

CONSERVATION FOLLOW-UP PROJECT FINAL REPORT

Conservation of the Critically Endangered Togo Slippery Frog in Ghana



Togo slippery frog (*Conraua derooi*)

This project aimed at saving the last viable population of the critically endangered Togo slippery frog (*Conraua derooi*) from extinction

CLP project ID: F01158013

(Field Period: Feb. 2013 to Aug. 2014)

Author (s):

Caleb Ofori-Boateng, Evans Nkrumah, Asha Damoah & Philip Amankwaa

calebofori@gmail.com:

www.herpghana.org

September 2014

Table of Contents

Table of Contents	2
Project Partners & Collaborators	3
Summary	4
Introduction	5
Key Project Partners and their Role	6
Project Members	6
Aim and objectives.....	7
Methodology.....	7
Objective 1: Determined the status of the Togo slippery frog population in the Togo-Volta Hills.....	7
Objective 2: Reduce human consumption of the Togo slippery frog.....	8
Objective 3. Restore 10-ha of degraded habitats of the Togo slippery frog in the Togo-Volta Hills.	8
Objective 4. Enhance in-country capacity to protect the Togo slippery frog.....	8
Outputs and Results.....	9
Outputs from Objective 1	9
Fig. 1. Field Work Pictures.....	10
Outputs from Objective 2	11
Fig. 2. Field Work Pictures.....	12
Outputs from Objective 3	13
Fig. 3. Field Work Pictures.....	13
Outputs from objective 4	14
Fig. 4. Field Work Pictures.....	14
Communication & Application of Results.....	15
Problems encountered and lessons learnt.....	17
Future Planned Work.....	17
Financial Report	18
Appendices	19

Project Partners & Collaborators

Herp Conservation Ghana (Herp-Ghana)

Herp-Ghana is Ghana's first amphibian and reptile conservation society. Herp-Ghana was the main implementing partner of this project. Herp-Ghana has field staff and key collaborators in the study site that facilitated successful implementation of project activities.

Amedzofe Tourism Board

Tourism personnel working for the Amedzofe tourism provided valuable assistants that enable us to successfully rediscover the Togo slippery frog in the Volta Region of Ghana

Adam Leache

All analysis of genetic data was conducted at Adam's lab (Leache Lab) at the University of Washington.

Ghana Wildlife Division

Provided the necessary permits including CITES permits that allowed the project team to send genetic material to the US

Kwame Nkrumah University of Science and Technology

Students from the Faculty of Renewable Natural Resources were involved in monitoring of project outcomes as part of their undergraduate thesis research

Mark-Oliver Rödel

Provided expert advice and guidance on the taxonomic component of this project

Zoological Society of London

Provided additional funding that allowed the project team leader to visit and conduct genetic analysis at the Leache Lab.

Summary

The slippery frog faces an imminent extinction threat due to hunting pressures and a rapidly declining forest habitat. The species is known to occur in two isolated sites; the Togo-Volta-Hills (along the Ghana-Togo border) and the Atewa Mountains (eastern Ghana). The objectives of this project were to: (1) determine the status of the Togo slippery frog population in the Togo-Volta Hills along the Ghana-Togo border (2) reduce human consumption of the Togo slippery frog (~ 50%) in the Togo-Volta region (3) restore 10-ha of degraded habitats of the Togo slippery frog in the Togo-Volta Hills and (4) enhance in-country capacity to protect the Togo slippery frog. Activities that were conducted to achieve project objectives include, field surveys, population assessment, collection of habitat data, collection and analysis of genetic data, conservation awareness in local communities, tree planting and capacity building training programs. Results show that the population of the slippery frog in the Togo-Volta is genetically distinct from the Atewa population in eastern Ghana (8.9% genetic difference, $p=0.010$) and only 112 individuals exist. Other important project results include the restoration of 10ha of degraded slippery frog habitat, raising of ~5000 indigenous tree seedlings and the establishment of West Africa's first amphibian field school program. Based on the population and genetic results of this project, we conclude that the true Togo slippery frog only occurs in the Togo-Volta Hills and that the species is far more threatened than previously assumed. This conclusion is in contrast to a previously held assumption that two different isolated populations exist. Future work must focus on the creation of a protected area in the Togo-Volta Hills to guarantee the long term survival of this critically endangered species.

Introduction

The Togo slippery frog (*Conraua derooi*) is a unique amphibian species in terms of its evolutionary history. The Togo slippery frog is one of between 16 and about 100 species (depending on which amphibian taxonomy you consult) present within the Petropedetidae family, which diverged from all other amphibians about 70 million years ago in the Late Cretaceous. This group started to evolve separately from the rest of the extant amphibians 5 million years before the extinction of the dinosaurs, which makes them as different from their closest relatives as pigs are to whales! (<http://www.edgeofexistence.org/amphibians/species>) It is currently ranked the 30th most genetically distinct and globally endangered amphibian in the world. The species was recently rediscovered after years of believed extinction. It is listed as critically endangered on the basis of a rapidly declining forest habitat and restricted geographic range (< 10km²). The frog occurs in only two isolated sites; The Togo-Volta hills and Atewa Mountains.

The frog faces threats from hunting pressures and a rapidly declining forest habitat. The frogs habitat (forests) are under great pressure from the surrounding population, majority of who are living below the poverty line and rely on the forests for their livelihoods. As a result logging, harvest and agricultural expansion are not sustainably managed and this poses a significant threat to the survival of this critically endangered species. The projects objectives were (1) Determined the status of the Togo slippery frog population in the Togo-Volta Hills along the Ghana-Togo border (2) Reduce human consumption of the Togo slippery frog (~ 50%) in the Togo-Volta region (3) Restore 10-ha of degraded habitats of the Togo slippery frog in the Togo-Volta Hills and (4) Enhance in-country capacity to protect the Togo slippery frog.

This project was implemented near Amedzofe in the Volta Region of Ghana. Geographically, the site falls along Ghana's easternmost boundary with the Republic of Togo. It comprises a ~1000ha land mas' part of a chain of mountains known as the Togo-Volta Range. Attitudinally, it is the highest point (700masl) of human settlement in Ghana. The habitat consists of a mosaic of riverine and upland semi-deciduous forest cover, embedded within a scenic mountainous landscape and a beautiful waterfall (Fig. 1).

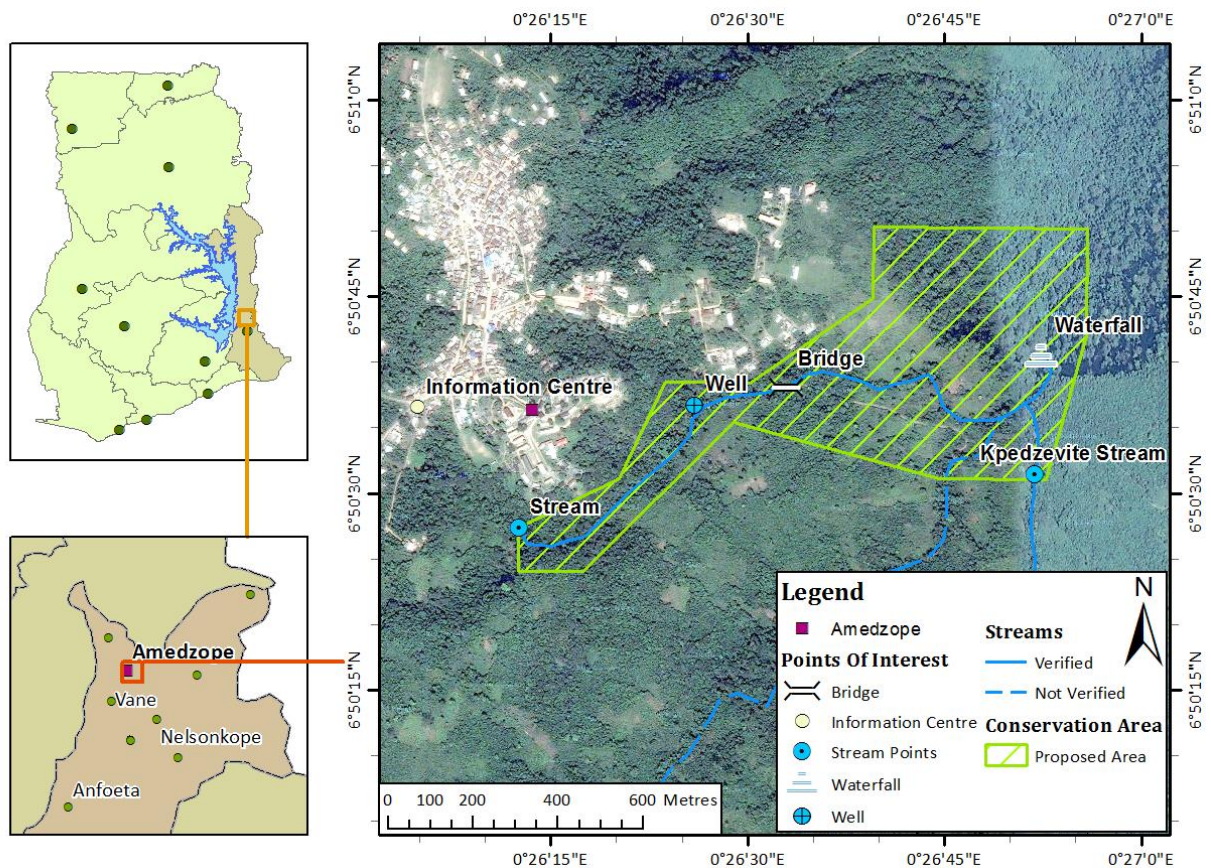


Fig. 1: Map of the project site (Amedzofe).

Key Project Partners and their Role

Herp-Ghana, an amphibian and reptile non-profit is conducting a number of conservation programs at the project site and therefore were key partners to this project. Herp-Ghana facilitated community entry and provided student volunteers who worked on this project. A number of local stakeholders including community leaders (Okusie Foli IV, Mr. Average, Mr. Sanctify and Mr. Destiny Tanko) and the Evangelical Presbyterian Church of Ghana supported the project in various ways.

Project Members

Project Members were Caleb Ofori Boateng (Team leader), Evans Nkrumah (Alternative livelihood support program leader), Philip Amankwah (Species survey leader) and Asha Damoah (Capacity building leader).

Caleb Ofori Boateng holds a PhD in Wildlife Management. He is a Research Scientist with the Forestry Research Institute of Ghana, a part-time lecturer at the Kwame Nkrumah University of Science and Technology and the director of Herp Conservation Ghana. Evans Nkrumah holds a PhD in

Wildlife Management. He is a fulltime lecturer at the Kwame Nkrumah University of Science and Technology and the founder and director of BatLife Ghana. Philip Amankwah holds a Bachelors in Natural Resources Management. He currently works with a local plantation firm. Asha holds a MSc. in Environmental Management. She is currently a human resource manager in a health facility.

Aim and objectives

The project aimed at improving knowledge on the Togo slippery frog to aid conservation efforts, reduce threats to the frog's survival and enhance capacity in in-country amphibian conservation. The specific project objectives were:

1. Determined the status of the Togo slippery frog population in the Togo-Volta Hills along the Ghana-Togo border
2. Reduce human consumption of the Togo slippery frog (~ 50%) in the Togo-Volta region
3. Restore 10-ha of degraded habitats of the Togo slippery frog in the Togo-Volta Hills. And
4. Enhance in-country capacity to protect the Togo slippery frog

Methodology

Objective 1: Determined the status of the Togo slippery frog population in the Togo-Volta Hills along the Ghana-Togo border.

Activities Conducted

Activity 1.1 **Field Surveys:** We conducted field surveys throughout most of the Volta region of Ghana. We used opportunistic encounter survey techniques. Beginning our search from sites where the frog has previously been recorded, we expanded to other areas where suitable habitat types were observed.

Activity 1.2 **Population Size Estimate:** We estimated the population size (*i.e.* counted) the Togo slippery frog in the Togo-Volta Hills. We used mark-recapture techniques. In total, we achieved a minimum of 10-repeat visits to preselected sampling sites. Data has been analysed using the Schnabel formulae.

Activity 1.3 **Habitat Preferences:** We characterize the habitat conditions within our sampling plots by selecting 50 sampling plots (25x25m) based a stratified random design. In each sampling plot, we collected site and habitat data (e.g. water temperature, turbidity, PH, canopy coverage, tree diameter (DBH) measurements and the distance from each sampling point to the nearest human settlement) as well as count data of the species. The

data has been analysed by developing single season patch occupancy models using the software PRESENCE (version 6.9).

Activity 1.4 **Population Genetics:** We assessed the genetic composition between the two global subpopulations of the slippery frog. We first collected tissue samples from individual frogs in both the Togo-Volta Hills and the Atewa Hills. Tissues samples were analysed at the Burke museum in Seattle, US. We compared mitochondrial DNA (mtDNA) between the two populations using widely used extraction kits (Qiagen), PCR and sequencing protocols.

Objective 2: Reduce human consumption of the Togo slippery frog (~ 50%) in the Togo-Volta region.

Activities Conducted

Activity 2.1. Schools Outreaches: We conducted conservation awareness and behavior change campaigns in local schools (primary, junior high schools and senior high schools) both in the Togo-Volta region and some townships around the Atewa Hills. In the last six months we focused most of our outreach efforts mainly in Amedzofe-the site where the largest population of the species persist in the Togo-Volta Hills. We educated both teachers and pupils as well as community leaders.

Activity 2. 2 Conservation Outreaches (Conservation Evangelism): We used religious platforms to home-in our conservation message on the need to protect the target species. The targeted behavior changes included changing the local people's preference for the consumption of the slippery frog as bush meat. Prior to this intervention we randomly sampled the views of 100 households to establish a baseline of preferences for the consumption of the targeted frog species.

Objective 3. Restore 10-ha of degraded habitats of the Togo slippery frog in the Togo-Volta Hills.

Activities Conducted

Activity 3.1 Site and tree selection: We surveyed and identified planting sites that are likely to benefit the slippery frog with respect to its breeding success.

Activity 3.2. Tree Planting: Tree seedlings were acquired and planted in collaboration with community leaders. Five thousand seedlings were planted and another 5000 regenerated. Planting occurred also in the village of Biakpa-the species previously occurred here and planting is aimed at providing a migratory riparian corridor whilst improving habitat conditions.

Objective 4. Enhance in-country capacity to protect the Togo slippery frog

Activities Conducted

Activity 1: Training of local people: We trained local people on how to identify the slippery frog and to conduct mark-recapture techniques using advance population monitoring techniques and tagging system. Team members also trained various local communities on different alternative livelihood programs.

Activity 2: Amphibian field school: We organized the first Ecology Field School in West Africa dedicated to building capacity in amphibian conservation and research. The course was organized over a 10-day period in the middle of a semi-deciduous tropical rain forest. Trainees received hands-on training in amphibian identification, research design, sampling techniques, fund raising and conservation.

Outputs and Results

Outputs from Objective 1

1. Sixty-two (62) sites in six main localities in the Togo-Volta Hills were surveyed during the project period. A previously unknown population of the Togo slippery frog was discovered (near Gbajeme village) in the course of our surveys. However, in some other localities where the frog has previously been reported (Biakpa & Leklebi), we could not confirm its' continues existence-this may be due to the consumption of this frog as bush meat by the local people and a high stream sedimentation due to ongoing road constructions.
2. The census population size of the slippery frog on the Ghanaian side of the Togo-Volta Hills has been determined. A total of 112 (± 5) individuals of the species occur on the Ghanaian side of the Togo-Volta Hills.
3. Habitat suitability models developed using modeling software's show that forest conditions and human presence are the major drivers of the slippery frog distribution (Appendix 1.1). Specifically, good quality forest remote from human settlements has the highest likelihood of harboring the slippery frog in the sites investigated.
4. The genetic data gathered shows that the two populations of the Togo slippery frog are genetically highly differentiated (8.9%, genetic difference, $p=0.010$). The population in the Atewa Hills certainly represents a new and previously undescribed species. The true Togo

slippery frog therefore only occurs in a single site: the Togo-Volta Hills, along the Ghana-Togo border.

Fig. 1. Field Work Pictures



Field surveys in the Togo-Volta Hills



Togo slippery frog in the Togo-Volta Hills



Field surveys in the Togo-Volta Hills



Field data gathering in the Togo-Volta Hills



Team and volunteer photos during fieldwork



Team and volunteer photos during fieldwork

Outputs from Objective 2

Thirty conservation talks and lectures were delivered by project team members to students including pupils. In addition, about 2500 adults were reached by our conservation evangelism outreach program in various churches and a mosque. Sixty community and religious leaders received training on how to incorporate conservation messages in their sermons and constituency plans.

Though we have no data on how often, conservation messages are incorporated into sermons, field monitoring conducted by undergraduate students before and after project intervention show the incidence of hunting and consumption of the target species reduced by 100% during project period.

CONSERVATION FOLLOW-UP PROJECT FINAL REPORT

Fig. 2. Field Work Pictures



Team leader speaking to students during a conservation outreach program



Team member speaking to students during a conservation outreach program



A district level conservation workshop for Muslim and Christian leaders at Kibi-District capital



Training workshop for religious leaders in Sagyimase-a village near our project site



Pristine remnant habitat of the slippery frog in the Togo-Volta Hills



Degraded habitats of the slippery frog in the Togo-Volta Hills-this patch have some frogs still persisting in it.

Outputs from Objective 3

10 hectares of degraded Togo slippery frog habitat was planted with native tree species. Fast growing indigenous tree seedlings (Ofram (*Terminalia superba*) Wawa (*Triplochiton scleroxylon*) Ceiba (*Ceiba pentandra*), Mahogany (*Khaya ivorensis*), Emeri (*Terminalia ivorensis*)) were planted in collaboration with the local community (Amedzofe). The team provided training for the local community and thereafter played a supervisory role in tree planting activities. Planting occurred along riparian corridors of the sanctuary where the slippery frog species occur. Restoration of tree cover will help improve microclimatic conditions necessary for the survival of the species. Also it will provide a riparian corridor that aids re-colonization of the species into its historical distributional ranges where it is now extirpated. In total about 5000 seedlings were planted. An additional, 10,000 native tree seedlings are being raised by community members to continue the restoration of a planned additional 10-20 ha of critical slippery frog habitat. Local people are passionate about species conservation and will continue to take care of all the trees planted after project completion.

Fig. 3. Field Work Pictures



Community evangelism @ Kibi Mosque



Community evangelism @ Kibi Mosque



Community Workshop @ Amedzofe Town



Tree planting @ Biakpa (team leader 2nd from right-left)

Outputs from objective 4

Fifteen early career conservationist including graduates and undergraduate students from three different Universities in Ghana and local NGO staff were trained in design of research and conservation programs as part of our amphibian field school program. Also, three local people were trained to identify the Togo slippery frog and continue population monitoring in the Togo-Volta Region of Ghana.

Fig. 4. Field Work Pictures



Field school: trainees ask questions



Field school: group discussions



Field school: mistnetting bats



Field school: trainees pose after bat surveys



Field school: Bird sampling



Field school: bird handling training



Field school: lectures



Field school: graduation



Project team inspects tree nursery



Project team inspects tree nursery

Communication & Application of Results

The results of this and previous projects have been used to develop a survival blueprint for the Togo slippery frog. The survival blueprint summarizes all known information about the species and provides a framework to guide conservation action. The document being developed in collaboration with the Zoological Society of London will soon be freely available on-line for downloads.

Also, two papers will be published from the data gathered from this project. The first manuscript will describe a new frog (*Conraua*) species from the Atewa based on the genetic results generated from this and other projects of our collaborators. The second paper will describe the habitat preferences of the Togo slippery frog.

Results of the project have also been shared with the local communities and this is already influencing conservation action on-the-ground. Details of communities' response to the project results are highlighted in the section below under project impact.

Monitoring and Evaluation

We funded an independent third party (undergraduate student) to conduct a social survey to assess the impact of our awareness creation activities on the behavior of the local communities. They conducted household level interviews on hunting incidence and consumption rates, species hunted and the reasons certain species were preferred. Based this initial results follow-up interviews were conducted asking similar questions after the project intervention. In general incidence of frog consumption reduced from 70% at the beginning of the project to less than 10% during the last monitoring.

Achievements and Impacts

A 100-hectare forest land has been donated by the local communities to protect the Togo slippery frogs habitat in response to the information generated and shared from this project. The land area encompasses a beautiful waterfall, mountain ridges, an upland evergreen forest and a moderately degraded buffer area. The establishment and functioning of the proposed sanctuary will protect the last remaining intact habitat of the target frog species and other endangered wildlife in the Togo-Volta Hills. This is an important contribution to the project aim of improving the conservation status of the critically endangered Togo slippery frog. The site will be managed by Herp Conservation Ghana in collaboration with the local communities to benefit both wildlife and the people.

Also, this project successfully engaged and partnered with local community groups to develop a 5000 seedling capacity community nursery. The nursery specializes in propagating indigenous tree seedlings endemic to the mountain ranges of the Volta-Hills and therefore not available in commercial nurseries. About 5000 indigenous tree seedlings have been raised. This is a very crucial partnership that contributes directly to our aim of realizing an improved habitat conditions for the survival of the Togo slippery frog.

Also, genetic results show that the two populations of the Togo slippery frog (previously assumed to be subpopulations) are distinct species. The data generated from this study and those of other collaborators is being used to write a paper describing the Atewa Hills population as a new species to science. This information has already been shared with all major stakeholders including the Ministry of Land and Natural Resources, The Forestry Commission of Ghana and the Coalition of NGOs against mining in forest reserves. Based on this result, we plan to also propose the Atewa Hills forest reserve as an Allianz for Zero Extinction Site.

Capacity Development and Leadership Capabilities

Important skills developed and / or improved include skills in DNA extraction and sequencing, teaching and effective community engagement. Other team members gained skills for the first time in using Visual Implant Elastomers Alpha numeric tags in censusing amphibian population. Also, we gain important skills in data analysis including using the program Mark to analyse population level data. Additional skills acquired by team members includes organization and human resource management skill during our capacity building amphibian field school program.

Problems Encountered and Lessons Learnt

Behaviour change and general community engagement programs worked very well. This is because we took advantage of the religious inclination of the target communities by integrating our conservation awareness into the people's religion. This religious approach to conservation triggered a lot interest in our campaigns resulting in significant behaviour changes. Important lesson we have learnt in community engagement is that you need to demonstrate that you are genuinely interested in the people and have respect for their religious and cultural inclinations.

All in all, the project did not encounter any major setbacks. There were some delays in getting genetic data analysed but this was resolved with funding from a partner organization that allowed me to travel to the University of Washington to complete the genetic component of this work.

Future Planned Work

This work will continue by focusing in two key areas. First, we will seek continuous funding to sustain behaviour change outcomes in the local community by providing an alternative protein sources for the people. Second, we will continue the restoration of riparian habitats with the possibility of providing an alternative water source for the local community aimed at reducing human impact on the frog's habitat.

Financial Report

Itemized expenses	Total CLP requested (USD)	Total CLP used (USD)
PHASE I - PROJECT PREPARATION	2,337.00	2,110.33
Communication (Air time, internet data and connectivity etc)	250	223.33
Field guide books, maps, journal articles and other printed materials	77	77
Insurance (NA)		
Visas and permits (Research permits and US visa)	300	300
Team training (Please detail: Living cost for 4-ppl@ \$20/per./day for 7-days)	760	560
Medical supplies/First Aid (NA)		
Reconnaissance (Please detail: Reconnaissance survey-(vehicle hire, fuel & living expense)		
Other (Please detail: Reconnaissance survey-(vehicle hire, fuel & living expense)	950	950
EQUIPMENT	3,764.00	4,479.00
Scientific/field equipment and supplies (Please detail: expendable supplies including DNA extraction)	1,880.00	2,680.00
Photographic equipment (Please detail: Camera)	250.00	250.00
Camping equipment (Please detail main items: Tents & headlamps)	704.00	424.00
Vehicle Hire (E.g. Boat/Truck/Engine: Vehicle hire)		
Other (Please detail: VI Alpha tags- injector, replacement needle and shim)	930.00	1,125.00
PHASE II - IMPLEMENTATION	18,699.00	18,110.33
Accommodation for team members and local guides (Please detail: Accommodation for team members and volunteers during conservation education in Amedzofe township)	1,000.00	1,050.00
Food for team members and local guides (Please detail: Food for 4 team members and 1 local guide during field work)	2,400.00	2,400.00
Travel (Including fuel costs) (Please detail: Vehicle hire, fuel and lubricants)	2,792.00	2,741.00
Workshop1 (Alternative livelihood training) Light refreshments for workshop participants, Living expenses (lodging and meals) for 3 facilitators, vehicle hire and fuel	2,457.00	2,508.33
Workshop 2 (Capacity building training for young conservationist), accomodation for 150 trainees, living expense of trainees, field gear, living expense of facilitators, field assistants, stationery	1,700.00	1,646.67
Outreach/education activities and materials (brochures, posters, video, t-shirts, etc.) (Please detail: 200 T-shirts @\$5.5/T-shirt (\$1,100), Transportation cost of meeting with stakeholders and brochures)	2,100.00	1,603.33
Other (Please detail: Seedlings cost, transportation of seedlings, planting and maintenance)	6,250.00	6,161.00
PHASE III - POST-PROJECT EXPENSES	200.00	300.00
Report production and results dissemination	200.00	300.00
Other (Please detail:)		
Total	25,000.00	24,999.66

Appendices

Appendix 4.1 CLP M&E measures

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	2	
Number of species assessments contributed to (E.g. IUCN assessments)		
Number of site assessments contributed to (E.g. IBA assessments)		
Number of NGOs established		
Amount of extra funding leveraged (\$)	\$50,000	IUCN-SOS
Number of species discovered/rediscovered	1	New Conraua species
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	1	Proposed AZE Site for Atewa forest
Number of species/sites legally protected for biodiversity	1	Community protection at Amedzofe
Number of stakeholders actively engaged in species/site conservation management	5	
Number of species/site management plans/strategies developed		
Number of stakeholders reached	10	
Examples of stakeholder behaviour change brought about by the project.		
Examples of policy change brought about by the project		
Number of jobs created		
Number of academic papers published	2	Manuscript in preparation
Number of conferences where project results have been presented	2	ACRS, ICCB

Address List and Web Links

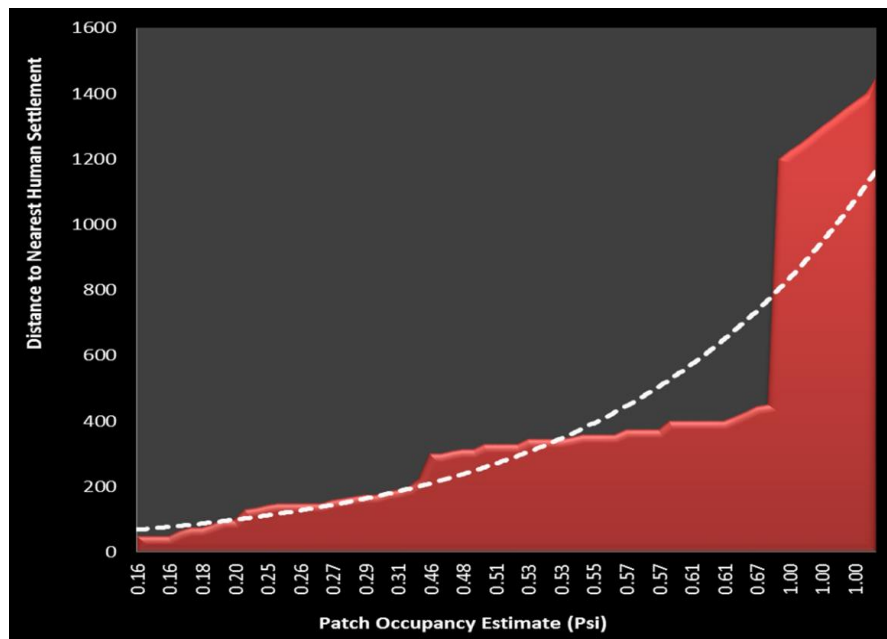
Herp Conservation Ghana: www.herpghana.org

Distribution List

1. Conservation Leadership Program
2. Forestry Research Institute of Ghana (FORIG)
3. Ghana Wildlife Division (GWD)
4. Herp-Ghana
5. Faculty of Renewable Natural Resources
6. Amedzofe Tourism Council

Summary Results

- 1.1 Results of predictive patch occupancy model of the Togo slippery frog. Results shows patch occupancy increases with increasing distance from human settlement (distances in meters)



1.2 Summary of genetic results. Results show that average pairwise genetic distance between populations is very high (8.9%) and significant.

