Issue number 112 (October 2014)
ISSN: 1026-0269
eISSN: 1817-3934

FrogLog

Volume 22, number 4

www.amphibians.org

Promoting Conservation, Research and Education for the World's Amphibians

Protecting the Lower Kinabatangan Floodplains

Using Story Maps to Increase Awareness and Promote Conservation

Recent Publications

And Much More!

The Yellow bush frog (*Philautus neelanethrus*). Photo: Angad Achappa.

In Search of Lost Frogs

Amphibian Survival Alliance Seed Grant Winners

The Times they are a-Changing: How a Multi-Institutional Effort Stopped the Construction of a Hydroelectric Power Plant that Threatened a Critically Endangered Red-Belly Toad in Southern Brazil

By Luis Fernando Marin da Fonte, Michelle Abadie, Thayná Mendes, Caroline Zank and Márcio Borges Martins

Brazil has today the world's richest amphibian fauna, with 1,026 species recorded (*1*). In spite of this, the cumulative tendencies suggest that richness is highly underestimated and many species are yet to be discovered. Describing this diversity is a monumental task and, for this reason, most biological aspects are still unknown. Brazil still holds large extensions of original landscapes; however, some Brazilian biomes, such as the Atlantic Forest, were reduced to a small fraction of their original distributions. As one of the world's current emerging markets, Brazil has faced recent economic acceleration with increased spatial and energetic requirements of all sorts. This new economic reality has resulted in increased exploitation of natural resources, in addition to the historical threats to the country's biodiversity.

With a largely unknown or poorly understood fauna, with many species still in the process of description, and increasing pressures on natural resources, the conservation of amphibians in Brazil is an overwhelming challenge. However, collaborative efforts between academia, government and non-governmental organizations have proven that it is not an impossible task. The case of the South-American Red-belly-toad, *Melanophryniscus admirabilis* Di-Bernardo, Maneyro & Grillo, 2006, is an emblematic example in many ways, and we believe that it can serve as a potential model for other groups involved with the conservation of amphibians.

The genus *Melanophryniscus* Gallardo, 1961 comprises 26 species distributed in South America. Most species have restricted ranges and are considered to be threatened at regional or global levels (*2*). *Melanophryniscus admirabilis* (Fig. 1) is a microendemic species known only from its type locality. It occurs exclusively along 700 meters of the Forqueta River, in a forested environment with steep slopes in the southern Brazilian Atlantic Forest (Fig. 2), in the Municipality of Arvorezinha, State of Rio Grande do Sul. Its explosive reproduction takes place in small and shallow puddles on exposed rocks of the river margins and when individuals are not reproducing, they probably inhabit the contiguous riparian forest, where they are rarely seen. Due to its restricted range (ca. 0.035 km^2), the ongoing loss of habitat quality, and because it was severely threatened by the possible construction of a hydroelectric power plant (HPP), the species is listed as "Critically Endangered" in The IUCN Red List of Threatened Species.

Melanophryniscus admirabilis was only recently discovered and described and, to date, only one population is known. In August 2010, the regional environmental agency had granted a preliminary authorization (the first of three) for the construction of a HPP in the same river, just 500 meters upstream of the only site of occurrence of the species. Although the consequences of implementation of the HPP were not fully understood at the time, we considered that they would be rather harmful for the single population of *M. admirabilis*. Until that moment, however, almost nothing was known about its natural history and its conservation status.

Therefore, in October 2010 the Laboratório de Herpetologia da Universidade Federal do Rio Grande do Sul (UFRGS) initiated a series of applied studies (Fig. 3) aiming to evaluate the potential threats to *M. admirabilis* and to assess its conservation status. We have searched for other populations in the nearby areas, totaling about seven km of forested river environments, including upstream and downstream portions within the Forqueta River. We also analyzed databases from numerous environmental studies conducted over past years in other rivers in the region, especially in the same river basin. However, despite our extensive search, we were not able to find new populations or similar locations suitable for the occurrence of the species. Funding from the Boticário Group Foundation for Nature Protection was essential in this stage.

We also carried out additional research (and we are still studying some important topics) on the natural history, genetics and ecology of *M. admirabilis*, such as diet, reproductive biology, next-generation population genetics (RADSeq) and estimation of population size (by both mark-and-recapture and genetic methods). Since the toad is a globally threatened species, we have always attempted to use less invasive methods for individual recognition (photo-identification) and DNA sampling (buccal swab).

In October 2011 we were invited to participate in the planning workshop for the "Action Plan for the conservation of amphibians and reptiles threatened with extinction in southern Brazil", organized by the National Center for Research and Conservation of Reptiles and Amphibians of the Brazilian Ministry of Environment (RAN/ICMBio). On this occasion, we were able to present the case

Fig. 1: *Melanophryniscus admirabilis* in its natural environment. Photo: Márcio Borges Martins.

Programa de Pós-Graduação em Biologia Animal, Laboratório de Herpetologia, Departamento de Zoologia, Instituto de Biociências, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Agronomia, 91501-970, Porto Alegre, RS, Brazil. E-mail: pulchella@gmail.com

of *M. admirabilis* and to share ideas and insights with other Brazilian experts. Besides the RAN/ICMBio team, our subject matter attracted the attention of the NGO Instituto Curicaca, a long-time active organization working on conservation issues in Southern Brazil. The definition of several "actions" involving academia (UFRGS), the government (RAN/ICMBio) and the NGO (Instituto Curicaca) was the ultimate seed for the process that culminated in the suspension of the HPP license.

About one and a half years after starting our research studies, we were finally able to assess the extinction risk of the species at the regional, national and global levels (all listed as "Critically Endangered" as per the IUCN Red List Categories and Criteria). The global assessment was published first, appearing in the IUCN Red List of Threatened Species (*3*). The regional list (Rio Grande do Sul's Red List) was published in September 2013 (*4*), and the national (Brazilian Red List) still awaits publication.

Besides our scientific activities, with the strong support of the NGO Instituto Curicaca and RAN/ICMBio, we decided to jointly act also at the political level against the implementation of the HPP. The NGO played, and still plays, a very important role in these activities, once they have plenty of experience in conservation issues. The Instituto Curicaca helped to coordinate meetings and workshops to discuss matters between the scientific community, the environmental agencies (both regional and national), local prosecutors and the entrepreneurs who wanted to build the HPP.

A significant milestone during this process was the broadcasting of the struggle "frog against HPP" in the regional media. A series of reports against the frog were published in the biggest South Brazilian media, probably intending to lobby the regional environmental agency to grant the implementation license (the second of three, but the one that allows for construction). Newspapers, radio and television focused on the subject of "a small frog hindering the construction of HPP" for over a week. They emphasised that an animal "without importance" could harm the region's economic development (*5*), despite the HPP in question being a relatively small project (it would produce only about 1 MW in a reservoir with 9,4 ha surface area). Although most of what was said was against the toad, this event was very important because it brought about public awareness to this issue.

A decisive stage in this process was a Technical Meeting (May, 2014) organized by RAN/ICMBio at UFRGS, with the presence of the entrepreneurs, the environmental state agency (FEPAM), Instituto Curicaca and the Public Prosecutor's Office (Fig. 4). All arguments, in favour and against the construction of the HPP, were exposed and debated. A relevant argument against the HPP was a neglected study, conducted by the environmental agency itself, recommending the exclusion of HPPs in the area (high Forqueta River included) to preserve the river headwaters. Additionally, the

Fig. 2: Reproductive site of *Melanophryniscus admirabilis* in Perau de Janeiro, Arvorezinha, State of Rio Grande do Sul, Brazil. Photo: Michelle Abadie.

Fig. 3: Team during fieldwork searching for individuals of *Melanophryniscus admirabilis*. Photo: Márcio Borges Martins.

mitigation strategies presented by the entrepreneurs were not satisfactory. Finally, the absence of robust risk assessment analyses for the HPP installation and the serious threats imposed to the species became clearer.

So, almost four years after we decided to embark in this conservation battle, the environmental agency finally decided against granting the license, considering that the HPP's energy-generating capacity was too small and there were better and less harmful alternatives (e.g., wind turbines); the area of the HPP project is inside the region intended to preserve the Taquari-Antas River basin headwaters, and the HPP's implementation could be very harmful to the only known population of a Critically Endangered species and could lead to its extinction. Thus, in mid-2014, the implementation license was officially denied.

The whole process, from the beginning of our studies to the official decision to deny the license application, was laborious and slow. But now that we have achieved it, we can identify some crucial aspects of the process: (i) our scientific studies, prioritizing to unveil the most relevant issues for conservation, were very important to better understand the species' relations with the environment and to allow for its extinction risk assessment; (ii) the publication of its assessment as "Critically Endangered" was a key step, especially the global one, published by The IUCN Red List of Threatened Species; (iii) the involvement of the NGO Instituto Curicaca was crucial, once they have experience not only with conservation matters but also with political issues; (iv) the governmental support provided by the National Center for Research and Conservation of Reptiles and Amphibians of the Brazilian Ministry of Environment (RAN/ICMBio) was fundamental; (v) the meetings and workshops conducted had great value to discuss and to bring ideas together; (vi) the broadcasting of the problem in the regional media brought public awareness to the issue; and (vii) the involvement of a multi-institutional and committed team, combining young and experienced people, dreamers and down-to-earth minds, scientists and politically experienced practitioners was more than vital for the good progress and success of our work.

However, despite the fact that the results achieved so far are undeniably relevant to the conservation of the South-American-Red-belly-toad, all our effort is not much more than a "running to stand still" situation. To effectively conserve this rare and beautiful species, we still need to move forward. We are now exploring the possibility of creating a conservation unit encompassing the whole range of *M. admirabilis*, as well as its surroundings. Given that the area is currently used for tourist activities and that the nearby region presents farming and livestock activities, our research is now directed to better quantify the additional threats identified to the species, such as habitat loss and fragmentation, use of agrochemicals, illegal collection and other impacts imposed by the tourists, as well as the possible occurrence of diseases (e.g., chytridiomycosis). To this end, we are once again working in the same way, bringing together our team with old (NGO Instituto Curicaca and RAN/ICMBio) and new partners, such as the Amphibian Specialist Group (ASG). Nevertheless, we still have many questions on how to achieve our objectives. For instance, which is the best type of

protected area to be implemented? Who should ideally manage the area, assuming that it can be formally protected? If it can't, what are the alternatives? Furthermore, another important question is how to deal with the surrounding neighbours, who are humble and poor small-scale farmers who have always lived in that area. What could be feasible economical alternatives for them, to make it a part of the solution for the toad's conservation?

Lastly, another crucial issue that arises is how to carry out efficient environmental education without exposing the species to smuggling. Since *M. admirabilis* has a very beautiful and colorful morphological pattern, it is rare worldwide (but locally abundant in its tiny range) and it inhabits an unprotected area with easy access to tourists, we are concerned about unnecessarily exposing the species. For instance, local reports indicate that individuals were recently collected illegally, since the media reports were broadcasted in the regional press. Therefore, the main question that arises is: does the knowledge acquired from environmental education improve conservation or can lead to illegal collection? We still do not know how to answer properly all of these questions, but we expect that sharing ideas and experiences with other experts can enormously improve our ability to decide. At this time we are celebrating the fact that, this time, and through multi-institutional and collaborative efforts, the conservation of a threatened species was prioritized over unsustainable development. We hope that sharing our experience may encourage actions like this throughout the world.

Acknowledgments

We would like to deeply thank and to recognize the participation of the following institutions and persons: Universidade Federal do Rio Grande do Sul - UFRGS (Fernando Becker, Gonçalo Ferraz, Murilo Guimarães, João Ito Bergonci, Juliane Heyde and Emanuelly Silva); the NGO Instituto Curicaca (Alexandre Krob, Andreas Kindel, Valentina Zaffaroni Caorsi, Patrick Colombo and Bruna Menezes); RAN/ICMBio (Ivan Borel Amaral); the Public Prosecutor's Office (Frederico Carlos Lang); the Environmental State Agency - FEPAM (Maria Dolores Pimeda and João Carlos Dotto); the Boticário Group Foundation for Nature Protection and the Mohamed bin Zayed Species Conservation Fund for the fundamental funding; the IUCN SSC Amphibian Red List Authority (Ariadne Angulo); and the local people from Arvorezinha (Dona Zeni, Seu Dulça, Dona Neusa and Graziela Civa).

References

1. M. V. Segalla, *et al.*, *Herpetologia Brasileira* **6**, 37 (2012).
2. C. Zank *et al.*, *PLoSONE* **9**, e94625 (2014).
3. Decreto Estadual Nº 51.797 de 8 de Setembro de 2014. (2014): Diário Oficial do Rio Grande do Sul n.o 173, de 09 de setembro de 2014.
4. C. Zank, L.F.M. Fonte, M. Borges Martins, M. Abadie, R. Maneyro, T. Mendes, *Melanophryniscus admirabilis*. In: IUCN 2013. (IUCN Red List of Threatened Species. Version 2013).
5. ZERO HORA, http://zh.clicrbs.com.br/rs/noticias/economia/noticia/2013/04/animal-raro-emperra-construcao-de-usina-no-vale-do-taquari-4110032.html (2013).

Fig. 4: Technical Meeting (May, 2013) organized by RAN/ICMBio at UFRGS to discuss the impacts of the HPP. Photo: Márcio Borges Martins.