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Ways to Protect the Environments of the Itaúnas Cloud Fish - Xenurolebias myersi (Carvalho, 1971) – Inhabitant of the Restinga Swamps, Conceição Da Barra, Northern Espírito Santo, Southeastern Brazil

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Abstract

Itaúnas is a locality of rare scenic beauty, with white sand dunes in the middle of the savanna coastal environments known as restinga, and many flooded pools, forming a unique landscape. In these ponds of dark, matte tea colored water, lives a fish, *Xenurolebias myersi,* an endemic inhabitant of Itaúnas. The survival of this unique little fish is worrying. The living environments of the Itaúnas cloud fish are under pressure, and the species is threatened with extinction as well. As inhabiting temporary, almost isolated environments, this fish is almost unknown. The local population is unaware that the region is inhabited by an endangered endemic fish. A form of protection comes from promoting its presence among the population of the village. The present contribution aims to shed light on the knowledge of *Xenurolebias myersi* and its awareness by the local population, as well as to highlight the urgent need to protect the Velha Antônia stream, a river drainage close to the village of Itaúnas, where the fish was caught for the first time.

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Introduction

In the floodable regions of northern Espírito Santo lives a fish that has developed a differentiated survival strategy. Its life cycle unfolds in the rainy season, when it mates and lays the eggs on the substrate that will soon dry out. As soon as the rainy season comes, even if years pass, the eggs will hatch and the cycle will repeat itself in accelerated time, to benefit from this ideal circumstance. Due to its rapid appearance in a previous dry area, they are known as the "cloud fish" (peixes das nuvens, in Portuguese) - as they come with the rains. Its life cycle is annual, reaching sexual maturity in the summer period when there is a lot of water in the marshes and dying during the dry period in the winter, when the puddles that are its habitat dry up. This contribution aims to shed light on the knowledge of *Xenurolebias myersi*, to raise awareness among the loca population about its presence, and to point out the urgency to protect the Velha Antônia stream, a river drainage close to the village of Itaúnas.

Fig. 1.*Xenurolebias myersi*, adult male with lanceolate dorsal and anal fins and contrasting vertical bars on flanks. Image: Rodrigo Damasio.

Fig. 2. *Xenurolebias myersi*, adult female with translucent fins and dark dots on flanks. Image: Frederico Pereira.

Habitat notes

Due to documentation, population registration and monitoring of the species by the local community (citizen science), it was possible to properly map the species distribution. The cloud fish inhabits the sub-basins of the Velha Antônia stream, Moças stream, in the Itaúnas river basin and additionally in the Limo stream, a tributary of Doce creek basin (Sarmento-Soares et al., 2022). These bright colored fishes are sexually dimorphic (Fig 1, Fig. 2). Lives in peculiar environments, where water is transparent, translucent, in an yellowish or dark orange tone, without turbidity. The species inhabits seasonal swamps in open areas of taboal (*Typha* spp.) or in restinga forests. They are found in temporary freshwater wetlands of varying size, from small defined puddles with dozens of meters to very extensive swamp areas, with a few square kilometers. Such environments are in the floodplain of rivers, some very close to the sea, just over a hundred meters from the beach. The puddles are shallow, between 20 and 70 cm deep. The bed of the marsh is composed of a triple layer of substract: leaf litter, red mud, which occupies about 20 centimeters or deeper, and then sand underneath. On the Trail of the Butterflies, within the State Park of Itaúnas (PEI), the flooded pools are located in open areas. But in the Limo stream the swamp is on the edge of the forest. The vegetation in the marshes consists of hydrophyte plants such as Nymphaceae (*Nymphea ampla*) and Salviniaceae (*Salvinia biloba*) that may be present. The cloud fish is often the only fish in its environment, but the habitat can be shared by non-annual species such as the barrigudinho (*Poecilia vivipara*), the tamboatá (*Callichthys callichthys*), the piaba (*Hyphessobrycon bifasciatus*) and even juvenile of piscivorous fish such as the traíra (*Hoplias malabaricus*) and the morobá (*Hoplerythrynus unitaeniatus*). The marshes where *Xenurolebias myersi* lives dry out once a year, in late winter, but we observed that larger wetlands do not dry out every year. In this sense, some populations experience a longer life cycle, according to the rainfall regime. The hatching of the eggs happens at the beginning of the rainy season, in November and December, which is when the fry appears.

But it is a silence presence.

Fig. 3. Velha Antônia stream, near village of Itaúnas. Type locality of *Xenurolebias myersi*. Potential area of conservation action and environmental education.

The Velha Antônia stream

Until 2004, *Xenurolebias myersi* was known only from point records in the Itaúnas river basin, most of them were from the Velha Antônia stream (Fig. 3). The Velha Antônia stream corresponds to the type locality of the fish of the clouds of Itaúnas, that is, the place where the species was first observed in the 1960s, by a team of researchers who were there to collect amphibians (Carvalho, 1971). Due to proximity of Itaúnas village, the Velha Antônia stream corresponds to a potential area of conservation action and environmental education. More recently, this peculiar little fish gained the charisma of the local community of the village of Itaúnas, today involved in the partnership for its conservation, in local schools and environmental education (Sarmento-Soares et al., 2022). The fish became a symbol of the village, and its known as the "Little Fish of the Clouds of Itaúnas".

We are currently concerned about the situation of the Velha Antônia stream. The arrival of asphalt in the village of Itaúnas

has brought a very aggressive and dynamic occupation, particularly along the river valleys closer to the village, as is the case of the Velha Antônia stream. This stream has been the scene of disputes between social movements, the timber sector and real estate speculation. The drastic transformations recorded in the floodplains give way to urbanization, as the wetlands are easily drained and grounded. Actions of recovery and conservation of the Velha Antônia stream now more than ever are necessary and urgent.

Discussion

Although conservation actions are in course since 2013 (MMA, 2013), the cloud fish remains as Endangered (EN) in the Red Lists (MMA, 2018; Hostim-Silva et al., 2019). *Xenurolebias myersi* is a focal species within the Brazilian action plan to conservation of rivulid fishes according to MMA ordinance No. 148, of June 7, 2022 as included in the National Action Plan for the Conservation of Endangered Rivulid Fish – PAN Rivulidae (MMA, 2022). The PAN Rivulidae highlights in its specific objective 3 the popularization of the species:"*disseminating knowledge about the focal species of rivulids, sensitizing society about the importance of wetlands for their conservation*" (MMA, 2013). Additionally, in Espírito Santo state the species is benefited in the Capixaba-Gerais Territorial Action Plan – PAT Capixaba-Gerais (IEMA, 2021).

Now we need more attention towards conservation of the cloud fish territory. We protect what we love, what is precious to us. With everyone's help, celebrating the life of this little fish is something that deeply moves us. The protagonism of Itaúnas community towards fish conservation potentiates actions of restoration of its living environments, through the involvement of local actors. The climate has already begun to change. Socio-economic losses associated with climate change can be avoided if local people act now. Together we will protect the environments from the Itaúnas waters.

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