AMPHIBIAM ANURANS OF AN ARAUCARIAN RAINFOREST FRAGMENT IN SOUTHERN BRAZIL

Anfíbios anuros de um fragmento de floresta úmida com araucária no Sul do Brasil

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ABSTRACT: Despite the devastation, the Atlantic Rainforest presents high levels of biological wealth. The first records of decline, all over the world, have been reported in creeks in the Atlantic Rainforest. The lack of knowledge on the existing species is an important limiting factor on the evaluation of the situation of the anurans conservation. The aim of this study was to record the anuran species in a forest fragment of phytoecological transition of the Atlantic Rainforest, in Faxinalzinho town, in the north of Rio Grande do Sul State, Brazil. 13 species of anuran amphibiams belonging to six families were recorded: Bufonidae (1), Cycloramphidae (1), Hylidae (4), Leiuperidae(2), Leptodactylidae (3), Microhylidae (1), and Ranidae (1). The *Proceratophrys bigibbosa* species has few records in the state of Rio Grande do Sul. *Lithobates catesbeianus* from Ranidae family has been accidentally introduced all over the world, its large size, high mobility, generalist feeding habits and its enormous reproductive capacity, make it a successful invader and a threat to the local biodiversity. Although the study area shows common species, it does not reduce the importance of this forest fragment, because it shelters populations of Atlantic Rainforest species, an environment subjected to strong anthropogenic pressure in the form of contamination by pesticides, habitat destruction, and deforestation.

Keywords: Seasonally Deciduous Forest. Mixed Umbrophylus Forest. Conservation. Forest remnants.

RESUMO: A Mata Atlântica, apesar da devastação sofrida, apresenta altos níveis de riqueza biológicas, primeiros registros de declínio em todo mundo foram reportados em riachos da Mata Atlântica. A falta de conhecimento sobre as espécies existentes é um fator limitante importante na avaliação da

situação de conservação dos anuros. O objetivo do trabalho foi inventariar as espécies de anuros em um fragmento florestal de transição fitoecológica da Mata Atlântica no município de Faxinalzinho, norte do Rio Grande do Sul, Brasil. Foram registradas 13 espécies de anfíbios anuros pertencentes a seis famílias: Bufonidae (1), Cycloramphidae (1), Hylidae (4), Leiuperidae(2), Leptodactylidae (3), Microhylidae (1) e Ranidae (1). A espécie *Proceratophrys bigibbosa* tem poucos registros no estado do Rio Grande do Sul. *Lithobates catesbeianus,* da família Ranidae, tem sido acidentalmente introduzida em todo o mundo. Seu grande tamanho, alta mobilidade, hábito alimentar generalista e sua enorme capacidade reprodutiva a tornam uma invasora bem sucedida e uma ameaça à biodiversidade local. Apesar da área de estudo apresentar espécies comuns, não reduz a importância desse fragmento florestal, pois abriga populações de espécies da Mata Atlântica, um ambiente sujeito à forte pressão antrópica na forma de contaminação por agrotóxicos, destruição do habitat e desmatamento.

Palavras-chave: Floresta Estacional Decidual. Floresta Ombrófila Mista. Conservação. Remanescentes florestais.

Introduction

The Atlantic Rainforest and its associated ecosystems covered, at the time of the discovery, 1,360,000 km^2, but currently only 8% of the biome area preserves its original biotic characteristics (MMA, 2000). Despite the devastation it has been put through, it still shelters high levels of biological wealth and endemism, figuring one of the 25 world hotspots (MYERS et al., 2005). Over 80 species of anuran amphibians are endemic; it may include whole families, as the case of frogs from the Brachycephalidae family (MMA, 2000). Dramatic declines of amphibians have been documented in different parts of the world, and the first reported declines were for creek species of the Atlantic Rainforest (HEYER et al., 1988).

Studies on anurans ecology are important to the conservation, although scarce regarding the wealth of species recorded, 913 species in Brazil, according to latest update of the Brazilian Society of Herpetology (SEGALLA et al., 2012). The constant degradation the natural ecosystems have been suffering, especially due to anthropic actions, implies on the change or complete elimination of specific microhabitats explored by anurans, it is also considered the main factor which is responsible for the population declines, observed in several anurans species on a global scale ((TOLEDO et al., 2003). Other hypotheses for the declining are the predation and the competition with introduced species, diseases, and weather changes (ROCHA et al., 2006). Invader species benefit from the global environment to replace endemic species or regionally restricted in altered habitats (DUKES, 2003).

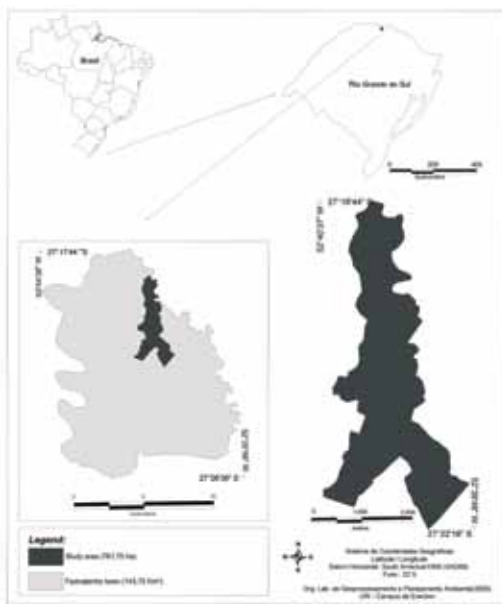
According to Garcia & Vinciprova (2003) the lack of knowledge on the existing species is an important limitation on the evaluation of the conservation status of anurans in the state of Rio Grande do Sul. The studies with anurans in the satet are still far from being sufficient to the strong anthropic pressure, the high degree of endemism and the anurans populations decline recorded in the Atlantic

Rainforest reinforce the importance of taxonomic inventories in areas of this forest. A list of anurans species in a forest fragment in the Seasonally Deciduous Forest of the Atlantic Rainforest in Faxinalzinho town, Northern Rio Grande do Sul, Brazil will be presented below.

Material and Methods

The study was developed in Faxinalzinho town located in Northern Rio Grande do Sul, Alto Uruguai region, 430 km distant from the state capital (Porto Alegre) (Figure 1). It has an altitude ranging from 280 to 780 meters, with altitudinal gradient of 500 meters. It presents subtropical climate, with temperatures ranging from 0º to 38º C, with an average of 18º C and occasional frost during winter. The rainfall patterns records average rainfall of 215.25 mm monthly, and with a greater intensity in the months from June to August and a lower from January to March (RTP, 2009).

Figure 1 - Location of the study area in the town of Faxinalzinho.



The study area is included in the region with Atlantic Rainforest domain, with presence of forest remnants of phytoecological transition among Seasonally Deciduous Forest and Mixed Umbrophylus Forest, which include both temperate climate species such as *Araucaria angustifolia* (Araucariaceae), *Vernonia discolor* (Asteraceae), and *Piptocarpha angustifolia* (Asteraceae), as well as deciduous species from the Fabaceae family such as *Apuleia leiocarpa*, *Myrocarpus frondosus, and Albizia edwalli* (BUDKE et al., 2010). The collections were done seasonally during four consecutive nights in wetlands, weirs, temporary ponds, arroyos and streams, wood and rocky outcrop areas, previously selected between November, 2009 and March, 2010.

For the species recording, we used VES - *visual encounter survey*, which consists on making random displacements at the sampling points, giving preference to the possible micro-habitats and the AST - *audio strip transects* (HEYER et al., 1994), two methods considered complementary (CRUMP e SCOTT, 1994; ZIMMERMAN, 1994) during the evening (6 P.M. – 12 A.M.). These records, done with the help of a proper audio recorder, allowed to determine the species in vocalization.

The identification of species was performed with direct observation of the animals and the vocalizations emitted by males (due to the vocalization and the concentration in the reproduction places, the male anurans are observed more frequently than the females). Photographs of the found animals were taken to help on the identification.

The nomenclature adopted in this study is consistent with Frost (2011). At least one individual of each species was collected and placed in 70% alcohol, and after, registered in the amphibians collection of MuRAU (Museu Regional do Alto Uruguai) at URI – Erechim/RS Campus, serving as a testimony

material (Capture/Collection/Transportation License number 15224-1 – IBAMA / ICM-Bio). Considerations on the conservation status of the species were made from the "Lista das espécies da fauna ameaçadas de extinção no Rio Grande do Sul" (MARQUES et al., 2002).

Results and Discussion

During the study, 13 anuran amphibians species belonging to six families were recorded: Bufonidae (1), Cycloramphidae (1), Hylidae (4), Leiuperidae(2), Leptodactylidae (3), Microhylidae (1), and Ranidae (1) (Table 1).

Table 1 - List of anuran amphibians species and encounter microhabitat of these species recorded in Faxinalzinho town, Rio Grande do Sul, Southern Brazil.

Family/ species	Michohabitat
Bufonidae Family	
Rhinella icterica (Spix, 1824)	Wet Áreas
Cycloramphidae Family	
Proceratophrys bigibbosa (Peters, 1872)	Waterlogged
Hylidae Family	
Aplastodiscus perviridis A. Lutz in B. Lutz, 1950	Wood
Dendroposhus minutus (Peters, 1872)	Waterlogged
Hypsiboas faber (Wied-Newied, 1821)	Border of wood and waterlogged
Scinax fuscovarius (A. Lutz, 1925)	Border of wood and waterlogged
Leuperidae Family	
Physalaemus cuvieri Fitzinger, 1826	Waterlogged
Physalaemus gracilis (Boulenger, 1883)	Waterlogged
Leptodactylidae Family	
Leptodactylus fuscus (Schneider, 1799)	Waterlogged
Leptodactylus gracilis (Duméril & Bibron, 1841)	Waterlogged
Leptodactylus latrans (Steffen, 1815)	Waterlogged
Microhylidae Family	
Elachistocleis bicolor (Valenciennes in Guérin-Menéville, 1838)	Waterlogged
Ranidae Family	
Lithobates catesbeianus (Shaw, 1802) INTRODUCED	Waterlogged

The *Leptodactylus latrans* species from the Leptodactylidae family was the most abundant family in the studied area. With terrestrial behavior, it was always found on the bank of water bodies, being collected in many parts of the study area. From the same family, the *Leptodactylus fuscus* species was recorded vocalizing in wetlands near pastures field, away from vegetation. The *Leptodactylus gracilis* species showed preference for terrestrial environment, followed by water bodies near vegetation.

The *Physalaemus gracilis* species, from the Leiuperidae family, is an abundant species in the region and it is usually found vocalizing hidden among the primary riverside vegetation always on the bank of water bodies during spring.

The *Physalaemus cuvieri* species, also from the Leiuperidae family, vocalizes hidden in vegetation during spring. The visualization is difficult and it is widely distributed in the study area, characteristic of the generalist species. The *Physalaemus gracilis* and *Physalaemus cuvieri* species are abundant in the region and are generally found vocalizing hidden among the primary riverside vegetation always on the bank of water bodies. The visualization is difficult and it is widely distributed in the study area by presenting characteristics of generalist species. According to Quinderé (2007), the *Physalaemus* (Anura, Leiuperidae) gender is found in South America, East from the Andes and it is currently consisted by 41 species distributed into seven groups: "albifrons", "cuvieri", "deimaticus", "gracilis", "henselii", "olfersii", and "signifer". This gender presents high quantity of polymorphisms and notorious abundance of cryptic species, which makes difficult the satisfactory identification of some populations based only on morphological criteria.

Representatives of the Hylidae family, *Hypsiboas faber*, were found vocalizing on the aquatic vegetation, with the body out of the water. *Hypsiboas faber* has occurred from Northern Argentina to Eastern Brazil and it reproduces in permanent ponds near roads in the Atlantic Rainforest (MARTINS, 1993).

Dendroposhus minutus, also from the Hylidae family, was located vocalizing on vegetation, at a height of approximately 50 cm over the water. This species was found in spring and autumn, being more abundant in autumn. The *Dendroposhus minutus* species showed preference for high perches, which suggests protection from predators. According to Haddad (1987), *Dendroposhus minutus* presents geographical distribution from Northern South America to Uruguay and Misiones in Argentina, and shows a more complex singing than most of which is usually observed among anurans, which makes special interest for acoustic communication studies.

The *Scinax fuscuvarius* species, from the Hylidae family, was found on trees at heights close to 1.5 m, near water bodies and open pasture fields, which has wide distribution in the study area.

Specimens of the *Aplastodiscus perviridis* species, also from the Hylidae family, were recorded vocalizing on vegetation near water bodies. The monitoring of the vocalization activities of the *Aplastodiscus perviridis* species indicated the preference, as a vocalization site, through the bushed flora vocalizing perched on the proximities of water bodies to a height of approximately 75 cm from the ground. Males of *A. perviridis* vocalize during the night in different situations: on the top of small plants or branches of trees of 1 to 3 m high, hidden under stones, in muddy wells partially covered by dead leaves, inside forests, on the banks of forest patches, or in swamps in open pasture areas. (HADDAD et al., 2005).

From the Microhylidae family, the *Elachistocleis bicolor* species has recorded few males in vocalization activity near the riparian vegetation. According to Thomé e Aguirre (2007), *Elachistocleis bicolor* shows wide distribution in South America, from Panama and Colombia, East of the Andes to Argentina and the Trinidad Island.

The *Proceratophrys bigibbosa* species, from the Cycloramphidae family was recorded in areas with more vegetation. The *Proceratophrys bigibbosa* individuals were found in an area with a lot of vegetation. *Proceratophrys bigibosa* is a species with few records in the North of Rio Grande do Sul state, Southern Brazil. There are occurrence records of the species in the localities of Arroio do Tigre, Canela, Nova Petrópolis (Linha Imperial), São Francisco de Paula, Sertão in Rio Grande do Sul state, Brazil, and Dos

de Mayo, Misiones, Argentina (ZANELLA e BUSIN, 2007), and recently recorded in the city of Erechim, in the North of the state (QUEIROZ e MARINHO, 2008).

The *Rhinella icterica* species, was only recorded in autumn, it was found in wet areas near the closed wood. According to Woehl (2002), the *Rhinella icterica* frog is distributed in southern and southeastern Brazil, eastern Paraguay and Misiones in Argentina, it is pretty abundant in urban areas of the plateau regions, in southern Brazil.

From the Ranidae family, the *Lithobates catesbeianus* species, had few records, near the vegetation, making its viewing difficult. This species also had record only in spring. The vocalization of the *Lithobates catesbeianus* males remembers the lowing of a bull, that is why it is called bullfrog and it occupies permanent water bodies. According to Boelter (2004), *Lithobates catesbeianus* is an amphibian of the Anura order, Ranidae family, which original distribution is restricted to southern Quebec (Canada) and Ontario to the Gulf of Mexico (USA). The bullfrog has been accidentally introduced all over the world, its large size, high mobility, generalist feeding habits and its enormous reproductive capacity, makes it a successful invader and a threat to the local biodiversity.

Final Considerations

None of the recorded species is part of the "Lista das espécies da fauna ameaçadas de extinção no Rio Grande do Sul" (MARQUES et al., 2002). This fact, however, does not reduce the importance of these forest fragments because they shelter Atlantic Forest species populations, an environment subjected to strong anthropogenic pressure in the form of contamination by pesticides, habitat destruction and deforestation.

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REFERENCES

BOELTER, R. A. **Predação de anuros nativos pela rã-touro (*Rana catesbeiana:* Ranidae) no sul do Brasil.** Monography (Master in Animal Biodiversity)- Universidade Federal de Santa Maria, RS. 2004. 36p.

BUDKE, J. C.; ALBERTI, M. S.; ZANARDI, C.; BARATTO, C.; ZANIN, E. M. Bamboo dieback and tree regenaration respenses in a subtropical Forest of South America. **Forest Ecology and Management,** v.260, p.1345–1349, 2010.

CRUMP, M. L.; SCOTT, N. J. Visual encounter surveys. In Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians (W.R. Heyer, M.A. Donnelly, R.W. McDiarmid, L.A.C. Hayek & M.S. Foster, eds.). **Smithsonian Institution Press**, Washington, 1994. p. 84-92.

DUKES, J. Hotter and weedier? **Effetcs of climate change on the success of invasive species**. *In*: GREE, R.E.; HARLEY, A.; MILES, L.; SHARLEMANN, J.; WATKINSON, A.; WATTS, O. Global climate change and biodiversity: summary of papers and discussion. University of East Anglia, Norwich, UK., 2003.

FROST, D. R. **Amphibian Species of the World:** an Online Reference. 2011. Version 5.5 (31 January, 2011). Electronic Database accessible at 29/04/2012 http://research.amnh.org/vz/herpetology/amphibia/ American Museum of Natural History, New York, USA.

GARCIA, P.; VINICIPROVA, G. Anfíbios. 2003. *In*: Livro Vermelho da Fauna ameaçada de extinção no Rio Grande do Sul. Porto Alegre, EDIPUCRS.

HADDAD, C. F. B. **Comportamento reprodutivo e comunicação sonora de *Hyla minuta* Peters, 1872 (AMPHIBIA, ANURA, HYLIDAE)**. Monography (Master in Biology/Ecology, Biology Institute) –Universidade Estadual de Campinas, SP. 1887. 140 p.

HADDAD, C. F. B.; FAIVOVICH, J.; GARCIA, P. C. A. The specialized reproductive mode of the trefrog *Aplastodiscus perviridis* (Anura: Hylidae). **Aphibia-Reptila**, v. 26, n.1, p. 87-90, 2005.

HEYER, W. R. **Measuring and monitoring biological diversity**. Standard methods for Amphibians. Washington. Smithsonian Institution Press. U.S.A. 1994.

HEYER, W. R.; RAND, A. S.; GONÇALVEZ DA CRUZ, C. A.; PEIXOTO, O. L. Decimations extinctions and colonizations of frog populations in southeast Brazil and their evolutionary implications. **Biotropica**, v. 20, n.1, p. 230-235, 1998.

LIPS, K. R.; REASER, J. K.; YOUNG, B. E.; ILBÁÑEZ, R. Monitoreo de Anfíbio en América Latina: Manual de protocolos. **SSAR Herpetological** circular n°30. Borrador. 2001.

MARTINS, M. Observation on the reproductive behavior of the Smith Frog, *Hyla faber*. **Herpetological Journal**, v.3, n. 1, p. 31-34, 1993.

MARQUES, A. A. B. **Lista das espécies da fauna ameaçadas de extinção no Rio Grande do Sul**. Enactment n. 41.672, from June 11th, 2002. - Porto Alegre: FZB/MCT- PUCRS/PANGEA, 52p. 2002.

MMA - MINISTÉRIO DO MEIO AMBIENTE. **Avaliação e ações prioritárias para a conservação da biodiversidade da mata atlântica e campos sulinos**. Secretaria de Biodiversidade e Florestas, MMA, Brasília. 2000.

MYERS, N.; MITTERMEIER, R. A.; MITTERMEIER, C. G.; FONSECA, G. A. B.; KENT, J. Biodiversity hotspots for conservation priorities. **Nature**, v.403, n.1, p. 853-858, 2005.

QUEIROZ, E. U.; MARINHO, J. R. Amphibia, Anura, Cycloramphidae, *Proceratophrys bigibosa:* Distribution extension for Rio Grande do Sul, Brazil. **Check list**. 2008.

QUINDERÉ, Y. R. S. D. **Citogenética de populações e espécies de *Physalaemus* do grupo "*cuvieri*" (Anura, Leuiperidae).** Monography (Master in Celular and Structural Biology)-Universidade Estadual de Campinas, SP. 2007. 84p.

ROCHA, C. F. D.; BERGALLO, H. G.; SLUYS M. V.; ALVES, M. A .S. **Biologia da Conservação: Essências.** Editora Rima, São Carlos. 2006. 582p.

RTP – Projeto Implantação e Gestão de Áreas Protegidas – **Partial Techinical Report.** Elaboration: URI Campus de Erechim, Technological Center, Marck 6th, 2009.

SANTOS, T. G.; KOPP, K.; SPIES, M. R.; TREVISAN, R.; CHECHIN, S. Z. Distribuição temporal e espacial de anuros em área de Pampa, Santa Maria, RS. Revista **Iheringia**, v. 98, n.2, p. 244-253, 2008.

SEGALLA, M. V.; CARAMASCHI, U.; CRUZ, C. A. G.; GARCIA, P. C. A.; GRANT, T.; HADDAD, C. F. B.; LANGONE, J. **Brazilian amphibians – List of species**. Accessible at: http://www.sbherpetologia.org.br. Sociedade Brasileira de Herpetologia. Captured on 29/04/2012. 2012**.**

THOMÉ, M. T. C.; BRASILEIRO, C. A. Dimorfismo sexual uso do ambiente e abundancia sazonal de *Elachistocleis cf.ovalis* (Anura: Microhylidae) em um remanescente de Cerrado no estado de São Paulo, sudeste do Brasil. **Biota Neotropica**, v.7, n. 1, p. 27-33, 2007.

TOLEDO, L. F.; ZINA, J.; HADDAD, C. F. B. Temporal and Spatial Distribution in an Anuran Community in Municipality of Rio Claro, São Paulo, Brazil. **Holos Environment**, v. 3, n.2, p 136-149, 2003.

WOEHL JR., G. Infestação de Amplyomma rotundatum (Koch) (Acari, Iscodidae) em sapos *Bufo ictericus* (spix (Amphibia, Bufonidae): novo registro de hospedeiro**. Revista Brasileira de Zoologia**, v. 19, n. 1, p. 329-333, 2002.

ZANELLA, N.; BUSIN, C. S. Amphibia, Anura, Cycloramphidae, *Proceratophrys bigibosa:* Distribuition extension for Rio Grande do Sul, Brazil. **CheckList.** 2007.