

Nature-based Ideas for Shoreline Resilience: Current Status and Next Steps

Peter Baye, Coastal Ecologist, baye@earthlink.net

Sarah Richmond, San Francisco Bay Conservation and Development Commission,
sarahr@bcdc.ca.gov

Roger Leventhal, Marin County, Department of Public Works, RLeventhal@marincounty.org

San Francisco Estuary shorelines are the leading edge of the Bay's response to rising sea level, increased storm wave energy, and resulting flooding and erosion. Conventional "hard" engineering responses to shoreline protection (e.g., armoring with rip-rap, dikes, seawalls) often perpetuate or increase degradation of shoreline habitats, esthetics, and public access and enjoyment. Shoreline responses to climate change impacts are influenced by adjoining parts of the baylands ecosystem, including the mudflat, marsh plain, and terrestrial transition zone, all of which can be modified to increase shoreline resilience. Different types of natural low-gradient shoreline systems efficiently dissipate wave energy, moderate erosion, or even promote vertical accretion. Using a geomorphic conceptual model as a framework to understand shoreline processes, we critically review examples of new engineering approaches such as submerged aquatic vegetation beds, estuarine beaches, redesigned stream mouths, alluvial fan-seep transition zones, among others. These approaches can be implemented in phases and in strategic locations, buying time for shoreline habitats to adapt to climate change and continue to provide ecosystem services such as flood risk reduction and biodiversity. New engineering approaches that take advantage of these natural wave attenuation and shoreline evolution processes can be integrated to form a climate change adaptation strategy. Emerging results from research and demonstration projects from different parts of the Estuary indicate potential wider application of these new engineering approaches. These approaches need to be further developed, refined, and critically applied within the context of specific sites and a future vision for the Estuary in light of accelerating sea level rise.

Keywords: Wave Attenuation, Shoreline Evolution, Engineering Approaches

Session Title: Future Solutions for the Bay (II)

Speaker Biography: Peter Baye, Ph.D. is a coastal ecologist and botanist with over 30 years of professional experience in conservation, restoration, management, and research on coastal ecosystems in California and northeastern U.S. and Canada. He specializes in coastal wetland, dunes, and beach ecosystems, and currently works as a consulting ecologist in California.

Sarah Richmond holds a Bachelor of Science in Geology from UC Santa Barbara and a Master of Science in Energy and Resources from UC Berkeley. She has considerable consulting experience as a Geomorphologist/Hydrologist leading surface-groundwater and sediment transport investigations and developing designs for wetland and stream restoration projects. At BCDC, she is the lead for the Corte Madera Baylands and Head of Tide studies and a key player on the Adapting to Rising Tides project team.

Aligning Regulation and Baylands Goals Implementation for Integrated Solutions and a Resilient Shoreline

Joseph LaClair, San Francisco Bay Conservation and Development Commission, joel@bcdca.gov

The topic specific environmental laws and regulations governing habitat and species preservation and enhancement established in the 1970's (air, water, species, etc.) have served us well in controlling environmental degradation and facilitating modest and dramatic improvements. In the 21st Century, we confront the hairy problems of climate change and related sea level rise that cut across the silos we've established for management and regulation and threaten some of the successes we've achieved, emphasizing the urgency of effective action. The necessary solutions will require us to continue our march to overcome the compartmentalization and "siloining" inherent in our management structures and pursue integrated solutions that support adaptive management.

We've had tremendous success with non-regulatory collaborative efforts, like the 1999 Baylands Ecosystem Habitat Goals, as well as regulatory successes, such as the Long Term Management Strategy for dredging and the Regional Monitoring Program. Moving forward we need to build on these successes to manage uncertainty, cope with complexity and confront significant resource constraints by adapting our institutions.

What governance changes are needed to effectively address the many impacts of climate change on the San Francisco Bay Estuary? How can we accomplish implementation of the Baylands Ecosystem Habitat Goals and integrated solutions for a resilient shoreline? What changes in land use regulation and policy are needed to facilitate acquisition of lands for wetland migration, to allow re-routing of freshwater, and restoration and reuse of sediment sources? How can permit and policy conflicts be resolved to enable experimentation and rapid learning? Can we develop adaptive policy that addresses both anticipated and unanticipated futures? Which pilot projects should we pursue to teach us how to design and build more resilient shoreline habitats and communities? Could we develop a forum where we can discuss these new approaches holistically, rather than on a case-by-case, project-by-project basis?

Keywords: Governance Resilience, Sea Level Rise, Resilient

Session Title: Future Solutions for the Bay (II)

Speaker Biography: As BCDC's Chief Planning Officer, Mr. LaClair directs the Commission's planning program, serves as technical advisor to the Commission and staff and provides liaison with governmental and private agencies on planning matters. He holds a Bachelor of Arts degree in Economics from the University of Oregon, and a Masters in Landscape Architecture and a Masters in City and Regional Planning from the University of California at Berkeley. He joined BCDC's staff in 1992 and, he became BCDC's Chief Planner in 2007. Mr. LaClair recently completed a Bay Plan policy project to address climate change and sea level rise and is currently focusing his efforts on developing the Bay Area's regional climate change resilience strategy.

Ways Forward: Panel Discussion on Key Opportunities and Barriers

Moderator: Amy Hutzal, State Coastal Conservancy

Questions will be selected from the audience for the panel to discuss. Based on the previous presentations, what are the key opportunities and barriers to moving forward? The content would likely cover topics such as more flexible policies that allow change when thresholds are reached, ways that policies can accommodate experimentation to facilitate more rapid climate change adaptation, recognizing sediment as a precious resource as sea level rises, what opportunities exist for good regional sediment management, how to move and place dredged sediment more cost-effectively, how to define beneficial use of sediments, sediment management in streams (must in-stream sediment management always be constrained by TMDLs?), and whether and how to release sediment from behind dams.

Session Title: Future Solutions for the Bay (II)

Panel Members:

Joe LaClair, BCDC

Jason Brush, US EPA

Cay Goude, USFWS

Anne Morkill, USFWS

Bruce Wolfe, SF Bay Water Board

Panel Member Biography: Cay Goude oversees the Recovery and Conservation Planning programs at the Sacramento Fish and Wildlife Office and administers endangered species programs throughout the Coast/Bay/Forest foothills geographic area of California. Mrs. Goude has her Bachelor of Science degree from UCD in Renewable Natural Resources with an emphasis in fishery biology and a Master of Science degree from CSUS in biology (emphasis in fishery biology). She worked for 7 years for the Corps of Engineers before coming to FWS. Cay has worked in the Sacramento Field Office since 1984. Mrs. Goude is past president of the California Chapter of the California/Nevada Chapter of the American Fisheries Society, Western Division AFS Past President and Equal Opportunities Section AFS Past President. Mrs. Goude received the Agency Staff Person of the Year in 2007 from California Native Plant Society for her work on the University of California, Merced project.

Panel Member Biography: As BCDC's Chief Planning Officer, Joe LaClair directs the Commission's planning program, serves as technical advisor to the Commission and staff and provides liaison with governmental and private agencies on planning matters. He holds a Bachelor of Arts degree in Economics from the University of Oregon, and a Masters in Landscape Architecture and a Masters in City and Regional Planning from the University of California at Berkeley. He joined BCDC's staff in 1992 and, he became BCDC's Chief Planner in 2007. Mr. LaClair recently completed a Bay Plan policy project to address climate change and sea level rise and is currently focusing his efforts on developing the Bay Area's regional climate change resilience strategy.

Panel Member Biography: Anne Morkill is a Wildlife Refuge Manager overseeing the San Francisco Bay National Wildlife Refuge Complex. The Complex encompasses 7 refuges, including tidal marsh restoration areas, offshore islands, remnant dunes, vernal ponds, and riverine habitats. Prior to moving to the Bay area in October 2012, Anne has worked for 23 years as a refuge manager and wildlife biologist at the Florida Keys Refuges, the Alaska Maritime and the Arctic Refuges in Alaska, and the Alamosa-Monte Vista Refuges in Colorado, as well as the Bureau of Land Management in Alaska and Wyoming Game and Fish Department.

Panel Member Biography: Bruce Wolfe has been the Executive Officer of the San Francisco Bay Regional Water Quality Control Board since 2003. He oversees the 110 staff of the Regional Water Board in carrying out the Board's mission of protecting, enhancing, and restoring the Bay and the Region's waters. Prior to his appointment, Bruce had been the Board's division chief for implementing watershed management programs, including stormwater pollution control, control and restoration of impacts to wetlands and streams, nonpoint source control, implementation of wastewater reuse, and control of discharges of waste to land. Bruce started with the Regional Water Board in 1977, is a registered professional engineer in California, and holds a B.S in Civil Engineering and an M.S. in Environmental Engineering from Stanford University.