

## Fungus destroying amphibian populations at higher rate than habitat destruction

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Oophaga pumilio from Cologne Zoo, Germany. Image: Wikipedia.

(PhysOrg.com) -- According to a new report published in the *Proceedings of the National Academy of Sciences*, human development and habitat loss are not the main contributor to the population decline of many amphibian species. In actuality, that human encroachment on natural habitat many actually be saying some of them.

*Batrachochytrium dendrobatidis*, or *Bd*, belongs to the <u>chytrid fungus</u> family and attacks over 350 different <u>amphibian species</u>. It passes via skin-to-skin contact or through the water and causes the outer layer of the amphibian's skin to thicken. Amphibians absorb electrolytes from the water through their skin in order to maintain their heartbeat and this



thickening of the skin disrupts that process, causing many to die. Those amphibians that absorb oxygen through their skin are left to suffocate if hit with this fungus.

While the loss of habitat and the *Bd* infection are both causes for the population decline in amphibians, C. Guilherme Becker from Cornell University and his advisor Kelly Zamudio looked at habitat loss and infection data from sites in Costa Rica and Australia. What they discovered was that frogs living in areas where their habitat had been disturbed by human development were less likely to become infected with *Bd*. Field studies of natural and disturbed habitats in the Brazilian Atlantic Forest that are home to the Golden Lesser Tree Frog confirmed these findings.

While most people assume that the destruction of a habitat increases the spread of disease, this study shows that in the specific case of the Bd fungus, this theory does not hold true.

**More information:** Tropical amphibian populations experience higher disease risk in natural habitats, *Proceedings of the National Academy of Sciences*, Published online before print May 31, 2011, <u>doi:</u> 10.1073/pnas.1014497108

## Abstract

Habitat loss and disease are main drivers of global amphibian declines, yet the interaction between them remains largely unexplored. Here we show that paradoxically, habitat loss is negatively associated with occurrence, prevalence, and infection intensity of the chytrid fungus Batrachochytrium dendrobatidis (Bd) in amphibian populations in the tropics. At a large spatial scale, increased habitat loss predicted lower disease risk in amphibian populations across Costa Rica and eastern Australia, even after jointly considering the effect of potential biotic and abiotic correlates. Lower host-species richness and suboptimal



microclimates for Bd in disturbed habitats are potential mechanisms underlying this pattern. Furthermore, we found that anthropogenic deforestation practices biased to lowlands and natural vegetation remaining in inaccessible highlands explain increased Bd occurrence at higher elevations. At a smaller spatial scale, holding constant elevation, latitude, and macroclimate, we also found a negative relationship between habitat loss, and both Bd prevalence and infection intensity in frog populations in two landscapes of the Brazilian Atlantic Forest. Our results indicate that amphibians will be disproportionately affected by emerging diseases in pristine environments, and that, paradoxically, disturbed habitats may act as shelters from disease, but only for the very few species that can tolerate deforestation. Thus, tropical amphibian faunas are threatened both by destruction of natural habitats as well as increased disease in pristine forests. To curb further extinctions and develop effective mitigation and restoration programs we must look to interactions between habitat loss and disease, the two main factors at the root of global amphibian declines.

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