

## Introduction: The Story of Frog King

Consider the lowly frog.

Its approximately 4600 different species cover most of the globe. No frogs in Antarctica, but there are species such as the Wood Frog that live in the Arctic, hiding underground and surviving a partial freezing of its body to endure the winter. Frogs are successful in marshlands and ponds, desert and savanna, in the trees and on the forest floor. Having evolved during the Devonian Period (360-415 million years ago), frogs and their amphibian family are older than the human species and very successful, yet their numbers have been on a precipitous decline over the last few decades.

Frogs are often considered an indicator species, the animal we should look to when we wonder how healthy a given ecosystem currently is and has been. Why look to the slimy, squishy frog? That sliminess is part of the reason, a product of the frog's respiratory system that pulls air directly through its skin, bypassing the protective barriers a nose, mouth, and lungs provide. Through their skin, frogs are directly exposed to the pesticides, hormones, fertilizer, heavy metals, and other contaminants we have piled into our shared world. Increased UV exposure and changes in temperature we have created weaken their immune systems and alter their breeding habits and reproductive success rates. We steal away their habitat, introduce invasive species that crowd them out or eat them up, and we capture them in excessive numbers for use in our laboratories and pet shops.

Why do we keep track of the frog? Because 168 of their species have been driven to extinction over the past several decades, and nearly half of the remaining species have faced declining numbers over that same period (at normal, historic rates of extinction, one lost frog species over those same decades would have been conceivable, at the utmost). Even in heavily protected, vast national parks and forests where human threats are kept as distant as possible, frog numbers are plummeting. Our actions affect them even at the greatest distances. We keep an eye on frogs because they are sensitive, they will be the first to go as our planet becomes uninhabitable—they are already being kicked out the door at the end of the same tunnel we humans are walking down.

Speaking of tunnels, you might think of frogs as the canary in the coal mine. Do you know this anecdote? Miners of the past (and likely many still in the present-day) would carry along a small cage housing a canary in their descent into deep mine shafts. The birds have a swift, sensitive metabolism that makes them very susceptible to changes in the environment. Thus, they were able to detect the presence of methane and carbon monoxide when those two gases built up under natural processes in the working mines. The canaries would fall down or die in the presence of these gases, just before the men themselves would be affected, giving the miners time to escape to the surface and allow the tunnels to be flushed with clean air.

Maybe we can imagine the entire planet as a mine of a sort, and frogs our canaries singing a song of peril into the twilight. Yet if that is all as we have said,

there is one problem with our analogy. There is no escaping this mineshaft we've dug ourselves down into.

We don't encourage or even tolerate hopelessness here at Frog King. There are things that can be done, to save the frogs and us as well. However, there is no elevator to climb into, headed for clean air. Our only choice is to clean up the mine itself, scrub the air clean, and give all the world and its many species another chance at survival.

Consider Costa Rica, where frog populations were found to have fallen 75% between 1970 and 2005. At first, scientists blamed the developing tragedy on a fungal infection that has increasingly affected the amphibians. Global climate changes have forced the vertebrates to climb higher in the rainforest, to reach an elevation that offers their preferred temperature, a climate they were accustomed to find previously at lower elevations. Unfortunately, this climb also gave them a greater exposure to the fungus and its deadly effects. All of this has been proven true. However, at the same time lizards in the same rainforests have been dying off at identical rates to the frogs. Here's the kicker—the lizards aren't susceptible to the fungus. Obviously, something besides the fungus is killing off the amphibians in Costa Rica, and the newest candidate is a lack of leaf material on the forest floor. Increased temperatures, invasive worms, and changes in rainfall have cleared the ground of the leaf cover these species need to survive. In this changing climate, the ground litter decays faster and trees aren't succeeding as well. Consequently, leaf litter is diminished on the ground, denying the frogs food and shelter.

In the end, the conclusion scientists are coming to over the decline in frogs — in Costa Rica as throughout the world, even in expansive national forests and other protected places — is that every little change affects the amphibians. The massive changes we are making affect the frogs massively. Cumulatively, all the small and large changes together are making it incredibly difficult for their survival. It isn't just any one thing. The frogs are dying because of the sum and total of the shortsighted things humans are doing to the world's environment.

Why are we Frog King?

Because if every little change for the worse can hurt the world's frogs, despite that we never intended a single hurt to them, then every little change we make for the better is bound to do all of us good, especially if it is the Good we intend.

We are Frog King because

we would miss the frogs. We don't want to be alone in the world, couldn't live without the oddly adorable frogs. In ways that we don't know and could hardly understand, we will not be the same without them, and they are leaving us.

