human Attitudes**

While many community members expressed willingness to protect amphibians, some groups — particularly women — held negative perceptions. When asked how they respond to amphibian encounters, some women reported killing them, either out of fear that the animals might cause harm or due to cultural beliefs linking amphibians to bad luck. Continued community sensitization is needed to foster positive attitudes and create mindset change, especially among women. In contrast, most men reported having no particular issues with amphibians and often simply ignored them.

4. Conclusion

In summary, the project has made significant progress in implementing planned activities, including species presence/absence surveys, community interviews, focus group discussions, and conservation sensitization in Semuliki National Park and surrounding areas. These efforts have provided valuable preliminary insights into the status of *X. ruwenzoriensis* and the threats it faces.

As the project advances, the focus will shift toward completing fieldwork in remaining sites, conducting detailed data analysis, and translating the findings into actionable conservation recommendations. Continued collaboration with local communities, park authorities, and stakeholders will be essential to ensure the success of conservation efforts for this rare and vulnerable amphibian species.

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