



CONSERVATION

# The Santa Bárbara Ecological Station: An island of Cerrado Biodiversity

By Bruno Ferreto Fiorillo

Anole (*Norops meridionalis*)

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**Bruno is an ecologist who is currently associated with Instituto Manacá. He is also the founder of Herp Trips, a company focused on the observation of amphibians and reptiles from the Atlantic Forest in southeastern Brazil. He sees photography not only as a powerful research tool, but also as one of the best ways to show nature in its entire splendor.**

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Fig 1 - Professor Marcio Martins



Fig 2 - Calango (*Ameiva aff. jacuba*)

A few kilometers from the city Águas de Santa Bárbara, the Santa Bárbara Ecological Station (SBES) is an “island” of biodiversity amid the agricultural sea of the state of São Paulo, Brazil. In just over 3,000 hectares, maintained under the care of four or five workers, more than 500 native species of plants, among different inventories, an enormous variety of vertebrates among amphibians, birds, reptiles, and mammals have already been found. A relatively high portion of these species is classified as regionally threatened, according to the São Paulo state red list of threatened species. Such tremendous biodiversity is probably related to the typical landscapes of the Cerrado biome that prevail in the area, ranging from scrublands to woodlands and gallery forests.

The name Cerrado is intended for the large region that covers the entire Brazilian open diagonal, except for the Caatinga and Pantanal biomes. It can be classified as a savannah, which originally designates landscapes dominated mainly by grasses and few trees. However, the Cerrado biome comprises several types of vegetation. Among them:

- Grasslands (campo limpo): a landscape completely covered by grasses, without trees, including some areas that are occasionally flooded.
- Grassy scrublands (campo sujo): also dominated by grasses but with a certain number of shrubs, palms and sparse trees.
- Grassy scrublands with scattered trees (campo cerrado): presents a greater number of sparse trees than the grassy



Fig 3 - Professor Ana Paula Carmignotto (left) and Giovana Felicio (right)

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Fig 4 - Adult Lindbergh's Oryzomys (*Cerradomys scotti*)



Fig 5 - Juvenile Lindbergh's Oryzomys (*Cerradomys scotti*)

scrubland (comprising about 15% of the vegetation cover).

- Typical cerrados: complex landscape in which trees (from 3 to 8 m height) fill the scenery even more but do not form a continuous canopy, the understory contains heterogeneously distributed shrubs and grasses covering the ground.
- Woodlands (cerradão): forests dominated by taller trees (from 8 to 12 m), almost continuous canopy and almost no grasses.
- Gallery forests: forest landscapes that necessarily present a source of running water, such as streams or creeks.

Several studies have suggested that Cerrado's biodiversity is strongly associated with vegetation cover. Such association was shaped by ecological and evolutionary processes that coined the current distribution of these species. However, in the state of São Paulo, the Cerrado has been continuously degraded by agricultural expansion. Consequently, many open-habitat dwellers have been pushed to the brink of extinction. Additionally, a new problem has arisen in the southern portion of the biome, the woody encroachment.

Unintuitively, in many cases, the advance of forest cover can be harmful to many members of the Cerrado's native fauna and flora. The research project led by Professor Marcio Martins (Fig. 1), from the Universidade de São Paulo, and of which my Ph.D. research took part, sought to portray the variation in the diversity of different groups of vertebrates along the



Fig 6 - Broad-headed Spiny Rat (*Clyomys laticeps*)



Fig 7 - Broad-headed Spiny Rat (*Clyomys laticeps*)





Fig 8 - Chacoan Gracile Opossum (*Cryptonanus chacoensis*)

vegetation cover gradient of the SBES. The studies developed during this and other projects revealed that the diversity of plants, mammals, and reptiles tend to decay from grasslands to woodlands in the SBES. Fire suppression (which should occur naturally in the Cerrado) in the last 15-30 years has led to a woody encroachment process and the advance of the woodland vegetation type. Such a change represents a major threat to endemic species (found only in a specific region) typical of open areas of the Station.

Under the supervision of Marcio, I found that lizard diversity declines sharply along the vegetation gradient and that most species found in the Station are not found in woodlands, or at least are much less abundant there. This is especially the case of the emblematic blue-tailed lizard (*Micrablepharus atticolus*; Fig. 9), an endemic species widely distributed throughout the Cerrado and highly dependent on open areas. This species is categorized as Vulnerable according to the São Paulo state red list of threatened species. Other lizard species seem to be under the same threat, such as the species *Ameiva aff. jacuba* (Fig. 2), which barely has a scientific name, since it does not fit perfectly *A. jacuba*, which was originally described from specimens collected in the Emas National Park (Goiás state, more than a thousand kilometers from São Paulo). *Ameiva aff. jacuba* can be a new species, possibly as endangered as the blue-tailed lizard.

The threat of woody encroachment is not restricted to reptiles. Professor Ana Paula Carmignotto (Fig. 3), a specialist in small mammals' ecology



Fig 9 - Blue tailed lizard (*Micrablepharus atticolus*)

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Fig 10 - Neuwied's Lancehead (*Bothrops pauloensis*)



Fig 11 - Rainbow Boa (*Epicrates crassus*)

and systematics from the Universidade Federal de São Carlos, has conducted some studies on these animals at SBES and found several habitat specialists. An example is the Lindbergh's *Oryzomys*, an endemic rodent that received its genus name in honor of its biome, *Cerradomys scotti* (Figs. 4 and 5). This species is also currently regionally threatened with extinction according to the most recent São Paulo state red list of threatened species. In the same way, the Broad-headed Spiny Rat (*Clyomys laticeps*; Figs 6 and 7), considered as threatened as the Lindbergh's *Oryzomys*, was found only in the most open landscape of the SBES, the last remnant of Grassy scrublands (campo sujo) in the reserve. Besides the rodents, Carmignotto also documented how marsupials behave in terms of habitat use across the station. Some species of this group follow quite the same pattern as rodents. For instance, the Chacoan gracile opossum (*Cryptonanus chacoensis*; Fig 8), belongs to a poorly known group of species (genus *Cryptonanus*) and it is only found in open habitats

On the other hand, species like the Anole (*Norops meridionalis*; Article cover) and the Neuwied's lancehead (*Bothrops pauloensis*; Fig. 10) seem to be affected differently. Both species are also endemic to the Cerrado and highly dependent on the typical landscapes of this biome. In these cases, we often found these species in the typical cerrado, a vegetation type moderately covered by low trees. However, even though they were able to colonize denser habitats, almost no individual of these species was found in woodlands.

Other species don't seem to be affected at all. The rainbow boa (*Epicrates crassus*; Fig. 11) is widely distributed across the Cerrado, however, it marginally occupies regions of the Atlantic Forest and was found at both open and forest environments of the station. We often found the false-coral (*Apostolepis dimidiata*; Fig. 12) in woodlands but in other studies it was primarily captured in open habitats. The only species of rattlesnake (*Crotalus durissus*; Fig. 13) found throughout Brazil, has extremely generalist habits,

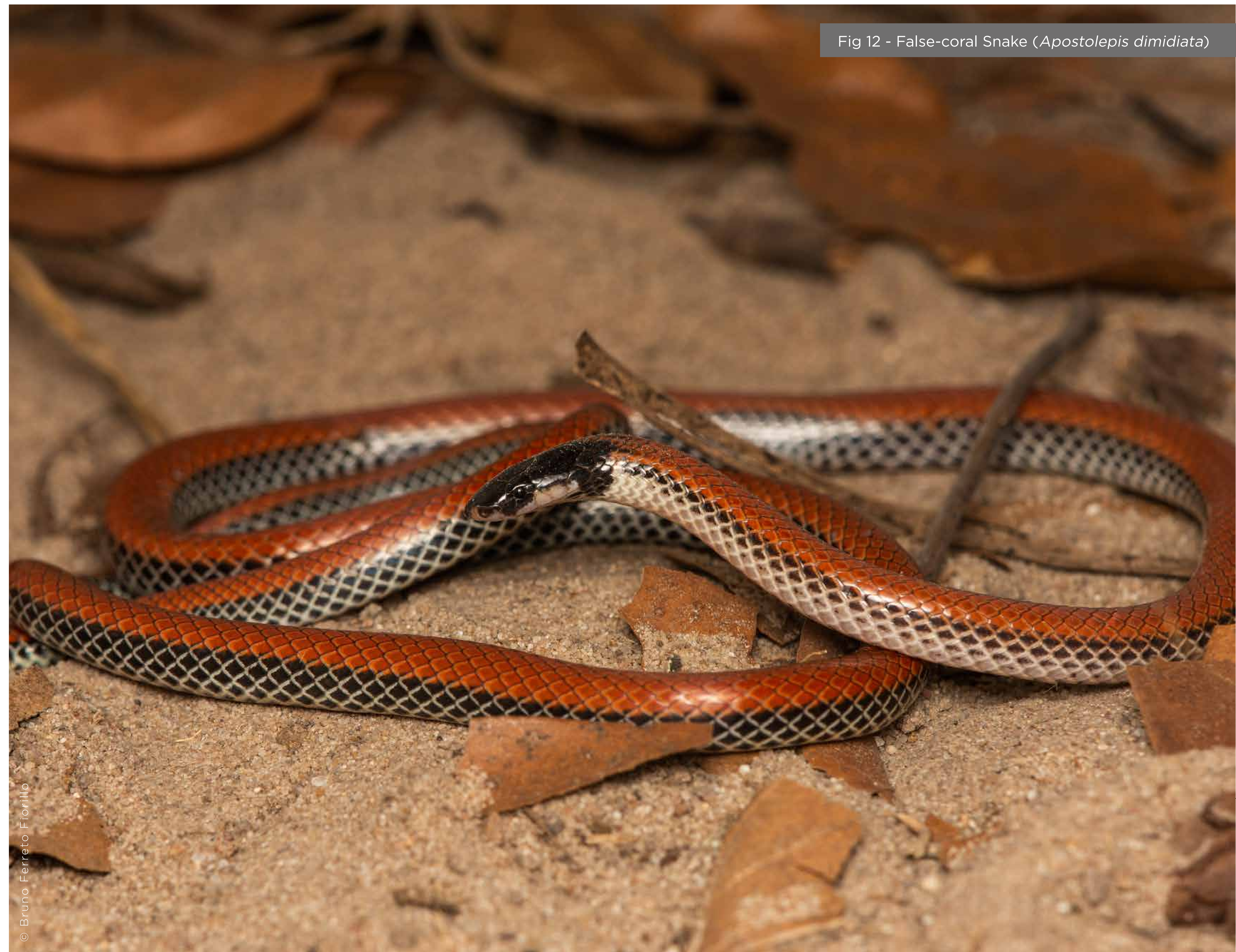


Fig 12 - False-coral Snake (*Apostolepis dimidiata*)



Fig 13 - South American Rattlesnake (*Crotalus durissus*)



Fig 14 - Fire management

being able to tolerate high levels of habitat disturbance (it can occur in extremely disturbed environments such as soybean or sugarcane plantations, which are impenetrable environments for many species). This was the most abundant snake in woodlands.

For managing woody encroachment, specific measures are necessary. Although difficult to accept, both by the general public and stakeholders, fire management (Fig. 14) is the most suitable way to contain the advance of woodlands and thus prevent the disappearance of typical open landscapes of the Cerrado and their associated fauna. Indeed, a study coordinated by a researcher from the São Paulo state Instituto de Pesquisas Ambientais, Giselda Durigan (Fig. 15), and colleagues demonstrates that, in the short term, prescribed fires do not harm local biodiversity (including small vertebrates), in addition to contributing to the maintenance of open areas.

Containing the advance of the woodlands is not the same as eradicating forest areas. Although there is a great number of species that rely on open habitats, several others inhabit forests. Among forest dwellers are the Brazilian lancehead (*Bothrops moojeni*; Fig 16), the false-coral snake (*Phalotris mertensi*; Fig 17), and the white-eared opossum (*Didelphis albiventris*; Fig 18). Thus, the researchers suggest that management should be carried out to keep the mosaic of landscapes as diverse as possible, consequently contributing to the support of most of the local biodiversity.

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Fig 15 - Dr. Giselda Durigan





Fig 16 - Brazilian lancehead (*Bothrops moojeni*)

Fig 17 - False-coral Snake (*Phalotris mertensii*)





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Fig 18 - White-eared Opossum (*Didelphis albiventris*)