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A critically endangered frog trapped in a shrinking 'ecological capsule'

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The Mucuchíes' Frog (*Aromobates zippeli*), which has not yet been evaluated by the IUCN Red List of Threatened Species, is in imminent risk of extinction. This frog lives only in the Mucuchíes region of the Venezuelan Andes. Through an AArk seed grant in 2017 we initiated an *ex situ* program to rescue the species.

The species is trapped in an 'ecological capsule' of dry forests separated from other such ecosystems by moist high Andean mountain paramo environments on their tops and seasonal humid forests on their lower parts. These dry forests are an ecological response to the relative dry conditions within this portion of the Chama river basin.

Dry montane forests are among the most threatened ecosystems in the northern Andes. In Venezuela, this type of forest has been subjected to human intervention (to almost full depletion) for more than 3,000 years. The deforestation started with ethnic groups that relied on wood for building housing structures, and conditions later worsened with European settlers bringing their crops, mainly wheat, to establish an agriculture favored by the dry and cold conditions. This succession of harmful events led to the Montane dry forests almost disappearing, along with the species they housed.

One of the last survivors of this ecological disaster is the Mucuchíes Frog, a small amphibian that adapted to these dry montane forests, living in their wettest places. Those places



A female Mucuchíes' Frog (*Aromobates zippeli*).
Photo: Enzo La Marca.

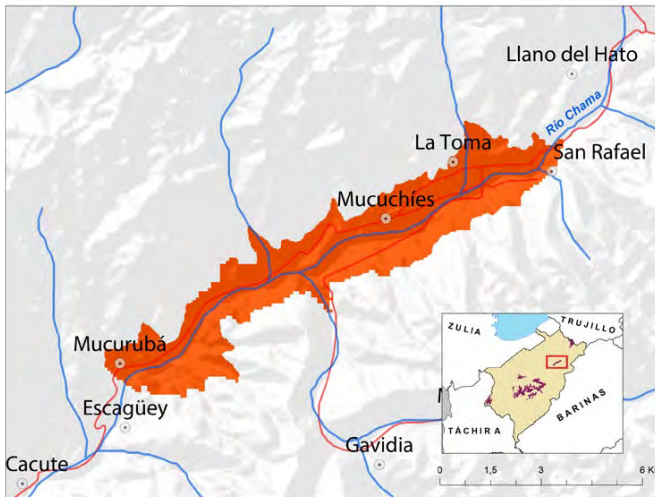
most likely escaped fires and were left untouched for agriculture because of some unfavorable topographical positions – usually deep depressions that serve as surface water runoffs which create humid microhabitat conditions.

We calculated the hypothetical maximum extension of the life zone where the species is most likely to occur, the Montane dry forest, as about twenty-eight square kilometers. Only two percent of this area is actually covered by dry forests. We surveyed many suitable places to discover that the frogs are gone from most places where they were abundant in the past, according to local people. Personal interviews with old locals further reveal a dark panorama for this frog. The easternmost locality we could track the species back was San Rafael de Mucuchíes, at 3,072 meters above sea level, while the westernmost (and also the lowest) was Mucurubá (2,270 meters above sea level). The closest to the type locality was Misintá, at 3,240 meters (the highest altitudinal record), where frogs were last seen two years ago, when the small creek where they lived dried out. Most populations were gone in the whole region between fifteen and twenty-five years ago. Our visits to the type locality near Mucuchíes (2,970 meters) revealed neither frogs nor vocalizations. A visit to the stream Los Alisos in the El Mocoa sector (at 2,906 meters), where some specimens had been collected by the senior author about three decades ago, yielded no specimens either.

After intense searching in the region, we only found a small population of Mucuchíes' Frog at a place at 2,690 meters above sea level, close to Mucuchíes, in a secondary river basin of about four square kilometers in the Moconoque sector, that satellite images show



Moconoque (upper photo) and El Mocoa (lower photo) sectors of the Mucuchíes region. Note how the Montane dry forests have been completely destroyed. Photos: Enrique La Marca.



Portion of the Chama river basin in the Merida Andes, in red-orange, showing the extent of the Montane dry forest life zone in the Mucuchíes region. The lower right insert shows its relative position within Merida state, in western Venezuela. Note isolation from other dry montane forests within Merida state.

to have only 0.15% of the total of the life zone in the region. Since these forests are not within any kind of protected area and given that they are still subjected to destruction for agricultural and rural purposes, the fate of these last forest remnants is obscure and the frogs (as well as any other endemic organisms) they house face a high risk of local or total extinction in the near future.

Our finding is the second documented locality ever for the species and became the source of specimens for the captive breeding program. This population lives in a relatively isolated remnant of vegetation within a matrix of cultivated lands in a rural landscape. The frogs are likely trapped in an 'ecological capsule' naturally affected by drought during the driest months of the year. Other threats to the animals are water extraction from a water spring where this population occurs, which is conducted all year round for agricultural purposes, and parasites. We found a heavy load of nematodes in several specimens, with one of them dying during its quarantine period in the *ex situ* facilities after defecating bloody feces full of parasites.

The *ex situ* program is running with an initial stock of thirty founder specimens. There has been one instance of egg laying, with a mass of eighteen eggs deposited over a decaying leaf covered



Near-hatching tadpoles in a Mucuchíes' Frog egg mass.
 Photo: Enrique La Marca.

by leaf litter. Tadpoles are growing healthy in the *ex situ* facilities, giving hope to the program.

To finish with a conservation appraisal for the species, we state that the Mucuchíes' Frog is an endemic frog whose habitat has been declining due to past and ongoing deforestation as well as by other human activities. We consider it rare within its range, with a highly fragmented distribution restricted to seven known locations (only one with a current living population). We suggest that this frog be considered as a Critically Endangered species (category CR A2c; B1b) in the IUCN Red List, based on an estimated population reduction of $\geq 80\%$ in the past, with continuing decline inferred in the area of occupancy, where the causes of reduction have not ceased, with an area of occurrence of less than ten square kilometers and having ninety-eight percent of habitat loss over more than 100 years.

We strongly recommend that an *ex situ* population be maintained to guarantee survival of the species, that captive husbandry be maintained for reintroduction purposes, and that public awareness be raised to save this unique Neotropical amphibian.

A metamorphosing Mucuchíes' Frog tadpole growing in the *ex situ* facilities of the Rescue of Endangered Venezuelan Amphibians Program in Venezuela. Photo: Enrique La Marca.



amphibian ark

Keeping threatened amphibian species afloat

Newsletter

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