



Destruction of forests and other wilderness spaces increase the risks of global pandemics. (photo: Tero Laakso)

Where Pandemics Come From - and How to Stop Them

By John R. Platt, The Revelator [Extinction Countdown](#) March 23, 2020

As biodiversity disappears, the risk to human health increases. Experts say we need to protect wild spaces and species to help prevent future outbreaks.

This continues to be a strange time, but that's the new normal," says ecologist Felicia Keesing.

She's speaking by phone from her backyard on a Monday morning, after spending three days helping to evacuate students from Bard College, in New York's Hudson Valley, where she teaches. "It feels like the beginning of a new phase for us," she says.

It feels that way for a lot of us right now. The COVID-19 coronavirus pandemic has upended lives and economies around the world, and experts warn it's likely to get worse before it gets better.

"This outbreak is pretty much what all of us would have considered the worst-case scenario," admits [Keesing](#), who has spent the past two

decades studying infectious diseases and how loss of species diversity affects human health.

Her research, along with that of a growing number of scientists around the world, shows a clear pattern: As biodiversity decreases and wild spaces vanish, pathogens can run amok, putting humans, wild and domestic animals, and even plants at risk.

No one can say for sure yet if COVID-19 came from any specific species or circumstance, but many experts have theorized that it jumped to humans in China's so-called "wet markets," where exotic animal meat has long been readily available for sale.

Previously unknown viruses have emerged under similar circumstances, when humans took disparate animals out of their various native environments and penned them together.

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Why this pandemic is only the latest in a string and we need to eliminate the sources: markets selling wildlife.

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“It’s a mix of biodiversity, but one that was created by people, not nature,” Keesing says. “We create a mix of species that don’t naturally occur together, and then it’s kind of like running an uncontrolled experiment. *This* virus jumps to *that* species.” Maybe that’s when a pathogen that we didn’t know about, that hadn’t previously made anyone sick (to our knowledge), suddenly becomes virulent and infects humans. “It was only when we did that to biodiversity that that virus became dangerous.”

These types of markets pose one of the clearest threats to animal and human health, but they’re not the only threat.

A greater risk is posed by the complex mix of habitat loss, population declines in wild species, and population increases among livestock and domesticated animals, invasive species and other more adaptable forms of wildlife.

“All over the world there are fewer and fewer of most kinds of wild creatures and more and more domesticated creatures and humans,” Keesing says. “We’re losing wild species, but we’re doing it at the expense of increases in a very small number of species. Those domesticated species

tend to be less diverse. We’re growing a lot of the same crops worldwide and raising a lot of the same animals, which makes for easier targets for pathogens. It’s much easier for them to move around.”



Cattle in corals. Photo: USDA NRCS Montana (public domain, uncredited)

That’s why the current outbreak has spread so quickly. “The fact that there are 7 billion people on the planet who are genetically very similar has been a boon for the COVID-19 virus, because there are so many of us at such high density that it’s able to spread through the population. We’ll see that play out for other kinds of pathogens, hopefully less virulent ones, maybe affecting wheat, corn, rice or chickens.”

Another factor helping pathogens spread through the modern world is the preponderance of what Keesing calls “weedy species” — this includes domesticated animals, as well as invasives like rats and mice, and even common species such as pigeons.

These “weedy” species have several characteristics in common. “They’re adaptable, they’re abundant, they tend to be small-bodied, and they reproduce quickly at a young age,” she explains. “They have shorter life spans, so they have a lot of turnover in their populations. And they have attributes that we’re still trying to understand that seem to make them better reservoirs for many different diseases.”

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That's why species going extinct and replaced in ecosystems poses a direct threat to humans. "The next emerging infection is more likely to come from a rat than from a rhino, right? We're creating a planet in which the rats are thriving and the rhinos are disappearing, and when we create environments where those species thrive we're absolutely affecting our health."

Even the decline of still-common species can have dangerous side effects. We've seen that over the past few decades with opossums in the United States. As their forest habitats have become fragmented, opossum populations have declined — and [Lyme disease has increased](#). Opossums normally eat ticks, and these unique marsupials can resist the pathogen that causes Lyme, but they don't do very well in altered habitats where "weedy," invasive mice thrive. These invaders then carry an increased abundance of ticks, and the disease, to humans. (If you've ever seen a meme about the value of opossums for tick control, it's based on [work by Keesing and her colleagues](#).)



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Why did the opossum cross the road? To eat one heck of a lot of ticks! A new study shows that opossums attract and then kill thousands of ticks per acre, per week, making them one of our best allies in stopping the spread of Lyme disease. More: ncbi.nlm.nih.gov/pmc/articles/P...



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The long-term solutions to these problems are simple to state but infinitely harder to accomplish.

For one thing, we need to preserve more wild spaces and the species that live in them. "The bottom line is that humans are taking up more and more space on the planet," Keesing says. "And whatever it is that we're using that wild space for, whether it's a suburban development or an Amazon warehouse, it's prioritizing human needs over wild creatures. And that is having consequences for us."

For another, we need to find ways to boost populations of native species. "There's no magic formula for that," Keesing says. "You do it by making space for these creatures, and that requires people to make difficult choices. We're all faced with difficult choices right now."

In addition to space, keeping those native species in their habitats, and protecting them from wildlife trafficking, remains essential. Many experts say that includes [shutting down the exotic wildlife markets](#) in China and around the world.

And we need to keep supporting the science that's improving our understanding of these issues. Keesing says that's been a growing, vibrant field of study.

"It's been a tremendous turn in the last five years especially — but really the last 10 or even 15 years — toward recognizing that the state of the environment affects the transmission of infectious diseases, and it's led to the burgeoning of a bunch of disciplines or sub-disciplines that connect the health of humans, wildlife and other animals, plants and the environment together. A lot of scientists, and particularly graduate students and postdocs, are really, really inspired by the fact that those linkages exist, and that's something we could continue to work on."

These steps may not offer much solace in the face of the current pandemic. But, as many experts are saying, now's the time to start looking to the next problem down the road — be it another disease, climate change or something else entirely.

"We do have other global challenges, and we're all going to need to work together, and we're all

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going to need to change our behavior,” Keesing says. “That doesn’t mean it hasn’t been painful already, and there’s a lot more to come, but

we’ve already seen that we can change our behavior quickly. We can learn from this experience.”

Further Reading

We’ve gathered 14 essential scientific papers discussing how biodiversity loss affects human health.

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