

Establishing a Captive Breeding Facility for Malagasy Amphibians

Project directors

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Total Funding Requested from AArk: \$4,972

Executive Summary

Slightly more than one quarter of Madagascar's amphibian species are threatened with extinction¹. Habitat destruction and over-harvesting are the greatest factors contributing to this biodiversity crisis. The impending threat of amphibian chytrid fungus *Batrachochytrium denrobatidis* (*Bd*) is also of huge concern². To bring the potential threat of this disease into perspective, it has been called the "worst infectious disease ever recorded among vertebrates in terms of the numbers of species impacted and its propensity to drive them to extinction"³. Association Mitsinjo, a community-run organization founded by villagers in Andasibe, is seeking a total of \$98,302 (USD) to create a captive breeding facility for threatened Madagascar amphibians. This facility will maintain captive amphibian populations to help ensure the continued survival of species at the greatest risk of extinction. On the ground, AArk funds will be used to purchase supplies for live food production and equipment for field work. The real benefit from financially supporting this project however, will be our ability to demonstrate solid backing from AArk on applications to leverage future funding opportunities.

Introduction

Madagascar hosts some of the highest amphibian endemism and species richness in the world⁴. At least 380 species have been identified, 150 of which still await description. All but one of these are endemic. Including those which are recognized but not described, Madagascar supports an exceptional 6% of all known amphibian species.

Tragically, over one quarter of Madagascar's amphibians are threatened with extinction⁵. Agriculture, charcoal production, legal and illegal logging, and livestock grazing all contribute to the destruction of amphibian habitat in Madagascar. This is especially threatening for the many species known only from a single site. Collection of amphibians for the pet trade also threatens certain species. Colourful and charismatic *Mantella* species are heavily targeted, many of which have extremely restricted distributions and are thus additionally threatened by habitat degradation.

Pilot research suggests that *Bd* has yet to arrive to Madagascar⁶, so it seems that for now Malagasy amphibians have been spared from this globally-spreading disease. However, given the island's proximity to mainland Africa, where *Bd* is widespread, and the high likelihood of *Bd* being introduced through contaminated equipment brought by tourists and foreign researchers, and materials imported for aquaculture, it is necessary to

have infrastructure in place in advance of the almost inevitable arrival of *Bd*. We propose to build a facility to support assurance colonies of threatened amphibians in Andasibe.

In addition to ensuring the future survival of threatened amphibians and developing capacity to manage an epidemic of *Bd*, this project also will raise awareness of local people to the ecological importance of frogs. Captive populations on display near the breeding facility will allow people to view frogs year-round, thereby raising awareness of Andasibe's uniquely rich amphibian fauna. Additionally, the facility will serve as an area where amphibian educational programs will be conducted for school groups, using captive frogs to spark interest in wild ones within the local community.

Frogs on display to the public will also sustainably generate income to help maintain this project indefinitely. The captive breeding and educational facility will be located at the Analamazaotra Forest Station, which is adjacent to Andasibe-Mantadia National Park. This is a particularly popular destination for ecotourists. Up to 300 may visit the park daily⁷. Tourists will be invited to view the frogs on display for a nominal fee, thereby generating income to support the facility while raising awareness of Malagasy amphibians at the same time.

Methodology

The project site is located at the Analamazaotra Forest Station, near the town of Andasibe in east-central Madagascar. This area supports an exceptional number of amphibian species – over 100 within a 30 km radius of town⁸. The proposed breeding facility will be built from the foundations of the forest station. Substantial renovations are needed to ensure the highest possible levels of biosecurity and to provide conditions suitable for raising amphibians and their live invertebrate food. Funding for renovating the forest station has been sought through the AZA Conservation Endowment Fund.

The project will rely on the local Andasibe population for staffing. Three fulltime employees are needed for maintenance, cleaning and control of vivaria, aquaria, record keeping, and live food production. Their training will be assured by experienced amphibian specialists. Project director Devin Edmonds has kept and bred amphibians since childhood and has authored two books about their captive care. He holds a degree in zoology from the University of Wisconsin-Madison and has experience maintaining captive assurance populations of Panamanian amphibians at the Henry Vilas Zoo. Additionally, he has successfully bred three of the four target species the breeding facility will initially support. Frogs will be cared for and managed under his supervision during the first two years of the project. Additionally, Dr. Jennifer Pramuk of the Bronx Zoo/Wildlife Conservation Society will hold training workshops at the facility. Along with other WCS staff, she will generate educational material about amphibians for school-aged Malagasy children as well as exhibit graphics for frogs on display.

Amphibian species have been chosen based on their conservation status, potential for successful management in captivity, and high ranking in AArk species prioritization list. The breeding facility initially will focus on establishing captive populations of four *Mantella* species: *M. aurantiaca* (CR, AArk priority 51), *M. cowani* (CR, AArk priority 51), *M. crocea* (EN, AArk priority 26), and *M. milotympanum* (CR, AArk priority 46).

At least 30 male and 30 female founders of each species will be collected to initially start the program. This has been determined to be a suitable number for maintaining high genetic variation in a captive amphibian population long-term⁹. Their

individual identities will be recorded by taking digital photographs of their ventral markings, which are unique between frogs. Tents, sleeping pads, head lamps, and nets will be used during the collection of founders, and will be utilized during field studies associated with the facility in the future. Populations will be managed following AArk guidelines to ensure maximum genetic diversity is maintained. Additional Madagascar frogs will be enrolled in the breeding program in the future. Emphasis will be placed on phylogenetically unique threatened species with restricted geographic ranges, especially those that occur in areas with high rates of habitat alteration.

As recommended by the Sahonagasy Action Plan¹⁰, species representative of varied ecological guilds will also be kept and bred at the facility to determine their captive care and breeding requirements. Developing breeding strategies for species that have yet to be worked with in captivity will facilitate rapid establishment of captive populations should the need arise in the future. Information gathered from breeding attempts made with new species at the Analamazaotra breeding facility will be disseminated with zoos and institutions worldwide through peer-reviewed publications.

The breeding facility will be composed of four rooms, with an additional building being built for educational activities. One room will be used for housing permanent assurance colonies of frogs, another for quarantine, a third for raising tadpoles and juvenile amphibians, and the final room for culturing live foods. Guidelines for best practices of amphibian facility biosecurity will be followed from the CBSG/WAZA Amphibian ex-situ conservation planning workshop held in El Valle, Panama in 2006. Staff at the Analamazaotra facility will follow the strictest biosecurity measures allowable, keeping in mind that future wild stocks may be supplemented with captive-bred animals produced at the facility.

Next to maintaining high levels of biosecurity, assuring a sufficient food supply for the frogs is among the most important tasks of the breeding program. Flightless fruit flies (*Drosophila*) will be cultured in jars. It is expected that in excess of 150 cultures will need to be maintained at the same time. Collembolans will be cultured for juvenile frogs. 100 to 200 small plastic food storage containers will be used for this purpose. Crickets will also be cultured in plastic storage containers. At least 50 large containers will be needed. Additionally, staff at the breeding facility will experiment with culturing other insects that are native to the Andasibe area, such as cockroach, beetle and termite species. To complement this food, suitable vitamin and mineral supplements will be used to ensure all nutritional requirements are met.

Association Mitsinjo seeks funding from AArk for field equipment, live food supplies, and personnel. One of the unique aspects of this project is the collaboration between a community-focused NGO, a North American Zoo, a university-based amphibian husbandry expert, and the people from the local Andasibe community. The following budget demonstrates the commitment of partnering institutions to support the personnel required to implement a captive conservation program with livelihood and local educational implications. While this seed grant may only represent slightly more than 5% of our total budget, financial backing from AArk will demonstrate support from a prominent amphibian conservation organization that will help leverage other funding sources we are currently applying for, such as the Mohamed bin Zayed Species Conservation Fund.

Budget

Item (Quantity x CPU)	Total Cost	Requested from AArk	Other Source/Status
<i>Live food production</i>			
Plastic bags (1000 x \$0.25)	\$250	\$250	
Small plastic boxes (1000 x \$0.25)	\$250	\$250	
Large plastic boxes for crickets (50 x \$2)	\$100	\$100	
Jars for <i>Drosophila</i> (1500 x \$0.50)	\$750	\$750	
<i>Drosophila media</i> (50 Kg x \$11)	\$550	\$550	
<i>Field equipment</i>			
Two-person tents (3 x \$200)	\$600	\$600	
Sleeping pads (6 x \$20)	\$120	\$120	
Headlamps (6 x \$17)	\$102	\$102	
Large nets (2 x \$15)	\$30	\$30	
<i>Record keeping</i>			
Digital camera (1 x \$120)	\$120	\$120	
Portable external harddrive (1 x \$100)	\$100	\$100	
<i>Bd</i> testing through Pisces Molecular (300 x \$10/test)	\$3,000		WCS (Requested)
<i>Personnel</i>			
Director (24 months x \$500)	\$12000	\$1000	MBZ* Fund (Requesting)
Three caretakers (60 months x \$300)	\$18000	\$1000	MBZ* Fund (Requesting)
Logistics manager (60 months x \$200)	\$12000		MBZ* Fund (Requesting)
Caretaker trainer (4 weeks x \$1600)	\$6400		WCS (Requested)
WCS Pathologist (4 weeks x \$1800)	\$7200		WCS (Requested)
Flight for WCS staff (2 x \$2500)	\$5000		WCS (Requested)
Per diem for WCS staff (28 days x \$50)	\$1400		WCS (Requested)
<i>Educational Materials</i>			
Development and printing of educational material	\$8400		WCS (Requested)
<i>Construction/Renovation of Facility and Vivaria</i>			
Labor (100 x \$4/man-day)	\$400		AZA CEF Fund (Requested)
Bricks, planks, nails, cement, shelves, lights, etc.	\$8200		AZA CEF Fund (Requested)
Air Conditioners (3 x \$200/unit)	\$600		AZA CEF Fund (Requested)
Vivaria, large for display/education (12 x \$200/unit)	\$2400		AZA CEF Fund (Requested)
Vivaria, various sizes (250 x \$28 ave./unit)	\$7000		AZA CEF Fund (Requested)
Plastic aquaria and containers (250 x \$4.40 ave./unit)	\$1100		AZA CEF Fund (Requested)
Vivaria plumbing, UV sterilizer, water monitoring	\$1500		AZA CEF Fund (Requested)
Glass & guide rails (20 x \$15/ m ² + 100 x \$4.30/unit)	\$730		MBZ* Fund (Requesting)
<i>Requested from AArk</i>		\$4972 (5%)	
<i>Currently seeking from other sources</i>		\$93330 (95%)	
<i>Total</i>		\$98302	
*Mohamed bin Zayed Species Conservation Fund			

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Timetable		
<i>Activity or task</i>	<i>Start date</i>	<i>Activity length</i>
Fundraising activities to launch project	March 2009	6 months
Building renovations	October 2009	2 Months
Construction of shelving units and vivaria	January 2010	2 Months
Importation and establishment of live food cultures	January 2010	6 Months
Personnel training	January 2010	2 Years
Collection of founders for initial target species	November 2010	2 Months
Acclimation of founders to captivity	November 2010	2 Months
Breeding program	December 2010	> 50 years
Educational materials and programs	January 2011	> 50 years