Climate Adaptation Planning Tools for California Local Governments

May 15, 2012 11:00 am – 12:00 pm

Please note:

• Questions and comments may be submitted using the on-screen webinar tools.

• For live assistance during the webinar, please call 916-658-8202.

• PowerPoint presentation is available for download at: www.ca-ilg.org/SCLN/ClimateAdaptationWebinar
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3. To submit questions or comments to the panelists, type text into the box provided in the **Questions Pane (D)** and click the **Send (E)** button.

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www.ca-ilg.org/webinarbasics
Today’s Agenda

I. Welcome and Introductions
   Steve Sanders, Institute for Local Government

II. State Climate Change Resources for Local Governments
   Michael McCormick, Governor’s Office of Planning and Research

III. Climate Adaptation Decision Support Tools
    Kurt Malchow, California Natural Resources Agency

IV. California Climate Adaptation Policy Guide
    Adrienne Greve, California Polytechnic State University, San Luis Obispo

V. Questions and Discussion
About the Institute

Who:
• Founded 1955
• 501(c)(3) Research and Education Arm of:
  – League of California Cities
  – California State Association of Counties

Mission:
Promoting good government at the local level
The Sustainable Communities Learning Network helps local officials and staff to access and share resources and tools that encourage their communities to consider and apply economically, socially and environmentally sustainable practices.

www.ca-ilg.org/SCLN
Sustainable Communities Learning Network


www.ca-ilg.org/SCLN
Climate Change Resources:

Resources for Local Government Climate Change Planning, Policy and Mitigation
State Web-based Guidance for Local Governments

- Local Government Access Points
- California Adaptation Strategy 2012
- CalEMA/CNRA – APG
- OPR Resources
  - OPR CAP Technical Advisory
  - General Plan Guidelines
- OPC Sea Level Rise Guidance
- California Coastal Commission - LCPs
- State Hazard Mitigation Plan
- DWR – Climate Change and Regional Water Planning
- SGC Grant Funding
- CEC – Energy Assurance
- CDPH Health and Climate Planning
Climate Action for Health: Integrating Public Health into Climate Action Planning

www.cdph.ca.gov/programs/CCDPHP/Pages/ClimateChange.aspx
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Climate Adaptation
Decision Support Tools

Focus: Cal-adapt and Draft Climate Adaptation Policy Guide -
Public Stakeholder Input Meetings

May 14-18, 2012
Bridging the Gap Between State and Local Planning:

First step: make the research easier to understand
(2009 CAS Executive Summary Strategy #12)
Cal-adapt (cal-adapt.org):
Local Climate Snapshots

Sea Level Rise
Areas vulnerable to a 100-year flood event as sea level rises

Orange County, CA

Orange County

Land Vulnerable to a 100-Year Flood Event

<table>
<thead>
<tr>
<th>Coast</th>
<th>Estimated Acreage in 2000</th>
<th>Estimated Acreage in 2100</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coast:</td>
<td>13,640</td>
<td>18,770</td>
<td>+27%</td>
</tr>
</tbody>
</table>

Inundation Area
- Current
- 19 in. rise
- 39 in. rise
- 55 in. rise

Coastline
- Current area at risk
- Area at risk with a 1.4 m sea level rise

Disclaimer
TEMPERATURE: EXTREME HEAT TOOL

Burbank, CA

Timing of Extreme Heat Days by Year

Number of Extreme Heat Events 6 | Jan 2099

Historical Avg. # Extreme Heat Days: 4
Extreme Heat Day Threshold: 105°F
All values based on modeled data
Bridging the Gap Between State and Local Planning:

Second: once impacts are understood, provide guidance to help evaluate vulnerabilities and develop strategies to address these impacts.

(2009 CAS Executive Summary Strategy #6, Comprehensive State Strategy 3a)
Adaptation Policy Guide

A planning/decision framework

Timeline:

November 2010 – April 2012: Contracting and production

April 9, 2012: Draft released as part of Governor’s Extreme Events Conference, Local Government Side Event

April 9 – June 8, 2012: Public Review

Final: End of June 2012
From science to planning:

- Climate Research
- Cal-adapt
- APG
- Climate Adaptation Plan

Additional research, tools and guidance applicable to community needs
Thank you

resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html
California Climate Change

Adaptation Policy Guide

Adrienne I. Greve

Assistant Professor, City & Regional Planning
Cal Poly - San Luis Obispo
agreve@calpoly.edu
Why Climate Adaptation?

2005–2034

2035–2064

2070–2099

Higher Emissions Scenario

Medium-High Emissions Scenario

Lower Emissions Scenario

Projected Higher Warming Range (8-10.5°F)

Projected Medium Warming Range (5.5-8°F)

Projected Lower Warming Range (3-5.5°F)

All Emissions Scenarios

California Climate Change Center 2006
Climate Adaptation & GHG Reduction

Greenhouse Gas Reduction
- Appliance trade-in
- Efficiency incentive programs
- Transit expansion
- Bicycle infrastructure expansion
- Pedestrian infrastructure
- Parking policy
- Increased solid waste diversion rate
- Composting programs
- Renewable energy generation
- Energy efficiency standards
- Car share programs
- Bike share programs
- Carbon tax
- Fleet vehicle conversion
- Mixed use development
- Increased residential density
- Carpool programs
- Green business certifications
- Establish growth boundaries

Passive cooling systems
- Urban heat island mitigation
- Wetland restoration
- Urban forest management
- Reflective roofing & paving
- Stormwater management
- Green infrastructure
- Permeable paving
- Planting lists
- Green roof programs
- Power plant upgrades
- Public education
- Water recycling
- Energy demand management
- Improved energy efficiency
- Tiered pricing
- Green building requirements
- Weatherization programs
- Community gardening

Adaptation
- Heat response plans
- Flooding response plan
- Managed retreat
- Sea level rise plan
- Desalinization
- Air quality notification system
- Watershed evaluation
- Mosquito control
- Water & air quality monitoring
- Ecosystem diversity assessment
- Establish cooling centers
- Economic diversification
- Defensible space policy for fire
- Migration corridor development
- Utility burial
- Retrofit for flood resistance
- Increase emergency services
- Reinforce critical infrastructure
- Update evacuation plans

Moser, 2011; Boswell, Greve, & Seale (2012)
Adaptation & Local Jurisdictions

- Diversity
  - Biophysical Setting
  - Jurisdiction Characteristics
  - Social/Political Feasibility
- Jurisdiction Control
- Scale (impacts & solutions)
- Uncertainty
  - Climate impact projections
  - Spatial resolution
  - Anticipated outcomes
- Cross sector impacts & solutions
- Links to other guidance
Adaptation Policy Development

1. Climate Impact Exposure
   - Sea level rise
   - Precipitation variation
   - Temperature

Climate Science

2. Sensitivity
3. Potential impacts

Impact Assessment

4. Adaptive Capacity
   - Existing plans or policy
   - Existing local capability
   - Economic sector

5. Risk & Onset
   - Likelihood of impact
   - Impact timeframe

6. Prioritize adaptive needs
7. Identify strategies

8. Evaluate & Prioritize Strategies
   - Probability vs. Risk
   - Costs
   - Time
   - Co-benefits

9. Phase & Implement
   - Timing
   - Funding
   - Responsible agency
   - Monitoring

Adapted from Boswell, Greve, & Seale, 2012
Climate Adaptation Team

- Long-range planning or community development
- Emergency response and natural hazards planning
- Economic development
- Parks and open space
- Transportation or engineering
- Utilities (water, wastewater, etc.)
- Administration/finance
- Chamber of commerce
- Public health
- Social services
- Local non-governmental organizations (NGOs - environmental, social, etc.)
- Professional organizations (agricultural, fisheries, communications, etc.)
Seven Sectors

- Equity, Health, and Socio-economic Impacts
- Oceans and Coastal Resources
- Water Management
- Forestry and Rangeland
- Biodiversity and Habitat
- Agriculture
- Infrastructure
Eleven Climate Adaptation Regions

North Coast Region
North Region
Bay Area Region
Northern Central Valley Region
Bay-Delta Region
Southern Central Valley Region
Central Coast Region
North Sierra Region
Southeast Sierra Region
South Coast Region
Desert
Vulnerability Assessment

- Exposure
- Sensitivity

- Potential Impact
- Risk & Onset
- Capacity to Adapt

Vulnerability
Exposure
Projected climate impacts

- Difference from current conditions
- Speed of onset
- Spatial variation
- Extent of impact
- Certainty
Estimating Exposure

• *Sea-level rise*: Identify areas of the community that are currently subject to coastal flooding (100-year flood) and areas potentially subject to the 55-inch rise forecasted for 2100.

• *Precipitation*: Identify the current annual precipitation and the forecasted change over time to 2090.

• *Temperature*: Identify the current average seasonal temperatures and the forecasted change over time to 2100.
Impact Certainty (IPCC)

<table>
<thead>
<tr>
<th>Driver</th>
<th>% Prob. Of Driver (IPCC)</th>
<th>Certainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature change</td>
<td>&gt; 90% probability</td>
<td>High</td>
</tr>
<tr>
<td>Precipitation change</td>
<td>&gt; 66% probability</td>
<td>Medium</td>
</tr>
<tr>
<td>Sea-level rise</td>
<td>&gt; 90% probability</td>
<td>High</td>
</tr>
<tr>
<td>Snow season and depth change</td>
<td>&gt; 90% probability</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: IPCC. 2007. WG1 Physical Science Basis, Section 10 & 11.
Sensitivity

2. ASSETS
- Residential
- Commercial
- Industrial
- Government
- Institutional (schools, churches, hospitals, prisons, etc.)
- Parks & open space
- Recreational facilities
- Infrastructure
- Water treatment plant and delivery infrastructure
- Wastewater treatment plant and collection infrastructure

1. FUNCTIONS
- Government continuity
- Water/sewer/solid waste Energy delivery
- Emergency services
- Public safety
- Public health
- Emotional and mental health
- Business continuity
- Housing access
- Employment and job access
- Food security
- Mobility/transportation/access
- Quality of life
- Social services
- Ecological function
- Tourism
- Recreation
- Agriculture, forest, and fishery productivity
- Industrial operations

3. POPULATIONS
- Seniors
- Children
- Individuals with disabilities
- Individuals with compromised immune systems
- Individuals without access to cars
- Non-white communities
- Low-income communities
- Renters
Vulnerability Assessment

- Exposure
- Sensitivity

- Potential Impact
- Risk & Onset
- Capacity to Adapt

Vulnerability

CalEMA, CNRA – APG Draft 2012
Potential Impact

For each point of sensitivity identify:

• Temporal extent
• Spatial extent
• Permanence
• Danger to local populations
• Level of disruption to normal community function
## Risk and Onset

<table>
<thead>
<tr>
<th>Secondary Exposure</th>
<th>Driver Occurs?</th>
<th>Certainty*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inundation/long-term waterline change</td>
<td>↑ sea-level</td>
<td>High</td>
</tr>
<tr>
<td>Extreme high tide</td>
<td>↑ sea level</td>
<td>High</td>
</tr>
<tr>
<td>Coastal erosion</td>
<td>↑ sea level</td>
<td>High</td>
</tr>
<tr>
<td>Salt water intrusion</td>
<td>↑ sea level</td>
<td>High</td>
</tr>
<tr>
<td>Changed seasonal patterns</td>
<td>↑ or ↓ precipitation-and/or-↑ or ↓ temperature</td>
<td>Medium</td>
</tr>
<tr>
<td>Heat wave</td>
<td>↑ temperature</td>
<td>High</td>
</tr>
<tr>
<td>Intense rainstorms</td>
<td>↑ temperature-and/or-↑ or ↓ precipitation</td>
<td>Medium</td>
</tr>
<tr>
<td>Landslide</td>
<td>↑ wildfire-and/or-precipitation</td>
<td>Medium</td>
</tr>
<tr>
<td>Drought</td>
<td>↑ temperature-and/or-↓ precipitation</td>
<td>Medium</td>
</tr>
<tr>
<td>Wildfire</td>
<td>Use Cal-Adapt</td>
<td>Medium</td>
</tr>
<tr>
<td>Snowpack</td>
<td>Use Cal-Adapt</td>
<td>High</td>
</tr>
</tbody>
</table>

*Estimated based on most conservative driver from Table 2.
Source: IPCC. 2007. WG1 Physical Science Basis, Section 10 & 11.*
# Adaptive Capacity

**Current capacity to adapt to projected changes**

<table>
<thead>
<tr>
<th>Plans</th>
<th>Standards, Ordinances, Programs, And Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Plan</td>
<td>Stormwater Management Program</td>
</tr>
<tr>
<td>Area and Specific Plans</td>
<td>Zoning Code</td>
</tr>
<tr>
<td>Local Hazard Mitigation Plan</td>
<td>Building Code</td>
</tr>
<tr>
<td>Transit Plan</td>
<td>Fire Code</td>
</tr>
<tr>
<td>Urban Water Management Plan</td>
<td>Tree Ordinance</td>
</tr>
<tr>
<td>Parks, Trails, and Open Space Master Plan</td>
<td>Floodplain Ordinance</td>
</tr>
<tr>
<td>Downtown Plan</td>
<td></td>
</tr>
</tbody>
</table>

- For each identified potential impact:
  - Identify actions in progress, planned, or readily implemented to address it.
  - If not yet implemented, evaluate the time and resources needed for implementation.
  - Note the degree to which existing actions could be strengthened.
Vulnerability

- Exposure
- Sensitivity
- Potential Impact
- Risk & Onset
- Capacity to Adapt

Vulnerability

CalEMA, CNRA – APG Draft 2012
Adaptation Policy Guide

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   - Temperature

Climate Science

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   - Timing
   - Funding
   - Responsible agency
   - Monitoring

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   - Time
   - Co-benefits

Adapted from Boswell, Greve, & Seale, 2012
Prioritizing Adaptive Needs
Policy in the Face of Uncertainty

Risk/Uncertainty - For an individual impact based on the scientific certainty and certainty of impact sensitivity

Develop Strategies
Evaluate Further/Develop Strategies
Monitor

Impact - A combination of potential impact and community capacity to adapt.

High

Medium

Low

Low  Medium  High
Identify Strategies

Part 3: Adaptation Strategies

- Description
- Factors to Consider
- Examples of Application
- Sources of Information
- Funding
- Sector overlap
Prioritizing Strategies

Impact Onset - When the impact will begin to have detrimental effects.

Cost - Ease of obtaining funding
Co-benefits - Benefit to the community beyond adaptation
Duration - Ease of implementation (from the perspective of time)
Social - Level of community &/or political support

Adapted from City of New York, 2009
Thank You!

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California Polytechnic State University, San Luis Obispo
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Questions?
Climate Adaptation Planning Tools for California Local Governments

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Thank you for attending!