Progress Report July 2024

1.0 Background

Exploitation of wildlife is a major driver of vertebrate population declines (Ripple *et al*., 2016) yet very few surveys quantify wild meat offtakes, trade or consumption. This lack of exploitation data is even poorest for amphibians (used interchangeably with frogs throughout the document). Indeed, of the 634 publications on hunting within WILDMEAT database (www.wildmeat.org), only four are on frog consumption. As the world's most threatened vertebrate class with over 41% threatened with extinction (McKie, 2014), the lack of amphibian exploitation monitoring further increases their vulnerability (Hughes *et al*., 2021).

In West Africa where demand for frog meat is on the rise (TRAFFIC, 2010), data available on exploitation (e.g. Howard, 2014; Mohneke, 2011) only focus on the trade dynamics and market quantities. There are little to no studies on offtake numbers thus, we have no knowledge of the true harvested quantities from source. Furthermore, there have not been any attempt to study the impacts exploitation is having on hunted species' populations within West Africa even though Mohneke (2011) suspects some frog species could be going locally extinct from overharvesting.

This study employs the use of simple monitoring tools with the involvement of hunters, to track captures at source and the potential impacts on the trend of frog populations. Thus, the project aimed to 1) collect data on hunter 'Catch Per Unit Effort' (CPUE) to model population size of exploited frog species 2) explore the socio-economic drivers influencing frog exploitation and 3) develop a guiding framework to assist in tracking the population for other hunted amphibians.

2.0 Methodology

- **Capture per unit effort to estimate the population size of exploited frog species**

The project involved 52 local frog hunters who kept record of their hunting expeditions (date of hunting, species captured, and duration of hunting). We also documented the hunting sites where frogs were collected and the markets hunters supplied. Data collection started in March 2023 and ended in May 2024. Attempt was also made to determine the rate of frog harvest over a 5-year period using event-calendar - which references a common or memorable occasion such as the coronation of a local chief, commissioning of a project, e.t.c). This is the first ever attempt to document offtake numbers within Ghana and the premier long-term study on this scale in West Africa.

Furthermore, an 800 km^2 area where frog hunting is conducted (i.e. Chuchuliga and Navrongo rice field areas) was studied. Targeted frogs utilised as meat were monitored to estimate their abundance. This abundance data was compared with that from a 300 m^2 area where frog hunting did not occur (control). All these areas form part of irrigated rice fields which obtains water from Tono Irrigation Dam, West Africa's largest agriculture dam which supplies water to support all-year farming.

A two-man team was assigned 300 m^2 area each. Using visual encounter surveys for frogs, surveys were conducted employing one of the hunting methods used by frog collectors i.e. handpicking. Collection occurred within the same hunting period as hunters between 7 pm to 11 pm. Studies were conducted thrice per month for six months (July to December 2023). The months covered both the wet and dry seasons of Ghana. Encountered individuals' morphological features (snout-vent length), sex, and age were determined after which they

were released back into the wild. The time spent on an individual did not last more than five minutes.

- **Explore the socio-economic drivers influencing exploitation of frog meat in Upper East Region of Ghana**

Using semi-structured questionnaires, and focus group discussions, we aimed to understand the factors that influenced frog consumption and exploitation in Ghana. To increase chances of including people of different income brackets and religious affiliations, we also employed purposive and snowballing sampling techniques. Communities targeted for the interviews were drawn from the Builsa and Kassena-Nankana Districts of the Upper East Region. The study design for interviewing households involved using systematic random technique. The fifth house counting linearly from the previous interviewed household, was surveyed next. A member of each household (at least 15 years) available during the interviews was engaged. Interviews were conducted between 6:00 am to 7:30 am and 6:00 pm to 7:30 pm when community members - many of whom are farmers - would be home.

Another set of semi-structure questionnaires were designed for frog traders and hunters. Traders were identified on market days and interviewed at Sandeman, Fumbisi, Wiaga, and Chuchuliga markets. Hunters who were seen bringing frogs to traders were interviewed or arrangements were made to meet in their local communities with other hunters to interview them (Figure 1).

Data was collected and stored in mWater App.

Figure 1 Project leader (right) interacting with some frog hunters

- **Develop a guiding framework that will assist in tracking the population of other hunted amphibians**

On this project, based on the experiences gathered from our frog meat population studies, we are designing a monitoring framework to track the populations of hunted frogs within West Africa. This will include the methods/activities, data collection plan, variables to be monitored, indicators to be set and data analysis that could help answer conservation needs questions.

3.0 Results and Discussions

3.1.1 Capture per unit effort

Offtake numbers

The current data obtained from the two frog hunting communities i.e. Doninga and Sandema involved in the study are presented below:

Three frog species are exploited commercially within the study area. These are *Hoplobatrachus occipitalis, Pyxicephalus edulis, and Ptychadena trinodis*. All species are listed least concern on the IUCN redlist. The offtake numbers obtained from seven hunters from the village of Sandema between March 2023 – April 2024 is 13,256 individuals of *H. occipitalis* and 287 individuals for *P. edulis* (Figure 2).

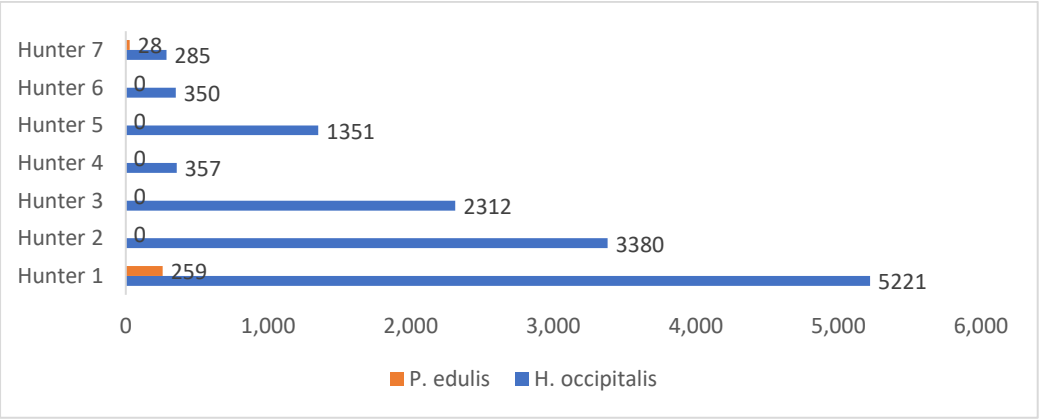

Figure 2 Offtake numbers obtained from frog hunters at Sandema

Hunters from Doninga reported the collection of 7,042 individuals of *H. occipitalis* and 2,988 individuals of *Ptychadena trinodis* between Dec 2023 – May 2024 (Figure 3). Collection involved a total of 45 hunters but they worked in teams.

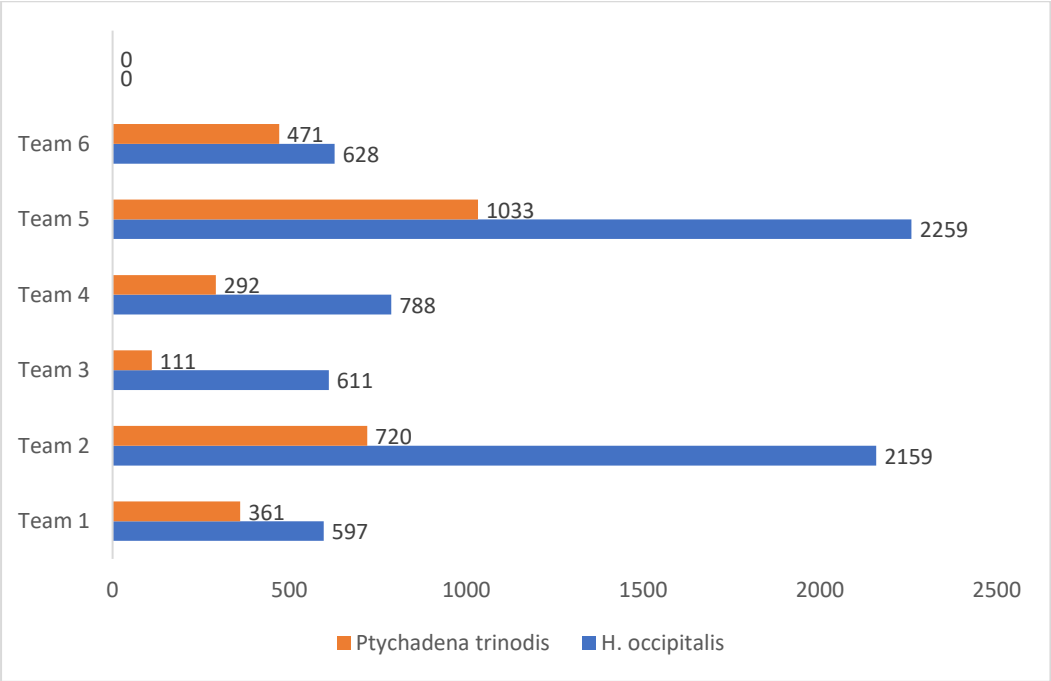

Figure 3 Offtake numbers reported by frog hunters from Doninga

Relative Abundance

A Kruskal Wallis test for abundance of *H. occipitalis* (the most encountered species) between sites was performed to determine whether harvesting was having an impact on species:

(H(2) = 9.9988, p-value = 0.006742

We found significant difference in abundance between the three sites i.e. the collection and non-harvesting sites.

Performing a Pair-wise comparison produced the results below:

Chuchuliga-Control p-value = 1.0000

Chuchuliga-Navrongo p-value = 0.0792

Control – Navrongo p-value = 0.0066

Significant difference was detected more between the Control and the Navrongo sites.

When the numbers caught were compared among sites, we found the total difference of *H. occipitalis* between Chuchuliga and the Control to be 109 whilst that between the Control and Navrongo was 158 individuals. Indeed, from the offtake data obtained from the Sandema hunters who collect from these areas, at least 91.3% of all hunting activities were conducted within the Navrongo rice fields.

3.2 Socio-economic factors influencing frog exploitation

3.2.1 Households

We interviewed a total of 847 individuals from 65 communities from the Builsa and Kassena-Nankana Districts (Figure 4). This comprised of 555 males and 292 females; 507 Christians, 280 Traditionalists, 55 Muslim and five who did not belong to any faith. Ethnic groups represented are 475 Builsa, 184 Kassena, 169 Nankana and 19 others who belonged to varied minority tribes.

Furthermore, 300 (35%) had some form of basic education followed by individuals who had no formal education (227), then those with senior high school (221) and tertiary – 99 (Figure 5).

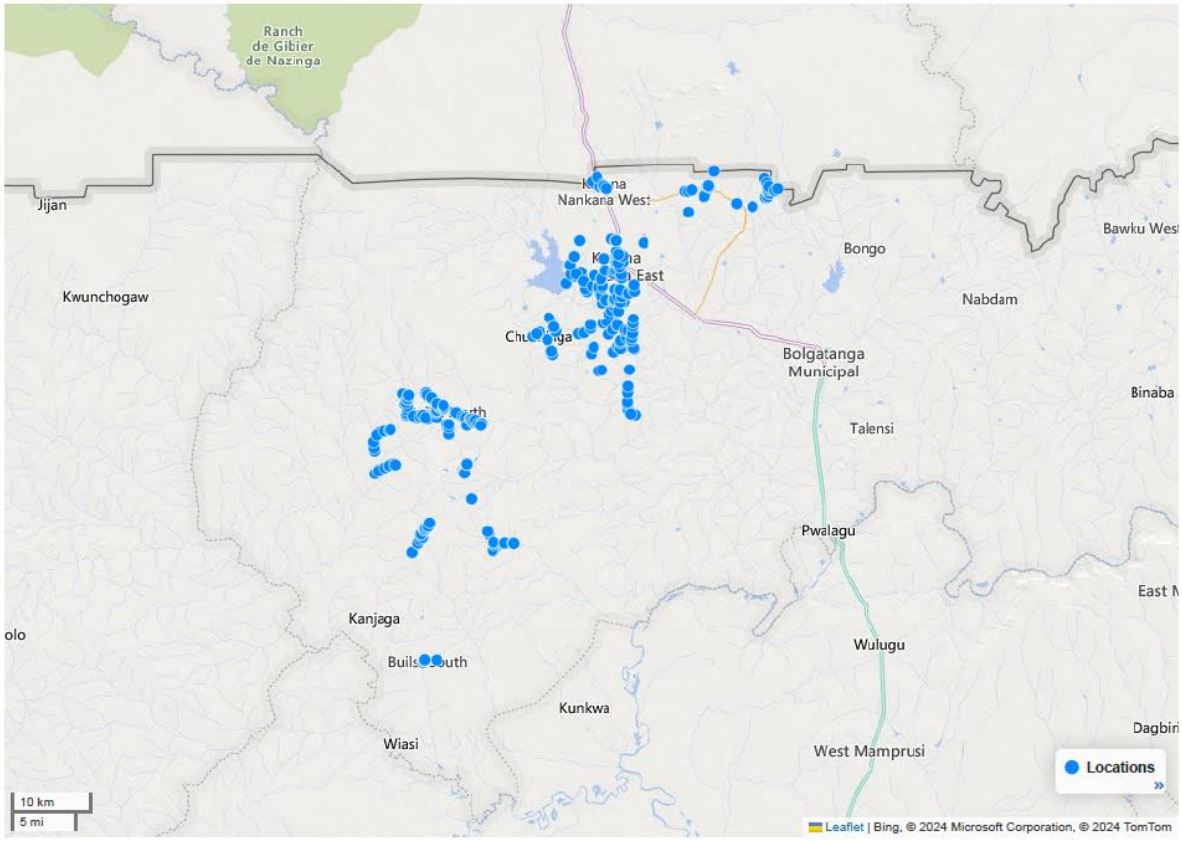

Figure 4 Locations of people interviewed on the project

The number of respondents who confirmed to eating frogs was a total of 504 individuals. The 341 individuals who indicated that they didn't eat frogs, approximately 66% of them used to in the past.

When statistical analysis was performed, testing the hypothesis that people in the poverty bracket are likely to consume frogs, we got chi-squared value of

$\chi 2 = 50.9411$, df = 2, p-value < 0.05

When the data was reviewed, we found that there was significant difference in the decision to eat frogs among different income earners. Of the 452 individuals in the extreme poverty line, 58.6% eat frogs; 73.0% of the 267 individuals in lower middle-income bracket, eat frogs; and

33.9% of the 112 individuals in upper middle-income bracket eat frogs. Thus, people in the extreme poverty and lower-middle income are more likely to consume frogs.

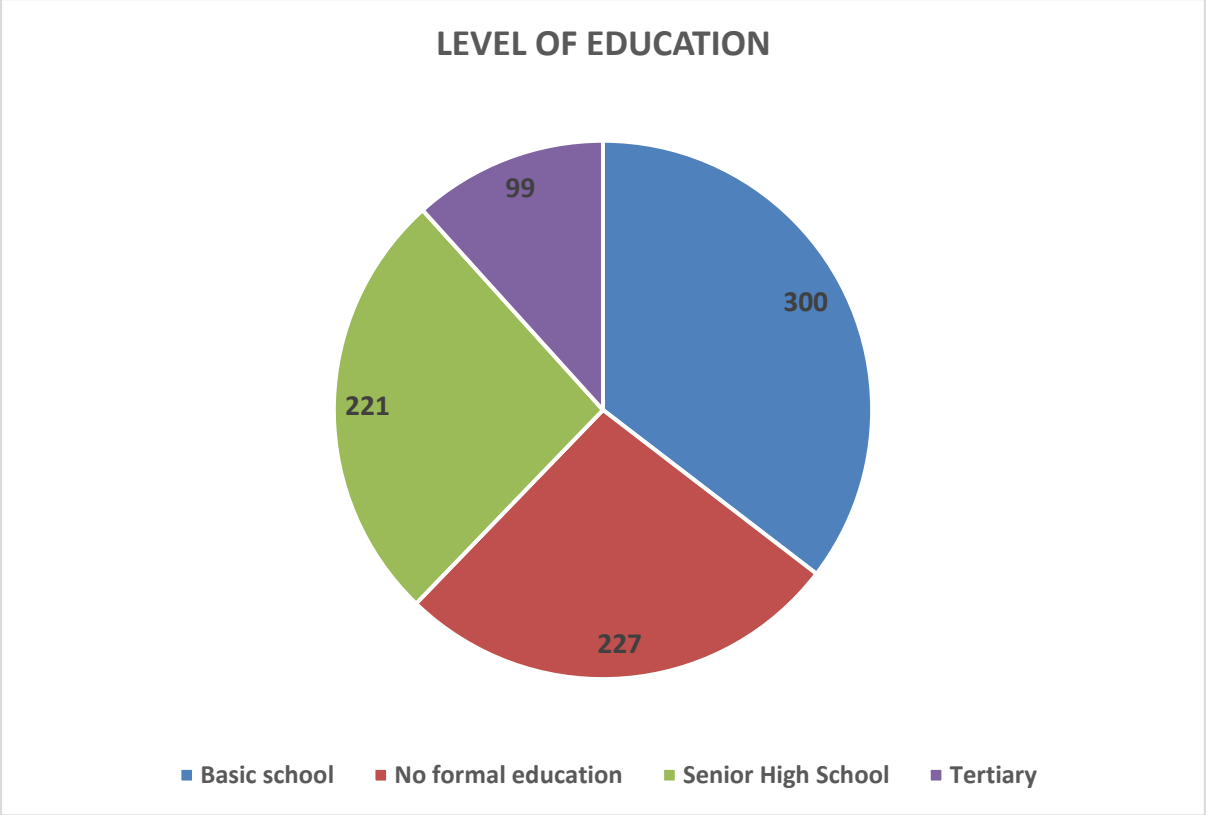

Figure 5 Respondents' level of education

When ethnicity was considered, we got a chi-squared value of:

$\chi 2 = 265.078$, df = 3, p-value < 0.05

From the data, someone from the Kassena ethnic group is less likely to eat frogs compared to the other ethnic groups of Builsa and Nankana.

To test whether religion had an influence on a person's decision to eat frogs, we obtained a chi-squared value of:

$\chi 2 = 45.1581$, df = 3, p-value < 0.05 (null hypothesis is rejected)

According to the data, people who belong to the traditional African faith within the area were more likely to eat frogs than other faiths.

On this project, we recorded the **first evidence of toad eating within Ghana** from the community of Badomsa-Wiaga of the Builsa North Municipal Assembly (Figure 6). The species targeted is the least concern *Sclerophrys regularis*. It was processed for consumption by de-skinning it to remove its poisonous skin and then gutted to remove internal organs before smoking.

3.2.2 Frog Hunters

We interviewed a total of 23 hunters from the communities of Doninga, Sandema, Chuchuliga, Katera and Kanjarga. We had focus group discussions with 17 more hunters from Kowri and Doninga. All respondents were male. There is no evidence that females collected frogs on commercial level here.

Approximately 96% of respondents are Builsa and the rest Nankana. Majority (60.9%) had no formal education whilst 21.7% had basic school education, 13% had senior high education and 4.3% had tertiary. Many (73.9%) earn a monthly income less than GHS1,000 with just 26.1% earning more than that in a month. This puts many in the extreme poverty bracket using the World Bank's 2022 categorisation.

Decision to collect frogs was mainly to serve sustenance purposes. It supported the purchase of farming inputs as well as food for family. Again, hunters said that frog collection did not require huge capital or investment compared to fishing, farming or hunting of mammals.

3.2.3 Frog Traders

A total of 25 frog traders were interviewed. This is an all-female activity. Traders received processed frogs either directly from the hunters or middle people (mostly the wives of the

collectors). Majority of respondents (92%) belonged to the Builsa ethnic group and 8% were Kassena. Many (60%) had no formal education. At least, 36% had some basic school education and the other 4%, secondary education. Again, majority (95.5%) earned less than GHS1,000/month with 4.5% earning more than GHS2,000/month.

Frog trade was not the only source of income for traders as everyone augmented it with other activities such as farming and the sale of fish and or larger mammals and reptiles. The decision to sell frogs was also as a result of demand from consumers.

4.0 Key points

- Hunting pressures appear to be greatest at Navrongo than at Chuchuliga as has been confirmed from offtake records from Sandema collectors
- This may explain the significant difference between the abundance of *H. occipitalis* in the Control site than at Navrongo.
- There is a potential for *H. occipitalis* population to decline in the future if offtake levels exceed their replacement rate.
- Frog hunting and trade is an important sustenance activity for both male and female within the Builsa districts. Any form of regulation should consider a study on the impacts such policies could have on the livelihoods of collectors and traders.

5.0 Upcoming activities

We will look at the number of individual frogs caught against the total unit efforts to obtain the capture per unit effort.

We will also consider water quality parameters such as pH, temperature, dissolved oxygen, turbidity e.t.c which may be influencing species abundance on the various collection sites to

eliminate the potential to make base conclusion of harvesting being the main factor affecting population.

6.0 Publicity of project

Project preliminary results have been presented in-person at the University of Ghana, and UK at the Students Conference on Conservation Science, and Livestock, Environment and People (LEAP) where Rufford Foundation's funding was duly acknowledged (Figure 7).

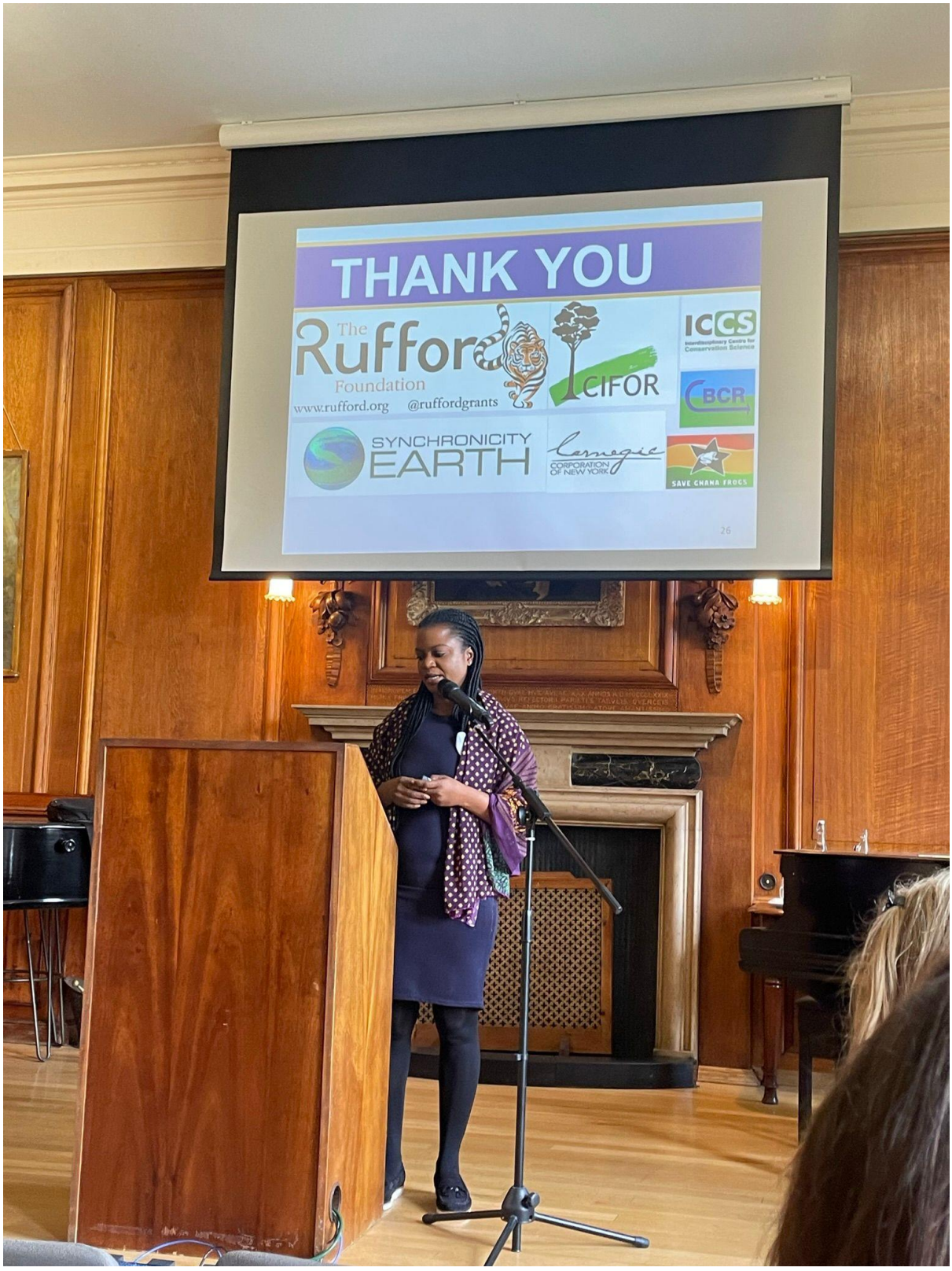

Figure 4 Project leader giving a talk on the sustainability of frog utilisation in West Africa at the LEAP conference - University of Oxford

Selected social media posts

https://www.instagram.com/p/C5DxWI8tbYp/?igsh=MXI5YXAzdHlzNmZyMw==

https://www.instagram.com/p/C53HvZdtdtF/?igsh=bmxhdzVlNnZzZGpx

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