

When hosts go extinct, what happens to their parasites?

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(PhysOrg.com) -- Hands wring and teeth gnash over the loss of endangered species like the panda or the polar bear. But what happens to the parasites hosted by endangered species? And although most people would side with the panda over the parasite, which group should we worry about more?

In a new paper published in [Proceedings of the Royal Society B](#), North Carolina State University biologist Rob Dunn and colleagues examine the concept of coextinction, or the domino effect of extinctions caused by species loss. For example, each fig species tends to be pollinated by a single fig wasp such that the loss of one should result in the loss of the other.

Mathematical models suggest that coextinctions due to the actions of humans are very common, the paper asserts. Yet, counterintuitively, there have been few reported cases of coextinction in the scientific

literature.

"What we know about coextinctions presents a kind of paradox. The models suggest thousands of coextinctions have already occurred and that hundreds of thousands may be on the horizon. Yet we have observed few such events," Dunn says. "So we're not sure if all of these coextinctions are happening and not being tracked, or if [parasites](#) and mutualist species are better able to switch partners than we give them credit for, or something in between. Maybe some of the specialized relationships - like between the figs and fig [wasps](#) - aren't so specialized."

Moreover, Dunn says, the models, if crudely accurate, suggest that the number of parasite coextinctions greatly outweighs the number of host extinctions.

"Since the diversity of parasitic or affiliated species - which may include viruses, ticks, lice and bacteria, and butterflies, but also so-called mutualists such as the crops pollinated by honey bees or the bees themselves - is several orders of magnitude greater than that of their hosts, the numbers of coextinctions are also expected to be far greater than the number of extinctions of host species," Dunn says.

This numbers game alone presents strong evidence to suggest that coextinctions are more important than the original host extinctions themselves. But the paper also examines other costs of coextinction - including the losses of biological diversity, unique species traits and what we can learn about evolutionary history.

But, regardless of whether we care at all about the loss of such species and their traits and roles, there is something even scarier about the consequences of coextinction.

"There is a distinct possibility that declines in host species could drive parasite species to switch onto alternative hosts, which in turn could escalate the rate of emerging pathogens and parasites both for humans and our domesticated animals and plants," Dunn says. "Put simply, when a host becomes rare, its parasites and mutualists have two choices: jump ship to another host or go extinct. Either situation is a problem."

Dunn noted that the regions where new human diseases, such as bird flu, are emerging coincide with the regions where the most mammal and bird species are endangered. "We have long talked about the negative consequences of the endangerment of the species we love," he says, "but getting left with their parasites is a consequence no one bargained for."

The paper concludes by calling for better study and understanding of coextinction, and for documenting cases of coextinction when they are discovered. It also calls for more study into the interactive effects of the different reasons for extinction - habitat loss, [species](#) invasion, overkill and coextinctions, not to mention climate change - to gauge how they affect each other.

More information: "The sixth mass coextinction: are most [endangered species](#) parasites and mutualists?" Robert R. Dunn and Nyeema C. Harris, North Carolina State University; Robert K. Colwell, University of Connecticut; Lian Pin Koh, Institute of Terrestrial Ecosystems, ETH Zurich; Navjot S. Sodhi, University of Singapore and Harvard University; Published: May 27, 2009, in *Proceedings of the Royal Society B*.

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