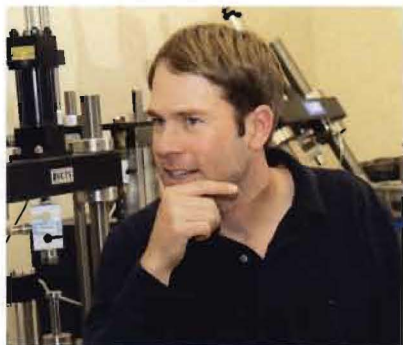




W H E N T H E L E

BY DENNIS STEERS



ROBB MOSS IS TALKING ABOUT hundreds of people dead, thousands homeless, and losses in the billions of dollars.

Yet, after detailing the potential for catastrophe should a powerful earthquake gravely undermine California's aging and poorly designed water levees in the Sacramento Delta and east San Francisco Bay,

the assistant professor of civil and environmental engineering smiles and says "Hey, I'm not really a doomsday guy. Only optimists can work with this stuff and survive."

Moss, who earned a Ph.D. in geotechnical earthquake engineering from UC Berkeley, is literally in the disaster business. His specialties are soil liquefaction, pile design for dynamic lateral loading of soil, and "big-picture risk analysis" of water levees. Much of his potential horror story for Northern California – which sounds like a script for a Hollywood disaster movie, complete with massive flooding, property damage on an epic scale, and the need for heroic action to prevent salt water intrusion into the California aqueduct – is based on his work on a National Science Foundation study of the 2005 flooding of New Orleans from Hurricane Katrina. Moss, along with 37 other engineers, scientists and officials, looked at the four levee breaches that flooded 80 percent of the city, damaging more than 100,000 homes and leaving more than 1,000 people dead.

"New Orleans is a very complex place – essentially a walled fortress with most of the city below sea level," Moss notes. "Add to that the very contentious political climate of the city, the multi-layers of bureaucracy regarding maintenance of the levees, and the potential for a large hurricane, and it's easy to see why many engineers and officials have been warning about this looming disaster for decades."

For his part of the NSF study, Moss focused on the soil near the breach of the 17th Street levee, which has been shielding New Orleans from the water of Lake Pontchartrain since the 1850s. The breach was so complex it overwhelmed his computer simulations, he says. Nevertheless, he and his group concluded that basic design flaws, rather than excessive water and wind, were responsible for the levee failure.

"With respect to the New Orleans failures, there were a few places where water levels, or storm surges, overtopped levees. But where the most catastrophic consequences occurred, along the 17th Street and London Avenue canals, there was no overtopping. The three breaches there had water levels well below the design levels," he says.

"We believe – and this point is in dispute among the four studies of Katrina that have been done – that this was a structural failure because of poor maintenance and flawed design. Basically, this was not an act of God, but an act of man."

The NSF study and others by the U.S. Army Corps of Engineers, the American Society of Civil Engineers, and the state



V E E S B R E A K

of Louisiana were submitted to Congress last spring. Although there were dramatic differences in some of the conclusions, and there was a Category III storm of controversy over the role of the Corps of Engineers in the disaster, Moss – who says his goal is to remain objective and “shoot friendly bullets at the problem” – was pleased by the overall reaction to the NSF findings.

“There was disagreement with key points in our study, but that was to be expected with anything this complex,” he says. “The good news is last month, General [Carl A.] Strock, the commander of the Corps of Engineers, came out with 12 action items for reform of the corps. Our group was very pleased that some of our key suggestions were incorporated in the action items. We tried to be forward-thinking – [focusing on] what can be done to strengthen the levees and improve levee maintenance to prevent flooding of this magnitude in the future.”

Moss’s future is a renewed focus on Northern California’s surprisingly large, sprawling and already-stressed aqueduct system. As a result of the population boom around Sacramento, Stockton and the Central Valley, more and more people are living in land protected by levees that Moss says are less structurally sound than those that failed in New Orleans. And because the threat in the Golden State is earthquakes, there won’t be any warning.

“The potential loss of life is actually higher in California than in New Orleans, where more than 90 percent of the people evacuated before Katrina struck,” he says. “The economic loss

to homes, businesses and agriculture will be staggering. And if flooding in the East Bay allows saltwater to intrude into the state aqueduct, 20 million people in Southern California could lose their source of drinking water. It’s not a pretty picture.”

Moss, who is currently working on a risk analysis of the “Bay-Delta” levees with a team from UCLA (the effort includes soil testing by Cal Poly graduate students), insists California does have some “significant bureaucratic” advantages over New Orleans. He is also encouraged by signs Katrina’s wake-up call has been heard loud and clear by state officials. “California doesn’t have the complex political infighting and turf wars they have in New Orleans, so responsibility for the levees is much more defined,” he says. “Since Katrina, the 29 most vulnerable locations in the Delta levees have been identified and are being strengthened. And more money than ever has been earmarked for engineering studies and levee maintenance.”

Moss, an avid rock climber when not teaching risk analysis to his civil engineering students, says worry-free levees are an unrealistic goal, but he believes steps can be taken to mitigate flooding.

“We need to determine what needs to be done to assure the levees are as safe as possible, then determine what can be done because of budget and other factors and then see what is actually done with repairs,” he says. “There are about 1,000 kilometers of levees to look at and sometimes the size of this potential problem seems too much. But again, I’m an optimist. If I wasn’t, it would be like ‘why bother?’” □