Conservation Leadership Programme: Final Report

CLP project ID & Project title: 1457 - Saving the Endangered Giant Squeaker Frog, *Arthroleptis krokosua*

Host country, site location and the dates in the field: Ghana, Sui River Forest Reserve. Dates in the field: 07-11/06/2013, 17-25/08/2013, 06-15/09/2013, 12-16/07/2014, 10-20/12/2014.

Participating Organisations or Institutions: The Forestry Commission of Ghana, SAVE THE FROGS! USA, Sefwi-Wiaso District Assembly and Traditional Council, logging companies; Logs and Lumber Ltd. and John Bitar & Co. Ltd., SAVE THE FROGS! Ghana undergraduate chapters, and Ghana Education Service.

The overall aim summarised in 10–15 words: Contribute data on the habitat and population ecology of the Giant Squeaker Frog (*Arthroleptis krokosua*).

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TABLE OF CONTENTS

Figures

Project Partners & Collaborators

We would like to acknowledge Conservation Leadership Programme (CLP) for the fund. We are also grateful to all our local collaborators: Forestry Commission of Ghana, Ghana Education Service, local chiefs and the people of Yawkrom for contributing in no small way to making this project a success. Our profound gratitude also goes to our international partner organisation, SAVE THE FROGS! USA for all the publicity and technical advice. We would also like to appreciate the following individuals who contributed immensely to ensure the success of this project: Dr. Kerry Kriger (SAVE THE FROGS!), Prof William Oduro (KNUST), PD Dr. Mark-Oliver Rodel (Museum für Naturkunde), Mr. Christian Atsu Fumey–Nassah (Forestry Commission of Ghana), Mr. Gregory Chimogo (Forestry Commission) and Elder George Nyarkor (a cocoa farmer at Yawkrom).

SECTION 1:

Summary

The overall goal of this project was to contribute baseline data on the habitat and population ecology of the Giant West African squeaker frog (*Arthroleptis krokosua*). Prior to this study, the ecology and distribution of *A. krokosua* and co-occurring amphibian species at Western Ghana's Sui River Forest Reserve was poorly known. We conducted extensive surveys to collate ecological data for the purpose of habitat management and conservation. We recorded a total of 207 individual anurans belonging to 17 species, six genera and five families. This included three globally threatened frog species and an adult individual of *A. krokosua.* We identified specific activities of illegal farming, logging, and mining, and invasion of non-native weeds as threats to the long-term survival *A. krokosua* and co-occurring frogs. Thus, with Participatory Rural Appraisal (PRA) tools, we educated and improved the participation of both government and other local stakeholders in the species conservation. We also built the capacities of local

people and undergraduates in survey methods and ecology of Ghanaian amphibians. Through our efforts, *A. krokosua* is now a recognised local "flagship", subsequently paving the way for many conservation interventions including habitat restoration projects.

Introduction

Conservation Value of the Project work

The Giant West African squeaker frog (*Arthroleptis krokosua* Ernst, Agyei & Rödel, 2008; hereafter Giant Squeaker Frog), is evolutionarily distinct from any West African amphibian. It is the largest member of the West African genus *Arthroleptis*. Its conservation status according to IUCN Redlist categories was Endangered; it has only been recently down-listed to the status of Near-Threatened. However, the species is still rare, with its known extant populations restricted exclusively to logging concessions in Western Ghana's Sui River Forest Reserve (SRFR).

The Conservation Problem and Issues Addressed

As a rare and restricted-range species, the Giant Squeaker Frog is vulnerable to extinction due to threats that can emanate from both natural and anthropogenic stochastic events. Unfortunately, the species is severely threatened throughout all its ranges, which are subject to high levels of degradation (Adum et al. 2011; Adum et al. 2013). For its habitat management and conservation, we studied the ecology and identified concomitant threats. There was also the need to educate and involve local stakeholders in the species' long-term conservation.

Background to the Project Site and its Conservation Significance

SRFR covers an area of 333.90 km^2 with a third (105km^2) under active logging. As it harbours the only known extant populations of the Giant Squeaker Frog, SRFR remains the only hope for the species' long-term survival. In addition, SRFR is also home to other globally threatened frog species including *Phrynobatrachus villiersi* (Vulnerable), *P. annulatus* (Endangered) and *Hylarana occidentalis* (Endangered).

Key Project Partners and Their Role

Ghana's Forestry Commission

SRFR is managed by the Forestry Commission (FC) on behalf of local communities. We involved FC and made our amphibian data available to them.

Sefwi-Wiawso District Assembly and Traditional Council

They are representatives of the local government and the traditional rulers within the district of the reserve. They linked us with local people while acting as opinion leaders also for this project, on behalf of local stakeholders.

Ghana Education Service (GES)

The District GES gave us permission to conduct conservation education programmes at local schools.

SAVE THE FROGS! USA

They helped us to globally publicise the plight of the species, our conservation efforts and CLP's support.

SAVE THE FROGS! Ghana University Chapters

We selected members from the chapters to assist on the project while building their own capacities in amphibian ecology and conservation.

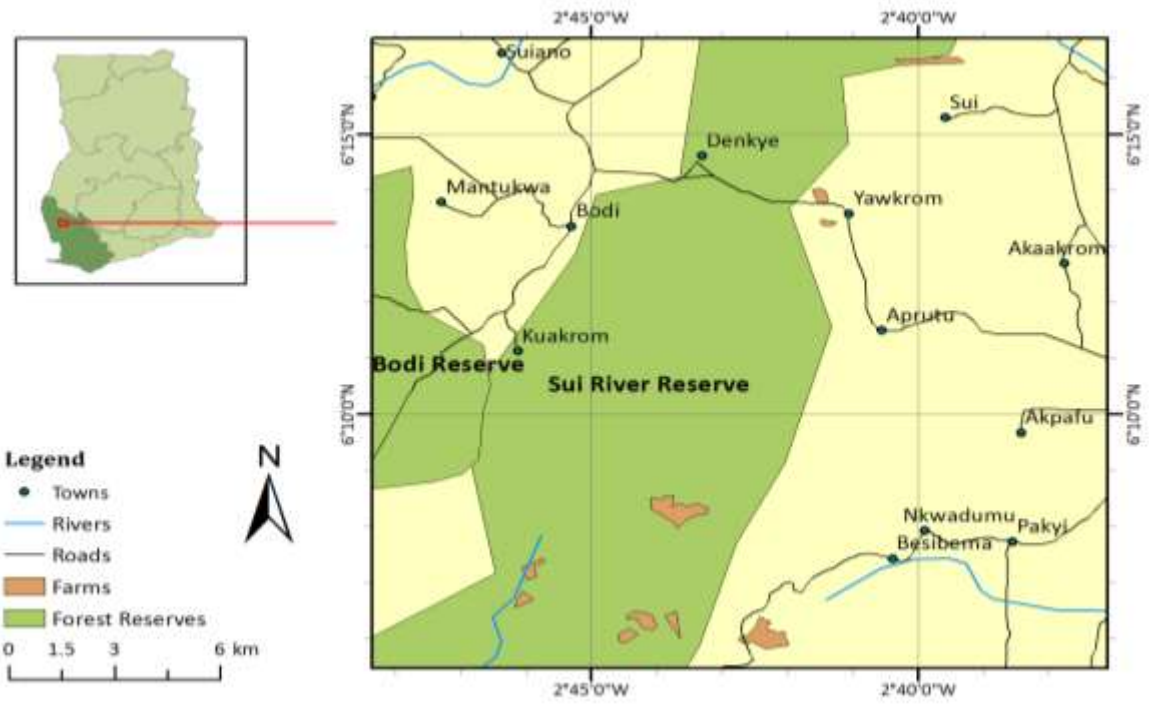

Fig. 1: Location of the Sui River Forest Reserve including admitted farms

Project Members

Gilbert Baase Adum (Project Leader) holds master's (MPhil) degree in Wildlife and Range Management. He is the Co-founder, Executive Director and Chief Ecologist at SAVE THE FROGS! Ghana. Gilbert has extensive knowledge about the Giant Squeaker Frog, with related publications. With the assistance of the other team members he was in charge of designing survey and conservation education protocols, training and dissemination of results. The other team members who supported in meeting the project objectives included:

Alfred Kofi Barah holds BSc in Natural Resources Management (Wildlife option). He is currently employed as a Law Enforcement Officer with Ghana Wildlife Division.

Jacqueline Sapoama Kumadoh holds a Masters in Environmental Conservation**.** She is the current Scientific Officer for A Rocha Ghana.

Ohene Boakye Adomako holds BSc in Natural Resources Management (Wildlife option). He is the Project Coordinator for SAVE THE FROGS! Ghana, and also a post-graduate student at the University of Greenwich, UK.

Sandra Owusu-Gyamfi holds a Masters in Environmental Conservation**.** She currently works with SAVE THE FROGS! Ghana as the Associate Executive Director. She was employed at the time of this project, and worked with the team to build her knowledge in amphibian research and conservation.

SECTION 2:

Aim and Objectives

Overall goal: Contribute baseline data on the habitat and population ecology of the Giant Squeaker Frog.

Objectives:

- Assess and estimate population size and structure.
- Study the habitat use and requirements, and document existing and potential threats to its survival.
- Launch conservation education programmes to increase environmental awareness among local communities, affected logging companies, government agencies, and the general public.
- Involve and build the capacities of university students, local people, and staff of logging companies and Ghana Forestry Commission in the protection of the species.

Objectives outlined were followed through to the end without any changes.

Changes to Original Project Plan

No changes were made to the original project plan or objectives.

Methodology

Objective 1 Population Estimates of the Giant Squeaker Frog

We conducted 6 months of field surveys in the dry and wet seasons, using Visual Encounter Surveys (VES) and Acoustic Encounter Surveys (AES). We visually scanned the terrain, examined possible hideouts (e.g. under leaf-litter and stones). We also conducted randomised opportunistic forest walks by walking slowly for 2 hours through suitable habitats. We captured and photographed frogs and used their distinctive colour patterns to identify them on subsequent visits.

Objective 2 Habitat Use and Identification of Threats

The positions of every individual specimen encountered were recorded using hand-held GPS units. Ecological data comprising forest structure, canopy cover, and litter depth at each visit were also recorded. We recorded ecological threats (signs of invasive weeds, timber extraction, skid trucks, mining and farming) during each field visit and gathered more information about ongoing illegal activities through informal interviews with local people.

Objective 3 Conservation Education Programme (Awareness Creation)

We also carried out awareness campaigns to appeal to the conscience of individuals to care and support amphibian conservation. We engaged locals and school children through PowerPoint presentations, video shows, radio and TV broadcasts and art and poetry competitions. We also created educational materials including flyers, posters, info cards and project t-shirts. These materials contained information about local amphibian species, threats they face and what ways people can help to protect them. To disseminate our results to wider audiences, we made use of Facebook and electronic newsletters.

Objective 4 Stakeholder Involvement and Capacity Building in Amphibian Conservation Research

We organised workshops and office-to-office meetings with logging companies and other stakeholders in stipulating guidelines for the protection of the species. The discussions considered timber companies setting aside the species' critical habitats during logging operations. Through field experience, we also involved university students, local persons, and staff from FC, in the correct identification of the species and its habitats. We also engaged some of these volunteers in the planning and execution of our educational campaigns.

Outputs and Results

Objective 1

We recorded a total of 207 anurans belonging to 17 species, six genera and five families. This included an adult male (43mm long) of the Giant Squeaker Frog, a rediscovery after four fruitless years of searching. The family Phrynobatrachidae recorded the highest number of species. The most dominant species however, according to the results was *Arthroleptis spp* with 65 individuals whiles *Amietophrynus regularis*, *Hylarana occidentalis* and *Phrynobatrachus tokba* recorded the lowest with two each. Two species (*Hylarana occidentalis* and *Phrynobatrachus annulatus*) are Endangered and another, *Phrynobatrachus villiersi* is Vulnerable. Five other species are Near-Threatened: *Arthroleptis krokosua* (which has only been recently reassessed), *Amietophrynus togoensis*, *Leptopelis occidentalis*, *Phrynobatrachus alleni*, and *Phrynobatrachus liberiensis*. Furthermore, nearly a half of the species are endemic to the Upper Guinea forest zone.

Fig 2: The rediscovered Giant Squeaker Frog

Fig 3: Co-occurring frogs: Coast River Frog (*Phrynobatrachus plicatus*)

Fig 4: Co-occurring frogs: Boutry River Frog *(Phrynobatrachus calcaratus)*

Objective 2

Objective 2.1 Habitat Use

We found the Giant Squeaker Frog during the late rainy season (October) at the highest peak of SRFR hills (06°14.727'N, 002°41.167'W), at an elevation of 610m asl. The canopy opening was relatively wide and the leaf-litter depth was 2cm. The local temperature was 24.9^{o}C. There were no nearby streams.

Objective 2.2 Identification of Threats

Logging

We recorded widespread legal and illegal logging activities by both timber companies and local people. These activities led to severe habitat fragmentation, and loss of the species' critical habitats.

Agriculture

The reserve is characterised by fertile soils essential for the cultivation of cash crops including cocoa (*Theobroma cacao*). As such, local farmers are increasingly encroaching it for new farmlands, creating pockets of farms in and around the species' habitat.

Mining

Many individuals and companies have started prospecting the reserve illegally for minerals leaving behind trails of abandoned and uncovered mine pits, serving as ecological traps to the species. At some places, we recorded an average of 50 mine pits/hectare.

Alien Plant Invasion

We recorded the alien invasive plant, Devil weed (*Chromolaena odorata*) within the species critical habitats. *C. odorata* has formed dense thickets preventing the growth of native plants. This has also led to the depletion of the density of leaf-litter that the species utilises for predator escape, protection from desiccation and breeding activities.

Charcoaling

We recorded charcoal production activities within the species critical habitat areas. The culprits are local people who burn down trees to produce charcoal, which is their main fuel source for cooking.

Fig 5: Recorded threats to the Giant Squeaker Frog. Clockwise from top left: weeds, charcoal production, farms and logged areas

Objective 3

We freely distributed thousands of educational materials including posters, info cards, and t-shirts to local stakeholders, students and the general public.

Fig 6: An electronic image of CLP-branded project t-shirts

Fig 7: Volunteers embarking on an outreach programme in local communities

Fig 8: Project leader with students at a conservation education programme (left) and with a student artist (right)

Fig 9: Schoolchildren at one of our organised outreach programmes displaying the Giant Squeaker Frog Info Card

Fig 10: An artwork by a student depicting saving the Giant Squeaker Frog

Objective 4

We specifically trained seven undergraduates, two locals and a staff from the Forestry Commission to build their capacities in amphibian conservation. We also established two junior chapters of SAVE THE FROGS! Ghana. In addition, we organised five stakeholders' workshops involving local people, logging companies and government institutions.

Fig 11: At an organised stakeholders' workshop

Fig 12: Traditional Council Meeting

Fig 13: Some trainees in the field collecting data

Communication & Application of Results

We held stakeholders' meetings to inform relevant authorities especially the Forestry Commission of Ghana and the board members of SAVE THE FROGS! Ghana about our findings for the necessary legal interventions to be carried out. We also made use of the media including

TV, radio and newspapers to reach more Ghanaians. On the global scale, in collaboration with US-based SAVE THE FROGS!, we updated subscribers of the organisation's newsletters, blogs and social media (Facebook, Twitter, YouTube) pages. We also made presentations at the 2014 Students' Conference on Conservation Science at the University of Cambridge; the University of Nottingham and British Herpetological Society. In addition, we published an article in FrogLog, the IUCN amphibian specialists group's newsletter. All these avenues were helpful in getting information out to the relevant local and international bodies, highlighting our findings about the plight of the Giant Squeaker Frog. This also generated the necessary attention and support for the conservation of the species and other co-occurring biodiversity at SRFR.

Monitoring and Evaluation

We formed a Project Implementation and Monitoring Team (PIMOT), consisting of team members, SAVE THE FROGS! Ghana Board members, representatives of all stakeholders and collaborators including local communities, who directly oversaw the smooth execution of the project. PIMOT made field visits after the implementation of activities to monitor and assess the project's operations. The Team solicited and evaluated feedbacks to establish the project achievement 'on the ground'.

Achievements and Impacts

Objective 1

The rediscovery of Giant Squeaker Frog after failing to find it in the past four years on other projects was a breakthrough. Our study recorded its second adult specimen ever, in addition to the holotype (Ernst et al. 2008). In 2009, Adum et al. (2011, 2013) recorded 13 individuals at SRFR all of which were juveniles (Adum et al., 2011, 2013). Although further investigations are needed, the failure to find any more than one adult at a time indicates the Giant Squeaker Frog

has low adulthood survival rates. However, our project was also successful in confirming the presence of three other globally threatened frogs.

Objective 2

The discovery of an entirely new locality within SRFR indicates the importance of this forest to the long-term survival of the Giant Squeaker Frog. Also, the presence of other globally threatened frogs and the high level of local endemism further indicate the uniqueness of this habitat for the protection of Ghana's amphibian biodiversity. However, we also established that the combination illegal logging, farming, and mining activities, and weed invasion are contributing to the species' decline. In agreement with past studies, our results also indicate the Giant Squeaker Frog is active mostly during the rainy season. Also, its presence at high altitudes and based on past records from lowlands shows the species is a habitat generalist.

Objective 3

Through TV, radio, newspapers, blogs, newsletter releases and social media postings, we made an estimated 2 million local and international people aware about the ecology and plight of the species. One attitudinal change we observed was the increase in the number of local volunteers on our subsequent amphibian research and conservation initiatives. Some locals to date also volunteer information on illegal activities within the forest to law enforcement agencies. The species in effect has become a "flagship", helping to protect biodiversity at the Sui River Forest Reserve. For instance, its publicity was also instrumental in helping us secure other funding grants for further conservation interventions such as habitat restoration.

Objective 4

With the establishment of the two junior chapters of SAVE THE FROGS! Ghana, we are securing the longevity of Ghana's environmental movement. The youth are continuously educated about amphibians and the need to appreciate them and nature as a whole. We believe this will

encourage more of these students to go on to pursue studies and careers in science related courses including biology, ecology and evolution. We could also train and support the thesis projects of seven undergraduate students at KNUST. This increased the number of young Ghanaian amphibian researchers by up to a quarter.

Capacity Development and Leadership Capabilities

Team members through this project have had the opportunity to improve greatly on their skills, knowledge and experience especially in the areas of research and presentation. We learnt the benefits of being team players and the need to get the opinions of members to help with decision making. Our interactions with different stakeholders helped to build an important relationship which we constantly utilise for the benefit of amphibian conservation.

The CLP Future Conservationist Award and related training provided us the impetus to be well placed and keeping us working in conservation till date. We have since won several other funding grants and scholarships. For instance our CLP-funded project aided in the award of Alexander von Humboldt Fellowship to Gilbert. Based at the Berlin Museum für Naturkunde, in addition to data from other projects, our CLP-funded amphibian records are giving us the chance to build models on the impacts of future climate on the Giant Squeaker Frog and other Ghanaian amphibians. Also with the CLP-funded data Gilbert also had a research stay at The University of Nottingham where we developed a manuscript that is still in preparation.

SECTION 3:

Conclusion

This project led to the rediscovery of the Giant Squeaker Frog, after going missing for four years. The SRFR is an important amphibian hotspot; nearly a half of species are endemic (to the Upper Guinean forest) including at least three globally threatened frogs. These include *Hylarana occidentalis*, *Phrynobatrachus annulatus* and *P. villiersi.* Unfortunately, the combination of illegal

farming, mining, and logging activities and invasion of alien weeds are pushing the Giant Squeaker Frog and these other endangered frogs to the brink of extinction. We have been successful with several conservation education and publicity activities including video shows, radio and TV broadcasts, conference presentations, journal publications, blogs, social media postings, distribution of educational materials and stakeholders' workshops. Subsequently, we recorded some positive changes in local people's attitude towards frogs and nature conservation in general. The Giant Squeaker Frog is also now recognised as a "flagship" species. However, there is still the knowledge gap about its population structure and breeding ecology, which are needed to inform specific interventions.

Problems Encountered and Lessons Learnt

Successful Activities

We were very successful in spreading our amphibian conservation message which reached millions of people. We largely attribute this to the engagement of other communication strategies especially, the use of print and electronic media. Unlike past efforts that failed to find the species, our approach in involving many undergraduate students also made a difference.

Problems Encountered

We recorded only one specimen of the Giant Squeaker Frog, thus, it was impossible for detailed studies on its population ecology. We also originally proposed lobbying the Forestry Commission of Ghana (FC) and logging companies with concessions in the reserve to delineate the species' critical habitats from logging. However, as work progressed, we realised this problem went beyond what was perceived. Even if the affected companies did agree to delineate the species' priority conservation areas, activities by illegal loggers and farmers could potentially thwart our conservation efforts. We painstakingly identified some of these illegal loggers and farmers and together with FC officials, we organised special workshops for them. We however, acknowledge

that it will still be difficult to stop entirely these culprits from encroaching the species' habitat. It would take persistent persuasion to get them out of the reserve. Already, their activities have degraded the species' critical habitats. Based on our preliminary stakeholder's workshop results, we also identified the need to restore degraded areas and provide alternative livelihoods to incentivise farmers and loggers who will be moved out of the reserve.

Assessment of Project Methods

As far as the proposed project methodology is concerned, they were very effective in helping us achieve our objectives. Particularly, the combination of Visual Encounter Surveys (VES) and Acoustic Encounter Surveys (AES) were very crucial in helping us rediscover the species, and recording co-occurring amphibians. When we realised that the threats associated with human activities went beyond what was envisioned, we decided to garner national support to put more pressure on authorities to protect the reserve. The use of print, broadcasting and internet-based media was effective in this regard.

Lessons Learnt

We learnt through this project to appreciate the importance of the bottom-up approach to tackling conservation problems. Since local people are the bona fide custodians of any forest and its resources, there can be no meaningful conservation success without their full participation and involvement. They felt respected and in the end, and opened up to us and offering useful information.

In the Future

The Giant Squeaker Frog's rare nature makes it difficult to achieve meaningful results within one year. Therefore, we have already established a long term-monitoring programme to realise more focused conservation actions. We are seeking further funding to sustain this initiative, which also allows local people and university students to build their capacities in amphibian

research and conservation. We have also embarked on restoration projects to improve the species' habitat conditions. With the success of future funding, we will sustain this progress to ensure we permanently eradicate invasive weeds, and restore all degraded and fragmented suitable habitat areas.

Given the findings of this project about the high level of threats to the Giant Squeaker Frog, the rarity and presumed low adulthood survival rates, its down-listing from Endangered to Near-Threatened by IUCN is worrying. The reassessment is based in part on the finding of a single record at Mount Nimba, Guinea (IUCN 2015), which is now a voucher specimen. However, since SRFR harbours its only extant populations, which are small and fragmented (based on the findings of this project and follow up studies), IUCN's reassessment is risky for the species' long-term protection. Thus, we highly recommend a proper re-assessment to 'Critically Endangered'.

Financial Report

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification (Justification must be provided if figure in column D is +/- 25%)
PHASE I - PROJECT PREPARATION				
Communications (telephone/internet/postage)	360.00	360.00	0%	
Field guide books, maps, journal articles and other printed materials	200.00	200.00	0%	
Insurance	90.00	105.00	17%	
Visas and permits				
Team training	135.00	125.00	-7%	
Reconnaissance	250.00	295.00	18%	Adjustments were made in this segment due to inflation especially in the area of transportation

Other (Phase 1)				
EQUIPMENT				
Scientific/field equipment and supplies	1,200.00	800.00	-33%	The team borrowed Hobo loggers from a sister organisation and used the proposed money to augment other inflated costs
Photographic equipment				
Camping equipment	400.00	465.00	16%	Inflation in the cost of camping materials. SAVE THE FROGS contributed matching funds
Boat/engine/truck (including				
Other (Equipment)				
PHASE II - IMPLEMENTATION				
Accommodation for team members and local guides	400.00	460.00	15%	
Food for team members and local guides	1,950.00	2100.00	8%	
Travel and local transportation (including fuel)	3,250.00	3250.00	0%	
Customs and/or port duties				
Workshops	845	775.00	-8%	
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	2,450.00	2675.00	9%	
Other (Phase 2)	2,000.00	2000.00	0%	
PHASE III - POST-PROJECT EXPENSES				
Administration	420.00	420.00	0%	
Report production and results dissemination	1,050.00	1050.00	0%	
Other (Phase 3)				
Total	**15,000.00**	**15,080.00**		

Section 4:

Appendices

Appendix 4.1: Recorded anuran amphibian species at SRFR and their current conservation status

Family	Species	Geo. Dist.	IUCN Redlist Category	No. individuals
Bufonidae	*Amietophrynus regularis*	A	LC	2
Bufonidae	*Amietophrynus togoensis*	WA	NT	6
Arthroleptidae	*Arthroleptis krokosua*	UG	NT	1
Arthroleptidae	*Arthroleptis spp*	UG	LC	65
Arthroleptidae	*Leptopelis occidentalis*	UG	NT	3
Ranidae	*Hylarana occidentalis*	A	EN	2
Ranidae	*Hylarana albolabris*	A	LC	7
Phrynobatrachidae	*Phrynobatrachus alleni*	UG	NT	11
Phrynobatrachidae	*Phrynobatrachus annulatus*	A	EN	32
Phrynobatrachidae	*Phrynobatrachus calcaratus*	UG	LC	24
Phrynobatrachidae	*Phrynobatrachus latifrons*	UG	LC	8
Phrynobatrachidae	*Phrynobatrachus liberiensis*	WA	NT	9
Phrynobatrachidae	*Phrynobatrachus plicatus*	UG	LC	14
Phrynobatrachidae	*Phrynobatrachus tokba*	WA	LC	2
Phrynobatrachidae	*Phrynobatrachus villiersi*	UG	VU	3
Ptychadenidae	*Ptychadena aequiplicata*	A	LC	6
Ptychadenidae	*Ptychadena bibroni*	A	LC	12

Geographic distribution: A = distributed also outside West Africa; WA = only in West Africa West of the Cross River; UG = endemic to the Upper Guinea forest zone (rainforest West of the Dahomey Gap).

Red list: EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern.

Appendix 4.2 Links to Website Reports about the Research and Conservation of The Giant Squeaker Frog

Press Releases on the Rediscovery of the Giant Squeaker Frog

Scientific America (International): http://blogs.scientificamerican.com/extinction-countdown/2013/10/25/frog-ghana-devil-weed/

Frogblog (international): http://www.savethefrogs.com/frogblog/save-the-frogs-news/one-of-the-worlds-rarest-frogs-finally-found/

Myjoyonline.com (national): http://www.myjoyonline.com/news/2013/october-21st/rare-endangered-frog-found-in-ghana.php

Modernghana.com (national): http://www.modernghana.com/news/498175/1/one-of-worlds-rarest-frogs-found-in-ghana.html

Promoting the Image of CLP

Facebook: https://www.facebook.com/adumgilbert/posts/780060368688677?stream_ref=5

Frogblog: http://www.savethefrogs.com/frogblog/save-the-frogs-news/save-the-frogs-ghana-wins-global-conservation-leadership-award/

Conservation Education

Ghana Television (national): http://www.savethefrogs.com/frogblog/businesses-for-frogs/save-the-frogs-ghana-to-talk-live-on-tv-about-the-plight-of-amphibians/

YouTube Videos

https://www.youtube.com/watch?v=35IxtlIl9Jk,

https://www.youtube.com/watch?v=g5fYQNGy8yI,

https://www.youtube.com/watch?v=I8qgRMCg5cE

Official Website

www.savethefrogs.com/ghana

Presentations

University of Cambridge: "Impacts of Invasive weeds on amphibians"

http://www.sccs-cam.org/Pdfs/2014/Book%20of%20Abstracts%202014-revised.pdf

University of Nottingham and British Herpetological Society: "Saving Ghana's Vanishing Frogs"

http://www.savethefrogs.com/frogblog/save-the-frogs-news/save-the-frogs-ghanas-programmes-co-ordinators-visit-to-uk-makes-huge-waves/

Appendix 4.3 Bibliography

Cited Publications within the Report

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Adum, G. B., Eichhorn, M. P., Oduro, W., Ofori-Boateng, C. and, Rödel, M.-O. 2013: Two-Stage Recovery of Amphibian Assemblages Following Selective Logging of Tropical Forests. Conservation Biology. doi: 10.1111/cobi.12006.

Ernst, R., Agyei, A. C., & Roedel, M. O. (2008). A new giant species of Arthroleptis (Amphibia: Anura: Arthroleptidae) from the Krokosua Hills Forest Reserve, south-western Ghana. Zootaxa, 1697, 58-68.

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IUCN SSC Amphibian Specialist Group. 2015. Arthroleptis krokosua. The IUCN Red List of Threatened Species 2015: e.T174591A16862286. http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T174591A16862286.en.

Appendix 4.4 Abstract of Presentation at the Universities of Cambridge and Nottingham

Impacts of invasive weeds on amphibians

SANDRA OWUSU-GYAMFI
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Alien invasive plants are threats to biodiversity worldwide but little knowledge exists of the impacts on amphibians in the tropics. At south-western Ghana's Sui River Forest, we investigated the relationship between amphibian densities and composition and the density of the alien invasive plant Siam Weed (Chromolaena odorata). There was a strong significant negative correlation between densities

of amphibians and C. odorata. In C. odorata infested areas, invasive amphibian species also dominated over leaf-litter amphibian species. These results suggest that the infestation of C. odorata establishes invasive amphibians and at the same time fuels the decline of leaf-litter amphibian species.

Appendix 4.5 Publication by a Project Member: Holding on by a Thread: The Plight of the Giant West African Squeaker Frog, *Arthroleptis krokosua*.

Authors: Sandra Owusu-Gyamfi and Gilbert B. Adum

Holding on by a Thread: The Plight of the Giant West African Squeaker Frog, *Arthroleptis krokosua*

By [1]Sandra Owusu-Gyamfi and [1]Gilbert B. Adum

The Giant West African squeaker frog (*Arthroleptis krokosua* Ernst, Agyei & Rödel, 2008; hereafter Giant squeaker frog), is evolutionarily distinct from any West African amphibian (3). It differs from all known members of its genus *Arthroleptis* by its large size (> 40 mm snout-vent-length), coloration and other morphological characters, such as a very broad head (2). This unusual frog, though currently listed as Endangered by the IUCN, no doubt may be one of West Africa's rarest and most endangered amphibians. For four successive years since 2009, despite investing thousands of dollars and countless man-hours in finding it, all efforts proved futile up until October 2013 when just a single adult frog was found at Western Ghana's Sui River Forest Reserve (SRFR). Unfortunately, SRFR is constantly under threat from logging, farming, illegal mineral mining and invasion of the alien weed *Chromolaena odorata* popularly called Devil Weed or Acheampong weed (1,2).

To date the Giant squeaker frog has only been recorded a few times. It was first identified in 2002 from a single specimen recorded at the Krokosua Hills Forest Reserve (3), about 30 km to the SRFR. Despite subsequent active searching to find more frogs it was not until 2009 that 14 individuals, its highest abundance ever, were recorded at SRFR (1, 2). Thus, only 16 individuals of the Giant squeaker frog have been observed to date, three of which have been kept as museum specimens. The fate of these surviving 13 individuals hangs in the balance due to the prevailing threats at their only remaining home on earth, SRFR. In the light of the persistent threats, which we have highlighted below, to save the Giant squeaker frog from imminent extinction we have proposed herein drastic and focused measures including the upgrading of its conservation status from Endangered to Critically Endangered.

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INVASION OF NON-NATIVE WEED *CHROMOLAENA ODORATA*

There are already large fragments within SRFR and the Krokosua Hills Forest Reserve that are characterized by highly compacted soil and secondary growth, clogged with the invasive weed *Chromolaena odorata* (2, 3). *C. odorata* is a non-native plant species that is a major threat to biodiversity throughout the tropics (4). *C. odorata* has formed dense thickets that impede the frogs' movement; it may

Appendix 4.6 Unpublished Theses of Undergraduates on the Project

Amoah, E. (2014) Habitat Threats and Zoogeographical Patterns of Amphibians in Sui River Forest Reserve. Undergraduate thesis, Kwame Nkrumah University of Science and Technology

Arthur, I, F. (2014) Effects of forest conversion into agriculture farms on amphibians in Sui River Forest Reserve, Western Ghana. Undergraduate thesis, Kwame Nkrumah University of Science and Technology.

Bawa, S. (2014) Correlation between *Chromolaena odorata* and amphibian community structure dynamics. Undergraduate thesis, Kwame Nkrumah University of Science and Technology.

Tawia, K. S. (2014) Amphibian composition and distribution along elevational gradient of Sui River Forest Reserve, Western Ghana. Undergraduate thesis, Kwame Nkrumah University of Science and Technology.

Osei-Tutu, O. (2014) Effects of riparian buffer width on distribution of amphibians in Sui River Forest Reserve, Western Ghana. Undergraduate thesis, Kwame Nkrumah University of Science and Technology.

Appendix 4.7 A Sample of Circulated SAVE THE FROGS! Newsletters

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SAVE THE FROGS! Ghana's Giant Squeaker Frog efforts featured in this month's FrogLog

SAVE THE FROGS! Ghana has been working hard to protect the Giant Squeaker Frog, one of the most endangered frogs on the planet. An article they wrote detailing their efforts was recently published in FrogLog. The article is called "Holding on by a Thread: The Plight of the Giant West African Squeaker Frog, Arthroleptis krokosua". Please download the PDF and distribute it widely.

Appendix 4.8 CLP M&E Measures

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	0	None
Number of species assessments contributed to (E.g. IUCN assessments)	1	There was a reassessment of the Giant Squeaker Frog in 2015 from Endangered to Near Threatened by IUCN based on our data and that from Mount Nimba, Guinea (Appendix 4.9).
Number of site assessments contributed to (E.g. IBA assessments)	0	None
Number of NGOs established	2	SAVE THE FROGS! Ghana through this project established junior chapters in local schools to help propagate our amphibian conservation message and inspire the next generation of scientists.
Amount of extra funding leveraged ($)	53,371	Since 2013, we have secured funds towards the Giant Squeaker Frog from: • Rufford Foundation: 2nd and Booster Grants • Amphibian Conservation Fund (Stiftung Artenschutz) • Disney Conservation Fund • Mohamed bin Zayed Species Conservation Fund
Number of species discovered/rediscovered	1	An adult of the Giant Squeaker Frog was discovered on this project
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	0	None
Number of species/sites legally protected for biodiversity	0	None
Number of stakeholders actively engaged in species/site conservation management	30	This number comprises of representatives of the local traditional council, Forestry Commission, logging companies and schools
Number of species/site management plans/strategies developed	1	In preparation

Number of stakeholders reached	+2 million	This includes both national and international people who were reached through blogs, Facebook, newsletter, radio, TV, newspaper and conference presentations.
Examples of stakeholder behaviour change brought about by the project.		Stakeholders especially within the communities are more appreciative of frogs and adopted the Giant Squeaker Frog as a flagship species for the protection of the Sui River Forest Reserve.
Examples of policy change brought about by the project		We updated the Forestry Commission of Ghana on the impacts of illegal activities within the reserve. Subsequently, there have been massive removal of illegal farms.
Number of jobs created	9	We engaged two local people full time on this project. To date, they still assist us on all our other projects within the reserve. We also sponsored undergraduate students' theses related to research on amphibians in the reserve.
Number of academic papers published	1	A publication was made in Froglog about the species' rediscovery and the threat to its survival
Number of conferences where project results have been presented	3	Presentations were made at the Students Conference on Conservation Science, University of Cambridge, University of Nottingham and British Herpetological Society

Appendix 4.9 Recent Reassessment of The Giant Squeaker Frog by IUCN

Taxonomy [top]

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Amphibia	Anura	Arthroleptidae

Scientific Name:	*Arthroleptis krokosua*
Species Authority:	Ernst, Agyei & Rödel, 2008
Common Name(s): English – Krokosua Squeaking Frog	
Taxonomic Source(s):	Frost, D.R. 2014. Amphibian Species of the World: an Online Reference. Version 6 (27 January 2014). New York, USA. Available at: http://research.amnh.org/herpetology/amphibia/index.html. (Accessed: 27 January 2014).

Assessment Information [top]

Red List Category & Criteria:	Near Threatened ver 3.1
Year Published:	2015
Date Assessed:	2012-05-01
Assessor(s):	IUCN SSC Amphibian Specialist Group
Reviewer(s):	Stuart, S.N.
Contributor(s):	Sandberger, L., Rödel , M.-O., Jarosińska, P. & Ernst, R.