





Climate change, water supply and quality management in the San Francisco Bay Area

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Quick Facts about the San Francisco Bay Area

- Total population (2010): 7,150,739
- Household median income (2010 \$): \$75,989*
- Poverty (2010): 9.7%
- Bachelor's degree or higher (2010): **41.5%***
- Water consumption (2009): total 132 gal/day, residential 78 gal/day



trend: decreasing



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Water – We have it. We don't have it. We have too much of it.





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Water – We have it. We don't have it.







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Climate Change in San Francisco Bay Area

- Sea level rise of up to 55 inches by 2100 in the Bay
- Changes in **precipitation patterns**:
 - Ionger summer dry periods and winter floods
 - Reduced snowpack in Sierras, more precipitation as rain
 - Earlier and more rapid snowpack melt
- Increased evapotranspiration and water uptake by plants
- Changes in fog dynamics and air moisture content
- Eastward shift in salinity gradient in Bay





Implications ...

- More frequent and permanent inundation
- More frequent and prolonged summer freshwater shortages (reduced storage capacity, 50% population growth)
- Saltwater intrusion and disruption of water treatment and supply infrastructure (and other critical transportation and energy assets) along coast, Bay, and in the San Joaquin-Sacramento river delta
- Deterioration in water quality
- Loss of biodiversity and habitat



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Sea Level Rise

- 16 inches by 2050 / 55 in by 2100
- Appr. 99 / 186 miles of major roads at risk of 16 in / 55 in inundation; 105 miles (1/6) of railway tracks and 93% of airport areas submerged at 55in
- Threats to critical energy and electricity infrastructure
- Loss of tidal wetlands and other critical habitat; reduced sediment deposition







FIGURE 1: MEAN SEA LEVEL AT THE GOLDEN GATE BRIDGE TIDE GAUGE







Water Resources

- Major challenges for water utilities and waste water treatment plants
 - Reduced snowpack threatens long-term freshwater supply
 - High altitude and capacity of storage reservoirs (Hetch Hetchy) help until about 2050
 - Reduced groundwater recharge
 - Saltwater intrusion into delta
 - Backflow problems at treatment plants
 - Water quality impairments from higher temperatures







Institutional Capacity for Adaptation

- Federal Departments and Agencies: EPA, FEMA, HHS
- State government and agencies: CA Dept. of Public Health, CA Air Resources Board, Sacramento – San Joaquin Delta Conservancy, Water Quality Monitoring Council, California Coastal Commission (CCC), Water Resources Control Board
- Regional agencies: Bay Area Conservation and Development Commission (BCDC); MTC, ABAG, regional air, water and transport agencies
- Local governments and agencies (county and city government, transportation agencies, water utilities, public health services)





Cross-agency and Governmental Cooperation





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Challenges

- BCDC:
 - Limited authority to implement climate change adaptation strategies
 - Issues permits for filling, dredging and changes in use of Bay up to 100ft landward
- CCC: Þ
 - Manages development of local coastal plans (LCP) for 60 cities, 15 counties that specify types and locations of permissible land use up
 - Authority up to 300ft of high tide line or first road
 - Implementation typically overseen locally
- Local government:
 - General Plans (updated every 5-15 yrs), lack of resources and know-how
 - Some 100 cities and local governments, lack of coordination
- Other regional agencies and organizations (e.g., ABAG, MTC)





Policy Solutions (1)

- Local government: 5-yr GP updates with safety element including climate change risks
- BCDC, CCC, planning agencies and FEMA: Shoreline risk assessment
- Local gov, BCDC, Redevelopment agencies: No permitting of new developments in inundation risk areas unless strict criteria are met
- Local gov, Redevelopment agencies: Flood protection plans





Policy Solutions (2)

- MTC, ABAG, Joint Policy Committee, BCDC, federal, state, regional and local agencies: cross-agency regional sea-level rise adaptation strategy; include in Senate Bill 375 (Sustainable Communities Strategies)
- BCDC: Maintain public access to Bay and ocean
- Change Coastal Act to require 5-yr updates to coastal plans
- FEMA should include projected sea level rise in calculation of National Flood Insurance Program rates to set proper incentives



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Thank you.





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