

How can a bat survive deforestation? Be small, mobile, and vegetarian

by Sophie Furnival on 2 November 2015

- *Bats are under great pressure as the landscape changes around them and their homes become more and more fragmented.*
- *A recent study looked into how important functional traits are in enabling bats in the Amazon to survive in a human-modified landscape.*
- *Researchers found that not all bat species cope with habitat fragmentation equally and that bats that are small, mobile, and vegetarian adapt better to fragmentation.*

Rainforests are full of bats, and with over 1,300 known species around the world bats really do come in all shapes and sizes. Each species has its own range of what ecologists call "functional traits," which are an animal's unique biochemical, physiological, or behavioral characteristics.

Yet, like other rainforest-dwelling animals, bats are under great pressure as the landscape changes around them and their homes become more and more fragmented. Natural habitat perturbations play a role in these changes, but the greatest pressures often come from human activities, such as livestock production, agriculture, logging, mining, and dam construction.

A recent study (<http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12490/abstract>), published in the *Journal of Applied Ecology*, looked into how important functional traits are in enabling bats in the Amazon to survive in a human-modified landscape. It found that not all bat species cope with habitat fragmentation equally and that bats that are small, mobile, and vegetarian adapt better to fragmentation.



Researchers handling a bat to photographing the wing to measure aspect ratio and relative wing loading (two components of the wing morphology trait). Photo

by Madalena Boto.

The study was led by a team from the Centre for Ecology, Evolution and Environmental Changes at the University of Lisbon, and conducted at the Biological Dynamics of Forest Fragments Project in the Brazilian Amazon. Over a period of two years, the team used mist nets to capture almost 5,000 bats from 59 different species in eight forest fragments. Focusing on the 26 most common species that could be accurately sampled in mist nets, the team correlated the species' functional traits with their vulnerability to fragmentation. To do this, they analyzed each species' prevalence among all forest fragments and its abundance in each of the fragments, as well as in control sites located in continuous primary forest.

The results confirmed what the scientists expected: vegetarian bats, which tend to be able to live in a variety of habitats and to be smaller, lighter, and more mobile than other kinds of bats, are less vulnerable to habitat fragmentation. By the same token, the results showed that carnivorous bats, which tend to be more habitat-specialized, larger, heavier, and less mobile, are at a greater risk of local extinction.



Researchers collecting data at the Biological Dynamics of Forest Fragments Project (BDFFP), Central Amazon, Brazil. Photo by Madalena Boto.

"Our results indicate that many animalivorous bat species rarely persist in small fragments and in the secondary forest matrix, being the first ones to become extinct with habitat loss," Fábio Farneda, a PhD student who led the research, told mongabay.com.

But why is being small, mobile, and vegetarian such an advantage for certain bats? Because it means they are far more capable of adapting to environmental changes. They are not too picky about their surroundings. They are more likely to move around the forest. Plus, it's always easier to find food the lower down the food chain you are.

Farneda and his coauthors write that the best way to minimize local bat extinctions is by "increasing habitat availability and enhancing structural and functional connectivity at the landscape scale through the creation, restoration and maintenance of corridors and stepping stones."



Tent-making bats in La Selva, Heredia Province Costa Rica. While tent-making bats mainly eat fruit, it may supplement its diet with insects, flower parts, pollen, and nectar. Photo by Rhett Butler.

Understanding how species' functional traits interact with environmental characteristics can help scientists predict how biodiversity could be affected in the future under different land-use scenarios, according to the researchers. As forest loss and habitat fragmentation continue, Farneda said he believes such information is "fundamental for the creation of effective conservation plans."

Citation:

Farneda, F.Z., Rocha, R., López-Baucells, A., Groenenberg, M., Silva, I., Palmeirim, J.M., Bobrowiec, P.E.D., Meyer, C.F.J. (2015). Trait-related responses to habitat fragmentation in Amazonian bats (<http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12490/abstract>). *Journal of Applied Ecology*, 52: 1381–1391.