

Reconciliation Ecology Could Save Species Headed for Extinction, UA Ecologist Says

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Writer: Kara Nyberg

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Unless people develop strategies to share the human geographical range with wild animal species, more species will be driven like the dodo and blue pike to extinction, says Michael Rosenzweig, professor of ecology and evolutionary biology at the University of Arizona. Current ecological conservation efforts won't save endangered species, he predicts.

"Nothing influences species diversities more than the area of habitat available to life," Rosenzweig said. His article, "Loss of Speciation Rate Will Impoverish Future Diversity," is featured in the May 8 issue of the Proceedings of the National Academy of Sciences.

Contact Information

Michael Rosenzweig
520-621-7296
scarab@u.arizona.edu

As the human race continues to grow exponentially, people require more land for living space and resources. Several scientists estimate that anywhere from 85 to 98 percent of the world's terrestrial habitats have been overrun by humans.

Small patches of land scattered all over the world is all the land that remains free of human influence. Species crowd together on these diminutive spots of land, tiny oases for the diversity of species that once ranged across the world. But will this strategy of biotic reserves work in the long-term?

Although many believe these small plots of land can prevent a mass extinction, the science of diversity suggests the opposite, Rosenzweig noted.

Traditional conservation, which sets aside land, is a valuable practice that needs to continue, but there are limits to what it can do, he said. "It can't magically preserve the Earth's whole set of ecosystems as if they were (living) museums -or a vast outdoor zoo. It isn't vast enough. Only the whole Earth is vast enough."

Evidence for this theory is simple enough. The more land species have to live on, the more different kinds of species live on that land. This is because large ranges increase the rate at which new species evolve while they concurrently decrease the extinction rate of existing species.

More specifically, greater land area supports a larger population of animals. Eventually, the population becomes so large that it splits into sub-populations. Sub-populations become isolated from each other by such geographical features as rivers or mountain ranges in the landscape. The longer two sub-populations remain separated, the more likely they will evolve in different ways. Eventually, sub-populations become new species.

Sub-populations also reduce extinction rates by minimizing the effects of random catastrophes. For example, if one area is hit by a flood that wipes out all animals in that area, sub-populations living elsewhere will be unaffected and will serve to maintain the species.

"The more [land] we have, the more [animals] we keep," which primarily is why the large areas of tropical provinces are replete with so many species, Rosenzweig said.

The biotic reserves into which humans have crowded animals appear to be sustaining the populations now, but that could change, he added. Animal populations on small biotic reserves can no longer cope with environmental change by moving to new areas.

And people compound the problem by creating some of the most severe environmental impacts these animals face, he added. The threat of global warming and the spread of new parasites and diseases may be such problems.

The crux of the problem, Rosenzweig says, is "conservation ecology will fail because it is addressing a smaller and smaller fraction of the Earth -- and we need to address a larger and larger fraction."

He proposes a solution may be "reconciliation ecology," a concept shared by many conservationists throughout time.

"The idea is to provide some stability to species, given the challenges humans throw at them. It requires that humans learn to share the land with animals. By meeting (other species) halfway, we can preserve our own needs while allowing other species to also reap the benefits of the land."

Two of many examples of successful reconciliation ecology in action, he added, are the Chiricahua leopard frog and the American crocodile.

The Chiricahua leopard frog not long ago nearly disappeared from federal reserve land that had been created, in part, to save this creature endemic only to the Southwest. Then some ranchers noticed that a few of these frogs subsisted quite well in their cattle tanks. Taking a keen interest in the plight of the frogs, the ranchers modified their tanks to be more 'frog-friendly' and made sure their cattle tanks held water during even the driest of summers. Their efforts were so successful that the ranchers now supply the federal preserves with the leopard frogs to help rebuild the populations.

The Turkey Point Power Station, a nuclear reactor plant in southern Florida, has proved a boon to the American crocodile. Huge gouges have been dug in the land to create water cooling canals for the plant. Though not a natural habitat, the American crocodile apparently pays no mind. These canals create optimal conditions for the crocs and now support one of the healthiest populations reliably breeding in the U.S.A. The power station takes a vested interest in the animals and hires biologists to preserve conditions for the crocodiles as well as enhance conditions that benefit other species.

Rosenzweig features other examples of successful reconciliation ecology in his forthcoming book, "The Careful Foot."

While he has no doubt that reconciliation ecology works as a conservation strategy, the question is whether the public will listen to and adopt such schemes.

"As a society, we are perfectly capable of looking forward into the future and saying, 'This is what we want, we've got to plan for it now, and we'll spend a little bit of money.' " he said. "But in the case of reconciliation ecology, it is not clear to me that we are spending any money."

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We're located @ 888 North Euclid, Suite 413, Tucson, Arizona 85721

Main number: 520.621.1877 | Fax: 520.626.4121

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