

number of useful Web sites, primarily from US government agencies. Rather than just list them, he provides an annotated discussion of the agency's organizational role and of the strengths of the online sites for students and others wishing to further pursue the topic.

## CHALLENGES

The book's last chapter, "Externally Imposed Challenges for Risk Analysis," contains

much wisdom and a breadth of understanding that itself would be worthy of expanding to book length. The chapter topics, including globalization, secrecy, and loss of trust, would be particularly fitting to end an introductory course on risk analysis or to serve as the outline for a more advanced graduate-level seminar.

Greenberg ends this sobering chapter with recommendations on how to respond and with predictions for the future.

## SCIENCE FICTION

For those who do not know Michael Greenberg, the most startling chapter in this book is one that I predict will be especially delightful to readers—particularly to students. It is a learned and somewhat whimsical review of disaster science fiction in relation to risk analysis, a subject he has written about in the past.<sup>1</sup> This provides a provocative learning tool that will wake up even the most moribund student in an early morning class.

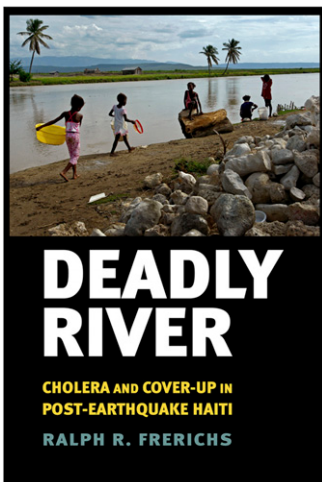
This is a very valuable book for the student, the teaching professional, and the casual reader interested in understanding the risky world we live in. *AJPH*

Bernard D. Goldstein, MD

## REFERENCES

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# Deadly Filth, Cartographic Deception, Trail of Victims, Microscopic Godzillas



by one person infecting another. Experts agree that the first order of business in containing an epidemic is to identify its point of origin. That would be Piarroux's focus when he arrived in Haiti. It would not be so easy.

Even before leaving the Université d'Aix-Marseille, where he teaches parasitology and mycology, Piarroux began scouring the Web sites run by international health organizations to track the speed and direction of the Haitian epidemic. He found several puzzling anomalies: the earliest disease map—published by Haitian health authorities and the Pan American Health Organization, a regional office of the World Health Organization (WHO)—showed the first cases near Mirebalais, a farming town along the Artibonite, Haiti's largest river. Yet subsequent maps issued by the UN's Office for Coordination of Humanitarian Affairs claimed the first outbreaks happened further downriver, dozens of miles away from Mirebalais.

Ralph Frerichs, professor emeritus of epidemiology at UCLA, has a penchant for detective stories. In *Deadly River*, Frerichs has written a masterful epidemiological whodunit set in Haiti, where the killer was swiftly identified as cholera. But other culprits emerged, as Frerichs describes in scientific yet lively prose: international health agencies and the United Nations (UN) tried to hide the role of UN soldiers in accidentally bringing the disease to Haiti.

In January 2010, a 7.0-magnitude earthquake slammed Haiti. Its epicenter was near Port-au-Prince, and the aftermath was infernal. More than 80 000 people died. Hundreds of thousands were left injured and homeless. Hospitals and government buildings crumbled. Water and sanitation pipes snapped like twigs and roads were buried in debris. As international aid agencies scrambled to help, experts warned that the filth and the lack of clean water and sanitation facilities could cause deadly outbreaks.

Unsurprisingly, it happened. Not immediately, but nine months later, cholera struck. But it did not break out in the shantytowns or refugee camps of Port-au-Prince, as health experts had anticipated. The first cases surfaced along the Artibonite River, an area unscathed by the earthquake. Even more perplexing: Haiti may have been cursed with hurricanes, quakes, and military coups, but historically it had been spared cholera. The disease scythed across the island at murderous speed, claiming hundreds, then thousands of lives in the first weeks.

Enter Renaud Piarroux, the epidemiologist dispatched by the French government to Haiti. He arrived two weeks after the disease had been identified as vibrio cholera, which can be passed on by contaminated water or food or

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**Deadly River: Cholera and Cover-Up in Post-Earthquake Haiti**  
By Ralph R. Frerichs  
Series: The Culture and Politics of Health Care Work  
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Most curious of all, a press communiqué was put out several days later by MINUSTAH, the UN agency in charge of its peacekeeping force in Haiti, which had nothing to do with medical aspects of the epidemic. Nonetheless, this agency claimed that the first case of cholera occurred on September 24, 2010 in the Lower Artibonite region, “a populated place where people live in precarious conditions without drinking water or latrines.” This press release shifted the date of the outbreak earlier by nearly three weeks, and the location from the hills of Mirebalais down to the Caribbean coast, a distance of 54 miles. This discrepancy bothered Piarroux before he even set off for Haiti. It was only later that the French scientist began to wonder if he was witnessing “epidemiological falsehood” and “cartographic deception.”

It soon became clear to Piarroux that it was deception, on an epic scale. Piarroux is the kind of gumshoe investigator who prefers getting out in the field to sitting at a desk. On arrival, he insisted on being taken to Mirebalais. By then, press reports had pointed to a UN peacekeeping camp of Nepali soldiers as being a possible source of the cholera, and several reporters who visited the camp, but were not allowed inside, noticed pipes leaking from the latrines into nearby fields and streams. A quick Google search revealed that a cholera outbreak had swept Kathmandu and its environs shortly before the Nepali troops left for Haiti. Frerichs makes a compelling case that not only were the UN agencies aware of this early on, but so too were the Centers for Disease Control and Prevention (CDC) and the WHO. Hunting for the origins of the disease, they all insisted,

would be a distraction from coping with the epidemic.

Haiti was only weeks away from a politically charged election, and there was a genuine fear that if word got out that MINUSTAH was to blame for inadvertently bringing in cholera, it could lead to riots aimed at the UN and the international aid agencies. MINUSTAH, in particular, was seen as an occupying military force and much loathed. It was reported that the beleaguered Haitian president, René Préval, had little choice but to go along with the UN cover-up. Frerichs, however, thinks Préval discreetly tried to reveal the truth.

As Piarroux was about to leave Haiti, a stranger handed him an envelope. Inside was a report from Haitian health workers who had rushed to Mirebalais on October 18, after the first cases of a violent and lethal watery diarrhea. The trail of victims led the health investigators straight to the gates of the UN camp of Nepali peacekeepers. But they were refused entry. The stool samples taken from victims were later analyzed in a Port-au-Prince government lab, run under the CDC’s auspices, and shown to be cholera. Frerichs insists that the CDC would have been privy to these early reports. He speculates that even though these reports were suppressed, the Haitian president may have defied the UN and made sure that Piarroux was slipped a copy.

The UN tried to give cover to its peacekeepers. It insisted that tests on the Nepali soldiers and the base itself came back negative for cholera. Critics, Piarroux among them, argued that these samples were taken weeks after the disease was gone. Household bleach would have killed any trace of the cholera organism from the sanitation facilities from which the environmental

samples were drawn. The UN’s insistence on its own innocence was given another knock by analyses of the vibrio cholera showing that the organisms found in Haiti were similar to South Asian strains. Later genome studies showed the two strains were virtually identical.

As pressure mounted on the UN agencies and more health experts were coming round to Piarroux’s conclusions, the UN set up an independent panel of experts to look into the matter. These scientists mostly favored an environmental hypothesis, which assumed that cholera had been lying dormant in the waters off Haiti but, like zillions of microscopic Godzillas, was roused into a pathogenic state by the earthquake and changes in temperature and water salinity. That theory troubled Piarroux: how could the organisms have swum up the river from the coast to Mirebalais, where the first deaths occurred? The panel ruled out the environmental hypothesis but stopped short of pointing a finger at the Nepali peacekeepers, concluding that the outbreak was caused by “a confluence of circumstances . . . and was not the fault of, nor deliberate action of, a group or an individual.”

The UN has yet to accept full responsibility for the cholera outbreak in Haiti and probably never will. Other biological disasters inevitably will arise elsewhere. Hopefully, says Frerichs, the global health organizations and the UN will react to the next crisis with more transparency and honesty than they did in Haiti. **AJPH**

*Tim McGirk*