Ex situ conservation of the Wampukrum Harlequin Toad, McDiarmid's Glass Frog, and Sabetari Glass Frogs at the Amphibian Conservation Center - Zoo AMARU

Fausto Siavichay Pesántez, Zoo AMARU, Cuenca, Ecuador and Carlos C. Martínez Rivera, PhD, Philadelphia Zoo, USA

Cordillera del Cóndor in extreme southeast Ecuador represents a unique mountain chain with an incredible, yet under-sampled amphibian diversity. Its lush vegetation, humid environment with Andean and Amazonian influences, along with a rugged terrain, have all created different habitats that are unique to the region. Some of its amphibian species, like the harlequin toads (*Atelopus*) and the glass frogs, (*Cochranella*, *Hyalinobatrachium*, *Rulyrana*, etc.) can only be found here and require pristine environments, but their populations are negatively impacted by human activities.

Unfortunately for this unique habitat, several hydroelectric and mining projects are underway in the area, and the development of international roads and the creation of small towns and gardens needed to support the people working in the area have placed Cordillera del Condor at risk, along with the endemic wildlife that lives here. The Amphibian Conservation Center - Zoo AMARU in Cuenca (ACC-Amaru), is dedicated to helping save Ecuador's endangered amphibians and currently holds populations of several endangered amphibians unique to Cordillera del Condor, including the Wampukrum Harlequin Toad (*Atelopus wampukrum* sp. nov.), McDiarmid's Glass Frog (*Rulyrana mcdiarmidi*), and Sabetari Glass Frogs (*Cochranella erminea*), which have been rescued from mining sites slated for total deforestation. With the support of Amphibian Ark, the Philadelphia Zoo and in coordination with the Ministry of the Environment, ACC-Amaru has been able to rescue these species in an effort to establish assurance colonies in captivity while looking for ways to halt the deforestation.

Juvenile Wampukrum Harlequin Toads (*Atelopus wampukrum* sp. nov.) searching for insects during feeding time. Photo: Carlos C. Martínez Rivera.

Currently, the main objective of our project is to breed our target species and establish the basic behavioral and developmental parameters of their husbandry while raising the young froglets. With the help of the grant from Amphibian Ark, we have been able to design a much simpler setup for our terrariums used for the developing frogs, which allows easy daily maintenance, while keeping our growing frogs healthy. Our terrariums are small (35cm x 40cm x 10cm), and have moist paper towels as the main substrate, which are changed every forty-eight hours. We found that this system, together with weekly cleaning of tanks, is very effective and much more sanitary than a heavily-planted terrarium. In this setup, we can easily monitor food intake by all animals, and we can collect feces, uneaten and dead insects much more easily as well. We also found that the time spent changing towels and cleaning tanks is less than the time spent checking animals and searching for dead insects and feces in the heavily planted terrariums. We include half coconut shells as refugia in all tanks and also add empty plant pots and clippings of plants for hiding and perching. These smaller tanks house up to three juveniles of the Wampukrum Toads; we may house glass frogs singly or in groups of three.

All substrate used for the small terrariums is as sterile as possible and all objects used for perching are thoroughly cleaned once or twice a week. Plant clippings are also changed regularly and destroyed. The top of the tanks allows for easy breathing and airflow. The room where these tropical frogs are housed is also equipped with an electric space heater to ensure that the room temperature stays between 27ºC and 30ºC.

Breeding tanks for Wampukrum Harlequin Toads (above) and glass frogs (below). Photo: Carlos C. Martínez Rivera.

We have also worked with the setup for the breeding tanks for our mated pairs of the Wampukrum Harlequin Toad. The breeding tanks are also smaller than originally proposed (150cm x 70cm x 40cm) for the Wampukrum Toads but have demonstrated to be very effective. These tanks are heavily planted and may have one third or half of the tank with flowing water on a closed cycle, since they only breed in fast flowing streams. We have not finished the breeding tanks for the colonies of Sabetari Glass Frogs and McDiarmid's Glass Frogs as we are trying to establish the adults and reduce their parasite load.

Specialized wildlife veterinarians from Zoo Amaru routinely conduct parasite monitoring and control by doing fecal analyses and other routine exams at our Amphibian Clinic, a separate quarantine unit within ACC-Zoo Amaru. The staff tries to identify parasites that are known pathogens, such as nematodes, trematodes, and other worms. When we know that animals are loosing weight or look listless we may treat the animals with Metronidazole, Ivermectin or medicated baths as needed following standard protocols.

Feeding a varied diet is very important and we consider it key to our success. We feed our colony a variety of invertebrates, such as moths (especially for glass frogs), fruit flies, crickets, forest roaches, mealworms and bean beetles. All feeder insects are provided with fresh vegetables and fruits, according to the insects' biology. Crickets are provided with dry dog kibble or fish pellets as substrate in their terrarium, and fruit flies are supplemented with fish flakes and green algae dust (Spirulina and Chlorella) when possible. Insects are also dusted with calcium and vitamins prior to being offered as foods to our frogs. We raise all of our food at our feeder insect room, which we've been able to double in size and increase production thanks to the help of the Amphibian Ark.

The veterinary assistant at ACC-Zoo Amaru conducting a routine checks. Photo: Carlos C. Martínez Rivera.

Shelving units with small housing tanks for Wampukrum Harlequin Toads and glass frogs. Photo: Carlos C. Martínez Rivera.