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Conference Assesses Levee Safety in California, Calls for National Water Resources Plan

By Mark Fitzgerald

In his book, *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley,* Robert Kelley examines the history of flooding and environmental policymaking in the Sacramento Valley and the ongoing struggle of designing and building thousands of miles of levees and drains. “We’ve been battling the inland sea here for a long time,” Ben Carter, the president of California’s Reclamation Board, remarked on July 25 at a conference in Sacramento. “Kelley’s book has been a tremendous resource. Policy follows disaster. History proves that. But clearly there needs to be a better balance between flood control system improvements and resource conservation.”

The conference—“Still Battling the Inland Sea: Exploring Solutions for California’s Complex Water Issues”—was held July 24-26 at the Holiday Inn Sacramento-Capitol Plaza and included a variety of presentations by engineers, policy makers, and research specialists concerning flood control and the levees that extend for more than 2,400 mi (3,862 km) along the Sacramento, American, and San Joaquin rivers and in the delta formed by the Sacramento and San Joaquin rivers. Sponsored by ASCE’s Sacramento Section and the Society of American Military Engineers, the event featured keynote addresses by John Paul Woodley, Jr., the assistant secretary of the army for civil works; Lieutenant General Robert L. Van Antwerp, the chief of engineers of the U.S.

Army Corps of Engineers; Edward Hecker, the chief of the Corps's Homeland Security Office and provost marshal of its Northwestern Division Regional Integration Team; W.F. Marcuson III, Ph.D., ASCE's president; Gerald E. Galloway, Jr., Ph.D., a research professor in the University of Maryland's A. James Clark School of Engineering; and Lawrence H. Roth, the Society's deputy executive director.

"If I had been asked prior to August of 2005 which of the two great cities, New Orleans or Sacramento, was in the most danger of catastrophic inundation, my answer would not have been New Orleans-my answer would have been Sacramento," Woodley stated. "We need to be ready to apply the lessons we've learned from Hurricane Katrina and other events to the challenges that we face in flood damage reduction in regard to the [Sacramento and San Joaquin] delta and the American and Sacramento rivers as well as anywhere else in California. Flood damage reduction needs to be thought about and understood on a systematic basis and it should be dealt with as comprehensively as possible. We must not give in to forces that lead to fragmented decision making and fragmented solutions. We need to integrate long-term solutions on the broadest possible scale."

Van Antwerp, who in June was named the Corps's 52nd chief of engineers, stressed the importance of sustainability, integration, and a national standard for hurricane protection and emergency preparedness. "The levees won't be done after you build them," he said. "They have to be sustainable. One big factor is subsidence and another one is sea level rise. If we're going to do legacy systems, the implementation plan has to go beyond what we're doing now. It's got to include monitoring, maintenance, and inspection and knowing what is not up to standard and knowing how to bring it up to standard for the long term."

Last year ASCE members throughout California released an infrastructure report that conferred an overall grade of F on the state's levees and flood control system. Large portions of the levees along the Sacramento, American, and San Joaquin rivers and in the delta of the Sacramento and San Joaquin rivers were built by farmers or settlers more than 100 years ago and haven't been modernized or adequately maintained to protect the urban population that sprawls throughout the valley today.

"You don't improve public safety by discussing white paper after white paper," Van Antwerp added. "At some point in the collaboration process you have to say, 'we've

done the best we can and this is our decision.' Then you move toward implementation and go for it. But whatever implementation plan you decide to go with, it has to have all the stakeholders involved. It has to be an integrated solution, and it has got to be all of us contributing. I don't care if there are fifteen signatures on the bottom. I'll be one of them and you can be one of them. But let's all say this is the plan. We need to move toward a national standard. Of course there will be variances, because people and places are different. Things will react differently in Louisiana than they will in Sacramento. But I think we still ought to have a national standard in place as well as a process that can deal with variances."

Last year California passed legislation—the Disaster Preparedness and Flood Prevention Bond Act of 2006 (Proposition 1E) and the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84)—aimed at improving its flood management programs and infrastructure. Under Proposition 1E, $3 billion has been allocated to repair and improve state and federal facilities and reduce the risks of levee failure in the delta of the Sacramento and San Joaquin rivers. Levees that are not part of the state flood control plan for the Central Valley will be funded by Proposition 84, and priority will be given to public safety, the development of a sustainable flood management system, and reducing state taxpayer liability. California's Department of Water Resources intends to use Proposition 84 funds to increase the money available for levee maintenance and special projects in the delta of the Sacramento and San Joaquin rivers.

"The Corps's primary concern as it moves forward and addresses the challenges we have with the nation's built levee infrastructure is to protect lives," Hecker noted. "Our vision is for a safe and informed public. It's a shared responsibility, and no one agency can address it holistically. But we look forward with great anticipation to a collaborative partnership with the state and the other agencies involved in this process. California has already shown its commitment to safety through these bond acts. The investment the state is making in its infrastructure is a great example of what's possible. The state understood the risk and made a big investment, and I think we need to translate that success around the country. It shows you what can be done when you identify the risk in a way that the public understands."

The Corps recently released a prototype risk assessment for the hurricane protection system in New Orleans and southeastern Louisiana that profiles pre-Katrina and current protection system conditions and demonstrates the dynamics of risk and the effects of system improvements on risk and vulnerability. Developed by the Interagency Performance Evaluation Task Force (IPET)—the body assembled by the Corps to review the performance of the hurricane protection system during Hurricane Katrina—the analysis is part of a larger study concerning levees and Hurricane Katrina. ASCE's External Review Panel (ERP)—which was convened in 2005 at the behest of Lieutenant General Carl A. Strock, then the Corps's commander and chief of engineers—is in the process of completing a technical review of the risk assessment, as it has done for previous ipet analyses, reports, and findings.

"The ERP has had an ongoing debate about whether Hurricane Katrina was the worst engineering catastrophe in U.S. history or whether it was merely a severe natural disaster that was exacerbated by lapses in engineering policy and engineering judgment," remarked Roth at the outset of a presentation entitled "Hurricane Katrina: The Worst Engineering Catastrophe in U.S. History." After highlighting various dimensions of the ERP's technical review of the IPET's findings, Roth added, "We ended up with a hurricane protection system that was severely compromised by questionable engineering decisions, by inadequate and dysfunctional interfaces between organizations, and by a political culture that didn't understand the potential for catastrophe and was unwilling to pay the price. Consequently, it ended up putting life-threatening risk on the back burner."

Roth has more than 30 years of experience in water resources engineering, principally in the areas of dams, levees, and canals. In May he testified before two subcommittees of the U.S. House of Representatives' Transportation and Infrastructure Committee: the Subcommittee on Economic Development, Public Buildings, and Emergency Management and the Subcommittee on Water Resources and Environment. In that testimony he urged Congress to enact the Dam Rehabilitation and Repair Act of 2007 (H.R. 1098) and the National Levee Safety Program Act of 2007 (H.R. 1587)—legislation aimed at bolstering the quality of the nation's dams and levees.

"What we learned with Katrina is very germane to Sacramento and many other places in the nation," observed Roth. "We need to plan for the long term, for projects that extend over many years. We need to establish mechanisms that enable us to incorporate

changing information, and we must update our projects based on the review of recent research, new case histories, and new standards. We also need to make sure that we implement rigorous risk-based approaches that allow us to select the appropriate level of protection for public safety, allow us to prepare alternatives and manage consequences, and allow us to inform the public in clear and concise terms about the consequences of decisions that are being made."

Last year the ERP released *Hurricane Katrina: One Year Later. What Must We Do Next?*—a report that recommended 10 measures for addressing and correcting the deficiencies in the hurricane protection system for New Orleans and southeastern Louisiana. The intent was to ensure that improvements were made in understanding risk and embracing safety, reexamining and repairing the hurricane protection system, revamping that system's management, and demanding engineering quality.

"I think that one of the positive aspects of Hurricane Katrina is that it's energized California," Marcuson observed. "As civil engineers, we bring vast environmental and infrastructure knowledge and capabilities to the table. But I think we need to be better communicators. If you are a master communicator, you can differentiate between wants and needs, and you can better influence and motivate those you come in contact with. I'd like to see engineers not only be problem solvers, but problem identifiers. We also need to identify leaders, coaches, and mentors and do a better job of leading young engineers. They are our future."

Galloway, a visiting scholar at the Corps of Engineers' Institute for Water Resources, called for a national vision for water resources management. "We need a vision that tells us how things are going to be in the future," he said. "If I were to ask you what you think the floodplain of 2050 ought to be, what would you say? Have nobody in it? Only fish and wildlife? Reasonable use? Only protected urban areas? We have no idea. We've never gotten together as a nation and tried to solve this. We need that vision."

According to Galloway, who served as a presidential appointee on the Mississippi River Commission and the American Heritage Rivers Advisory Committee, the overall investment and upkeep of the nation's water resources have waned in recent decades. "We need to have policy precede catastrophe," he emphasized. "The problem is not just floods. The stewardship of the nation's water resources is being neglected. Yet when the

governor of California raises five billion dollars to take care of levees, he does a great job at setting a mark for other people to move ahead. We know that the Everglades are moving forward, because Florida is ahead of the federal government in funding. Other states may be thinking the same thing. Texas has got some great water plans going. But we all have to become involved in the process. As citizens, we have to communicate with our representatives. Whether it's at the city, county, state, or federal level, we need to let them know what we think. Initiatives like the one here in California can make a real difference and even help us shape a vision for water resources that makes sense for the whole nation."