BayWAVE Sea Level Rise

MCCMC March 22, 2017

The goal of the BayWAVE project is to increase awareness and preparation for future SLR impacts by using this coordinated, multi-jurisdictional assessment.

Vulnerability Assessment

April 2017

- Understanding risk and vulnerability
- Developing a regional assessment
- Identifying adaptation strategies
- Creating a沿海地区 Coastal Vulnerability Index

Methods

Quick Start Kit
- Data
- Models
- Maps
- Reports

Public Meetings and Next Phase

April 2017

- Public meetings to share results of the risk and vulnerability assessment
- Engaging communities in planning for adaptation and preparedness

Supporting Tools

- Pearl Telling
- PowerPoint presentations
- Maps
- Reports

Visit www.MAPSLR.org for more information

Project Team: Mixture, Community Development, and Public Policy.
Contact: Dr. Kevin principal, planner, and project manager with questions.
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Vulnerability Assessment
April 2017

- Identify
- Buildings
- Coastal flooding
- Wildlife
- Drowning
- Medical care
- Industrial
- Critical infrastructure
- Coastal roads
- Resilience
- Habitats
- Hydrology
- Harbors
- Parking
- Electric substations
- Parks
- Emergency response facilities
- Critical facilities
- Health centers
- Healthcare
- Electric power
- Telecommunications

Methods
Our Coast Our Future Viewer (OCOfV)
GIS data: 10m, 30m, 50m, 200m, plus each with the X and Y projection
GIS data over 200 data layers from various sources

Supporting Tools
- Project Talking points
- Presentation templates
- Adaptation Fact Sheets
- Illustrated, interactive Project Summary

Public Meetings and Next Phase
April 2017

Public meetings are to share the results of the Vulnerability Assessment and to play the future of floods and share the process for planning.

April 19th: 9-9:45AM Southwood Park, San Rafael
April 28th: 7-9PM Mill Valley Community Center
April 29th: 10-12 PM Novato City Hall

Visit www.MarinSLR.org for more information

Project team: Marin Community Development and Public Works
Contact: Chris Chou, principal planner and project manager with questions.
Rise

The goal of the BayWAVE project is to increase awareness and preparation for future SLR impacts by using this coordinated, multi-jurisdictional assessment.
The issue

Marin is at risk: today and in the future. We need to plan, coordinate and act to prepare for rising tides. Much of our infrastructure transportation, utilities, our wetlands, and our community is within the vulnerable shoreline. We've begun planning together and this was a first step. We will need to do much more…
Vulnerability Assessment

April 2017

Entire Marin Bay Shoreline from Sausalito to Novato (report complements CSMART for the coast)
Report catalogs the impacts from sea level rise by asset and geography:

- land
- buildings
- roads and waterways
- water, wastewater, stormwater, gas, electricity, and telecommunications
- agriculture
- habitat and wildlife
- recreation and public access
- emergency services
- cultural resources
- and by each incorporated and unincorporated community

Methods

Our Coast Our Future
BCDC's One Map Many Scenarios: 10 inches, 20 inches
Methods

Our Coast Our Future Viewer (CoSMoS)
BCDC's One Map Many Futures

Scenarios: 10 inches, 20 inches, 60 inches, plus each with the 100-year storm

GIS plus over 100 stakeholder interviews
In 15 years, high tides could threaten Marin’s shoreline buildings, roads, and original utility systems. Damage and breakdowns in road and utility networks would impact the entire County, especially Southern Marin. Tidal flooding (red) could reach 5,000 acres, 1,300 parcels, 700 buildings, and 6 miles of road in San Rafael east of State Route 101, bayfront Belvedere and Tiburon, Greenbrae, Stinson, and Valdocco Cay. A 100-year storm surge (pink) would flood these areas with storm surge flooding, and flood 3,000 acres, 2,500 parcels, 3,300 buildings, and 20 miles of road in North Novato, Black Point on the Petaluma River, lower Santa Venetia, Belvedere Lagoon, bayfront Cotter McAdams and Mill Valley, Marinship in Sausalito, Marin Lagoon in San Rafael, Tamalpais, and Airmont. Flooded ferry facilities would prevent commuters and visitors from traveling across the bay. Boating facilities in Sausalito, Mill Valley, Strawberry, Tiburon, Belvedere, San Rafael, Bel Marin Keys, and Black Point may be inaccessible.

This is especially a concern for marinas with residential boats and Southern Marin Fire and Sausalito Police boats. The Casto St. Fire Station in San Rafael is vulnerable to tidal flooding, though all emergency professionals would be denied vehicular access to people in vulnerable areas. Southern Marin marshlands would shift high marsh to low marsh to mud flat, and eelgrass beds could shrink under deeper, darker waters. These habitat shifts would have significant repercussions for plant, insect, fish, and animal species.
Tidal flooding could reach 7,000 acres, 3,000 parcels, 2,000 buildings, and 18 miles of roadway in the same locations impacted in the near-term, though more severely. With a 100-year storm surge, the area vulnerable to tidal flooding would also experience storm surge flooding. An additional 7,000 acres, 2,200 parcels (8%), 3,650 buildings (7%), and 40 miles of roadway could anticipate storm surge flooding. Most levees south of Novato are not designed to withstand this level of flooding and would be overwhelmed. Storm surge flooding would extend farther inland beyond the existing areas of Mill Valley, Strawberry, San Rafael, St. Vincent, and North Novato. Water travel could experience similar outcomes as in the near-term, though the highest high tides and storms surges would cause even more damage than weathered twenty years earlier. Pipelines beneath flooded roads could become separated between rising groundwater and the roadway, causing pipes to bend and break, and even damage roadways. This is true for sanitary, stormwater, and potable water pipes. PG&E substations, electrical transmission towers and lines, and natural gas pipelines could be bent or broken by flooding, subsidence, and erosion, with far reaching impacts on utilities, buildings, and transportation. This ten inch increase in sea level would continue to shrink protected beach and marsh habitats in Southern Marin. Shoreline parks and pathways would flood often.
By 2100, tidal flooding could reach nearly 7,000 acres, 8,000 parcels (13%), 9,000 buildings (12%), and 100 miles of road. Higher sea levels could adversely impact the locations flooded in medium-term, and significant portions of the areas that previously suffered storm surge flooding. Tidal flooding would impact beyond the State Routes 101 and 80 in low-lying areas, into Southern Marin's narrow valleys and creek sides, and over every levee in Marin County. A 100-year storm surge could flood these areas, and an additional 6,500 acres, 4,800 parcels (20% total), 3,000 buildings (10% total), and 10 miles of road, extending to Sausalito west of Bridgeway, Marin City housing, Mill Valley's Alto Shopping Center, Las Gallinas and N. San Pedro Blvd. in San Rafael, Baywood Acres, Country Club, and Kentfield. Major building damage could amount to $91 million (2018 dollars). Vulnerable single family homes exceed $20 billion in market value (2018 dollars). Several park and ride, hundreds of bus stops, and bus routes, and SMART rail track, including the San Rafael Transit Center, could experience flooding. Disruptive flooding at the SASSM and NSD wastewater treatment plants and pump stations would affect tens of thousands of people. Storm surges could flood Tiburon Fire Station No. 1, Corte Madera Fire Station No. 13, and Novato Albertson Ave. Fire Station. A few emergency shelters in Southern Marin flood at high tide, and many more could be closed during a storm. The Central Marin Police Department may have to navigate deep water to reach Larkspur and Corte Madera shoreline residents. In Southern Marin, mud flats and water would dominate existing marshes. In the north, tidal marshes could expand.
Public Meetings and Next Phase

April 2017

Public meetings expected to share the results of the Vulnerability Assessment and to play the Game of Floods and share the process for planning.

April 19th 7-9 PM Pickleweed Park, San Rafael
April 25th 7-9 PM Mill Valley Community Center
April 29th 10-12 PM Novato City Hall
Supporting Tools

- Project Talking points
- Presentation template
- Adaptation Fact Sheets
- Demonstration Project summaries
Visit www.MarinSLR.org for more information

Project team: Marin Community Development and Public Works
Contact Chris Choo, principal planner and project manager with questions.
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Vulnerability Assessment
April 2017

Supporting Tools
- Project Talking points
- Presentation templates
- Adaptation Fact Sheets
- Document and Project Summary

Methods
Our Coast Our Future Viewer (GMap3D)
GIS data used to map flood scenarios.

Public Meetings and Next Phase
April 2017
Public meetings exposed to share the results of the Vulnerability Assessment and to play the first flood exercises.

Visit www.MarinSLR.org for more information
Project team: Marin Community Development and Public Works
Contact Chris Cho, principal planner and project manager with questions.