



Physician to an Ailing Planet

Paul Epstein explains to Claudia Dreifus why global warming is hazardous to your health

For all his adult life, tropical disease specialist and public health physician Paul Epstein has worked as a medical-political activist. In the 1970s he was a health-care provider in a newly independent Mozambique. In the 1980s—a time when many medical professionals shunned HIV-AIDS patients—Epstein treated them at a Cambridge, Massachusetts, clinic. More recently Epstein, 62, joined forces with psychiatrist Eric Chivian, winner of the 1985 Nobel Peace Prize for his work on nuclear disarmament, to become a kind of eco-policy physician, if there is such a thing. As associate director of the Center for Health and the Global Environment at Harvard Medical School—Chivian is founding director—Epstein uses his medical expertise to document the impact of environmental degradation on human health.

“With this work I’ve got a few billion pa-

tients,” Epstein commented during a recent interview at a health-food restaurant not far from his Boston office. “I try to show that bad environmental policy can make people sick.”



Which human diseases are linked to global warming?

Malaria. It’s a mosquito-borne infection, and it isn’t caused by global warming. But climate change is contributing to its resurgence. As temperatures rise, precipitation patterns change. In some areas there are more intense droughts. In other parts of the world we see heavier rains. Greater precipitation creates ideal conditions for malaria-bearing mosquitoes to thrive. Mountainous areas that were once too cold for these carriers of disease are warming up. In Africa, malaria is circulating in the region of Kenya once known as “the white highlands.” The English settled there because it was cooler

than the coast and relatively free of malaria. In Zimbabwe, the mosquito is now found at higher altitudes. Malaria mosquitoes are spreading in the mountainous areas all along the Great Rift Valley. The same thing is true in Asia. In Papua New Guinea, there has been a surge of malaria in the highlands. And we are seeing other mosquito-borne diseases beginning to ascend into the Himalayas.

How do you know that this is the result of global warming?

Because it’s often happening in the same regions where glaciers are melting, plant communities are migrating to higher elevations, and temperatures are rising. Global warming is also increasing the intensity of extreme weather. In Mozambique, weeks of devastating floods in 2000 were accompanied by several cyclones. Immediately afterward, malaria increased five-fold. Extreme precipitation events can also lead to outbreaks of water-borne diseases like cholera and cryptosporidium. The latter affected 400,000 Milwaukeeans in 1993. As you recall, that was the year of the giant floods of the Mississippi River. This kind of thing is not just confined to developing nations.

So diseases that are associated with global warming have become a problem in this country, too?

The rapid spread of the West Nile virus in the United States was accompanied by extreme weather. As oceans warm, ice melts and water vapor rises, and the increased evaporation over land and sea is changing weather patterns worldwide. While we don’t know how West Nile was introduced into the United States, we think that drought played a role in amplifying the disease. West Nile first appeared in New York City, in 1999, when there was a terrible drought. In those conditions, mosquitoes thrive in the small pools of organically rich water that remain in drains. The heat wave didn’t stop until late August, and then only with heavy rain. Epidemiologists now say the virus had been lingering in animals, with a few human cases over the summer. Then it spread as insect populations grew after the heavy rains. The spread of West Nile to 44 states and five Canadian provinces in 2002 was associated with another intense drought, with no snow or spring runoff in the Rocky Mountains.

Does that mean the public health problems associated with global warming are essentially about mosquito-borne disease?

No, there are many health issues affected by a

changing climate—for instance, the 1993 emergence of hantavirus, which is a rodent-borne disease. A six-year-long drought in the Southwest had decreased the numbers of rodent-eating predators. Then came unusually early rains, which provided a bounty of food for the rodents. The rodent population exploded elevenfold. That led to the proliferation of animals carrying hanta—and ultimately to the deaths of 32 people that year. There are also

begun in Asia during the 1960s. We set up treatment facilities, which helped lower the death rate dramatically. When we returned to the United States in the early 1980s, I entered public health school here at Harvard, at a time when molecular biology was becoming the dominant trend. Much of what we learned involved new diagnostic tools and drugs—it wasn't so concerned with environmental factors that were the drivers of disease. Our experience in Mozam-

subject that was published in the *Lancet* in 1993. Since then she's been using data about the relationship among sea surface temperatures, plankton blooms, and cholera to develop early-warning systems and prevention measures to reduce the threat posed by the disease in a warmer world.

How easy was it to get this kind of information out to the public?

When Eric Chivian and I went to the Earth Summit in Rio in 1992, we held a press conference where I spoke about the relationship between climate change and cholera. Nobody picked up the story except the *Wall Street Journal*, which did a big spread on it. The *Journal* understood that there was a connection between outbreaks of disease and the health of the economy. When cholera hit Peru, for example, the country lost a lot of money—in terms of tourism, in terms of shrimp exports. So disease and epidemics are one of the pathways you can use to work with economic forces that are affected by climate change.

One of the surprising features of your work is the unusual coalitions that you and Dr. Chivian have been able to forge. For instance, how did you get Swiss Re, the re-insurance giant, to participate in your climate change study?

Swiss Re is not a newcomer to this issue. Analysts there have been producing reports on climate change since 1994. Frankly, they're worried about whether they can insure the future. The costs associated with natural catastrophes have grown exponentially. In the 1970s and 1980s they amounted to about \$4 billion a year; in the 1990s those losses went up tenfold. By 2004 they came to \$123 billion. Last year, with hurricanes Katrina, Rita, and Wilma, losses exceeded \$200 billion. Swiss Re is thinking about the health of its assets—so there's a convergence of interests. At our center, we have a corporate council that includes Swiss Re, 3M, Johnson & Johnson, and British Petroleum.

Some environmentalists might worry that you're getting into bed with the Devil.

I think we need new alliances among businesses, scientists, international agencies, and environmentalists. The financial sector—which includes insurers, banks, and pension funds—must be farsighted. The job of activists is not to do away with business, but to ally with the more enlightened forces and help redirect economic development in a way that is healthy and sustainable.

Malaria isn't caused by global warming, but climate change is contributing to its resurgence. Heavier rainfall creates ideal conditions for mosquitoes, while mountainous areas that were once too cold for these carriers of disease are warming up

new health problems arising among returnees to New Orleans after Hurricane Katrina, which is the kind of weather extreme we can expect more of with global warming. There's a new syndrome, "Katrina cough." Mold is everywhere—flooding fosters fungi. Toxins are ubiquitous. (See "Rough Burial," page 28, and "Health Threats Linger in New Orleans," page 42.)

What about the rise in asthma rates nationally? Is that associated in any way with global warming?

Well, many factors contribute to asthma, including air pollution—particulates and ground-level ozone. Our research suggests that the increase in carbon dioxide in the atmosphere, which comes from the burning of fossil fuels, also contributes to asthma. CO₂ stimulates plant growth, particularly weeds, and helps them produce excessive pollen. It has the same effect on some soil fungal spores. So one end product of using more carbon-based fuels is more allergens in the air. This increase may be one reason why asthma in the United States has more than doubled in the last 25 years, according to the American Lung Association.

How did you develop an environmental health specialty?

I started out as a family physician and then became a tropical disease doctor. My wife, Andy, is a nurse, and we went to Mozambique with our two children in 1978 for the American Friends Service Committee. There we saw very difficult things—including the effects of the seventh global cholera pandemic, which had

bique made clear the environmental and social dimensions of public health. I realized a bridge was needed between science and a holistic view of a healthy earth.

You mentioned cholera, which plagued the world long before people knew the term global warming. What's the link?

Cholera was something I'd seen and felt in Mozambique, but at that point few scientists were asking whether the global environment had anything to do with the disease. The light went on in 1989. That was when Rita Colwell, who later became head of the National Science Foundation, began reporting fascinating research showing that cholera bacteria can be harbored by floating algae, which proliferate as the temperature of the ocean surface increases. Rita and I collaborated on a paper on the

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trees would be saved if every household in the United States replaced just one 500-sheet roll of virgin toilet paper with one recycled roll.