

Is Habitat Destruction More Dangerous for *Atelopus* Than Chytrid?

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Population declines have strongly affected a group of frogs known as Jambatos, or Harlequin frogs, of the genus *Atelopus* (3). Many of these declines have been purportedly caused by chytridiomycosis (3). However, our recent publication in *Journal of Herpetology*, “Changes in population size and survival in *Atelopus spumarius* (Anura: Bufonidae) are not correlated with chytrid prevalence,” presents a case where habitat destruction rather than chytrid was responsible for population decline (6).

Our 22-month mark-recapture study followed the population size and survival of *A. spumarius* at a locality in Amazonian Ecuador. Six months into the study, the opening of a road allowed timber extraction that resulted in trees being logged along our study site. Thereafter we witnessed a slow decline in estimated survival rates and population size. Three years later in September of 2014, a group of students from the Zoology Museum at Pontificia Universidad Católica del Ecuador returned to the site. Since the conclusion of our study in 2010, the road had advanced closer to the *Atelopus* population and houses and crops had overtaken what was previously prime *Atelopus* habitat; the students did not find any remaining individuals.

We found that early habitat degradation resulted in a significant decline in male body condition. Additionally, following habitat degradation, rates of emigration decreased, suggesting that the population was not moving out of the area despite deteriorating conditions. This was likely compounded by the high site fidelity we observed in both males and females.

Bd is present at our study site, but the population of *A. spumarius* appeared to be unaffected, as we found no evidence of chytrid-infected individuals despite genetic screening of all individuals found. This was contrary to our expectations because *Atelopus* has been considered one of the groups most severely affected by chytrid (3). There are two potential explanations for this apparent lack of effect: (1) a long history of coevolution between *A. spumarius* and an endemic *Bd* leading to stable coexistence, or, (2) the population declined after the arrival of a novel *Bd* but later recovered by evolving resistance. In addition to our data, growing support for an endemic *Bd* that has long been in South America (5) lead us to suggest that the first hypothesis is more likely than the second. Moreover, recent population studies with other species of *Atelopus* show a similar pattern: stable populations in the presence of *Bd* (1,2,4).

It is now apparent that at least some species of *Atelopus* can survive with ambient levels of *Bd*. Regardless of which hypothesis explains *Atelopus* resistance to *Bd*, we highlight that at present, habitat destruction may be the most significant threat for the survival of these unique and Critically Endangered anurans.



Photo: Rebecca Tarvin.



An *Atelopus spumarius* population near Puyo, Ecuador, existed in sympatry with *Bd* since at least 2008, but logging in 2011 resulted in their disappearance. Photo: Santiago Ron.

References

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