



**EMPOWERING INDIGENOUS PEOPLE TO PROTECT TWO THREATENED
HINGE-BACK TORTOISES (*Kinixys homeana* AND *K. erosa*) IN SOUTH-WESTERN
GHANA**

Detailed Final Report-October 2022





PROJECT TEAM:

Principal Investigator: Ohene Boakye Adomako, MSc. Sustainable Environmental Management, University of Greenwich, UK (eden.boakye@gmail.com)

Co-Principal Investigator: Evans Amoah Amoako, MSc. Sustainable Environmental Management, University of Greenwich, UK & MPhil. Natural Resource and Environmental Governance, Kwame Nkrumah University of Science and Technology (KNUST)-
evansamoah55@gmail.com

Co-Principal Investigator: Victor Agyei, MPhil. Wildlife and Range Management, KNUST
nanaantwi15@gmail.com

Volunteers:

1. Esther Odi Tiekou, MSc candidate, Planning, Monitoring and Evaluation, KNUST/BSc. Natural Resources Management, KNUST (oditiekou@gmail.com)
2. Kwaku Afrifa-Dwumah, MPhil candidate, Silviculture and Forest Management, KNUST (dkafrifa@gmail.com)
3. Nancy Karikari, BSc. Natural Resource Management (karikarinancy8@gmail.com)



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EXECUTIVE SUMMARY

This project was developed based on our second RSG's recommendations and focused on the threatened Home's Hinge-back tortoise (*Kinixys homeana*) and Serrated Hinge-back tortoise (*Kinixys erosa*) to promote sustainable economic livelihoods for tortoise-hunting families and strengthen the involvement of indigenous people in tortoise conservation. We involved professional mushroom farming trainers from the Glean Society Network (GSN) (Climate Link Hub) to organize intensive courses for 30 tortoise hunting families from the Tano Offin region. In addition to the mushroom training program, we conducted surveys in forest and fetish markets in the Tano Offin forest region. Altogether, the field surveys documented 22 live individuals comprising 19 individuals of *Kinixys homeana*, one (1) *Kinixys erosa* and two (2) *Pelomedusa subrufa* (African Helmeted Turtle). We estimate that more than 4000 *Kinixys* tortoises are sold on the Kumasi fetish market on average in a year. *Kinixys homeana* appeared to be the species most traded compared to *Kinixys erosa* which was scarce on the market. We also developed activities to educate basic schools and churches in the project study region. We educated them about the plight of tortoises and their conservation needs. Overall, our experience on this project revealed that there is a high acceptance of alternative livelihood programs especially mushroom farming among local people. Our future programs will therefore target local people we have trained on mushroom farming to form co-operatives and resource them to start production in their communities. We also deem it necessary in the future to involve relevant stakeholders to develop a trade monitoring scheme for tortoises and sustain surveys to accumulate more data on the field ecology of *Kinixys homeana* and *K. erosa*.



1. BACKGROUND

Forest hinge-back tortoises (genus *Kinixys*) are threatened throughout their range in Sub-Saharan Africa (Luiselli *et al.* 2006; Branch 2007; Luiselli *et al.* 2013). These forest tortoises mostly range in protected areas over the Guinean West African rainforest region (Luiselli *et al.* 2006). However, even in protected areas, populations of *Kinixys* tortoises are not free from threats (Lawson 2000; Luiselli *et al.* 2006). The main threats culminating to their decline in this region are agricultural expansion, deforestation and hunting by local people in desperately poor economic conditions (Luiselli *et al.* 2006).

In fact, in West Africa Forest dwelling people rely heavily on wild animals (bushmeat) to meet their protein needs. Bushmeat hunting is, thus, widespread and impacting negatively on wildlife. Hunting may represent a serious source of threat to *Kinixys* tortoises. Generally, tortoises are hunted for subsistence and also sold on bushmeat and fetish markets (for traditional juju medicine). According to Luiselli *et al.* (2013), the use of *Kinixys* tortoises as African traditional medicine may not threaten the survival of wild populations of this genus, since this trade is not a common practice. However, we are yet to determine if the trade of *Kinixys* tortoises threatens Ghanaian populations. For instance, we are aware of their use in traditional medicine, yet we do not know the true extent of the trade of *Kinixys* tortoises in Ghana.

This project focuses on two threatened *Kinixys* tortoises, namely the Home's Hinge-back tortoise (*Kinixys homeana*) and Serrated Hinge-back tortoise (*Kinixys erosa*). Specifically, *Kinixys homeana* is currently listed on the IUCN Red List as Critically Endangered due to current declining population trend (Luiselli *et al.* 2021). *Kinixys erosa* remains listed as Data Deficient due to inadequate information on its population status which needs to be updated (e.g., see Tortoise & Freshwater Turtle Specialist Group, 1996).

Over the years since we started working on *Kinixys homeana* and *K. erosa* with support from the Rufford Small Grant (RSG), we have accrued important data along with launching parallel conservation education to reduce tortoise consumption in south-western Ghana. This current project was developed based on our second RSG's recommendations to promote sustainable economic livelihoods for tortoise-hunting families and strengthen the involvement of indigenous people in tortoise conservation. Accordingly, on our last RSG, 76.67% (46) of 60 hunting households interviewed in the Tano-Offin forest region (stronghold of the two *Kinixys* species) were willing to abandon tortoise hunting for sustainable livelihood options. Against this background, we sought to further reduce hunting of tortoises and destruction of their habitats, via the following objectives: (1) train tortoise-hunting families to farm mushrooms as alternative livelihood; (2) improve the skills of local people to monitor hunting activities; and (3) intensify educational campaigns to reconnect local people with tortoises and their habitats.

1.1 Project Area

Tano-Offin forest reserve (Tano Offin) is located in south-western Ghana (6°30'-7°00'N, 2°00'-2°30'W). It forms part of the Upper Guinea Forest block, one of the world's 25 Biodiversity Hotspots. The vegetation is a mixture of moist semi-deciduous and Upland Evergreen, making it one of Ghana's only two forests with such vegetation type. For its extraordinary biological



importance, Tano Offin was re-designated in 1999 as a Globally Significant Biodiversity Area (GSBA), the 4th largest of thirty (30) GSBA's countrywide. It has a Genetic Heat Index (GHI) of 176.4, indicating it is among the very few forest reserves that has the highest number of rare species. The forest also protects the head waters of the two major rivers, Tano and Offin, and together with their tributaries they form a network of important breeding sites for many wildlife species. These rivers are also the major sources of drinking water for local communities. However, Tano Offin faces imminent bauxite mining threat (<https://www.ghanaweb.com/GhanaHomePage/business/65-Civil-Society-Organisations-oppose-China-s-US-15bn-bauxite-development-plan-in-Ghana-683540>).

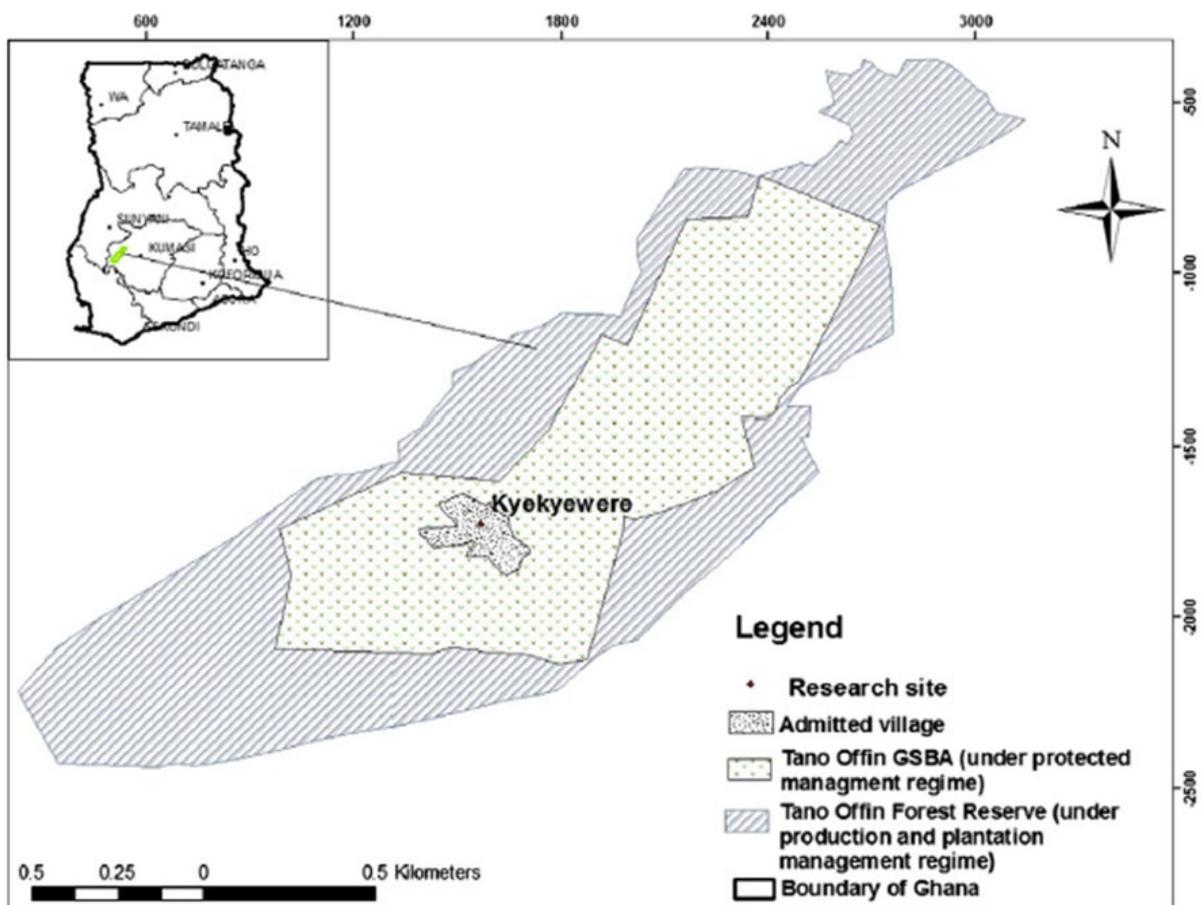


Figure 1. Map of Tano-Offin adopted from Derkyi et al. (2013)

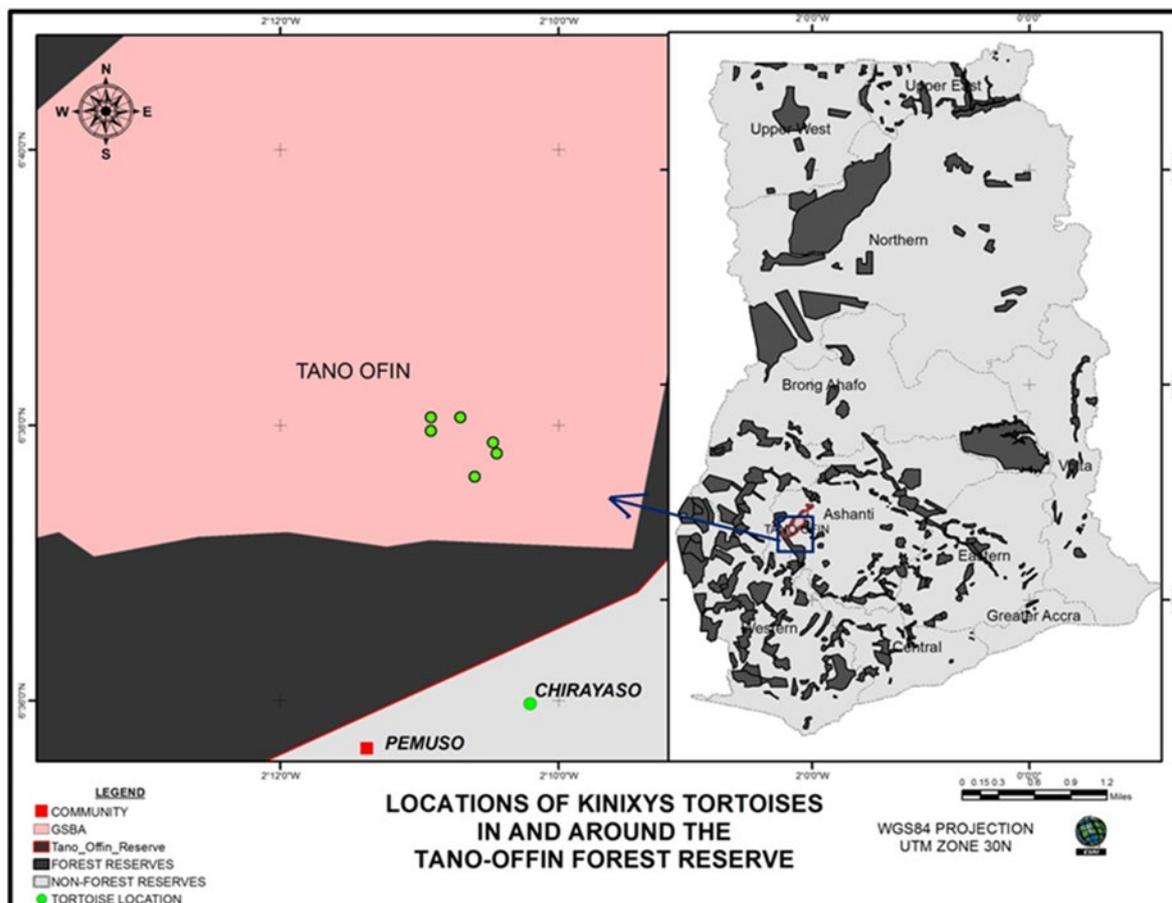


Figure 2. Map of Ghana showing the Tano Offin forest and areas where we have sighted Kinixys tortoises previously.

2. SUMMARY OF PROJECT FINDINGS

2.1 Mushroom Training Program

We involved professional mushroom farming trainers from the Glean Society Network (GSN) (Climate Link Hub) to organize intensive courses for 30 tortoise hunting families from the Tano Offin region. Out of the total trainees, 11 individuals were unanimously selected to benefit from materials and resources to support pilot production. The training program covered topics including identifying planting materials, outsourcing production materials, production knowledge, best management practices, harvesting, and marketing trends. The program's pilot phase was a success, as the first batch of beneficiaries formed a business group to pilot mushroom production with training materials handed over to them. Beneficiaries also pledged to become tortoise ambassadors, working closely with the projects' already recruited community patrol volunteers to sustain efforts in getting community members to stop hunting tortoises.



Figure 3. Some local Participants trained in mushroom farming at a Workshop



Figure 4. Project extension officer working on culturing mushroom and inspecting a pilot production

2.2 Field Surveys

2.2.1 Forest surveys

We recorded one *Kinixys erosa* and two (2) individuals of *Kinixys homeana* during periods extensive surveys in Tano Offin. These individuals were encountered in the month of October. Within their habitats of capture, we also recorded tortoise foraging activities on wild mushrooms; these findings follow similar trends in previous surveys we have conducted in these areas and other forest reserves in Ghana.



Figure 5. Forest surveys: Top left -*Kinixys homeana*; Top right -Principal Investigator holding *K. homeana* captured during surveys; Bottom left -*Kinixys erosa*; Bottom right -Wild edible mushroom within tortoise habitat

2.2.2 Fetish market surveys

In addition to forest surveys, we conducted investigations in a famous fetish market in Kumasi within the project region in June 2022 (this aspect of the survey was supported by the Zoological Society for Species and Population Protection Herpetology Grant, ZGAP-DGHT). According to traders we interviewed, this fetish market has been in existence between 70-100 years, where customers purchase specimen for traditional medicine and spiritual purposes. All the traders interviewed did not have any permit for conducting their activities. This fetish



market is within the same locality with the largest bushmeat market “Atwemonom” in Kumasi, Ghana. This is the first in-depth study to understand the trade of *Kinixys* tortoises in Ghana.

Species & quantities traded: In total, we interviewed 10 traders and documented 994 specimens of four species namely *Kinixys homeana*, *Kinixys belliana* (Bell’s hinge-back tortoise), *K. erosa* and *Pelomedusa subrufa* (African Helmeted Turtle). Tortoises were traded as shells and live individuals (live individuals are sold on demand by customers). According to the traders we interviewed, 891 of the specimens were in stock in their storerooms (not visibly available to us) while we counted 103 specimens which were on display for sale at the market. Traders reported that they had 580 *Kinixys homeana*, 303 *K. belliana*, seven (7) *K. erosa* and one (1) *Pelomedusa subrufa* in stock. The specimen we counted had been in traders’ possession between 1 month to 12 months prior to our surveys. Tortoises were mainly sold as Shells and Live individuals. We counted 84 shells and 19 live individuals; we counted 49 shells of *K. belliana*, 35 shells of *K. homeana* and 17 live individuals of *K. homeana* and 2 live individuals of *Pelomedusa subrufa*. All together, the traders reported they sell on average 401 specimen of *Kinixys* tortoises mostly as shells every month (4,812 in a year on average). It appears *Kinixys homeana* is the species most traded compared to the others as traders who were able to provide information confirmed they sell 140 of this species every month on average compared to 12 *K. erosa* specimen.

Price of specimen: The average price of *Kinixys* tortoise range from 30ghc-100ghc (2.6GBP-8.7GBP); the price range depends on the size and availability of specimen on the market and cost incurred in transportation from the source of purchase to market centre.

Distribution of trade: All the traders reported that, they purchase their *Kinixys* supplies within Ghana. While they were unwilling to provide information on where they get their supplies, some of them reported that they get their specimen from Ashanti region (town called Ejisu), Northern region and Bono East region (city called Techiman). The traders purchased their specimen from farmers, hunters and middlemen. They also reported that they do not purchase or sell their specimen outside Ghana. However, we gathered that, these same traders who sell other reptile species such as the West African Dwarf crocodile (*Osteolaemus tetraspis*), African Slender-snouted Crocodile (*Mecistops cataphractus*), African Rock Python (*Python sebae*) etc, reported they get these specimens from Nigeria, Togo, Senegal, Niger, Burkina Faso, Benin and Mali. They also sell some of their specimen to buyers from countries outside Ghana: Nigeria, Ivory coast, Togo, Benin, Burkina Faso, Niger, Mali, USA, Tanzania.

Uses of specimen: We established from traders that, the shell of *Kinixys* tortoises is used to treat medical conditions such as bone fracture, burns from hot water, heat or steam and asthma; perhaps these were the main purposes customers come to the market to purchase them. The shell is also believed to fight against spiritual problems; for instance, it is believed you are protected from spiritual attacks if you put your bathing soap in a tortoise shell.



Figure 6. Tortoises (*Kinixys homeana*) and *Pelomedusa subrufa* (located in shiny gold bowl) recorded at the Kumasi Central Fetish Market



Figure 7a. Kinixys shells on display on Fetish Market in Kumasi. Other items such as spiritual items such as soaps, powders, liquids and artefacts are also sold on the market.



Figure 7b. Kinixys shells on display on Fetish Market in Kumasi. Other items such as spiritual items such as soaps, powders, liquids and artefacts are also sold on the market.



Figure 8. West African Dwarf crocodile (*Osteolaemus tetraspis*) skin identified on the Fetish market showing that the market is a thriving reptile market in Ghana with threatened species on display for sale.

2.3 Educational campaigns

2.3.1 Education in schools and churches

We developed activities to educate three basic schools and churches in the project region. We educated them about the plight of *Kinixys* tortoises (habitats, vulnerabilities, current threats). The activity scope ensured that both pupils and their teachers developed an interest in conservation ideology, as well as become nature enthusiasts advocating for and contributing to the protection of the hinge back tortoises and other threatened species at large. Schoolchildren were engaged for four hours during each educational session in conservation fun activities such as creative arts, taking a stand, running dictations, and memorizing fun facts about tortoises. Eventually, the school engagement sessions were capped off with a creative art session in which students were encouraged to work in groups and use their imagination and artistic side while sketching and labelling hinge back tortoises. These sessions were particularly engaging because pupils were able to freely express themselves while sharing their indigenous knowledge about tortoises and the forest as a whole.

We also engaged community members in religious centers about the importance of conserving tortoises, their role in preserving plant diversity, clean water, and forest ecosystem balance. Our engagement module was created with “caring for God’s creation” in mind. Members of



the church were introduced to the biblical foundation for creation care, their stewardship mandate, and the role they should play in restoring creation.



Figure 9. Sessions of educational engagement activities in basic schools





Figure 10. Sessions of engagement with a community church

2.3.2 Media campaign

The principal investigator, had the rare opportunity to be interviewed on the JoyNews Food Chain program (https://www.youtube.com/results?search_query=food+chain+joynews), a popular national television program that reaches thousands of Ghanaians, to talk about Bushmeat Consumption in Ghana, where he highlighted about the need for a collective effort to protect endangered species from hunting and consumption and at the same time find sustainable strategies to protect the livelihoods of traders whose subsistence have been dependant on bushmeat trade for centuries in Ghana (<https://www.youtube.com/watch?v=1sub8gRE71k&t=54s>).



Figure 11. Principal Investigator sharing his perspective and educating the Ghanaian population on the downside of bushmeat consumption on endangered species during an interview on JoyNews Food Chain program



3.0 CONCLUSION AND RECOMMENDATION

3.1 Mushroom farming as alternative livelihood option

Our investigations over the years have showed that *Kinixys* tortoise capture rates coincide with wild mushroom gathering season in the forest; during this period local people target tortoises while they hunt for edible wild mushrooms, which are also consumed by tortoises. Also, there is widespread poverty in Ghana that force local people to engage in risky activities such as hunting. We believe that, developing mushroom farming for local people is a surest means to curb hunting of *Kinixys homeana* and *K. erosa*. Beneficiaries from our first pilot training program were happy and shared these main feedbacks:

- The workshop on mushroom production training was very important and beneficial, however going forward, the training should think about expanding the number of participants in upcoming workshops.
- The project team should consider providing start-up capital to the first batch of participants in order to pilot the mushroom production business at the community level as a group.
- Other alternative livelihoods such as snail rearing, and honey production should also be explored given that their commodities also have a ready market just like the mushroom.

Our experience on this project has showed us that, there is high acceptance of alternative livelihood programs (especially the mushroom farming) among local people. However, these programs also need adequate funding for setting up and monitoring. Our initial target was to start productions with local people, however, funding from this project could only support training workshops and few local people to start production on their own. Our future project will target trainees by forming them into co-operatives and resourcing them to start production in their communities.

3.2 Monitoring and tracking illegal hunting

Within fringe communities, the highest capture season for *K. homeana* and *K. erosa* within the mushroom hunting season unfortunately coincides with Ghana's annual closed wildlife season from August 1-December 1 due to weak law enforcement. We now know that the trade of these tortoises on fetish markets in Ghana is widespread and enormous and may be having negative impacts on wild populations especially on *K. erosa* which was scarce on the fetish market, we investigated. Our future programs will therefore undertake the following steps:

- Engage relevant stakeholders including traders and the Ghana Wildlife Division to review the Wildlife Conservation Regulation for *Kinixys homeana* and *K. erosa* and develop tortoise trade monitoring systems, to curb hunting of these species.
- Investigate other localities in Ghana where tortoises are traded for African traditional medicine.
- Sustain monitoring activities to assess and track illegal hunting and accumulate more data on the field ecology of tortoises; to inform species and habitat management plans and possible IUCN classifications.



3.3 Awareness campaigns

Following our post-evaluation feedback from pupils and community members including workshop participants, we discovered that the vast majority of them now understand the value of protecting tortoises and are eager to serve as tortoise guardians in their communities. Our future project will focus on the following educational strategies:

- Establish nature-based clubs in basic schools
- Organize visits or excursions for students to the habitats of *Kinixys homeana* and *K. erosa* since majority of pupils and their teachers have yet to visit such places for educational purposes.
- Increase awareness among the general public about the plight of tortoises and their conservation needs.
- Design appropriate conservation messages and dissemination strategies to target stakeholders in the tortoise commodity chain



4.0 APPENDICES

4.1 Appendix 1: Description of materials and methods for fetish market surveys

We conducted surveys within the Kumasi central market. Reconnaissance surveys were first conducted to determine where reptiles are traded for traditional medicine (juju). Once, we identified the location of the market, we used convenience sampling to interview traders who were willing to talk to us. We made sure to ask them extensive questions to cover important areas of data capture for our study. Data was collected within a period of 14 days with 10 traders. Data was collected using a combination of direct observation and semi-structured interviews. The necessary tasks we followed were as follows:

- Counting all the individual chelonian specimens available at the marketplace by examining carcasses, heads, and body parts and attributing to different specimens. Each specimen was identified to species level following Trape *et al.* 2012 (e.g., see Segniabeto *et al.* 2013).
- Interviewing traders about species information, distribution of trade, socio-economic dimension of and history of the trade.

A conventional approach by Segniabeto *et al.* (2013) was followed to determine the number of individuals of each species observed during market surveys. For instance, if for a given chelonian species, we find ten different heads and ten different carapaces of consistent size, then we will consider the number of traded specimens for that species to be 10. The method by Newing (2011) was followed to analyse open-ended questions; these questions were grouped into themes, with the frequency of occurrence of each topic calculated.

4.2 Appendix 2: Evaluation of mushroom training participants

Prior to the start of training programs, the participants had relatively high expectations. All participants indicated their overall expectation of the program being met at the end of the training session. Interacting with them, a number of them highlighted the following shared experiences:

- *“I have always been interested in mushroom production, so learning this trade would be incredibly beneficial for my family and me. I can start a side company selling mushrooms to help pay for my family's expenses (Male, farmer)”*.
- *“In today's world, income diversification is critical. Depending solely on petty trading isn't helping me at all. Mushrooms, as you are aware, have a large market in our community and other neighbouring communities. Who doesn't enjoy mushroom soup, or any dish made with mushrooms?” (Female, Petty Trader and farmer).*

It is worth noting that the vast majority of those who benefited had no prior knowledge or training in mushroom production. Only a few had received some form of training; however, they stated that it was not very practical and that they could not boast of having a firm grasp on its production processes.



Trainers' Evaluation

Overall, beneficiary's feedback on the trainer who took them through the mushroom production processes was very positive. The trainer's in-depth knowledge of mushroom production, ability to articulate and interact, and presentation styles were unanimously agreed upon and admired by beneficiaries. They also commended the trainer's approach of incorporating a large practical component into the illustration component of workshops. The blended approach and allowing beneficiaries to practice in groups made learning and knowledge sharing very easy.

Overall Training Experience

We discovered that all trainees were particularly pleased with the outcome and structure of the training workshops. We randomly engaged some (11 in total) beneficiaries who provided post-evaluation feedbacks as follows:

- *“Our trainer is extremely knowledgeable about mushroom production; I was particularly impressed with how he was able to lead the group to completion without confusing anyone”.*
- *“The training was really practical and interesting. I was thrilled when the facilitator let us to attempt making mushrooms from scratch on our own after he finished training us”.*
- *“I used to think growing mushrooms was a difficult process, but this trainer made it very simple for me to follow the steps without getting confused”.*
- *“The training was very useful, and we need to reach out to more people”.*
- *“I am confident that I will use the new skills I have gained to start my own business in my community. Mushroom production does not require as much capital as many people believe”.*
- *“Growing mushrooms is a very profitable business because the market is already there. Back in our community, people would have to walk quite a distance to harvest mushrooms in our forest; even now, due to the use of agricultural chemicals and forest encroachment, we rarely get these wild mushrooms”.*
- *“I am grateful for this opportunity, especially since I did not have to pay anything to participate in this training. I am aware that mushroom production training is quite costly”.*
- *“As a result of this training, I now consider myself a mushroom production expert and look forward to passing on my knowledge to young people”.*
- *“I liked how the trainer used both theoretical knowledge and practical approaches in the training”.*

Feedback from Participants

- The workshop on mushroom production training was very important and beneficial, however going forward, the training should think about expanding the number of participants in upcoming workshops.
- The project team should consider providing start-up capital to the first batch of participants in order to pilot the mushroom production business at the community level as a group.
- Other alternative livelihoods such as snail rearing, and honey production should also be explored given that their commodities also have a ready market just like the mushroom.



5.0 ACKNOWLEDGEMENT

We are very thankful to the Rufford Foundation for the financial support to undertake this project. We are also grateful to the Zoological Society for Species and Population Protection Herpetology Grant (ZGAP-DGHT) for matching funds to investigate the trade of *Kinixys* tortoises on fetish markets to expound our understanding on the conservation status of *Kinixys homeana* and *K. erosa*. We are grateful to inhabitants of the Tano Offin forest region for their dedication and willingness to support the conservation of tortoises through their involvement in field patrols, training workshops and awareness activities.



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