Adapting to Rising Tides with the Power of Information Technology – San Francisco Bay Area and Beyond
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Information technology (IT) is everywhere. However, many aspects of the water resources management sector have been IT-starved. One area of water resources management where innovation is rapidly advancing is 'smart' flood management. This presentation highlights how San Francisco Bay is responding to sea level rise, how information technology is driving innovation in flood management, and how important lessons learned from New Orleans, New York and the Netherlands can be applied to create a smart and more climate resilient water resources system.

San Francisco Bay is the largest estuary on the West Coast of the United States and home to about 7.5 million people. It is also home to Silicon Valley, the world's epicenter for the tech industry. As the Bay Area developed over the last 160 years, large parts of the Bay have been filled to spur development for a rapidly growing population and economy. Today San Francisco Bay is only about two-thirds the size it was 160 years ago. The San Francisco Bay Conservation and Development Commission (BCDC) was created in the 1960's and stopped filling of the Bay. Sea level rise driven by climate change now threatens to reverse the process of a shrinking Bay. The reclaimed land was built just high enough to be protected from a 100-year storm, with no buffer for potential increases in sea level. Sea levels have already risen approximately 8 inches over the last century and are expected to rise up to 16 inches by mid-century and up to 55 inches by the end of the century. An estimated $62 billion in property value is at risk under these scenarios. The State of California is taking a progressive attitude in addressing the sea level rise impacts on the Bay's shoreline. Through the Adapting to Rising Tides (ART) program, the State is conducting numerous studies and applying lessons learned from other coastal communities to assess the impacts and vulnerabilities and propose adaptation solutions for both natural and urban shorelines.

One coastal region California has learned from is the Netherlands. The state has developed a knowledge exchange relationship on flood management and sea level rise adaptation to take advantage of the centuries of experience the Dutch have gained while living below sea level. California's adaptation strategy is also benefiting from lessons learned from recent climate related disasters in New Orleans and New York following Hurricane Katrina and Superstorm Sandy. Both of these storms brought tremendous change to how flood risk management and climate change is perceived in the US –within public agencies involved, as well as in the eyes of the public and business world. For example, flood control systems have traditionally been designed to be 'strong' - with levees, storm surge barriers, flood walls, pump stations and gates, and other infrastructure. Many areas at risk from climate change have begun to employ a more balanced approach incorporating non-structural and natural ecological measures. In the face of climate change and the shrinking resilience of this infrastructure, efforts to make flood control systems 'smart' have also emerged. Examples of smart flood control systems include levees equipped with sensors to detect weak spots in real-time, advanced flood early warning systems, advanced weather forecasting coupled with evacuation planning and traffic management, and serious gaming applications that replicate real life situations to train emergency management staff.

There is a big need for new monitoring systems with millions of sensors and huge amounts of data that is analyzed and translated into understandable and actionable outcomes to manage risks and avoid expensive disasters as we have recently seen in New York and New Orleans. Given the sea level rise challenges facing Silicon Valley and the greater San Francisco Bay Area, the concept of smart cities, smart flood control, and climate adaptation is quickly gaining traction in this area. As tech companies turn their attention to flood management and water resources, San Francisco Bay will be a very attractive test

bed to prove new concepts and act as a catalyst for new business opportunities in smart flood control worldwide.