

New roadmap to prevent pandemics centers on protecting biodiversity

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Big eared townsend bat (*Corynorhinus townsendii*) Credit: Public Domain

An international team of 25 scientists has proposed a roadmap for how to prevent the next pandemic by conserving natural areas and promoting biodiversity, thereby providing animals with enough food, safe havens and distance to limit contact and the transfer of pathogens to humans.

Pandemics begin when disease-harboring [animals](#), such as bats, come in close proximity with people, livestock or other animals and pass on new pathogens. Viruses such as SARS-CoV-2, SARS-CoV-1, Nipah, Hendra and possibly Ebola have all fatally spilled over from bats to humans, sometimes through an intermediate host.

"The world is focused on how can we detect and then contain a novel pathogen once it is circulating in humans, rather than how can we prevent that pathogen from entering the [human population](#) in the first place," said Raina Plowright, professor in the Department of Public and Ecosystem Health at Cornell University, and first author of the paper, "Ecological Countermeasures to Prevent Pathogen Spillover and Subsequent Pandemics," published in *Nature Communications*.

The pandemic-prevention strategy is based on insights from [a pair of 2022 papers](#) that serve as a [case study](#) applicable to all animals that potentially carry zoonotic diseases. Those papers—about how bats can spread fatal Hendra virus to horses and people—explained that when bats lose their [natural habitats](#) and winter food sources, their large populations splinter and they migrate in small groups to agricultural and urban areas.

They also become stressed, partly due to inadequate food sources, and they shed more virus in their urine. The virus falls to the ground where grazing horses become infected; horses in turn can then infect people. But when natural habitats can provide adequate food, especially in fallow winter months, the bats return to these habitats, aggregate in large numbers, and stop shedding virus.

The roadmap uses this and other case studies to explain the mechanisms linking environmental change and spillover of pathogens from animals to humans, and identifies ecological interventions to disrupt these links and policy frameworks to implement them.

Ecological interventions begin by protecting the places where animals eat. "We need to make sure there's always an abundant supply of food available at all times of year, especially when animals are in stressful life history stages like reproduction and migration," Plowright said.

Next, it's important to protect where animals may roost or aggregate, as tens of thousands of bats can roost in canopies and caves, so when these areas are disturbed, these populations can splinter, move and shed more virus. Also, cave-dwelling bats may not have other caves to move to, in which case they stay put, become more stressed and likely shed more [virus](#). Protecting lands that act as buffers between people and wildlife is also key.

"There are trillions of microbes in nature, but we rarely actually get sick, because there are many, many barriers between us and new pathogens," Plowright said.

Lastly, for communities who come in contact with animals, it's important to ensure people have the protection that they need to avoid pathogen exposure, Plowright said.

The study's authors emphasize the need for an international agency or panel that can assess and synthesize data on pandemic prevention, preparedness and response and collect metrics on intactness of landscapes, ecological integrity and biodiversity.

More information: Ecological countermeasures to prevent pathogen spillover and subsequent pandemics, *Nature Communications* (2024).

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