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The changing environment

global health at duke: part III in a series

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Three years ago today I was dripping wet and happily exhausted, having just hiked from 10,000 feet in the Peruvian Andes down into the Amazon lowlands.

A colleague and I were collecting soil samples to study the diversity of tropical microbes. A Wake Forest University friend was using the different elevations to understand how climate change might affect rainforest diversity. A writer for Smithsonian Magazine interested in deforestation was trying to keep his camera and notebooks dry.

As we hiked through the jungle, I was struck by the changes we saw, including clear-cutting, forest fragmentation and soil erosion, and by the far-reaching impacts those changes might have.

From diversity to deforestation, the environment and human health are inseparable. The environment gives us food, shelter and an abundant source of medicines. The changing environment is what I'd like to focus on here-how issues such as climate change, deforestation and the quest for clean water affect human health today. Tackle these problems and we'll save lives; ignore them, and health crises are possible.

The World Health Organization recently estimated that climate change is already claiming 150,000 lives a year through the spread of diseases, heat waves and other factors. Warming temperatures allow the mosquitoes that spread malaria and dengue fever to expand their ranges. Cases of food poisoning from salmonella and other pathogens increase with higher temperatures.

In 2003 an unprecedented heat wave in Europe killed more than 30,000 people. The city where I was born, London, hit 100 degrees for the first time since climate records were first taken there in 1870. (It crossed the 100-degree barrier again in 2006.) While no single heat wave can be blamed on global warming alone, long-term datasets show that the length and severity of heat waves have increased in recent decades. Severe weather, both heat waves and storms, is our likely future.

Human changes to habitats can increase outbreaks of new diseases. Population growth in the tropics is putting increased pressure on rainforests and other tropical environments. A new logging road, for instance, can open a large area to bushmeat hunting; the very first HIV/AIDS infection may have occurred when someone killed and butchered an infected chimpanzee for meat in Cameroon.

Closer to home, forest fragmentation across our state is making Lyme and other tick-borne diseases more common. The white-footed mouse and the white-tailed deer, two important tick hosts, both prefer the forest edges that are now common in our area. Fewer predators and a mosaic of forested and cleared plots mean higher densities of hosts and ticks. Several people I know who work in the Duke Forest have recently had tick-borne diseases. In my case, it was only a few months ago.

Perhaps no resource is so clearly linked to human health and well being as access to clean water. More than a billion people today lack safe drinking water, and from five to 10 million people die from poor sanitation each year.

In eastern India and Bangladesh, surface waters are often contaminated with pathogens that cause cholera and other diseases. A program to dig groundwater wells in the 1970s gave millions of people access to clean drinking water for the first time. Unfortunately, many of these wells turned out to have high concentrations of the poison arsenic, linked to cancer and other diseases. The government of Bangladesh is now identifying which wells are contaminated and attempting to provide treated surface water as an alternative.

What can we at Duke do about such issues? We have world-class scientists in our medical school who are already improving human lives, seeking vaccines for AIDS and other diseases that can't yet be cured.

Duke also has world-class leaders in ecology and the environment. Avner Vengosh in the Nicholas School of the Environment and Earth Sciences is an expert on arsenic in ground water. John Albertson, a hydrologist at the Pratt School of Engineering, is leading a team funded by Duke's Center on Global Change to predict where malaria will appear in a warmer world. Katia Koelle, a new ecologist in the biology department, studies how climate affects infectious disease outbreaks and how pathogens like cholera and influenza evolve in their environment.

Duke's commitment to becoming a leader in global health is evident in the launch of the Duke Global Health Institute last year. Duke's medical school and environment programs are some of the best in the world. If we want to make Duke the place to go for improving human health, the marriage of medicine and the environment is an excellent place to start.

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