Climate Change and the Water Resilience Portfolio

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Managing water is at the forefront of climate change adaptation in California

- Drought reveals strengths and weaknesses in water systems
- How will a changing climate add to the challenges?
- Actions to prepare for droughts of the future will benefit water management today
The unusually warm drought of 2012–16 was a window into the future.
Five climate pressures are impacting California’s water system

- **Warming temperatures**
- **Shrinking snowpack**
- **Shorter wet seasons**
- **More volatile precipitation**
- **Rising seas**
California is warming

- Temperature impacts:
  - Evaporative loss
  - Soil moisture deficits
  - Urban and agricultural irrigation demand
  - Surface water quality
  - Increasing demand for wetlands and instream flows (cold water)
Snowpack is shrinking, “snow droughts” common

- Snowpack impacts:
  - Montane groundwater recharge
  - Total water budget and timing
  - Water available for recharge
  - Water quality
  - Reservoir temperatures
“Seasonality” is increasing

- Seasonality impacts:
  - Early and late season irrigation demands
  - Increased demand for spring and fall wetland and river ecosystem water
  - Reduced spring inflow to reservoirs and irrigation systems
  - Opportunities for managed recharge
Precipitation is becoming more volatile

- Increased pressure to expand flood reserve in multipurpose reservoirs
- Increased pressure to maintain carryover storage in reservoirs
- Increased uncertainty about flood recharge opportunities
- Increased demand for aquifer storage and pumping
Accelerated sea level rise

- Sea level rise impacts:
  - Challenges to manage salinity in coastal aquifers
  - Threats to water quality and levee stability in the Sacramento-San Joaquin Delta (15% of statewide supply, 25% of SJV)
Reducing vulnerability to climate pressures requires concerted action

Four essential reforms:

1. Plan ahead
2. Upgrade the water grid
3. Update water allocation rules
4. Find the money

Shasta Reservoir during drought
Reform 1: Plan ahead

- Successful adaptation requires advance planning at local and regional scales.

- Top priorities:
  - Strengthen urban water management plans
  - Ensure effective groundwater sustainability plans
  - Develop drinking water plans for rural communities
  - Prepare ecosystem drought plans
Reform 2: Upgrade the water grid

- Modernizing our “water grid” can help reduce costs of future droughts

- Top priorities:
  - Improve capacity of conveyance and storage (reservoirs + aquifers)
  - Modernize and integrate operations
Reform 3: Update water allocation rules

- Facilitate equitable and efficient allocation during dry times, promote capture and storage during wet times
- Top priorities:
  - Promote groundwater recharge
  - Streamline trading and banking
  - Give the environment a water budget
  - Improve water rights administration

Sacramento National Wildlife Refuge
Reform 4: Find the money

- Reliable sources of funding are crucial for adapting to climate change

- Top priorities:
  - Use general obligation bonds for public benefit
  - Fill the gap for fiscal orphans
  - Reform water pricing law

### CA General Obligation Water Bonds

- **Passed**
- **Failed**
- **Pending**

- Water-oriented state GO bonds (billions, $2012)

- **1970s**
- **1980s**
- **1990s**
- **2000s**
- **2010s**

- 0 5 10 15 20 25 30

- **Passed**
- **Failed**
- **Pending**
Reasons for optimism

- Urban sector has been adapting and investing
- Agriculture has been innovating, improving efficiency, and working toward groundwater sustainability
- Progress is under way on safe drinking water supplies in rural communities
The environment needs a fundamental change in course

- Efforts to date haven’t stopped species decline
- Climate pressures increasing the risk
- More flexible, ecosystem-based management is needed

Lower Yuba River
Getting ready for the future will require strong leadership