

IN CONFIDENCE

Rufford Small Grant



Request for Referee Statement

Title of Application: Ecology and distribution of the Morro do Ferro anuran fauna (Poços de Caldas Plateau) with focus for Pithecius ayeaye (ANURA, HYLIDAE)

Name of leader: MIREILE REIS DOS SANTOS

The individual named above has applied for a Rufford Small Grant. We would be grateful if you could give the Selection Panel your candid opinion about the applicant and work indicated in the application below. **Your reference will be one of the key factors we take into account when assessing the application.** It is vital that you tell us how you first met the applicant and how long you have known them. Please also clarify if your contact with them has only been via e-mail, skype, etc. or if you have actually met them in person.

Background to the Rufford Small Grants

The Rufford Foundation seeks to fund people whose work makes a pragmatic, substantial and long-lasting contribution to nature conservation. Such work often includes other elements such as sustainable development, public education and environmental campaigning. Rufford Small Grants are designed to provide accessible and flexible funding for those who want to bring about change. Conservationists from any country working anywhere in the developing world are welcome to apply. Projects in the First World will not normally be considered for funding. Applicants are not restricted to qualified scientists, but must be able to compile a written report to describe and quantify the success of their work with appropriate references. Undergraduate and school level expeditions are not eligible. More information about the Rufford Foundation and previous Award and Grant recipients may be found on the Foundation's website at www.rufford.org

Referees

Please write a reference giving your opinion about the pragmatic and long-lasting impact of the work in question; the applicant's ability to lead a team; the ability of the applicant and the team to communicate the solution to the problem they are addressing; and any other information that might help the Panel.

Successful candidates who apply for a Rufford Small Grant will receive up to £5000. We would value your candid opinion about the applicant's ability to absorb and spend such funding with due responsibility.

Please submit your reference by email to the address given below. **Emails should be submitted from your institution email account.** Unfortunately, references sent via web-based services such as Yahoo, Gmail or Hotmail can not be accepted.

Josh Cole - Rufford Small Grants Director

The Rufford Small Grants Foundation
Email: apply@ruffordsmallgrants.org
www.rufford.org

Ecology and distribution of the Morro do Ferro anuran fauna (Poços de Caldas Plateau) with focus for Pithecius ayeaye (ANURA, HYLIDAE)

ID

27976-1

Applicant

MIREILE REIS DOS SANTOS

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Grant type

Rufford Small Grant

Executive Summary

Amphibian populations are declining at an accelerated rate, mainly by decharacterization and replacement of natural habitats by monocultures. In Brazil, this situation is very worrying, especially dangerous in regions of altitude in the Atlantic Forest, where many species can disappear without having the actual information on its occurrence and distribution. Thus, this project aims to inventory populations of amphibians in high altitude streams, focusing on Pithecopus ayeaye, a critically endangered species endemic to the Poços de Caldas Plateau.

Publishing plan

Our disseminating plans of the results are given in two ways: 1) scientific: the publication in indexed journals as well as in the national database on biodiversity, conferences and seminars on the subject; and 2) social: with the wide dissemination in the community through the project site, local circulation periodicals (Regnella Scientia) and lectures at local educational centers in order to promote environmental education from regional natural resources.

Amount applied for

£4,833

Principal countries

Brazil

Category

Amphibians

Personal Details

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Nationality

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Facebook page

<https://www.facebook.com/>

LinkedIn profile

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Twitter username**Website or blog**

Biography

Education

Centro de Ensino Superior de Juiz de Fora - CES - 2003 - 2007
Graduate Degree in Biological Sciences

Universidade Federal de Alfenas - UNIFAL - 2012 - 2014
Master Science Degree in Ecology and Environmental Technology

Universidade Federal de São Carlos - UFSCar - 2014 - 2018
Doctorate in Sciences (Ecology and Natural Resources)

Previous Work

I worked in varied areas, but in the education I have got approximately 15 years of experience. In my academic research of Msc and Doctor degree I graduated in Ecology investigating responses of metacommunities of aquatic invertebrates to land uses, in streams of altitude in Poços de Caldas Plateau.

Current Work

Currently, I'm working in a government institution for teaching and research, developing ecological research with other biological groups (eg. Fish and amphibians), always seeking ecological relationships as support for habitat conservation.

Future Plans

The Poços de Caldas Plateau is a very peculiar region, because it has high altitudes (up to 1700 meters) and semicircular relief with the appearance of a volcanic caldera. All streams born and drain into this volcanic caldera. There are recent research records demonstrating degree of isolation and geographic differentiation in regional flora species. However, there are many mineral resources that attract industries that cause serious environmental impacts, threatening to extinguish the fauna and flora of the region. One of these mineral-rich regions is called Morro do Ferro (Moinhos watershed), where there are records of one extremely rare and therefore critically endangered Amphibia-Anura species, *Phyllomedusaidae* (*Phyllomedusa ayeaye* Lutz, 1966), according to the IUCN. In the same region, I developed my doctoral research and continued with some scientific research, expanding to plant and fish communities. In the short term I aim to investigate if *Phyllomedusa ayeaye* to still records in the region, for to later to work on the definition of the ecological niche of that specie. This data set will serve as support for the recovery of degraded areas in that region, for the program of breeding in captivity (ex-situ) and possible reintroduction.

Organisation

Instituto Federal de Educação Ciência e Tecnologia do Sul de Minas Gerais - IFSULDEMINAS
(<https://pcs.ifsuldeminas.edu.br/>)

Introduction to RF

was it a recommendation

RF Conferences

No

1. Background

1.1 The Origin of Your Work

The Poços de Caldas Plateau is a particular region of the Atlantic Forest. It has a "volcanic caldera" aspect surrounded by mountains with altitudes reaching up to 1700 meters. Due to the high altitudes all streams outcrop and drained inland for this semicircular region of approximately 30 km². These characteristics can promote endemism and differentiated ecological processes. Scientific research in the Plateau is still scarce, considering his regional territorial extension and biodiversity, besides the environmental impacts resulting from the local

mineral exploration and the extensive eucalyptus monoculture. Like ecologist, I investigate patterns in metacommunities, especially of the biota related to high-altitude streams, with the aim to understand how changes in the landscape, especially the replacement of natural matrices by eucalyptus, can affect these groups. Indeed, the anuran biological community is still little inventoried and ecological aspects such as niche, spatial distribution, richness, and others are unknown. In particular, *Pithecopus ayeaye* (Subfamily Phyllomedusinae) it's on the international list of critically endangered species. Endemic of the Plateau of Poços de Caldas and a stretch in the Serra da Canastra National Park, the last record of this species in the Plateau was in 2007.

1.2 The Contribution of Your Work

This research will promote an updated taxonomic listing of anurans for the Poços de Caldas Plateau, specifically for Morro do Ferro, an area that harbors high biodiversity and suffers from the environmental degradation, such as eucalyptus plantations. Additionally, I will conduct an extensive search for *Pithecopus ayeaye* in the area in order to identify his occurrence habitats and what aspects of biology are ecologically limiting to their populations and geographic distribution. This dataset will support in-situ and ex-situ conservation programs aimed at reintroducing them into their naturally occurring areas.

2. Project Activities

2.1 Project Site

Sampling net will first be done in the Morro do Ferro (watershed Moinhos, central geographical coordinate UTM 340723E and 7577285S, Datum WGS84, 23K), the region where the species was described in the past. The visual diagnostic samplings will be performed by direct and indirect methods.

2.2 Fieldwork

We intend to develop this research in 03 stages (steps), which will cover 03 years (36 months), being 1 to 24 months of fieldwork and 25 to 36 months of laboratory research (can be extended), if the steps previous are reached.

2.3 Activities and Timescale

This research will be developed in three stages, in 36 months:

First stage: it will consist of active direct and indirect search for anurans in streams located in Morro do Ferro, with the aim to verify the existence of *Pithecopus ayeaye* populations at the site (12 months). The period of 12 months is justified because all the Morro do Ferro streams will be analyzed on a temporal scale. In this stage, taxonomic listings of the species occurring at this region will be generated.

Second stage: if the presence of *Pithecopus ayeaye* is recorded this research will continue to the next stage, in which we will evaluate aspects of the biology, structure and ecological dynamics of this population. In this stage, we will characterize the local of occurrence with the purpose of identifying the ideal conditions (ecological niche) for the occurrence of these populations. In this stage yet, will be doing the inventory of riparian flora (richness and composition) including shrub herbaceous vegetation surrounding the streams, organic matter analysis in the sediment, physical and chemical analyses of the water, environmental heterogeneity, climatic variables, among others. The field activities of this stage will be concentrated only in the streams where the species occurs. If *Pithecopus ayeaye* has not occurred on the Morro do Ferro (it's the original area of occurrence) in the first stage (1 to 12 months), we will search for this species in other streams on the Poços de Caldas Plateau for another 12 months.

Third stage: this step will only occur if *Pithecopus ayeaye* is still recorded on the Poços de Caldas Plateau. If these populations still exist in their original areas of occurrence and are viable (after the conclusion of the ecological studies of the population), we will request permission from the competent agencies to collect some specimens and perform tests for ex-situ reproduction (in captivity) of the species. This step will take 12 months.

Publication of results: after the first step (1 to 12 months), regardless of the occurrence of *Pithecopus ayeaye*, we intend to publish the checklist of species of anurans occurring in Morro do Ferro, on Poços de Caldas Plateau. If *Pithecopus ayeaye* is recorded and the second and third stages occur, we intend to publish the results obtained and methods of creation in high impact periodic and wide scientific circulation.

3. Methods

3.1 Methods to be Used

The methods of this research will be divided according to the proposed work stages (according to item 2.3), and the grants requested at this first moment is for the execution of the first stage.

First stage (1-12 months): The visual diagnostic samplings of the first stage will be performed by direct and indirect methods. Direct method: active searches will be performed in the streams and its adjacencies inserted in the study region, in the foz-nascent direction, at twilight/night time, as it coincides with the habits of *Pithecopus ayeaye*, the target species of this study. Every 12 months a total of 24 campaigns (ranging from 1 to 3 days) will be performed from 6:00 pm to 1:00 am in the selected areas, through visual and/or auditory identification. Through the active search will be explored environments such as temporary and permanent pools, hollows of trees, terrestrial bromeliads, folhço, and leaves of plant species that border the streams, where normally the species does posture. Due to the conservation status of the (critically endangered) *Pithecopus ayeaye* and other species, the recorded specimens will be individually identified by photograph, using a digital optical zoom camera (Canon 5D Mark II with 100-400mm lens), a digital voice recorder (Sony brand). When possible, since it does not affect the health of the animals, they will have their body size measured and sexing defined in the field. The species registration places will be georeferenced with Garmim e-trex GPS model and their registered environmental characteristics, in order to allow an understanding of the habitat and ecological niche of the registered species. The obtained data will be compared between the areas sampled. Indirect method: Indirect records will be given through traces such as nests for spawning, presence of larvae (tadpoles) and others. All will be registered with the help of a photographic camera.

Second stage (13 - 24 months): in this stage, we will focus only on the populations of *Pithecopus ayeaye* and their area of occurrence and distribution patterns. The methodology for the determination of population parameters (structure and dynamics) will be that of capture and recapture, in which the captured specimens will be individually tagged in the field with subcutaneous mininanochip inserted in the dorsal part of the animal. Before release, allometric variables such as cara-cloacal length (1mm digital caliper), mass (dynamometer) and sexing will be taken. After the animals will be released again in the same place where they were collected.

Third stage (25 - 36 months): after the collection and analysis of the population viability of *Pithecopus ayeaye* we will capture some specimens for breeding tests under simulated mesocosmos conditions.

3.2 Reasoning

The loss of habitats by fragmentation of the landscape directly reflects the loss of biodiversity. Biological groups with less dispersive and more sensitive potential, such as amphibians, become as a matter of priority, threatened and in danger of extinction. Amphibians specifically have been declining sharply throughout the world because of habitat fragmentation and also of pollution from large-scale plantations, pesticide use, and fertilizers. The study region has few published data on anuran fauna, and one of them is still in the register of critically endangered species, both for their endemism and for the loss of their natural habitat. The sampling methods are chosen (direct and indirect) aim at the least interference in the population dynamics of the species, optimizing the meetings through non-invasive methods preserving the natural populations. In this way, the risk of eliminating species not yet described or even threatened of extinction will be null throughout the development of this stage.

4. Conservation Benefits

4.1 Conservation Outputs

Understanding the behavioral biology of anuran fauna and relating it to environmental filters makes it possible to establish habitat conservation programs focused on the maintenance of these most vulnerable populations. Furthermore, it allows knowledge about reproductive and niche aspects, favoring breeding programs in captivity for later reintroduction in natural environments, recomposing populations with high risk of extinction. Still, our results can support local political programs of conservation of key environments for amphibians, in the Poços de Caldas Plateau. This would be very desirable considering that the study region presents relevant economic interest with potential for mining to rare earth element and agriculture.

4.2 Conservation Evidence

Our results, besides promoting a checklist of the local anuran fauna, can still discuss the current occurrence status and data of *Pithecopus ayeaye* populations, the major object of this study. It will also subsidize knowledge about possible new local species, or even, when all stages are achieved, promote knowledge about the biology of the species for captive breeding purposes (ex-situ conservancy). Also, it will compose a network of local data on biodiversity of the Poços de Caldas Plateau, which has already been developed.

4.3 Conservation Importance

In general, the worldwide anuran fauna is under strong pressure and threat of extinction. Specifically, *Pithecopus ayeaye*, an anuran of the Subfamily Phyllomedusinae, popularly known as "Reticulate Leaf Frog" or "Foliage-foliage-with-leg-reticulate" is endemic to the Poços de Caldas Plateau and stretches of the Serra da Canastra and in the State Park of Furnas do Bom Jesus. It is in the category of critically endangered species because it occurs in very small areas and under strong anthropic pressure. According to the IUCN, it is a rare species, occurring in low densities and with a high need for studies on its population dynamics, as well as life history and ecology.

5. Monitoring

5. Monitoring

The checklist of the anurans of the "Morro do Ferro" will generate dataset on the biodiversity of anurans contributing to research on these populations. The presence of *Pithecopus ayeaye* on Morro do Ferro, in the Poços de Caldas Plateau, will support national and international assessments of the conservation status this species, and will serve as a tool for local conservation programs of natural habitats. One example is the strengthening of the importance of maintaining local aquatic ecosystems through other ecological researches that have already been developed in the same region, with other taxonomic groups. Also, the record of *Pithecopus ayeaye* in his natural habitat will provide knowledge to create a stable population ex-situ in captivity for the rescue of natural populations. The dissemination of results in local media will be very relevant for the conservation of this species.

6. Your Team and Other Contacts

6.1 Team Description

Dr. Iberê Farina Machado - He has been working in amphibian ecology and zoology research since 2004. He has provided advice on updating the Brazilian Amphibian Conservation Status list (UNDP - ONU and RAN-ICMBio, partnership). He is the board of the Boitatá Institute - NGO, at the Amphibian Specialist Group (ASG-Brasil) with IUCN. He is a visiting researcher at the Federal University of Goiás and develops research in the Laboratory of Herpetology and Animal Behavior. He will be able to contribute with the taxonomic identification, biology and ecology of anurans, besides the state of conservation in the national and international lists of threatened amphibians. Dr. Carmino Hayashi - He has experience in zoology and applied ecology, especially on studies of ecologic faunistic interactions (physiological responses aiming at reproductive aspects for mass production and reintroduction of species in their natural habitats). Will be able to assist in the

analysis and interpretation of results, conclusions and writing a scientific paper.

Dr. Paulo Augusto Zaitune Pamplin - He will be able to contribute in the analyses of population ecology, evaluating the dynamics of the population of *Pithecopus ayeaye*.

Dr^a Isabel Ribeiro do Valle Teixeira - She has experience with experimental research involving behavior and biological responses to environmental variations.

Daniel Rubens Silveiras de Matos - He is pursuing a degree in biological sciences of Federal Institute of Education Science and Technology of Minas Gerais State - Brazil. He will contribute on fieldworks for anurans sampling.

Ederson José de Godoy - He is pursuing a degree in biological sciences of Federal Institute of Education Science and Technology of Minas Gerais State - Brazil. Has professional experience in wildlife photography and will be able to aid in the fieldworks, recording in photos the species found.

6.2 Your Skills

During my academic training and my career as a teacher/researcher in recent years I have been investigating the ecological responses of aquatic communities in high altitude environments, in order to understand how anthropic actions can negatively affect these organisms. We already have an extensive biological sampling network. I have extensive experience in coordinating teams, since before academicist career I worked as an environmental consultant coordinating fieldwork on biodiversity research and environmental regulations. At the institution that I work now a day I have projects with internal support (grants) under my coordination, with students oriented in scientific researches.

6.3 Links

The institution in which I work (Teaching and researching) for eight years, has an agreement with several other local public institutions, promoting research and extension, which will help us in the dissemination of the results. As an example of partnerships, we mention the city's Botanical Garden, local public schools, the City Hall, among others. We still intend to disseminate our results in the institution's own media, such as social networks and institutional site.

Funding			
Description	Item Cost	External Amount	Rufford Amount
Administrative fee	413	413	0
Vehicle rental (72 days during 24 campaigns)	857	0	857
Lodging and food (72days for 4 persons)	3,429	0	3,429
Fuel (100) liters for 24 campaigns	99	99	0
Water proof megaphone	99	0	99
Canon Mach 2 Photo Camera	1,389	1,389	0
Waterproof backpack	36	0	36
Zoom - H1- DIGITAL RECORDER	95	0	95
Head lamp	159	0	159
Protective glove	23	0	23
Waterproof overalls	262	262	0
Multi-parameter probe for measurement of limnological variables (horiba U52)	6,350	6,350	0
Herpetological hook	135	0	135
Totals:	13,346	8,513	4,833

Notes to budget

Pounds to real (£1 = 5.04)

To conduct this research a total of £ 12931 will be required, of which 8513 will be our consideration and 4833 will be grant from Rufford. For this we will count on the support of infrastructure and equipment of the Federal Institute of Education, Science and Technology of the South of Minas Gerais - IFSULDEMINAS and of the Federal University of Alfenas - Poços de Caldas.

We will use infrastructure from existing laboratories and equipment, as well as an institutional vehicle for some fieldwork. For the first and second stages (1-12 and 13 - 24 months), several fieldworks will be required, with lodging and food up for 1 to 3 days for four people. For this, we will need the financial contribution to sponsor these expenses, as well as to purchase consumer materials that we do not have.

External funding

From the total of £13346 of the project, we already used £8513 from other sources of funding to acquire a multiparameter probe to measure physical and chemical variables of water, waterproof overalls and a photographic camera. The funding of these items was made through a public resource of the institutions and private acquisition of team members.

Referees

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