

amphibian ark

Rescuing amphibians in crisis

Newsletter

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Above: The endangered Long-toed Tree Frog from South Africa is one of many species that the newly formed Anura Africa works to protect (pg. 7).

Below: The AArk team gathers in person for the first time in years for a long-awaited strategic planning meeting, hosted by Brevard Zoo (pg 2).



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Amphibian Ark leaps ahead during strategic planning meeting at Brevard Zoo

Becca Brunner | Program Director, Amphibian Ark

Amphibian Ark is a global organization with staff based all around the world. To touch base in person, our core team generally meets once every couple of years to discuss our future directions and plans. The pandemic put a wrench in this tradition, so we were very grateful when Brevard Zoo in Melbourne, Florida offered to host us this January for a much-needed strategic meeting. This marked the first time our core team had met in person since the hiring of Jonathan Wilcken, our Executive Director, and Becca Brunner, our Program Director. Luis Carrillo, our Training Director, is based at Brevard Zoo and graciously planned our 3-day meeting. We were also joined by Onnie Byers, the Chair of the IUCN Conservation Planning Specialist Group (CPSG); Elizabeth Townsend, the Finance Officer for both AArk and CPSG; Keith Winsten, the Executive Director of Brevard Zoo; and Anne Baker, AArk's previous Executive Director—who joined us over zoom despite being under the weather.

After many fruitful discussions, we developed a strategic plan to guide our work in the coming years. By reviewing AArk's successes thus far, we refined the three main pillars of our work: 1) prioritizing species in need of rescue, 2) building sustainable capacity, and 3) supporting species assurance programs. These pillars helped guide our decision to take a more country-based approach in our programming. In the near future, we plan to implement National Amphibian Rescue Programs, each guided by an AArk Country Coordinator. Our pilot country-based programs in Argentina and Brazil helped inform this new direction. We also plan to evolve our Conservation Needs Assessment process to incorporate the latest conservation science and to disseminate the results more broadly, update our website, and remodel our grants program. Stay tuned for exciting changes in the coming months...

Please take a look at our new Strategic Plan on the following few pages!

The AArk team met in person this January, generously hosted by Brevard Zoo. Pictured below, from left to right: Keith Winsten, Executive Director at Brevard Zoo; Becca Brunner, Program Director at AArk; Jonathan Wilcken, Executive Director at AArk; Luis Carrillo, Training Director at AArk; Onnie Byers, Chair of CPSG; Elizabeth Townsend, Finance Officer at CPSG and AArk.





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Rescuing amphibians in crisis

Crisis



Around the world, more amphibians are at risk of extinction than any other group of vertebrates. As a result of habitat loss, disease, and climate change, **over 40% of all amphibians are currently on a path to extinction**. The world is losing amphibians at a rate of one species every eight months.



Response

In response to this growing crisis, **Amphibian Ark** was established by the IUCN Species Survival Commission (SSC) and the World Association of Zoos and Aquariums (WAZA). At Amphibian Ark, **we secure a future for amphibian species most at risk**: those likely to become extinct before their natural environment can be made safe for them again. For those species, we set up *ex situ* assurance programs so that when it is safe to do so, they can be released back into the wild.



Amphibian Ark collaborates closely with our sister organizations: the IUCN Species Survival Commission's **Amphibian Specialist Group (ASG)** and the **Amphibian Survival Alliance (ASA)**. Together, we aim to amplify amphibian conservation efforts around the world.



Amphibian Ark rescues amphibians in crisis, saving species that cannot currently be safeguarded in nature. We do this by:



Prioritizing species in need of rescue

- ▶ Identifying focus countries
- ▶ Building networks of experts
- ▶ Conducting *Conservation Needs Assessments* for all threatened amphibian species & promoting the results
- ▶ Strengthening our conservation assessment toolkit

Building sustainable capacity

- ▶ Building country readiness
 - > Establishing National Program Coordinators
 - > Recruiting partner institutions
- ▶ Building institutional capacity
 - > Assessing institutional needs
 - > Delivering training programs

Supporting species assurance programs

- ▶ Providing for programs
 - > Funds
 - > Training
 - > Expertise
- ▶ Facilitating institutional partnerships
- ▶ Preparing partners for species reintroduction





So far, AArk has helped secure a future for 37 of the world's most at-risk frogs and salamanders. Programs for many more are in progress.

To date, amphibian ark has:

Developed a suite of internationally-recognized **amphibian conservation assessment tools**

Conducted **Conservation Needs Assessment** workshops for **3,565 species** across **51 countries**

Trained **2,840 practitioners** across **34 countries** in amphibian rescue and management

Developed the world's most comprehensive **free, online amphibian husbandry library**

Provided funding for **46 species assurance programs** across **22 countries**



Valcheta's Frog: an AArk Success Story

This species was prioritized for *ex situ* rescue at an AArk *Conservation Needs Assessment* workshop in 2010. Found in only one small area in Argentina, it was under imminent threat of extinction, mostly due to invasive species. Acting quickly, we helped fund their rescue and trained local program managers. An assurance program was established in 2015, and habitat restoration began shortly afterwards. Valcheta's frog has now been successfully reintroduced back into the wild.



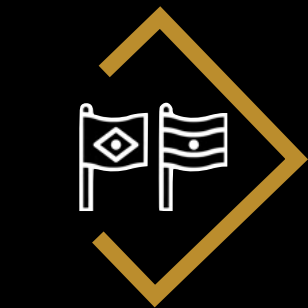
The Future

Over the next decade, **Amphibian Ark will strive to provide hundreds more amphibian species the assurance programs they need** to keep them safe until reintroduction is possible. We will work to spread our network through more countries around the world, **building larger and ever-stronger partnerships of institutions committed to saving their country's amphibians**, and develop better resources to help them with this work. *Our priorities are:*



Evolving our Conservation Needs Assessments

- ❑ Incorporate new and emerging science into AArk's CNA tool
- ❑ Transform the way regional and national assessments are communicated



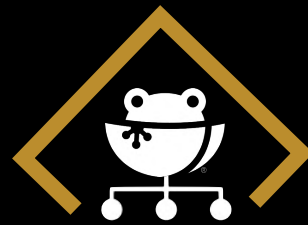
Launching National Amphibian Rescue Programs

- ❑ Establish *National Amphibian Rescue Programs* in 6 countries by 2026
- ❑ Set up and support networks of zoological institutions within each country to be prepared for amphibian rescue



Growing and Targeting our Grants Program

- ❑ Remodel the AArk grants program to help fund delivery of *National Amphibian Rescue Programs*
- ❑ Provide greater assistance to grant applicants



Engaging our Growing Stakeholder Base

- ❑ Welcome a communications professional to the AArk team
- ❑ Develop and implement a new AArk communications strategy
- ❑ Redesign and relaunch the AArk website



Photo credits: Margarita Lampo (*Atelopus cruciger*), Victor Luna-Mora (*Andinobates tolimense*), Nick Richwagen (*Anaxyrus terrestris*), North American Bsal Taskforce (*Salamandra salamandra*), Andrew Baita (*Pithecopus hypochondrialis*), Bjorn Olesen (*Pelobatrachus nasutus*), Jelger Herder (*Hyperolius tuberilinguis* & *Ichthyosaura alpestris*), Gabriela Agostini (*Ceratophrys ornata*), Federico Kacoliris (*Pleurodema somuncureense*), Janet Fikar (*Dendrobates tinctorius*), Lucas Bustamante (*Hylalinobatrachium mashpi*)

Anura Africa: a new non-profit dedicated to amphibian conservation in sub-Saharan Africa

Jeanne Tarrant | Director, Anura Africa

Anura Africa the only non-profit solely dedicated to amphibian conservation in sub-Saharan Africa. We are committed to advancing amphibian conservation in the region, by identifying needs and knowledge gaps, bolstering research capacity, and implementing conservation actions informed by evidence. Our landscape-level conservation approach centers on Africa's remarkable amphibians as sentinels for ecosystem health and resilience. We support sustainable landscape-level habitat protection by facilitating natural resource management practices aimed at ensuring the conservation of critical amphibian habitat. Our approach is guided by global amphibian conservation priorities, with a focus on enhancing ecosystem resilience to safeguard species adaptation. Integral to our mission is supporting mindset shifts towards appreciation for African amphibian conservation through skills transfer, citizen science, partnerships, improving awareness and strengthening local capacity.



As habitats are transformed and climate change impacts become increasingly realized, Africa's amphibians are at increased risk of extinction. These flagships for freshwater health, habitat integrity and diversity, are often the last to be considered in conservation planning. Globally, 40.7% are threatened. Scaling up conservation action for amphibians has never been more critical.

Please check out our website here and spread the word: <https://www.anuraafrica.org/>

To read more, here is a link to Anura Africa's first blog post: <https://www.anuraafrica.org/post/the-croak-amphibian-conservation-conversations>



Right: Jeanne Tarrant, Director and Founder of Anura Africa, has decades of experience in amphibian conservation throughout her home country of South Africa and surrounding countries. **Bottom:** An amphibian outreach event with local children and one of Africa's endangered frog species, the Long-toed Tree Frog. Photo: Keir Lynch



Conserving endangered urban amphibians in Cuenca, Ecuador

Jackeline Arpi, Fausto Siavichay, & Nataly Aguilar | Centro de Conservación de Anfibios - Amaru, Ecuador

At the Centro de Conservación de Anfibios- Amaru (CCA), we maintain populations of two endangered frog species: *Ctenophryne aequatorialis* and *Gastrotheca cuenana*. We rescue individuals from the urban properties around the construction of the Guanguarcucho wastewater treatment plant, a project by the city of Cuenca, Ecuador that began in 2022. The *ex situ* management of *Ctenophryne aequatorialis* has been a challenge for our technicians because it is a fossorial species (meaning it lives underground for most of its life) with seasonal reproductive behavior—their breeding is triggered by certain precipitation events in Cuenca.

The rescue, translocation and monitoring process for these species includes twilight outings to find frogs. We follow an established security protocol for the collection and transport of individuals to the conservation center, and new frogs are quarantined; this process includes preventive baths against emerging diseases, evaluation of coproparasites (in feces), and physical evaluations for a month. Our analyses have identified coproparasites from the orders Armophorida, Strongylida, Slopalinida and Eucoccidiida. Once the quarantine period is over, we place individuals in enclosures according to their ecology. Terrariums are enriched with soil, leaf litter, coconut fiber and tree bark disinfected with 3% benzalkonium chloride.

During fieldwork in the city, we also rescued a large number of tadpoles. Once transported to the center, we placed tadpoles in glass aquariums with gravel substrates and a 30% daily water exchange. Their diet consists of a powder (based on fruits, vegetables, cereals and spirulina) that is prepared in the amphibian nutrition area. By raising them at CCA, we were able to record metamorphosis times for both species: 5 months for *Ctenophryne aequatorialis* and 3 months for *Gastrotheca cuennana*.

The diet of juveniles and adults in both species is varied. We determine the appropriate prey size based on each individual's interorbital distance (a proxy for age and size). Some prey species include: *Tenebrio molitor*, *Zophobas morio*, *Drosophila melanogaster*, *Shelfordella tartara*, *Nauphoeta cinerea*, *Blaptica dubia*, and *Galleria mellonella*.

This project also includes a translocation component, where we move part of the rescued population to previously studied areas with characteristics similar to the type locality. These actions have been carried out following the protocols and research permit 279-02-2024-AI-OTCU-DZ6-MAATE, granted by the Ministry of the Environment, Water and Ecological Transition. We intend to monitor and evaluate the status of translocated individuals in the near future.

More research is necessary to better understand the behavioral response of individuals to threats such as disease and anthropogenic activities. Working with urban amphibians presents several challenges, but it would not be possible without the support of the Telecommunications, Drinking Water, Sewage and Sanitation Company of Cuenca (ETAPA EP).



Ctenophryne aequatorialis is one of the endangered species cared for at the Centro de Conservación de Anfibios - Amaru in Cuenca, Ecuador. This species is especially challenging to manage because it lives underground and needs rain to trigger breeding in the wild. Photo: Juan Carlos Sánchez



The Centro de Conservación de Anfibios laboratory for the management of rescued amphibians. Photo: Fausto Siavichay

Reproductive site supplementation for the Banderita Marsupial Frog in Argentina

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W.J. González Raffo | Institute of Neotropical Biodiversity (IBN), CONICET-UNT, Tucumán, Argentina

M. Boullhesen & M.S. Akmentins | Institute of Andean Ecoregions (INECOA), CONICET-UNJu, Jujuy, Argentina

The *ex situ* conservation program for the Banderita Marsupial Frog (*Gastrotheca gracilis*) has made important progress since Amphibian Ark's support in 2018. However, this species continues to be under threat in the wild due to contamination via urban solid waste and the presence of domestic animals. These threats exacerbated by the presence of the chytrid fungus and the effects of climate change on the reproductive sites where Marsupial Frogs release their tadpoles.

To potentially bolster breeding success in the wild, an artificial pond, created with a 25-liter container, was installed in the Los Sosa Provincial Reserve (Fig. 1) in October 2023. During the subsequent tadpole collection season for our *ex situ* population supplementation project in January 2024, we confirmed the presence of tadpoles in the artificial pond. This could mark a turning point in the conservation of the Banderita Marsupial Frog.

Based on these encouraging preliminary results, we decided to build three additional artificial ponds—each with different parameters, in order to better understand this species' behavior and environmental preferences. One pond was lined with a 500 μ m plastic tarp measuring 3 x 2 m and a depth of 30 cm (Fig. 2b); the second was installed without the lining (Fig. 2a); the third consisted of buried 200-liter containers (Fig. 2c).



Fig. 1



Fig. 2

Left: Initial artificial pond/container installed for pilot test; many tadpoles were collected there during the following breeding season. **Right:** To test Banderita Marsupial Frog preferences, the team installed 3 different types of artificial ponds: a) with no tarp, b) with a tarp lining, and c) 200 liter containers.

During the 2024 season, we also collected 189 *Gastrotheca gracilis* tadpoles for later supplementation into natural habitats. We released 145 juveniles (after the breeding and quarantine period in our *ex situ* facilities) at the same site. We had a survival rate of 82%.

Preliminary results from the first breeding season after installing the artificial breeding site showed a greater number of tadpoles in the artificial container compared to the natural ponds. This suggests that artificial ponds could be a viable method for ensuring stable Marsupial Frog reproductive sites. We will continue to record and analyze future results in the Yungas Forests in the Los Sosa Provincial Reserve and may expand supplementation in other protected areas within the province of Tucumán, Argentina.

This project highlights the importance of implementing concrete measures to protect endangered species. The creation of various artificial ponds—which seem to be extremely effective with a relatively low cost—represents a step forward in the *in situ* conservation of the Banderita Marsupial Frog and highlights the potential of joint actions between scientific institutions and environmental authorities.

New findings call for the establishment of an ex situ conservation program for the Niquitao harlequin frog in Venezuela

Enrique La Marca & Erik La Marca | Reva Conservation Center, Venezuela

Marcos Hidalgo | Guaramacal Andean Bear Project, Venezuela

Leomerth Lacruz & Wilmer Narváez | National Parks Institute (Inparques), Venezuela

Historical data and a new record from the past

Atelopus chrysocorallus was described from the La Aguada stream, a tributary of the El Molino stream (tributary of the Burate River) in the Ramal de Calderas mountain range, Trujillo state, Andes of Venezuela (La Marca 1996, Memoria Soc. Cienc. Nat. La Salle 142). Its distribution covers cloud forests from 2000 to 2700 meters above sea level in the northern portion of the Ramal de Calderas national park, near Niquitao. We know that it is a diurnal frog (active during the day) found in terrestrial habitats (in undergrowth near ravines).

It is a rare species, known only from the type series collected in 1987 and from 10 other specimens observed on the same occasion. In July 1990, Enrique La Marca directed an exploration in the El Molino ravine. They did not observe frogs, but they obtained evidence of a flood that could have affected the population (La Marca 2005, Ranas Arlequines, CI Colombia). In 1994 there were unconfirmed sightings, while a search in 2004 was unsuccessful (La Marca 2008, Libro Rojo Fauna Venez.). These data can be interpreted as evidence of a drastic population decline in the species, as has been documented for other Andean-Venezuelan species of *Atelopus*. It has since been classified as Critically Endangered.

In the last century, according to local testimonies, it was a relatively abundant species in some places. Carmen Riera Saavedra, a resident of Niquitao, tells us that orange frogs were abundant in 1989 at the Las Pailas site, a system of pools between rocks in a cascading ravine where people usually go to bathe during vacation. This is a new locality, previously unknown for the species, about 3 km north of the type locality, and which constitutes one of the lowest elevation records for the species. Mrs. Riera comments that in that decade it was common to see them on rocks near the water in the month of August and that people from the town collected them to take them to their homes. Later, since the 1990s, she says they became very rare until they disappeared, which she attributes to burning and the use of agrochemicals in the area.

Searches in September and November 2010 ended with the discovery of 700 tadpoles in the main channel of the El Molino stream and in its tributary, the La Aguada stream (type locality). In November 2011, 312 tadpoles were found in the type locality; we failed to find specimens during a visit to the same place in January 2016.

These tadpoles, and the adult females captured in October 1987, which had mature eggs and highly convoluted oviducts, suggest that the reproductive period of the species begins in the month of June, during the peak of the rainy season in the region. Likewise, spawning would begin in September, when the water flow decreases at the beginning of the dry season. This activity would correspond to the bi-seasonal rainfall pattern (with only two seasons, one rainy and one dry) of the Venezuelan lowlands.

New ecological data

Knowledge of the habitat and ecology of a species is necessary for its potential application in captive breeding. The data that concern the type locality and its surroundings show annual averages of temperature and precipitation of 12 to 16 C and 2000 to 4000 mm, respectively (Ewel et al. 1976, Zonas de Vida de Venezuela). Everything indicates that *A. chrysocorallus* is an inhabitant of cloud forest ecosystems within the Very Humid Low-Montane Forest Life Zone. A pH close to 8 in the stream water indicates slightly alkaline conditions, which must be considered if we want to replicate the water alkalinity to raise tadpoles in ex situ facilities. The substrate of the watercourse channel is sandy, with rocks (densely covered by mosses and liverworts) within and towards the banks of the stream.

In June 2023, we carried out a reconnaissance of the vegetation surrounding the ravine where in the past adult specimens of the harlequin frog were found. The forest canopy is relatively continuous, with coverage estimated at more than 80%. On the forest floor we found fallen trunks and branches with profuse coverage of mosses and lichens, and abundant decomposing leaf litter. At the lower limit of the national park, close to the type locality of the Niquitao harlequin frog, we found intervened areas, particularly at the Mibó farm (with small-scale breeding of cows, sheep, chickens, as well as trout) and on the unpaved road that connects it with the paved road from Niquitao to Las Mesitas.

Quebrada El Molino, watercourse in the Ramal de Calderas mountain range. Photo: Erik La Marca





Field team in the Mibó sector, June 2023. From left to right: Wilmer Narváez, Marcos Hidalgo, Enrique La Marca, Francisco Santiago, and Leomerth Lacruz. Photo: Erik La Marca

An old photo could reveal a previously unknown locality

Thanks to Luis Fernando Navarrete, we were granted access to a slide of an *Atelopus* individual from the Páramo de Niquitao, originally taken in the field by the prominent Venezuelan herpetologist Abdem R. Lancini. The coloration of the animal resembles that of some specimens of the type series, although the specimen on the slide was uniformly orange. We have not been able to locate that specimen in a museum. However, given its coloration and proximity to the type locality of the species, it could be an *Atelopus chrysocorallus*, which would extend its historical distribution range to a higher altitude (~3000 m) in a different ecological habitat (probably sub-páramo).

Threats to the species

Known threats to the species include habitat destruction, deforestation, use of agrochemicals, intensive agriculture and extensive livestock farming, timber extraction for domestic use, fires, pollution of waterways, and exceptional floods due to extreme rainfall. The introduction of exotic animal species is another threat that has not been previously documented. Through direct interviews with Julio Romero, we learned that, in the 1990s, he caught a trout near the intake dam in the El Molino ravine, which contained two specimens of the Niquitao harlequin frog in its stomach. Currently there are three artificial enclosures for trout breeding near the main house of Finca Mibó at the lower limit of the park. Trout were introduced several decades ago in many of the streams and lagoons in the area. We have recently seen trout in the Tirindí stream, adjacent to the El Molino stream. Data on predation by trout can help us understand its impact on the population of amphibians and other species in the area.

Conservation

In 2021, the national park Ramal de Calderas "Dr. José Gregorio Hernández" was created. In the original proposal, the lower limit of the park was lowered to 2,200 meters above sea level on the right bank of the El Molino ravine to specifically include the type locality of *Atelopus chrysocorallus*. Since 2021, the park rangers of the new national park are being trained to identify this emblematic species of the region. We have also carried out environmental educational activities in the town of Niquitao and in the sectors near La Laguneta and Mibó.

Ecological data and knowledge of threats to a rare and endangered amphibian species are critical to developing effective conservation strategies. Together, our habitat and threat data provide a comprehensive view of the factors that threaten this species and, consequently, could be used to develop conservation strategies to protect this species and ensure its survival.

Recent findings

The most recent findings of the Niquitao harlequin frog are those of park ranger Francisco Paredes, who saw a metamorphosed specimen in September 2023. The site, which constitutes a new locality for the species, is located in a sector of the La Aguada stream, where the water intake that supplies the Mibó farm is located.

We hope this new data will help inform effective strategies to protect this endangered species. To this end, we have advanced an Action Plan ([Link here](#)) and we suggest continuing with our environmental education campaign to raise awareness among the local population to protect the species.

Acknowledgments

The authors thank Carlos Briceño, Carmen Riera Saavedra and Julio Romero, residents of Niquitao, for sharing valuable information. To Francisco Paredes, park ranger of the Teta de Niquitao Natural Monument, who provided data on recent sightings. To Francisco Santiago, Coordinator of the Ramal de Calderas National Park, for all his courtesies. Luis Fernando Navarrete, from the Museum of Natural Sciences of Caracas, kindly provided us with the historical *Atelopus* slide. The Mohamed bin Zayed Conservation Fund and the Chessington Conservation Fund have provided support to the REVA Conservation Center to carry out conservation activities with the Niquitao Harlequin Frog.



Atelopus cf. chrysocorallus from the Niquitao paramo. Slide: Abdem R. Lancini

Amphibian Ark Donors, January-March 2024

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Up to \$50,000

The Bernard & Nancy Karwick Foundation

The George & Mary Rabb Fund for Conservation

Synchronicity Earth

Anne Baker & Robert Lacy



Up to \$10,000



Up to \$5,000

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David Corsini
Fahim Dhalla
Cassandra Giannousis

Up to \$500 (Cont.)

In memory of Julie Gionfriddo
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Patrick Welch, in memory of Julie Gionfriddo
Wildling Axolotls

Up to \$50

Zoe Andrus
Cynthia L. Bauman, in memory of Julie Gionfriddo

Up to \$50 (Cont.)

Beastly Threads
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Noah Dixon
Max Elikan
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Valrie Fingerman & Stephen Hirsch
Craig Harms
Finley Houglum
Brandon Kong
Joseph Moreira
Anony Mouse
Vivian Nunn
Zach Pasquel
Michael Reid Hunter
Gloria Snowden
Melissa Van Liew, in memory of Sherri Presler
Georgeanne Wilcox
Donna Yannazzone

Up to \$25

Gabrielle Aldrich
Kade Ariani
Jaeliana Caban
McKay Caruthers
Luca Cassetta
Richard Cissel, in memory of Katie's mom
Diana Hassel, in memory of Julie Gionfriddo
Heiko Janssen
Ruby Mitchell
Taylor Nixon
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Amanda Restell Mand
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John Szymendera
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