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### EXTERMINATION OF BATS THREATENS TROPICAL ECOSYSTEMS

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If you stopped people in the street anywhere in the world to ask them their opinion of bats, the overwhelming majority would probably say they hate and fear these shy, nocturnal animals. Brazilians are no different. To them, as to most people, bats are hideous creatures, rabies carriers, which like to feed on the blood of innocent children or young girls.

Of course, almost all of these associations are based on popular superstition and entirely false. Worse still, the systematic destruction of Brazilian bat species threatens to disrupt the very processes by which rain forests reproduce. Ignorance of bats endangers the species themselves, and by extension the precious environments in which they live.

Of the 900 bat species known to exist worldwide, about 150 occur in Brazil. Species diversity in the Brazilian forests is higher than anywhere else, except for some Asian countries. Only three are blood-eating. Two of these, *Diphylla eucadata* and *Diaemus youngii*, attack birds, and just one, the *Desmodus rotundus* attacks mammals.

All the remaining 147 species feed on insects, fruits, flowers or very small animals \_ lizards, frogs and sometimes even other bats. Some are omnivorous in that they feed on leaves, insects or fruit, depending on whatever is at hand. There are also "humming-bird" bats. These suck up the nectar from flowers, and "fishing" bats that capture their prey as they skim over the surface of a stream or lake.

When they have no contact with humans, Brazilian bats live in the rain forest and roost in caves, tree hollows, or other dark places. They play important roles in insect control, pollination, and dispersal of the seeds of key plants such as trumpetwood, the souari (or pekea) nut, ingá, bell bauhinia, and some passionflowers.

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The majority of bat species are insectivorous. Indeed, bats are believed to have evolved as the only flying mammals because of the need to hunt nocturnal insects. To perfect their hunting skills, they developed sophisticated echolocation systems ("bat sonar") for orientation while flying in the dark. These capabilities served as inspiration for key modern technologies, such as radar.

Some species do not have large populations and are rarely seen, but several live in proximity to humans and are exposed to pollution, agrochemicals and prejudice. Moreover, the common vampire bat (*Desmodus rotundus*), the only species harmful to humans and livestock, proliferated so fast that hostility has become generalized towards all bat species, leading to indiscriminate killing.

Many bats also depend on fragile environments such as caves, where the ecosystem is delicate and one tiny change can mean death for large numbers. Because of the many hazards, added to lack of detailed research, these flying mammals could just die out in silence and ignorance.

There are a number good reasons why the extinction of bats would be a tragic loss to the planet. One is crop protection. "Bats are excellent biological control agents," said Deoclécio Guerra, a researcher at the Federal University of Pernambuco, a state in the Northeastern region, where 55 bat species have been catalogued. 30 of them are insectivorous.

An insectivorous bat can eat the equivalent of its own weight in a single night. It feeds mainly on moths, termites, flying ants, beetles and cicadas.

At sunset in downtown Recife, capital of Pernambuco, huge flocks of two free-tailed species (*Molossus molossus* and *M. ater*) can be seen wheeling and swooping in the reddening sky in search of their evening fill of insects.

"Just imagine what would happen to us if they became extinct," said Guerra. He added that unfortunately, these bats are often poisoned by agrochemicals when they feed on contaminated insects.

In the rainforest, insectivorous bats help to maintain a balance among nocturnal insects. Birds play the same important role by day.

Some plants are pollinated solely by bats, said Marlies Sazima, a botanist from the University of Campinas, in São Paulo state. The trumpetwood, or trumpet tree is a good example. "Its seeds are dispersed by birds, bats and other mammals, but only bats pollinate them," said Sazima.



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Trumpetwood (*Cecropia* spp.; embaúba or umbaúba in Portuguese) is an important pioneer in the tropical rain forest. When a falling tree opens a natural clearing or a deforested area begins to regenerate, there is always a species of trumpetwood among the first trees to appear.

Trumpetwood is also a fast-growing species that provides the shade required for rarer species to germinate. Many other plants, such as several species of cactus, are pollinated by bats and thus guarantee cross-reproduction in different environments, including the semi-arid Northeast.

Fruit bats contribute to the recomposition of natural vegetation by dispersing seeds. The vast majority prefer wild fruit with soft pulp and small seeds, but at least one species (*Artibeus lituratus*) can destroy cultivated fruit.

"A bat can eat 150 grams of fruit per night, and 500 bats can destroy 75 kilos," said Valdir Taddei, a biologist at the Biological Science Institute of São José do Rio Preto, also in São Paulo. Rather than trying to kill them, Taddei argues, it is preferable to plant wild fig, trumpetwood, and Malabar almond nearby. The bats will feed on these species and leave the cultivated fruit trees alone, he said.

Despite their contribution to tropical ecosystems, and the admiration of researchers, bats are widely detested. To ordinary people, the only good bat is a dead one. The most widespread practice is to smoke colonies out of caves and eaves, or treat roosting places with rat poison.

Another common tactic is to use "vampiricide" paste containing an anticoagulant: live bats are caught in a net and smeared with paste. "When they get back to the colony they lick each other, then swallow the coagulant and bleed to death," said Tadei.

The paste has an extraordinary multiplying effect. "If smeared on ten bats, at least 300 will die," reckoned the biologist. "But this kind of control must be handled by teams trained to recognize harmful species and decide if it is really necessary to use poison in a specific case - otherwise, beneficial species may be killed," he explained.

Excessive proliferation of vampire bats in the interior of Brazil owes a great deal to unwitting human "assistance." Natural habitats, such as tree hollows and caves have been destroyed, and cattle ranching provides a plentiful food source.

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Also, eaves and roofs of houses, barns and stables, offer just the right temperature and humidity for bat colonies to roost.

It is now up to humans to restore the balance. In the 1980s, bats were massacred in Brazil, with the aid of World Bank loans intended to be used in campaigns to protect cattle against rabies. The World Bank suspended the project when environmentalists in Brazil and other countries objected. Nevertheless, ignorance goes hand in hand with panic in some parts of the country.

In Serra da Bocaina Park, not far from Rio de Janeiro, an official program to eradicate rabies led to a surge of attacks on bat colonies since last March. The killings increased especially after after six people in the small town of Cunha were bitten by bats. Mário Rondon, the park director, said the government then authorized attacks.

None of the six human victims were severely wounded or infected with rabies, but the cases occurred in the wake of cattle rabies in the area - 237 animals died between 1987 and 1989. The ensuing panic targeted bats.

Rondon said that he is personally opposed to a campaign to wipe out vampire bats. "It would be more economical and rational to immunize the cattle and leave these flying creatures in peace in the forest," he said.

The park, covering 110,000 hectares, was set up to preserve one of the last remaining swathes of Atlantic rain forest. And if poisoning of bat colonies continues, harmless species on nearby farmlands could be damaged.

According to Wilton Ferreira Leite, a vet with the São Paulo State Department of Agriculture, the government is not exterminating bats but "very carefully reducing the population of blood-eaters."

There are no reliable statistics on the real size and composition of the bat population in Brazil. Prejudice against the protection of bats is rife, however.

"Brazilians cannot conceive of protecting an animal unless it is cuddly and strokable," said Ivan Sazima, another biologist from the University of Campinas.

Sazima belongs to Bat Conservation International (BCI), headquartered in Texas. BCI ran several campaigns to educate the public about bats in the United States, African and Asian countries. "In countries where people eat bats it is easier for people to understand the importance of protecting them," said Sazima, "But in Brazil the association with vampires is so strong that it is much harder to raise public awareness," he added.



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Contrary to myth, vampire bats do not suck their victim's blood through devilish fangs. They make a small wound in the skin and lick the blood as it trickles, using an enzyme in their saliva. Research currently being conducted on this enzyme in London aims to find a remedy for thrombosis.

"This shows how even the blood-eating bat, which is harmful to humans, has scientific relevance and should be protected," said Deoclécio Guerra.