

News focus

Protection fails to stem amphibian decline

A long-term analysis of amphibians and reptiles in a Costa Rican nature reserve designed to protect them reveals an alarming fall in numbers.

Nigel Williams reports.

Worries about the status of amphibian populations worldwide have been growing for many years. Survey after survey has shown dwindling numbers in habitats around the world. The most recent Global Amphibian Assessment finds that almost one third of the world's amphibian species are threatened, compared with only 12 per cent of bird species and 23 per cent of all mammals.

The assessment also found that 34 previously known species are now extinct and another 130 species have not been seen in recent years and may also be extinct.

These dramatic findings have prompted researchers urgently to identify the causes. The recent widespread occurrence of a fungal infection appears to have played

a key part in some of the losses, and habitat destruction, for these often particularly demanding animals needing both land and water, also appears to have played a key part. Species living at higher altitudes also appear to have been more susceptible to the fungus and catastrophic declines.

But a new study of the abundance of amphibians in a low-lying nature reserve in Costa Rica, appears to present a triple whammy for current thinking on these problems. For the survey finds that amphibian numbers have declined by around 75 per cent over the past 35 years within the reserve in spite of no habitat loss and no evidence of the fungal disease affecting many other regions. Further, survey of several reptiles within the reserve finds them in significant decline too.

The team of researchers, led by Steven Whitfield at Florida International University, worked in the lowland forest reserve at La Selva in Costa Rica. Long-term data on numbers of animals within the tropics is scant, but the team were able to use biological records at this reserve dating from 1970 to show numbers of individuals within species of frogs, toads and also reptiles over the past 35 years.

While Latin America has seen some of the most dramatic declines in amphibian numbers, researchers hoped many species would continue to thrive in dedicated reserves, where building, land clearance and agricultural chemicals are banned.

The new findings suggest an unknown ecological cause is behind at least some of these rapid losses and have prompted scientists to call for urgent studies in other protected forest



Not so rosy: The strawberry poison frog is one of the amphibian species in decline in a Costa Rican reserve. (Photo: Steven M. Whitfield.)

areas. But the situation is further complicated by the assessment of amphibian and reptile numbers in abandoned cacao plantations at the reserve edge, where the decline in numbers appears to be much smaller.

The researchers considered whether changes in climate which have brought warmer weather to the reserve along with more wet days may have had an impact. The researchers found a rise of more than 1°C in temperature over the 35-year period and a doubling of the number of wet days although no overall annual increase in rainfall. They considered whether these conditions changed the leaf litter on the forest floor. Nearly all of the species the team looked at rely on leaf litter to some extent, either using it for shelter, or feeding on insects that eat the leaves. Increasing heat and damp may have reduced the persistence of leaf litter and changed its physical ability to harbour amphibians and reptiles.

The study revealed that frog numbers drastically declined with some species falling by more than 13 per cent per year between 1970 and 2005. Sharp declines in numbers of two salamander species, falling on average more than 14 per cent per year, were also recorded. Lizards also suffered with one species, the striped litter skink, down more than 10 per cent each year.

The study was published in the Proceedings of the National Academy of Sciences (online). Many of the falls recorded elsewhere have been in high, mountainous regions and those have mostly been driven by the spread of fungus. But testing of 140 individuals of three species between June and November 2006 for the lethal fungus, showed no evidence of infection. And reptiles are not thought to be susceptible to it either.

The researchers compared the conditions in the forest with those found in the neighbouring abandoned cacao plantations. And they believe the differing litter dynamics in the two habitats may explain the different results. "Because cacao trees have

several leaf-flushing events each year, litter accumulation is greater in cacao plantations than it is in old-growth forests," the researchers write. So the impact of changing weather conditions may have a lesser impact on leaf litter in these areas.

And whatever factor or combination of factors is affecting the amphibians, the researchers highlight that declines in pristine habitats may be accompanied by simultaneous declines in other taxa. "Cross-taxa declines have been documented elsewhere, yet not emphasized," they write.

They also point out that many other dramatic losses, particularly in the neotropics, reported in research papers have occurred over a matter of weeks or months. "In contrast to these sudden decline events, we demonstrate that community-wide gradual declines may occur."

"It is currently impossible to determine how often gradual community-wide declines such as the one we report here are actually occurring, because trends such as those we report are impossible to detect without long-term abundance-based data on population densities collected using consistent methodologies."

The authors believe it is crucial to extend the study to other protected forests, such as those in Peru, Ecuador and Colombia, to assess the populations of amphibians and reptiles there. According to the Global Amphibian Assessment, the largest number of threatened species worldwide occur in Latin American countries with 209 in Colombia, 198 in Mexico and 163 in Ecuador. On the Caribbean islands more than 80 per cent of species are threatened and this rises to 92 per cent in Haiti.

Even where amphibian populations appear not to be in danger, the authors have a warning. "Our data indicate that even populations of amphibians for which specific threats have not been identified may nonetheless be suffering dramatic decline, and that such populations may be considered stable because of a lack of long-term data, not lack of threats."

Mapping hidden resources

A new database on water availability in an arid region of Kenya is helping both local communities and endangered wildlife, writes **Michael Gross**.

Finding water is all the more important if there is relatively little of the precious stuff available, and even more so if human users and wildlife compete for it. The Samburu District in north-central Kenya, for instance, counts as arid to semi-arid, as it only receives between 250 and 500 mm of rainfall per year and boasts only one permanent river. And water quality can be as problematic as the quantity.

In a research project supported by the environmental charity Earthwatch with up to five volunteer teams per year, ecologists Alexander Njue and Kiplagat Kotut have created a detailed map of both permanent and temporary water resources in this area. Over three years, scientists and volunteers used Global Positioning System (GPS) data together with detailed ground observations of water availability and quality, seasonal variations, and aquatic biodiversity to obtain an overview of the water supplies.

This work has been compiled into a new comprehensive Geographic Information Systems (GIS) database which is now available online as an interactive map. As computers and computer users are still rare in this area, Earthwatch scientists are also setting up ways of communicating the information orally, by presentations, workshops, and visits to remote communities.

Furthermore, a 'task force' of local people was set up, who, in collaboration with Earthwatch scientists, local NGOs, and government offices will continuously work to spread the information among local communities.

Project leader Alexander Njue explains: "We have selected individuals from local communities (Community Fellows) who have participated in data collection and