WE ARE AMPHIBIANS: Conserving biodiversity and promoting sustainable development in the Sierra Nevada de Santa Marta, Colombia

Fundación Atelopus
por la conservación de Anfibios y Reptiles

Ensuring the conservation two Threatened harlequin toads (Atelopus) in the Key Biodiversity Area Sierra Nevada de Santa Marta, Colombia.

ACKNOWLEDGEMENTS

Thank you for supporting the indigenous and peasant communities of the Sierra Nevada de Santa Marta for giving us their collaboration to conserve amphibian species. Many thanks to organizations such as Re:Wild, MBZ Species Conservation Fund, Rufford Foundation, ZGAP, NatGeo, University of Magdalena, National Natural Parks of Colombia, and Conservation Leadership Program, for financial, logistical and collaborative support which It has changed our professional and personal life, making our purposes and dreams come true!

Thanks for everything.

SCIENTIFIC OUTCOMES

OUTCOME 1: Population dynamics of two endemic, endangered Atelopus species, A. nahumae and A. laetissimus collected and threats to their survival identified.

OUTCOME 2: Presence of the chytrid fungus (Batrachochytrium dendrobatidis) monitored.

OUTCOME 3 Data on ecological parameters to help current efforts to maintain viable captive Atelopus populations for possible reintroduction gathered.

CONSERVATION OUTCOMES

OUTCOME 1: Awareness raised of the degree of endemicity and conservation status of Atelopus spp.

OUTCOME 2: Site-specific conservation strategies defined with local stakeholders to reduce drivers of amphibian decline and increase the degree of habitat protection.

OUTCOME 3: Plan for implementing community-based Atelopus conservation strategies developed.

INTRODUCTION

Amphibian populations are declining worldwide at an alarming rate. Harlequin toads (Atelopus) are among the most threatened group of amphibians, with 80% of the 96 described species classified as Endangered or Critically Endangered, and two species confirmed as Extinct (IUCN, 2019). In Colombia, of the 45 species of Atelopus 33 are Endangered or Critically Endangered; that is to say that 73% of all the diversity of the genus in the country is in a critical condition. The causes of the dramatic population declines and extinctions of some species of the genus are attributed to the pandemic Bd fungus (Batrachochytrium dendrobatidis), habitat loss, water pollution, and climate change which all have led Atelopus to be listed as the most threatened amphibian group in the world (Lips, 2005; La Marca et al. 2005; Lotters 2007). There are five endemic harlequin toads inhabiting Sierra Nevada de Santa Marta, Colombia (SNSM): Atelopus carrikeri, A. walkeri, A. arsyecue, A. laetissimus and A. nahumae (Acosta -Galvis 2013, Ruthven 1916; Rivero, 1963; Rueda-Almonacid 1994, Ruiz-Carranza et al. 1994), that replace each other altitudinally (Rueda-Almonacid 1994). A. laetissimus and A. nahumae are in the northeastern part of the Sierra Nevada de Santa Marta in the departments of La Guajira, Cesar and Magdalena, with an altitudinal distribution of 1900 – 2880 masl and 2500 – 2800 masl respectively (Acosta-Galvis 2013, Ruiz-Carranza et al. 1994). These species live around the montane rainforest streams (Lötters 1996) and unlike the general diurnal habits of other Atelopus species, A. laetissimus and A. nahumae have also nocturnal activity (Granda-Rodriguez et al. 2008 Carvajalino-Fernandez et al. 2008; Obs. Pers). Our project purpose was to promote the conservation of endangered and endemic Atelopus species in the Sierra Nevada de Santa Marta, Colombia.

GOALS

1. Our most important result at a scientific level during the execution of this project is to obtain data and relevant information that join the global efforts to save the species of the genus Atelopus. Our analyses show a stable trend in the population and currently, there is still No traces of the BD fungus have been detected, although the presence of the fungus has been documented in other locations for the Sierra Nevada de Santa Marta, which motivates us to continue our long-term population and epidemiological monitoring efforts with these species of the gender.

2. At the level of work with the community and local actors, we had a great impact from our activities, resulting in the construction of a work route with specific actions to mitigate threats to biodiversity, such as the implementation of ecological points in strategic areas for the collection of solid waste and recycling, the initial construction of a pilot phase for small-scale reforestation with native plants led by the women of the community, in addition to an important focus on environmental education work for the new generation such as They are the children and young people who allow forming the first ecological workgroup for the conservation of the natural resources of the territory. Within these activities, talks were given to local actors, a colourful harlequin workshop of the SNSM, and the first championship of the Harlequin Toad in San Pedro de la Sierra, for being the guardians of amphibians in the region.

3. The first signing of voluntary conservation agreements, after several days of approaches, dialogues, and sensitization to the owners of private properties where these populations of the harlequin toad still persist, committing in the medium and long term to protect natural resources within their properties, providing a window of opportunity to ensure the habitat for this species and the amphibian community that coexists with it, in addition to working together to improve conditions and mitigate specific threats that may affect the species.

In the initial fase, this project developed in an integral way with local actors and that has had a positive impact on the conservation of the harlequin frogs of the Sierra Nevada, we attach some images of the scientific process and work with the communities during the implementation of carvings, Jordanian awareness, construction of threat mitigation actions

and population monitoring to know the current status of the populations of *A. laetissimus* in San Pedro de la Sierra Nevada and ensure their conservation.

Figure 1. Scientific work focused on population and epidemiological monitoring of A. laetissimus, obtaining relevant information on environmental parameters, survival and BD Fungus.

Figure 2. Work with local communities focused on the new generations (children and young people) to increase awareness and social empowerment about the conservation value of amphibian species in the region, especially the Atelopus species in the SNSM.

Figure 3. Didactic and playful material was created to facilitate the transmission of information and accurately communicate the conservation message about the territory, natural resources, and amphibian communities in the region.

Figure 4. Implementation of specific mitigation actions such as ecological points for the proper management of solid waste, the construction of a small-scale reforestation plan, and the signing of voluntary conservation agreements by farm owners in San Pedro de la SNSM.

We tested for the presence of the Bd fungus (*B. dendrobatidis*) by passing a swab on the dorsum, venter, on each flank, and on each palm and sole of each individual. We followed biosecurity protocols to avoid pathogen dispersal and sample contamination (Rueda-Solano et al 2016). After swabbing, each individualwas released at the same site of capture (Figure 3). We have tested the presence of Bd on swabs for mostindividuals with end-point polymerase chain reaction (PCR) (Annis et al. 2004) at the laboratory of Universidad de los Andes.

Table 1. Results of Bd analysis in Atelopus species in San Lorenzo and San Pedro 2,200 - 2,500 m altitude, SierraNevada de Santa Marta, Northern Colombia.

Species	Habit	Microhabitat	No. Of individuals Swabbed	Positive Bd*	Negative Bd*
A. laetissimus	Nocturnal	Terrestrial/Shrub	59	0	59
A. nahumae	Diurnal/Nocturnal	Terrestrial/Shrub	10	0	10
A. carrikeri	Diurnal/Nocturnal	Terrestrial/Shrub	25	0	25

We collected data on the land use and land cover types at each sampling sites where both species of *Atelopus* were monitored (Figure 10). We evidenced that agricultural crops and cattle ranching pastures are the most common activities in the area, and this is primarily due to the economic activities of the community. Compared to San Lorenzo agricultural crops and cattle ranching pastures are much more frequent in San Pedro causing higher negative effects to the water quality and forest cover in these monitoring streams. As we continue working with the local communities and analyzing the population dynamics data, we will identify the impact of these land uses in *Atelopus* populations and strategies to mitigate them.

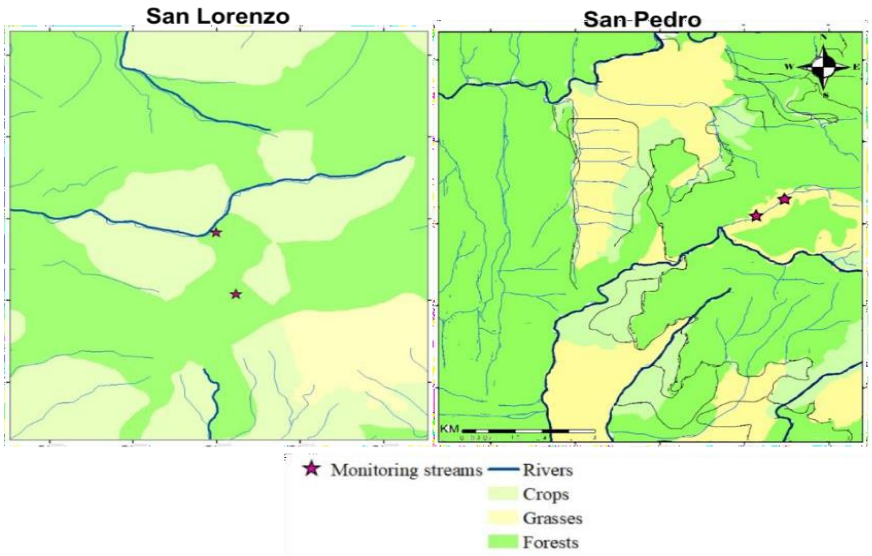

Figure 5. Spatial mapping activities in San Lorenzo and San Pedro, Sierra Nevada de Santa Marta

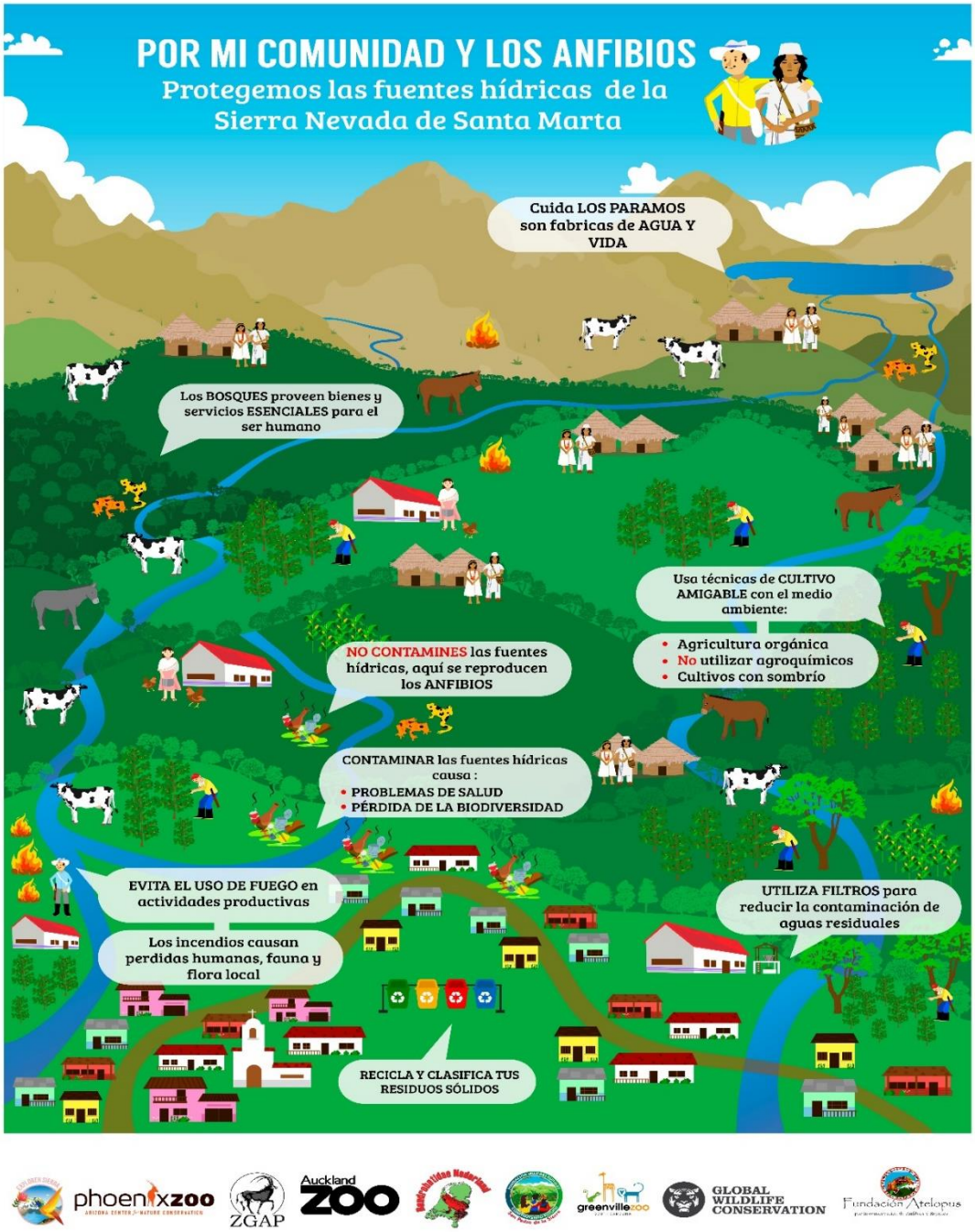

Figure 6. The visual plan developed based on environmental education workshops with the local communities of San Pedro and San Lorenzo in the Sierra Nevada de Santa Marta.

KUTUNSAMA PROJECT

Figure 7. Cultural strengthening and social work with the indigenous community of Kutunsama

Empowerment in the Arhuaco community of Kutunsama to recover and strengthen their ancestral knowledge: A tool to continue protecting their ancestral territories and managing their natural resources.

PARTICIPATIVE MONITORING

Figure 8. Formation of the community monitoring group with children from the La Tagua village in Sierra Nevada de Santa Marta.

We created a participatory community monitoring group with children from the region, to recognize the amphibian species in the region and the importance of preserving biodiversity to improve the quality of life of people in the community (figure 11). We have also developed environmental education workshops and created teaching and dissemination materials.

FUNDACION *ATELOPUS* ACHIEVEMENT'S

Outstanding achievement of the *Atelopus* Foundation for the conservation of amphibians in the Sierra Nevada de Santa Marta (figure 12).

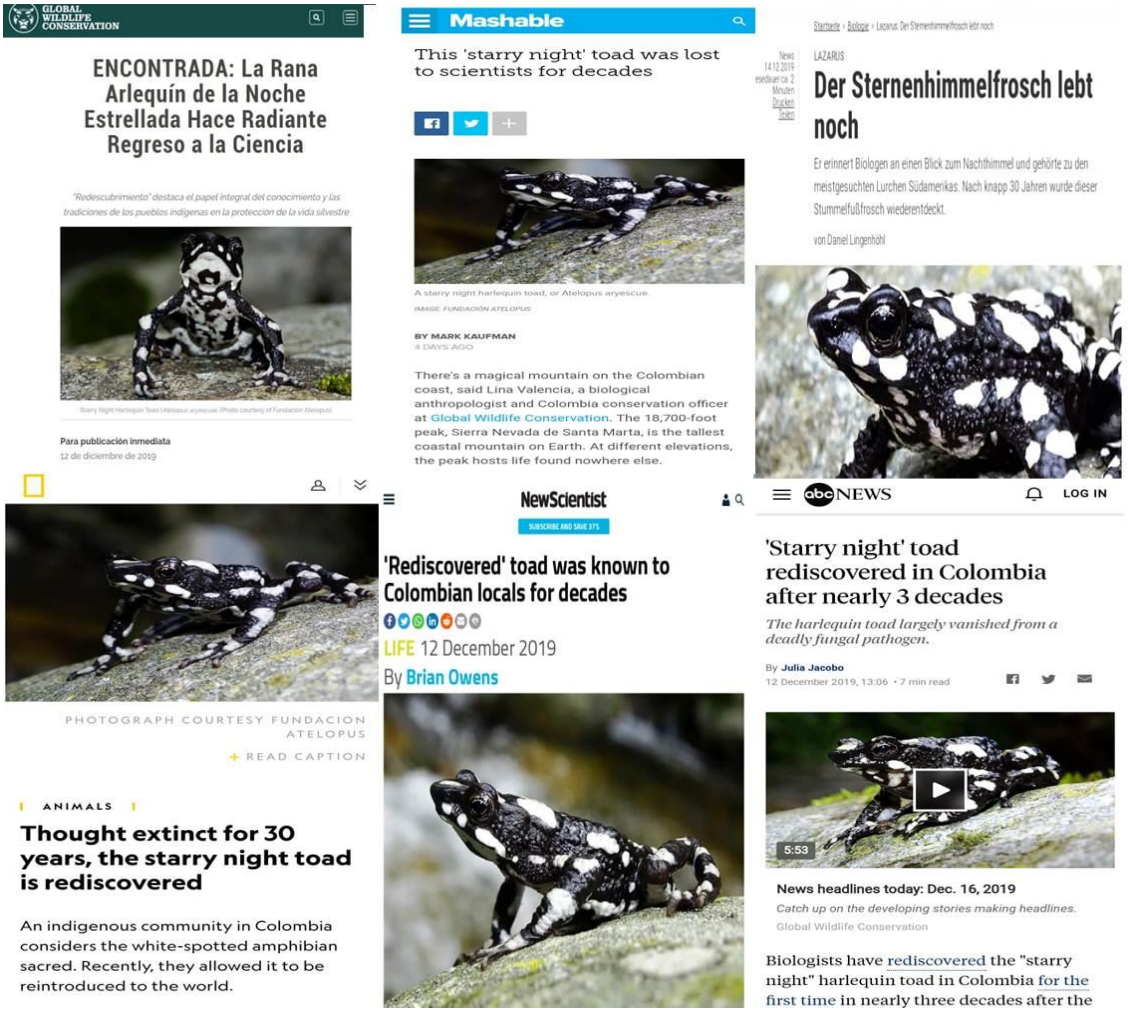

Figure 9. Gathering information about the rediscovery of the starry night frog.

The *Atelopus* Foundation shares with great happiness one of its great achievements during this last year as a result of the work and permanent dedication promoted by each of its members and managers, it deals with the rediscovery of a species of *Atelopus* that was lost lost to the scientific domain by more than 25 years, but not for the Arhuacas indigenous communities with whom he has always lived and that by the administration of the territory and ancestral practices have allowed them to survive in their natural environment, the

mountainous forests of the Sierra Nevada de Santa Marta in Sogrome, department of Cesar, Colombia.

Atelopus arsyecue The "Harlequin Toad Starry Night"; or "gouna" (water guardian) as it is called in the typical dialect of the Arhuaca indigenous community. It is a species of the genus *Atelopus*, a group of flagship conservation objects for our organization and currently occupy the first place as the most threatened group of amphibians worldwide, which is why this rediscovery is synonymous with reflection and hope that allows us to allow how can we conserve biodiversity from spiritual and cultural knowledge.

Our feeling is of happiness to know the great impact that this news has had a national and international level, in addition to the satisfaction because we have managed to be an information channel for the whole world and to be able to rescue the ancestral value of the indigenous communities in their struggle by conservation their territories and the biological importance of these. We highly thank the representatives of the Arhuaca community who allowed these expeditions to be a reality, in addition to being able to initiate monitoring work in this part of the Sierra is an even greater honor, in addition to a great opportunity, the fact of having managed to generate ties of trust with the community to continue working together in the conservation of the biodiversity of the Sierra Nevada.

Likend: https://www.nationalgeographic.com/animals/2019/12/starry-night-toad-rediscovered-colombia-extinction/

FINANCIAL REPORT

The charts below summarize Fundación Atelopus most recent financial results on the international level. The figures on which these charts are based have been prepared in accordance, which calls for nonprofits to record revenue based on the year that funds are raised (accrual method of accounting) rather than on the year that contributions are designated for expenditure. As a result, our year-overyear revenues and net assets can and do fluctuate, sometimes significantly.

2020-2021

REVENUE AND SUPPORT In US$

Grants and donations from organizations $ 65.300

Contributions from individuals $ 250

Research income $ 200

In-kind contributions $ 3.500

Other income $ 200

Total Income $ 69.450

EXPENSES

Conservation $ 55.560

Research $ 5.000

General and administration $ 8.890

Total Expenses $ 69.450

ASSETS

cash and cash equivalent $ 37.700

contributions and grants receivable $ 5.200

prepaid expenses $ 4.130

Investments $ 6.530

Property and equipment, net $ 15.890

Total assets $ 69.450

LIABILITIES AND NET ASSETS

Accrued Liabilities $ 3.500

NET ASSETS

Unrestricted $ 1.800

Temporarily restricted $ 63.150

Permanently restricted $ 1.000

Total Accrued Liabilities and Net Assests $ 69.450

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