

Study links disease, poverty and biodiversity

December 28 2012, by Kenneth R. Weiss

Poverty and disease often come together. That much is well understood. But how much does poverty foster disease? Or, how much can disease perpetuate poverty? And what's the role of nature, given that so many infectious diseases are spread by mosquitoes or spend part of their life cycle outside of the human body?

A new study finds that certain types of infectious and parasitic diseases have a significant influence on economic development across the world and accounts for some of the differences in per-capita income between those who live in countries in the tropics or those in temperate latitudes.

And the team of economists and ecologists suggests that healthy forests or other ecosystems, with broad diversity of [plants and animals](#), can ease the burden of parasitic diseases and those spread by mosquitoes or other vectors.

The authors, writing in the [Public Library of Science Biology](#), make these assertions based on an extensive analysis of data from the World Bank on per-capita income in 139 countries and the burden of parasitic and vector-borne diseases as measured by lives lost as well as time lost to illness.

Although many economists now recognize that malaria and [hookworm](#) can hamper economic growth, the authors write, "an intense debate remains on the relative importance of general disease burden on global patterns of wealth and poverty."

Many of the extremely poor live in the tropics, the latitudes that tend to harbor more [infectious diseases](#).

The study, led by Matthew H. Bonds, an economist and [ecologist](#) at Harvard Medical School's department of global health and [social medicine](#), wanted to look beyond how the differences in latitudes correlate with disease and poverty. They also wanted to control for other economic influences, such as well-functioning government, legal and economic institutions.

Disentangling cause and effect can be tricky, and the authors used a [statistical approach](#) to evaluate the relative importance of various causal factors, while controlling for variables.

"Our model indicates that vector-borne and [parasitic diseases](#) (VBPDs) have systematically affected economic development," the authors write. "Importantly, we show that the burden of VBPDs is, in turn, determined by underlying ecological conditions. In particular, the model predicts that the burden of disease will rise as biodiversity falls."

The study explains that some diseases, such as Lyme disease and malaria, rely on other hosts for part of their life cycle and can increase as these non-human hosts multiply with the loss of predators and competitors. For example, rodent populations soar when coyotes, wolves, owls or other predators aren't around to eat them.

"Our study shows that biodiversity also seems important in boosting economic welfare - probably through its impact on buffering disease outbreaks," said Andrew P. Dobson, a co-author who studies infectious diseases at Princeton University's department of ecology and evolutionary biology.

Their findings suggest, he said, "that the U.S. and many tropical nations

would have much healthier economies if they spent more on health care and saved more biodiversity."

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