Climate Change Impacts and Adaptation Efforts in California

Summary of Oversight and Informational Hearings of the California State Senate Committee on Environmental Quality

Senator Robert Wieckowski, Chair

November 2015

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CLIMATE CHANGE IMPACTS AND ADAPTATION EFFORTS IN CALIFORNIA

SUMMARY OF OVERSIGHT AND INFORMATIONAL HEARINGS OF THE
SENATE ENVIRONMENTAL QUALITY COMMITTEE
ROBERT WIECKOWSKI, CHAIR
November 2015

EXECUTIVE SUMMARY

Climate change is one of the foremost challenges of our time. Increases in carbon dioxide and other climate pollutants have led to increased global average surface temperatures, diminished snow and sea ice, and rising sea levels. According to the United States Environmental Protection Agency, every 2°F increase in global average temperature is expected to result in 5-15% reductions in crop yields, 3-10% increases in rainfall during heavy precipitation events, and 200-400% increases in areas burned by wildfires in the western U.S. In California, higher temperatures and more extreme events, including heat waves, wildfires, floods, and droughts, will have a range of consequences for public health, air and water quality, infrastructure, agriculture, natural resources, safety and security, and the economy.

California has been a leader on climate mitigation policy, and continuing greenhouse gas reduction strategies is critical to avoid the most severe impacts. Because the climate system changes slowly, though, some impacts are unavoidable and beginning to be felt even now, with long-term cost estimates from climate change on the order of hundreds of billions of dollars for California alone. Preparing for these impacts will require that we strengthen, coordinate, and invest in our state's adaptation and resiliency building efforts.

To achieve these goals, it is imperative that we have a thorough understanding of impacts and current efforts, ongoing needs, and future challenges in adaptation across the diverse regions of the state. In response, the State Senate Environmental Quality Committee held four oversight and informational hearings on adaptation this year, particularly focused on the areas of environmental quality, public health, and environmental justice.

The first hearing, held at the Capitol, was focused on the Administration's statewide activities to date to ensure that California's communities are prepared to address the impacts of climate change. The Secretaries

of the California Health and Human Services, Environmental Protection and Natural Resources agencies, and Department of Food and Agriculture, as well as representatives from the Governor's Offices of Emergency Services and Planning and Research testified. Collectively, they discussed coordination, research, and tools being developed to help California build resiliency while maintaining the state's important mitigation goals to reach 1990 levels of greenhouse gas emissions by 2020 through a number of strategies such as expanding renewable energies, improving energy efficiency, and reducing waste.

Also testifying at the first hearing were regional and local government representatives who spoke to what they need from the state to meet their own adaptation goals. These needs broadly included strong local-regional-state collaborations, an alignment of policies and investments, and fine-grain, up-to-date research data to support decision-making. Finally, the Little Hoover Commission presented on their 2014 report, "Governing California Through Climate Change," which included recommendations for more inter-governmental collaboration, the incorporation of climate risks into state planning, and improved resources for local efforts. Overall, testimony highlighted a great deal of preliminary thought and planning yet a lack of statutory direction to clearly articulate roles at each level of government, facilitate broad coordination, and detail how adaptation activities are integrated with mitigation policy.

This initial hearing was followed by three regional hearings in the San Francisco Bay Area, Central Valley, and Southern California. The diverse group of speakers included a member and a lead author from the Nobel Prize-winning Intergovernmental Panel on Climate Change and representatives from academia, state and regional agencies, local health and planning departments, and nonprofits speaking to climate communication and equity considerations. Taken together, these hearings highlighted the broad, cross-sector nature of climate change, which has been called a "threat multiplier," exacerbating existing public health and environmental quality concerns, particularly for already socially and economically disadvantaged communities. Additionally, the accelerating rates of climate changes, on top of chronic, routine environmental stressors, will have severe impacts across the state. Highlights included:

Statewide: Higher Temperatures and Public Health

- Higher temperatures lead to worsening air quality and direct heat-related illness and death, including 650 deaths in California in a 2006 heat wave.
- Longer, hotter seasons can also facilitate the spread of vector-borne diseases such as West Nile Virus, which surged to unprecedented levels in the state last year.

San Francisco Bay Area: Sea Level Rise and Infrastructure

- In the Bay Area, sea levels have already risen 8 inches over the past 100 years.
- With current projections, rising seas combined with a 100-year flood event would close over 2,000 miles of roadway, the Oakland and San Francisco airports, and the Port of Oakland.

Central Valley: Agriculture and the Economy

- Across the Central Valley, there is moderate to high agricultural vulnerability to climate change impacts in the majority of agricultural lands and a need for adaptation planning.
- As of this summer, California's drought, worsened by increasing temperatures, already had an estimated $2.2 billion price tag for the state's agriculture.

Southern California: Extreme Heat and Local Adaptation Planning

- The greater Los Angeles region will likely see 60-90 additional high heat days each year by the end of the century, effectively adding a new season of extreme heat with business as usual scenarios, based on recent downscaled modeling studies.
- Though mitigation measures would have a dramatic impact on reducing temperature extremes by 2100, 70% of warming will be inevitable, necessitating the implementation of adaptation plans.

At each hearing, speakers described a variety of local and regional adaptation research and project initiatives. For example, regional collaboratives for climate adaptation in Sacramento, San Diego, Los Angeles, and the Bay Area have been working to facilitate networking and dissemination of research and tools for members, which include governments, academia, businesses, community groups, and non-profits. University of California campuses and nonprofits in the Central Valley and Los Angeles are focusing on communication projects to make climate impacts relatable to the public, and the Los Angeles County Public Health Department has formed an action-oriented, inter-departmental Climate Committee, helping build staff's "climate capacity."

These efforts often lack the resources to ensure that their tools and expertise are available to neighboring communities and other stakeholders in California. In response, many local and regional representatives suggested centralizing resources at the state level to improve efficiency in planning and network-building. Furthermore, while some communities have detailed adaptation strategies, others have yet to begin for a myriad of reasons, such as a lack of financial resources, staff time, and training, lack of access to necessary climate research and tools, or uncertainty about how to prioritize and align local strategies. Therefore, presenters emphasized the need for a framework for collaboration and coordination of adaptation policies and projects among and within levels of government. A holistic statewide strategy with complimentary approaches across governments and sectors could provide multiple benefits without needless duplication of efforts and basic research.

In order to address these needs and challenges, Senator Robert Wieckowski authored SB 246 (Chapter 606, Statutes of 2015). This legislation creates a program within the state's Office of Planning and Research to coordinate among state, regional, and local entities and create a central hub of information and tools to help stakeholders efficiently address adaptation. The bill also forms an advisory committee to provide local perspectives and technical expertise to assist state agencies. Along with SB 246, AB 1482 (Gordon, Chapter 603, Statutes of 2015) establishes a framework for adaptation coordination among state agencies, and SB 379 (Jackson, Chapter 608, Statutes of 2015) requires local jurisdictions to include climate vulnerability and adaptation considerations in their general plan updates.

As highlighted by adaptation leaders throughout the hearings, state government will be instrumental in facilitating cross-sector and cross-jurisdictional research projects, policies, and planning tools by engaging stakeholders at all levels. Overall, this package of legislation and the four hearings are part of California's growing efforts in comprehensive climate change adaptation and resiliency planning and implementation, forming a strong foundation on which the state can continue to build.

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INFORMATIONAL HEARING OF THE SENATE ENVIRONMENTAL QUALITY COMMITTEE
BOB WIECKOWSKI, CHAIR

Wednesday, February 25, 2015, 10:00 a.m.
CALIFORNIA STATE CAPITOL
ROOM 3191

California's Adaptation Efforts to Climate Change Impacts on Environmental Quality and Public Health

AGENDA

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1. **Climate Change Impacts on Environmental Quality and Public Health in California**
   a. Linda Rudolph, *Co-Director of the Climate Change and Public Health Project, Public Health Institute*

2. **State Efforts to Improve Adaptation and Resiliency and Next Steps**
   a. Matt Rodriquez, *Secretary, California Environmental Protection Agency*
   b. John Laird, *Secretary, California Natural Resources Agency*
   c. Diana Dooley, *Secretary, California Health & Human Services Agency*
   d. Karen Ross, *Secretary, California Department of Food and Agriculture*
   e. Christina Curry, *Deputy Director, California Governor's Office of Emergency Services*
   f. Louise Bedsworth, *Deputy Director, California Governor's Office of Planning & Research*

3. **Regional and Local Efforts**
   a. Larry Greene, *Vice Chair, Alliance of Regional Collaboratives for Climate Adaptation (ARCCA)*
   b. Kif Scheuer, *Climate Change Program Director, Local Government Commission*

4. **Independent Perspective on Climate Adaptation Efforts in California**
   a. Carole D'Elia, *Executive Director, Little Hoover Commission*

5. **Public Comment**

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BACKGROUND INFORMATION

Climate Change Overview

Broad Impacts in California and Worldwide

There is broad scientific consensus that the climate is warming and that much of this warming is due to human activities, with serious implications for California.

The 5th assessment report from the Intergovernmental Panel on Climate Change (IPCC) notes that atmospheric concentrations of global warming pollutants have risen to levels unseen in the past 800,000 years. Carbon dioxide concentrations have increased by 40% since pre-industrial times. These increases have led to a rise of global average surface temperatures of approximately 1.4°F since 1900, with much of this increase occurring after 1970. Per the latest report by the National Oceanic and Atmospheric Administration (NOAA), 2014 was the 38th consecutive year that the global temperature increased. Research indicates that an increase in the global average temperature of 3.6°F above pre-industrial levels, which is only 1.1°C (2.0°F) above present levels, poses severe risks to natural systems and

human health and well-being. According to the U.S. Environmental Protection Agency, for every 2°F increase in global average temperature, we can expect to see 5-15% reductions in crop yields, 3-10% increases in rainfall during heavy precipitation events when flood risks are already high, and 200-400% increases in areas burned by wildfires in the western U.S.

Higher temperatures globally have already resulted in diminished snow and sea ice and have caused sea level to rise by nearly eight inches.

In California, the frequency of extreme events, including heat waves, wildfires, floods, and droughts, are expected to increase. Higher temperatures and more frequent and severe extreme events will have a range of consequences for public health through impacts to water quality, air quality, and the spread of infectious diseases.

As the evidence for anthropogenic climate change has mounted over the last few decades, the state has implemented a broad climate portfolio to mitigate global warming impacts by pursuing policies that reduce greenhouse gasses (GHGs).

And although deep and severe cuts in GHG emissions globally are still needed to avoid the most severe consequences of a changing climate, they will not be enough to stave off climate change. Even if all GHG emissions ceased today, many impacts of climate change would still be unavoidable because the climate system changes slowly.

The Costs of Climate Change and the Need for Adaptation

A major report from the University of College London's Institute for Global Health and the medical journal The Lancet has called climate change the "biggest global health threat of the 21st century." Climate change not only brings about new threats, it is a magnifier of existing natural hazards. The impacts to health, infrastructure, hazard response, etc. will come with a financial cost, as well. Additionally, the Pacific Institute estimates that $100 billion worth of property is at risk of flooding during a 100-year flood with 1.4 m of projected sea level rise, including 55 healthcare facilities, over 330 hazardous waste facilities or sites, 30 coastal power plants, and 28 wastewater treatment plants.

Furthermore, recent extreme climate events revealed that the impacts from climate change are happening now and underscored the significant vulnerability in many human systems to climate variability.

For the protection of public health, environmental quality, natural resources and the state's financial interests, California must both continue the state's leadership in pursuing groundbreaking greenhouse gas emission reduction measures, as well as aggressively implement climate adaptation and resiliency measures to protect communities from the inevitable impacts to come.

Impacts to Environmental Quality and Public Health from Climate Change

Water Quality Impacts

In many regions, hydrological systems are being altered by changes in precipitation and snow pack, which leads to water availability and quality concerns. Reductions in the Sierra Nevada snowpack are expected from higher temperatures, leading to diminished water reserves. Because of these dwindling

water reserves, groundwater pumping may continue to increase and result in an increased concentration of pollutants in drinking water. For example, nitrate contamination of drinking water, already an acute problem in many areas in the Central Valley, may be further exacerbated by this scenario, resulting in a much higher fraction of residents who are not able to drink water safely from their tap. Though overall rain amounts will be reduced, rainfall events are expected to be more extreme, which can overwhelm sewage and water treatment facilities, resulting in decreased water quality. In coastal areas, rising sea levels can lead to increased salinity in coastal aquifers. Higher salinity of water has reduced usability for both drinking water and agricultural purposes, and desalination procedures are energy-intensive and costly. According to the Public Policy Institute of California's (PPIC) 2008 "Adapting California's Water Management to Climate Change" report, sea water intrusion in the Delta could disrupt the state's water supply for months to years (Hanak and Lund, 2008).

Air Quality Impacts

Worsening air quality is expected from numerous sources. Longer, hotter days will lead to increased amounts of ground-level pollutants such as ozone. Analysis of powerplants in California showed a 3% increase in NOx emissions per degree F increase in daily temperature (Drechsler et al., 2006). Heat waves also directly lead to immediate public health concerns, particularly for those people without either access to air conditioning or enough money to pay for running an air conditioner even if they have access to one.

In Chicago's 1995 heat wave, temperatures reached 106°F, resulting in numerous blackouts, thousands of residents with dehydration, kidney failure, and respiratory distress, and over 600 deaths. In California in 2006, a 10-day heat wave caused 650 deaths, including a greater relative increase in deaths along the coast, where air conditioning is less common. Even with conservative emissions scenarios, major metropolitan areas in California, including Los Angeles, San Francisco, and Sacramento are projected to have 37-52 more extreme heat days (>90°F) each year by the end of the century (Miller et al. 2008).

Extreme events, such as wildfires, can affect air quality by leading to increased concentrations of particulate matter (PM), which has been linked to premature death in people with heart and lung disease, as well as aggravating asthma and respiratory symptoms. Scientific modeling has predicted 12-53% increase in large California wildfires by 2100 (Westerling and Bryant, 2006).

Infectious and Vector-borne Diseases and Public Health Impacts

Climate change can further lead to public health impacts by facilitating disease spread and exacerbating chronic health conditions. Already, California has seen an increase in the length of the growing season and pollen production amounts of ragweed, a common cause of severe seasonal allergies, due to increased CO_2 concentrations.

Increased temperatures can promote bacterial contamination in foods and lead to increases in harmful algal blooms that have been tied to skin, gastrointestinal, respiratory, and neurological signs and symptoms. Reductions in the number and sizes of recreational bodies of water due to decreased rainfall can further lead to increased concentration of pollutants and bacterial contaminants from more users in fewer and smaller areas.

Also, there is concern about the spread of vector-borne diseases, as the distribution of vectors (e.g. ticks, mosquitoes) carrying pathogens spread into new habitats as regional climates change. For example, previous research has shown that human outbreaks of Saint Louis encephalitis are correlated with periods of several days when the temperature exceeds 30°C (95°F), as has been the case in previous California epidemics (Githeko et al. 2000).

Hot temperatures also facilitate the spread of West Nile Virus (WNV) by speeding up both the replication of the virus and the development of the mosquito that carries it. Mosquitoes digest blood meals more rapidly at higher temperatures, leading them to feed more often. This leads to an overall increase in mosquito populations that are biting more often. The number of WNV cases in California more than doubled in 2014 compared to the previous year. Furthermore, higher temperatures along the coast could increase the risk of West Nile Virus in these areas, which have typically been at low risk. Somewhat counterintuitively, droughts, which will likely increase with climate change, can also favor mosquito breeding. Streams that would normally be flowing become a series of stagnant pools in which mosquitoes breed.

Disease spread to crops from vectors and pests is expected to threaten food production and quality, in addition to the effects of drought and severe weather events. Combating these threats to food security will likely require increased use of pesticides and fertilizers, which leads to increased GHG emissions and concerns about human health and water quality from runoff. In times of food insecurity and rising prices, people turn to nutrient-poor, calorie-rich foods with health impacts including malnutrition and obesity.

Climate Change and Environmental Justice Considerations

Climate change exacerbates existing environmental quality and public health concerns facing California, sometimes being referred to as a "threat multiplier." This is particularly true for social inequity concerns in already socially and economically disadvantaged communities, which will be harder hit by, and less able to adapt to, the impacts of climate change. These communities already experience higher rates of chronic disease and lower life expectancy and have fewer resources available to respond and recover from impacts of climate change.

In their 2010 "Indicators of Climate Change in California: Environmental Justice Impacts" report, the Office of Environmental Health Hazard Assessment (OEHHA) developed indicators to describe the impacts of climate change on disadvantaged communities which included air conditioner ownership and cost, farm worker exposure to extreme heat, exposure to urban heat, and vulnerability to wildfires. For example, low-income households are less likely to either have air-conditioning or be able to pay for the costs of using an air-conditioner during extreme heat events, and impacts from heat are more intense in urban areas with less natural shade cover, which is also where low-income families and people of color are more likely to live.

Furthermore, minorities and low-income people are more likely to live close to facilities such as powerplants and refineries that can generate high local emissions, such as NOx and PM (Boyce and Pastor, 2013). In the Salinas Valley, a largely agricultural region, some of the state's worst air and water quality overlaps with areas of severe poverty, where per capita income is 26% lower than the state average (Fougeres, 2007). Local dust storms, field burning, farm machine use, and high numbers of shipping trucks can all contribute to high levels of local air pollutants. As well, industrial agriculture can

lead to contamination of water sources for local communities from the use of pesticides and fertilizers, as well as wastes from livestock facilities and food processing plants.

Adaptation Efforts

Adaptation and mitigation choices that are being made now will affect the risks to our communities from climate change throughout the 21st century.

Adaptation Efforts at the International Level

According to the IPCC's 5th report on adaptation and resiliency, countries across the world are beginning to develop adaptation plans and policies to make climate change considerations a part of their future development planning. In Africa, most national governments have initiated adaptation governance systems, though efforts tend to be isolated. In Europe, across levels of government, adaptation policy has been developed with some integration of adaptation planning in select sectors. In Asia, some areas have begun incorporating adaptation actions, as in subnational development planning, water management, and coastal reforestation of mangroves. In Australia, New Zealand, and New Guinea, planning for sea level rise and reduced water availability is being adopted broadly, less so for implementation. Central and South America have begun ecosystem-based adaptation, as well as adoption of resilient crop varieties and changes in water resources management in the agricultural sector. In North America, there has been an incremental approach to adaptation assessment and planning, especially at the municipal level, by governments with some longer-term investments in infrastructure.

Adaptation Efforts Across the U.S.

According to the U.S. EPA, 32 states have completed Climate Action Plans (CAPs). These range in scope from providing a list of recommendations to implementing policies, though more of the focus tends to be on reducing GHGs versus planning and implementing adaptation efforts.

According to the National Conference on State Legislature's recent climate change state policy update, more states are working on adaptation in response to extreme weather events. Per NCSL's database, since 2010, there have been 24 bills enacted in 9 states, including California, regarding climate adaptation. These have included legislation ranging from broad level coordination to planning for specific impacts, such as sea level rise.

For example, Hawaii enacted legislation last year to establish an interagency Climate Adaptation Committee and authorize the development of a statewide climate adaptation plan to address adaptation priorities and allocate funds. Hawaii has both statute to prioritize climate change adaptation in the state planning act (SB 2745, 2012) and resolutions to establish measures to increase climate resilience (HR 77, 2014 and HR 34, 2014).

Climate Action Plans in Major Metropolitan Areas

A number of cities across the U.S. have developed CAPs, including, but not limited to, San Francisco (adopted 2004), Boston, MA (2007), Denver, CO (2007), Philadelphia, PA (2007), Chicago, IL (2008),

Portland, OR (2009), Sacramento (2012), Minneapolis, MN (2013), Seattle, WA (2013), San Diego (Draft 2014).

In December 2014, 16 communities across the U.S. were recognized as leaders in climate change by the White House. Boston was the first city to add climate resilience to their large new construction review process. Dubuque, Iowa, in addition to GHG reduction targets of 50% by 2030, is focused on risk reduction and resilience, particularly relating to development and infrastructure. In California, three communities were recognized, including 1) San Francisco for their climate and sustainability targets that cover a range of sectors and include broad goals to measure their progress; 2) the Blue Lake Rancheria Tribe for implementing both climate resiliency and GHG reduction measures from their 2008 climate action plan, having already reduced energy consumption by 35%; and 3) the Sonoma County Regional Climate Protection Authority (RCPA), the first local government agency in the nation that was created to address climate change specifically and has formed partnerships across silos to work towards its GHG reduction goals.

California's State Efforts in Climate Assessment & Adaptation Planning

Executive Orders and Legislation Regarding Adaptation

While there have been a number of laws, regulations, and executive orders regarding climate change and GHG emission reduction efforts, there are far fewer that specifically address adaptation and resiliency.

Executive Order S-03-05 in 2005 established GHG reduction targets, created the Climate Action Team, and directed the Secretary of Cal/EPA to coordinate efforts to meet the targets. The EO further required the Secretary to report back to the Legislature and Governor every two years concerning the progress on these goals, as well as GHG impacts to California and mitigation and adaptation plans.

Executive Order S-13-08 in 2008 directed state agencies to plan for climate impacts specifically from sea level rise and to coordinate the California Climate Adaptation Strategy by June 2009, noting that "California must begin now to adapt and build our resiliency to coming climate changes through a thoughtful and sensible approach with local, regional, state and federal government using the best available science."

Coordinating Bodies

Climate Action Team (CAT): Created in 2005 by EO S-03-05, the CAT is comprised of 17 members from state agencies, boards, and departments, headed by the Secretary of Cal/EPA. The CAT is tasked with coordinating statewide efforts to implement GHG reduction programs, as well as the state's Climate Adaptation Strategy. Within CAT, there are 10 Working Groups, including Agriculture, Land Use and Infrastructure, Public Health, State Government, and Intergovernmental.

Strategic Growth Council (SGC): The Strategic Growth Council was created through SB 732 (Steinberg) Chapter 729, Statutes of 2008. SGC is a cabinet level committee of state agencies, including the Office of Planning and Research (Chair), California State Transportation Agency (CalSTA), California Natural Resources Agency (CNRA), Business, Consumer Services and Housing Agency (BCSH), California Environmental Protection Agency (Cal/EPA), California Health and Human Services Agency (CHHS), and California Department of Food and Agriculture (CDFA). The CAT has a

broad range of tasks, including assisting state and local entities in planning sustainable communities and meeting AB 32 goals. The latest 2015 Draft Program Guidelines for the Affordable Housing and Sustainable Communities Program note, "The applicant must demonstrate that where applicable climate adaptation measures are integrated into their Project" and contains an appendix on climate resiliency.

Climate Change Assessments

A number of assessment and planning documents have been developed by state agencies to better understand risks from climate change to California. These include:

- First Assessment (2006): The first California climate change assessment used global models to provide more regionally scaled information on climate impacts to the state. This assessment provided support for passage of AB 32 and the development of the California Air Resources Board's 2008 Scoping Plan for GHG reductions.

- Second Assessment (2009): The second California climate change assessment provided initial economic impact estimates from climate risks in the state. This assessment provided support for the 2009 California Climate Change Adaptation Strategy document, which was the first plan for climate risks developed across sectors.

- Third Assessment (2012): The third California climate change assessment was completed after requests for additional information about state vulnerabilities to climate change, including institutional barriers to preparation efforts, sector-specific risks, and local risks. This assessment provided support for the Safeguarding California Plan, which was an update to the 2009 Adaptation Strategy document.

- Fourth Assessment: The fourth California climate change assessment is being completed and is intended to provide information to support adaptation decisions. It is the first inter-agency effort to implement much of the Climate Change Research Plan and is ultimately intended to serve as the basis for the request for proposal (RFP) for a portfolio of projects developed by the CNRA, along with OPR and the CAT Research Working Group and to be released during the 2015-16 Fiscal Year. The 4th assessment identifies key research themes and projects for each theme, and indicates funding for non-energy sectors (energy-related studies will support the assessment but identify different funding sources).

Adaptation Resource & Guidance Documents

In addition to assessing the risks, state agencies have created documents to aid state, regional, and local efforts in climate resiliency and adaptation. These include:

- California Climate Change Adaptation Strategy (CAS, 2009): The CAS is a statewide strategy that includes a summary of impacts from climate change and provides recommendations for adaptation strategies in seven sectors, including public health, water, agriculture, transportation and energy, forestry, biodiversity and habitat, and oceans and coastal resources. Overall, it provides guidance for establishing adaptation and resiliency actions.

- California Climate Adaptation Strategy First Year Report (2010): This document provided a first-year update to the 2009 CAS.

- California Adaptation Planning Guide (APG, 2012): Prepared by the CNRA and the Office of Emergency Services, this document is designed to provide guidance and support for local governments and regional collaboratives in addressing the impacts of climate change.

- Safeguarding California (CAS update, 2013): This update to the 2009 Climate Adaptation Strategy by the CNRA in coordination with other state agencies augments previous strategies based on new climate science and risk management options.

- Cal-Adapt: This is a web-based climate adaptation planning tool intended to benefit local planning efforts by downscaling climate change scenarios and research so that users can identify risks from climate change by specific regions within California. This is a project of the CNRA, the California Energy Commission and their Public Interest Energy Research (PIER) Program, along with numerous private and public partners.

As noted in the Little Hoover Commission's 2014 "Governing California Through Climate Change" report, the efforts to understand challenges and vulnerabilities from climate change have been encouraging. However, according to the report, there is still a need "for a more unified approach to adaptation on the part of state government." They note that currently, there is no single, comprehensive administrative structure in California for creating adaptation policy. They further state that most adaptation strategies at the state level are still advisory and have been developed without coordination with local governments and the private sector, which have been largely planning and implementing projects on their own or as part of regional collaboratives.

After their research, which included multiple hearings, an advisory committee meeting, and interviews with stakeholders and experts, the Little Hoover Commission made numerous proposals regarding climate change governance in California. In addition to enforcement and clarification of laws regarding private property and impacts from wildfires and sea level rise, the Commission recommended:

- That the Governor and Legislature create a new state entity or enhance the institutional capacity of an existing organization, which should include an independent science board, to help California's multitude of governments prepare for and react to climate change; and

- That the California Strategic Growth Council expands its focus beyond reduction of carbon emissions to include a greater emphasis on adaptation to the impacts of climate change.

<u>Regional Efforts on Climate Adaptation</u>

Regional collaboratives are an important part of the adaptation process by helping to coordinate local efforts by assisting with planning and implementation as well as being a voice at the state and federal levels.

The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) is a network of regional collaboratives across California, including five regions: San Diego, Los Angeles, San Francisco Bay,

Capital, and Sierra Nevada. ARCCA was formed in 2012 by leaders from regional collaboratives focusing on climate change in conjunction with OPR in order to help urban centers throughout California prepare for the impacts of climate change. Member collaboratives include the San Diego Regional Climate Collaborative, Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC), the Bay Area Joint Policy Committee, the Capital Region Climate Readiness Collaborative, and the Sierra Climate Adaptation & Mitigation Partnership.

Local Efforts on Climate Adaptation

In 2013, the Rockefeller Foundation selected five cities in California—Los Angeles, San Francisco, Oakland, Alameda, and Berkeley—to receive technical support and funding for climate resiliency planning through its Resilient Cities Centennial Challenge.

Aiding these and other cities and counties across California are a number of public and private organizations. One of the many examples is the Local Government Commission (LGC) in Sacramento, a nonprofit organization that assists local governments with policy development and implementation, and one of their main issue areas is climate change and adaptation. Climate Resolve is a founding member of the LARC in the Los Angeles area and focuses on building collaborations to communicate with the public about climate change and promoting resiliency and GHG reduction efforts. The Bay Area's Climate Readiness Institute is a partnership with universities, the regional collaborative, and leaders from the local government, non-profits developing climate science, adaptation strategies, and mitigation tools.

Throughout California, a number of cities and counties have developed plans for addressing climate change, including San Francisco, San Diego, Berkeley, Albany, Arcata, Chula Vista, Davis, Los Angeles, Santa Barbara, and Marin County. For adaptation specifically, Fresno and San Luis Obispo Counties have developed regionally specific climate adaptation strategies across socioeconomic and natural systems.

Summary

As the evidence for anthropogenic global warming has grown, California has been a leader on climate mitigation policy and continuing these greenhouse gas reduction strategies is critical in the ongoing efforts against global warming. However, to better address the magnitude of this challenge, and to protect the state from climate effects that are happening now and will continue to become more severe, aggressive adaptation and resiliency building policies must be holistically incorporated into the state's overarching climate strategy to create a more comprehensive approach to addressing climate change.

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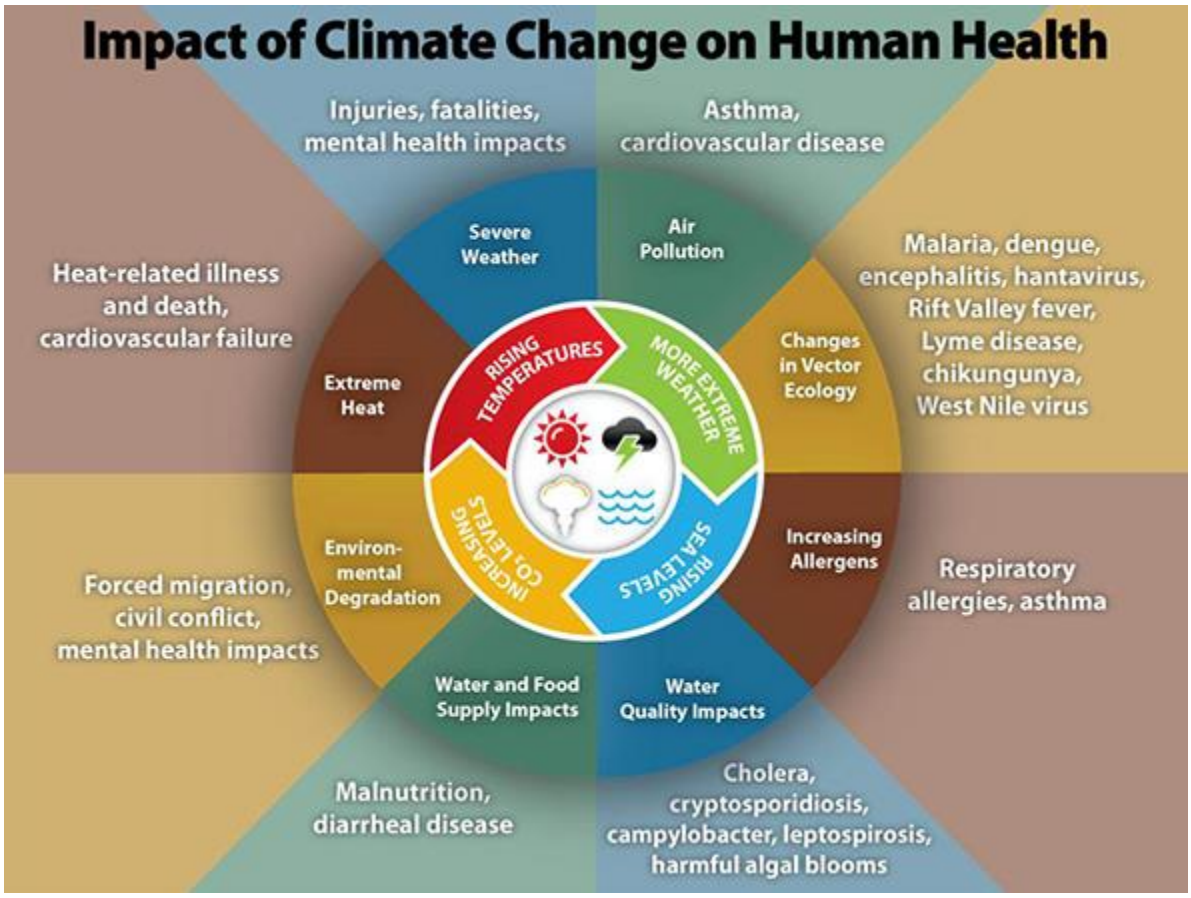


Source: Centers for Disease Control and Prevention (CDC), Climate and Health Site – “Climate Effects on Health” with content from the National Center for Environmental Health. http://www.cdc.gov/climateandhealth/effects/default.htm

EXTREME HEAT DAYS ACROSS THE STATE

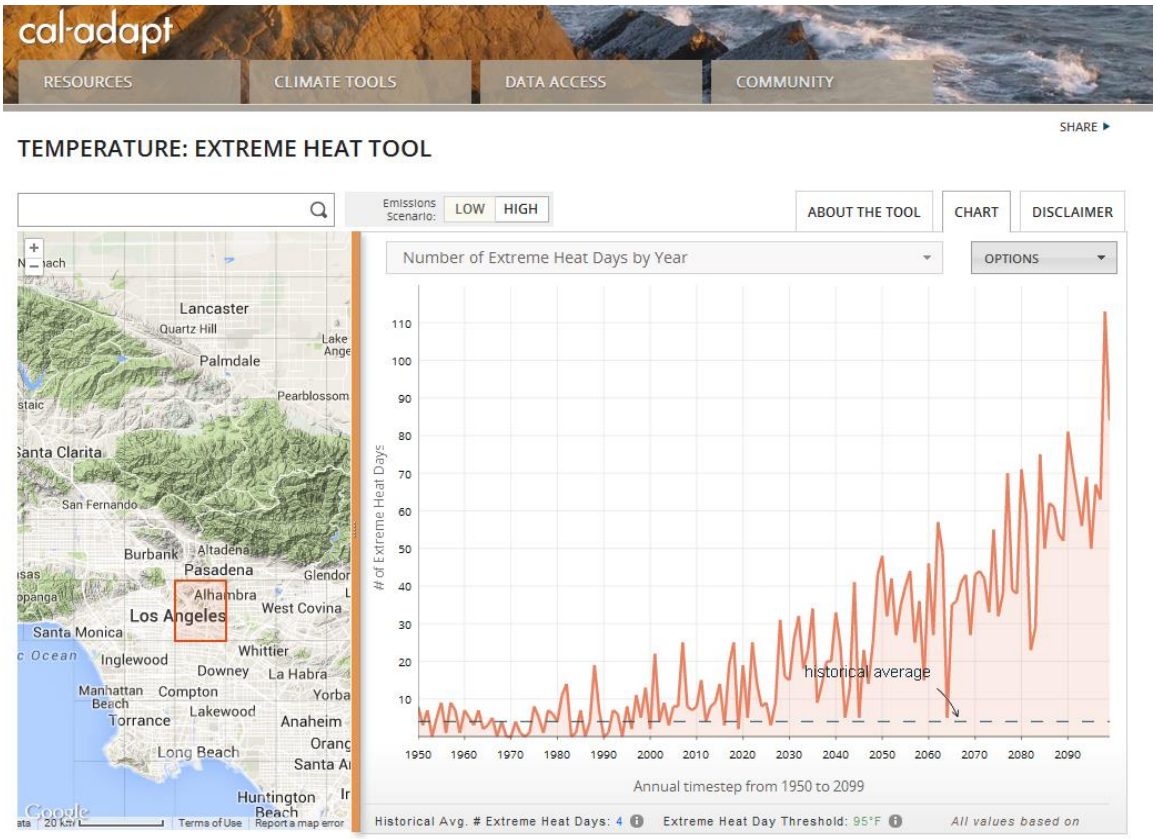


Figure 1. The number of projected extreme heat days (>95 ºF) through 2100 in Los Angeles.*

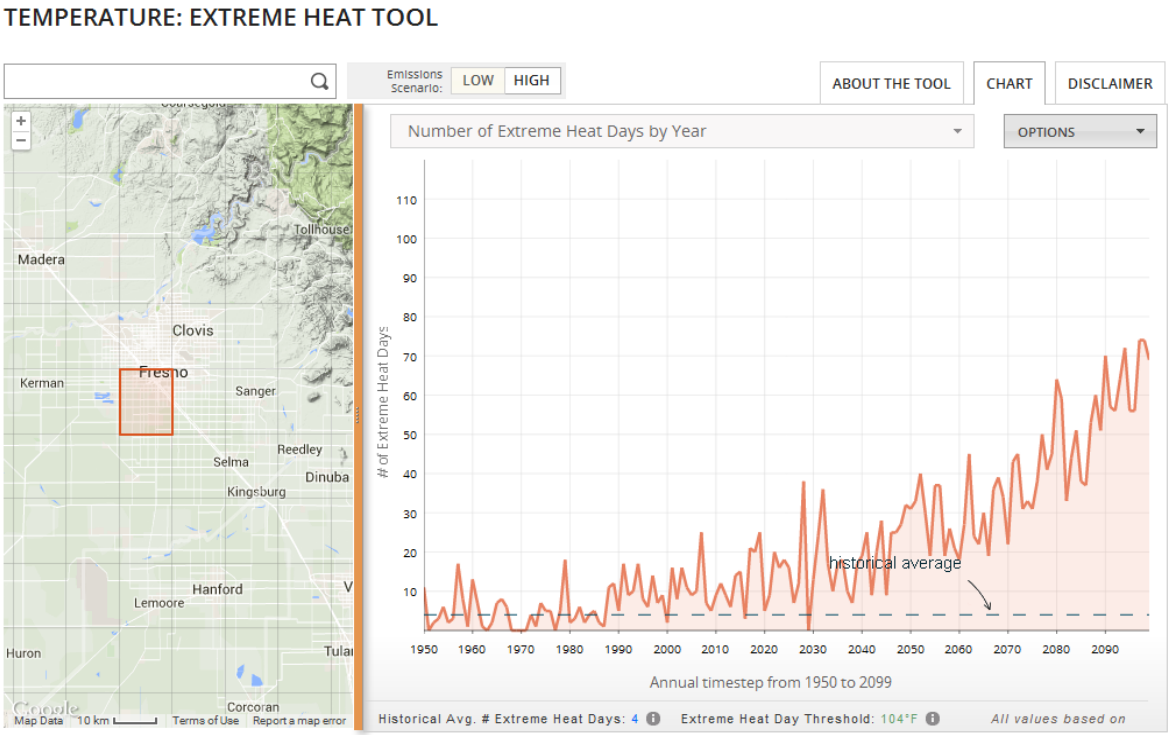


Figure 2. The number of projected extreme heat days (>104 ºF) through 2100 in Fresno.*

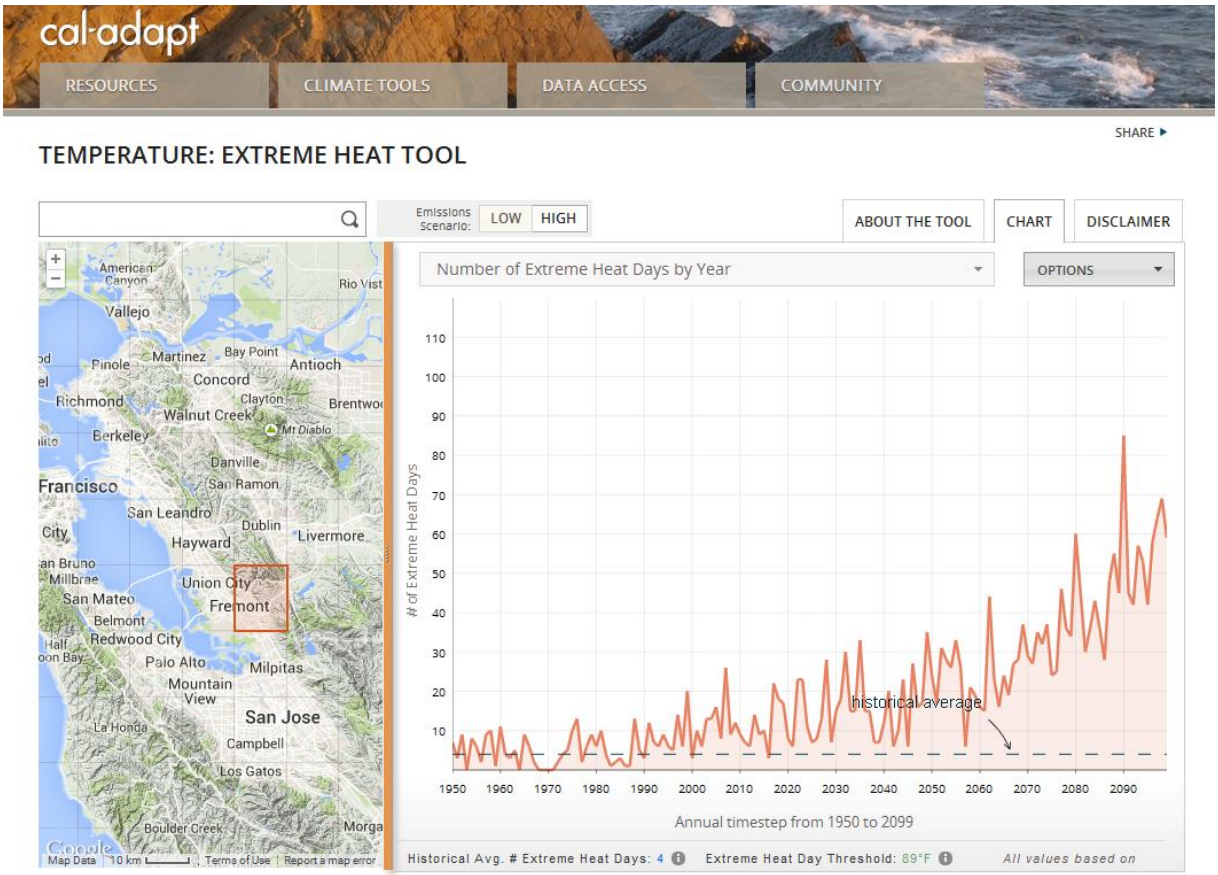


Figure 3. The number of projected extreme heat days (>89 ºF) through 2100 in Fremont.*

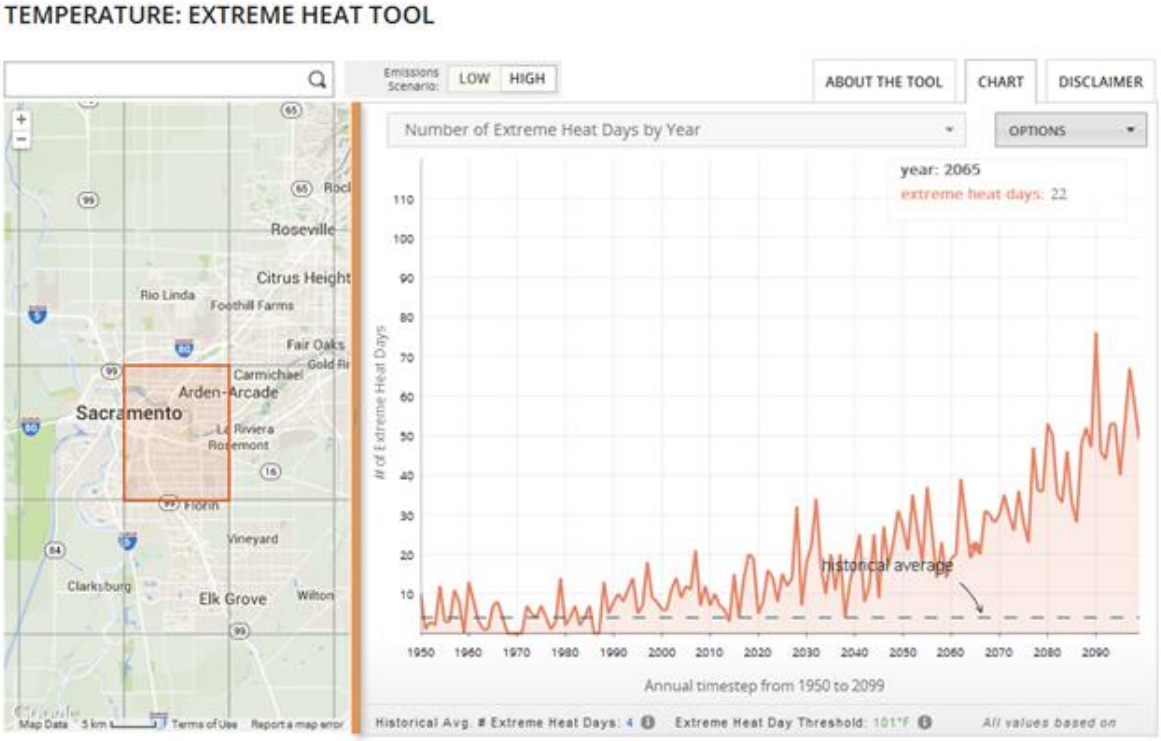


Figure 4. The number of projected extreme heat days (>100 ºF) through 2100 in Sacramento.*

*All figures generated using the cal-adapt tool: http://cal-adapt.org/temperature/heat/

Senate Committee on Environmental Quality
Climate Change Adaptation in California
February 25, 2015

Linda Rudolph, MD, MPH
Director, Center for Climate Change and Health
Public Health Institute, Oakland, CA

Good morning. Thank you so much for inviting me to participate in today's hearing, and for your interest in the increasingly urgent need to address the impacts of climate change on the people of California. I will start by telling you briefly about my background. By training I'm a board certified occupational/environmental medicine physician - with a masters in public health epidemiology. Prior to joining the Public Health Institute in 2013, I served in local and state government for 30 years, including as the Medical Director for the California Workers' Compensation Division, the Chief Medical Officer for Medi-Cal Managed Care, the Health Officer and Director of Public Health for the City of Berkeley, and, most recently, the Deputy Director for Chronic Disease Prevention and Health Promotion in the California Department of Public Health.

In that position, I had the privilege of serving as the founding chair of the California Health in All Policies Task Force, under the auspices of the Strategic Growth Council, and the first chair of the Climate Action Team's Public Health Work Group, and launched the climate change and health team. I oversaw a health impact assessment of California's cap and trade regulation, conducted in partnership with the Air Resources Board, and was the lead author on the Public Health Chapter of the 2009 California Adaptation Strategy - the first comprehensive state public health adaptation strategy in the U.S.

I am currently the Director of the Center for Climate Change and Health at the Public Health Institute, where I provide consultation to local health departments and other local government agencies on Health in All Policies and climate change and health.

I will provide a very brief overview of the impacts of climate change on health and health inequities, based largely on the 2014 3rd National Assessment on Climate Change and the most recent report of the International Panel on Climate Change, and then offer several recommendations.[i]

Climate change is the greatest threat to public health and the defining health issue of the 21st century.

Climate change threatens the systems on which human life depends - our air, water, food, shelter, and security. People in California and around the world are already experiencing the human health impacts of climate change, and these will continue to increase.

Direct impacts on health are those associated with the increasing frequency and severity of extreme weather events, including heat, floods, wildfires, and drought. For example, FEMA estimates that there were over 1800 deaths, and CDC estimates over 7500 injuries following Hurricane Katrina.[ii] Extreme rainfall or storms can also overwhelm sewage systems, cause water contamination with sewage and toxic pollutants, and damage crops.

Heat is already the cause of more deaths than any other weather-related event in the US. There were 650 excess deaths in California in the 2006 heat wave; over 70,000 excess deaths in Europe's 2003 heat wave, and 55,000 in Russia in 2011. Many heat deaths occur in urban heat islands, where building density, paved surfaces, and the absence of trees and green spaces can result in temperatures as much as 22 degrees Fahrenheit higher than surrounding areas. The very young, the very old, those with preexisting medical conditions, and outdoor workers - particularly agricultural workers - are at higher risk of heat illness.[iii]

Cal-Adapt projects that population centers throughout California will experience an average of 40 to 53 extreme heat days by 2050 and an average of up to 99 extreme heat days by 2099, compared to a historical average of 4 days per year. Heat also has significant impacts on labor productivity. Leading climate and health researchers recently warned that on our current emissions trajectory, the impacts of rising temperatures could be so great as to cause "a discontinuity in the long-term progression of humanity."[iv]

Climate change also impacts health indirectly through its impact on the natural environment. For example, changes in temperature and humidity lead to changes in the distribution of disease-carrying vectors such as ticks and mosquitos. Here in Sacramento, mosquitos are appearing much earlier than expected due to the warm winter. The aedes aegypti mosquito - which carries dengue and chikungunya fevers - has recently been found in the San Joaquin Valley and Southern California, and dengue fever is now endemic in the Florida Keys for the first time since before WWII.

Climate change worsens air pollution. Concentrations of ground-level ozone, a major component of smog, rise almost linearly with rising temperatures, creating a "climate penalty" that threatens to undermine our efforts to reduce air pollution and lead to increases in asthma, other respiratory illness, and heart disease. Warming also causes an increased risk for food and water-borne diseases, and worse allergies, due to higher pollen production and a lengthening of the pollen season - already more than 3 weeks longer than "normal" in some parts of the U.S.

Climate change poses serious threats to our food supply. Extreme heat, other extreme weather events, and drought all cause significant declines in crop yield, which in turn tend to increase food prices. Rising food prices lead to higher rates of food insecurity, which is associated with increased risk for diabetes, obesity, and cardiovascular disease. Ocean acidification due to rising CO2 levels in the ocean threatens the survival of many marine organisms and fish populations - another threat to our food supply and our economy.

The third category of climate impacts on health and well-being are those mediated through human social and economic systems, such as job loss, economic impacts, social disruption, forced migration, and conflict.

Extreme weather events cause displacement and disruption of jobs, education, and health care. The number of events causing more than a billion dollars in losses has increased substantially since 1990. A 2011 study estimated that just six climate-related events were associated with $14 billion dollars in health costs, including the value of lives lost prematurely.[v]

A recent Department of Defense report concluded that climate change "is an immediate threat to U.S. national security", because it adds to the challenges of global instability, poverty, food and water shortages, and conflict. Experts predict that there will be "200 million to 1 billion migrants from climate change alone, by 2050." Well-respected national security analysts believe that the current conflict in Syria has been exacerbated by drought that caused the internal displacement of about 1.5 million people. Pakistan - a highly unstable country with a population of about 180 million - just announced that it will soon face "water starvation". In December, the UN warned that a prolonged drought in Central American is turning into a humanitarian crisis for nearly 2.5 million people, with the loss of upt to 75% of the maize and bean crop in Honduras and Guatemala, and the death of thousands of cattle.[vi]

Drought provides a good demonstration of the wide variety of impacts associated with just one aspect of climate change. The direct impacts of drought relate to the loss of access to clean and safe water. I needn't remind you that humans cannot survive without water. Hundreds of California families in poor rural areas have literally lost their water supply for drinking and bathing, becoming reliant on bottled water or water imported by truck.

Due to the drought, thousands of acres are lying fallow and many ranchers have reduced their livestock herds. As a result, food prices are likely to increase.[vii] Rising food prices mean higher levels of food insecurity, which is associated with increased risks for diabetes, cardiovascular disease, and obesity.

Drought and warming both increase the severity and frequency of wildfires, threatening firefighters and homes. Large fires send huge plumes of smoke into the air - smoke that can travel many hundreds of miles to cause very poor air quality over large areas for weeks at a time, with associated respiratory and cardiovascular disease impacts.

Southern California is also seeing an upsurge in West Nile Virus, as warm weather and stagnant pools in sewer pipes provide ideal mosquito breeding grounds. By last September, number of cases of West Nile was about triple the five-year average.[viii]

Drought and heat also dry out soil, creating irritating dust that may also carry the spores of fungal diseases such as valley fever, which the Centers for Disease Control describes as a "silent epidemic" across the southwest.[ix] In fact the California department of corrections is now precluding the placement of African Americans and other high-risk inmates in certain prisons, to prevent further rise in valley fever rates.[x]

The statewide economic cost of the 2014 drought is estimated to be above $2 billion; around 17,000 jobs in the fields and in food processing and related jobs have been lost.[xi] But drought also brings other significant costs. The National Climate Assessment states that, "For California and other states across the Southwest climate change will increase the cost of maintaining and improving drinking water infrastructure by increasing the need for wastewater treatment and water desalination to supplement water supplies; even without the costs of these preparedness measures, California's drinking water system alone will require more than $4 billion in investment per year for the next 10 years." [xii] No wonder drought is associated with depression and other mental health problems.

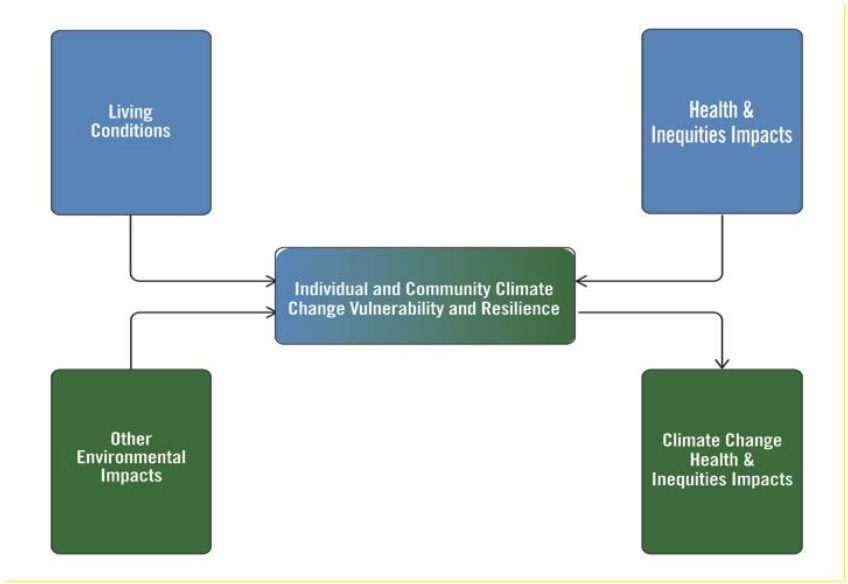
The current drought is exceptional, but a new study from NASA forecasts a more than 60% likelihood of a megadrought lasting 30 - 35 years if we continue our current rate of greenhouse gas emissions through mid-century.[xiii]

Climate change disproportionately impacts people of color and low-income communities, and thus serves as a "threat multiplier" to exacerbate already unacceptable health inequities.

Population health status is largely determined not by health care, but by our physical, social, economic, and services environments - what we call the social determinants of health. We all know that place matters. Neighborhoods differ a lot. Some have great parks, beautiful tree lined streets, and nice sidewalks; others are near busy freeways and refineries and asphalt playgrounds; some neighborhood have full-service grocery stores and farmers markets, and others have a plethora of fast food and liquor stores and billboards. These differences shape people's health behaviors, and result in big differences in the rates of chronic illness, and in differences in life expectancy of up to 15 years. We see this in every part of California and the nation.

What does this have to do with climate change? Individuals and communities have different levels of vulnerability to climate change - the degree to which they are susceptible to the adverse impacts of climate change- and of climate resilience - the capacity to respond effectively and still thrive in the face of climate change impacts. Climate resilience and vulnerability are essentially the flip side of one another. Together they determine the extent to which climate change will impact health and well-being (in addition to the nature of exposure to climate risks, for example living near the coast or on a floodplain).

Som of the most important components of vulnerability and resilience are living conditions - the social, physical, economic, and services environments that comprise the social determinants of health- and pre-existing health status.



A few examples:

- I mentioned that ozone levels are related to warming temperature. People who live near busy roadways are at higher risk for asthma. People with asthma or heart disease are more vulnerable to the effects of ozone; those who live in areas with already high ozone levels are at higher risk as those levels rise even further.
- As drought reduces surface water availability, groundwater becomes a great source of drinking water; but in much of the central valley, groundwater contamination with nitrates from nitrogen fertilizers is extensive. And people living in poverty are far less able to purchase bottled water or truck in water for bathing and household use when their wells run dry.
- Similarly, low-income people are less able to adapt as food prices rise due to the impacts of climate change on crop yield.
- Pre-existing illnesses such as heart disease and diabetes - more prevalent in low income and communities of color - increase the risk of heat illness. But low-income neighborhoods are also less likely to have adequate healthy tree canopy, further increasing the risk for heat illness as extreme heat events become more frequent; and, we know that low income people - especially low income elderly - may be reluctant to use their air conditioners due to concerns about energy costs.
- People living in poverty are less likely to have insurance, reducing their ability to recover after a natural disaster.

Many climate mitigation and adaptation strategies have positive impacts on population health. Routine assessment of the health consequences of climate actions can optimize the significant health benefits and health care cost savings potentially associated with climate action.

There are a great many strategies to reduce greenhouse gas emissions, as you can see in California's AB32 scoping plan. Many of these actions can also bring substantial benefits to health; but some may cause human harm, or exacerbate existing health and social inequities. A few examples:

There are three main strategies for reducing greenhouse gas emissions in transportation: low carbon fuels and zero emission vehicles, fuel efficiency, and reduced vehicle miles traveled. All three strategies reduce air pollution, and thus reduce respiratory and cardiovascular disease. But only active transportation - walking, biking, and using public transit - also gives us the benefits of physical activity. Dr. Maizlish at CDPH has worked with regional planning and transportation agencies in the Bay Area and SCAG to quantify those benefits, and they are huge. In Southern California, if we were to shift from an average of four minutes to 19 minutes of bicycling and walking, we could see a 12% reduction in heart disease, stroke, and diabetes, and significant reductions in breast and colon cancer, dementia, osteoporosis, depression. But, without careful attention to safety, we could also see a significant increase in bicycle and pedestrian injuries.

Projections of Health Impacts of Increased Bicycling and Walking from 4 to 19 minutes of Daily Physical Activity, SCAG Region

	Change in disease burden	Change in premature deaths/yr
Cardiovascular Dis.*	12% ↓	3,134
Diabetes	12% ↓	374
Depression	3% ↓	<2
Dementia	6% ↓	465
Breast cancer	3% ↓	60
Colon Cancer	3% ↓	75
Road traffic crashes	22% ↑	315

Maizlish N. CDPH.

A transition from fossil fuel powered electricity to clean energy would provide substantial reductions in air pollution and its related health impacts. If we shifted to sustainable local food systems and ate less meat, we could see not just a reduction in greenhouse gas emissions, but also less pesticide illness, less water contamination, less antibiotic resistance, more habitat preservation, and fewer chronic illnesses.

Urban greening - trees, parks, urban agriculture and community gardens - yields many co-benefits, including reducing the urban heat island and risk of heat illness, reduced air pollution, reduced storm water runoff and flood risk, replenishment of groundwater aquifers, reduced air pollution, less crime, more places to be physically active and support social networking, and reduced energy use and energy costs.

But not every climate intervention strategy has health co-benefits. If biofuel production displaces food production or displaces indigenous people, we may see rising food prices or forced migration. As people pump out more groundwater to adapt to the drought, the rate of land subsidence increases, placing road, levees, dams, and other critical infrastructure at risk. “Market mechansims” such as cap and trade may result in continued high air pollution levels in fence-line communities, thus perpetuating health inequities.

Without rapid and substantial reductions in greenhouse gas emissions, the risk rises that climate disruption will overwhelm our adaptation capacity. But because further climate change is inevitable, it is essential that we plan and prepare for climate impacts, and promote climate resilient communities.

California is a world leader in climate mitigation, and recently proposed legislation will advance our greenhouse gas emission goals significantly. But we know that climate

impacts will grow due to the long life of gases already in the atmosphere and because globally, we remain on a dangerous upward trajectory of emissions. That means that while we pursue ever more robust mitigation strategies, we must also plan for and prepare for climate impacts. The best way to build long term climate resilience is to promote healthy communities with high levels of social cohesion, lower levels of chronic illness and health inequities, strong local sustainable food and energy systems, and residents who are knowledgeable about and prepared for climate risks.

Many off the agencies responsible for safeguarding the health and well-being of California's residents have engaged on the issue of climate change. Reasons include the need for workforce capacity development, the perception that other issues are more urgent, limited state (and national) leadership on climate change and health, lack of a mandate, concerns about the politicization of climate change, siloed funding streams, and lack of resources. The Bay Area Climate Energy Resilience Project conducted a profile of Bay Area county adaptation efforts and found that while local government is, in general, under-resourced in this arena, the lack of resources is most profound in the public health sector.[xiv] While a few local health departments in California have begun to address climate change - notably Los Angeles, Contra Costa, San Luis Obispo, San Francisco, and Santa Clara - too many are doing very little to address the health impacts of climate change.

Many health care systems - such as Kaiser Permanente - are working diligently to reduce their carbon footprints, and to prepare for emergencies. A few have begun to assess the climate vulnerabilities of their facilities. But we learned in Hurricane Katrina and again in Superstorm Sandy that more comprehensive assessments and preparation is required. In 2005, Hurricanes Katrina and Rita destroyed at least eight hospitals. Damages from Superstorm Sandy required the evacuation of 4500 residents from damaged nursing homes, closed multiple hospitals - some for months, and cost New York City public hospitals $800 million, with an estimated $3.1 billion in recovery costs to healthcare facilities.[xv]

A final challenge is that few members of the public, and many policy makers, have not yet connected the dots between global climate change and health. Two recent surveys of members of the American Thoracic Society and National Medical Association found that over 75% and 60% of physicians, respectively, are already observing the health impacts of climate change among their patients.[xvi] Yet Americans are generally unaware of the potential health consequences of global warming. A recent Yale survey found that only about one in four are able to name one health problem related to climate change.[xvii] We also know that when people understand the health impacts of climate change and the health co-benefits of climate action, they are more likely to support climate action.

To summarize: Climate change poses a profound threat to human health, and threatens the basic systems on which human life depends - our air, water, food, shelter, and security. The editor of the internationally prestigious British Medical Journal recently called on the World Health Organization to declare climate change a public health emergency. "Deaths from Ebola infection, tragic and frightening though they are, will

pale into insignificance when compared with the mayhem we can expect for our children and grandchildren if the world does nothing to check its carbon emissions. And action is needed now."

I will turn briefly to a few thoughts about how we might begin to address climate adaptation and resilience from a public health perspective.

1. **Incorporate climate, health, and equity considerations in all state and local policies, planning, investments, and programs, and promote climate mitigation and adaptation strategies that optimize health and equity co-benefits.** For example, a transportation infrastructure plan that truly considers health would place far greater emphasis on public transit, safe bicycle and walking infrastructure, and more rapid and robust implementation of complete streets. Land use planning that considers future climate impacts would not place either critical infrastructure or housing in areas at risk of sea level rise or flooding. Existing public health and other programs could incorporate more emphasis on building social cohesion for climate resilience. Investments in energy efficiency could target existing multifamily rental homes to address both climate and fuel poverty. Building and planning ordinances could mandate more aggressive measures to reduce urban heat islands. And we could pay attention to greening our communities whenever and wherever possible.

2) **Support and promote active engagement of all communities in State and local climate planning, preparedness and resilience efforts.** The real involvement of community members in climate planning and action supports social cohesion, identifies important community assets and strengths, and enhances the development of strategies that are feasible and engenders support for their funding and implementation.

3) **Implement a coherent statewide social marketing campaign** to increase recognition of climate change as a health issue and promote community support for more robust climate action. The lack of wide recognition that climate change impacts human health and well-being and lack of urgency in addressing climate change both suggest the need for more effective climate communications. A modest investment to research, develop, and implement an effective social marketing campaign on climate change and health would likely yield far greater support for robust climate action.

4) **Greater engagement and resourcing of CDPH and local public health agencies is required to improve protection of California residents from the impacts of climate change and optimize the co-benefits of climate action.** Our public health agencies need leadership, resources, guidance, and workforce capacity development to implement comprehensive strategies to assess climate health vulnerabilities, to monitor and forecast the impacts of climate change and climate change strategies on health and health inequities, to participate in the development and implementation of climate adaptation and mitigation plans, and to promote community resilience to reduce the impacts of climate change on health and human well-being. For example, we need more accurate and timely surveillance for heat illness, more sensitive and consistent heat warnings, and comprehensive urban heat island reduction programs. The State could require the

integration of climate change in grants and contracts to local health departments wherever relevant, for example in public health preparedness programs. We need an updated assessment of the climate vulnerabilities of our vital public health infrastructure, such as waste water and drinking water treatment facilities, and plans to address them.

We also need a more robust and focused effort to adequately assess and prepare for the impacts of climate-related events on our health care delivery system. The White House recently released an excellent report on hospital resilience, but there is no requirement nor funding to ensure implementation.[xviii]

5) **Better coordination of and accountability for climate adaptation and resilience are needed.** The state's adaptation strategy identifies nearly twenty agencies with responsibility for public health related to climate change, in addition to multiple local and regional partners.[xix] Yet none are mandated to address the health impacts of climate change, and there is currently no mechanism to coordinate these bodies.

In closing, our best long-term protection against the health impacts of climate change is to redouble our efforts to reduce greenhouse gas emissions and to promote healthy and equitable climate resilient communities. California's climate mitigation program has benefited from a clear commitment, leadership, mandates, and significant resources for implementation. I suggest that we need the same - and quickly - to build adaptation capacity and climate resilience to protect California residents from the impacts of climate change on human health and well-being.

I thank you for your interest in addressing this enormous challenge.

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ARCCA Alliance of Regional Collaboratives for Climate Adaptation

February 25, 2015

The Honorable Bob Wieckowski
Chair, Senate Environmental Quality Committee
State Capitol Building, Room 2205
Sacramento, CA 95814

Dear Chairman Wieckowski, Committee Members Gains, Bates, Hill, Jackson, Leno, and Pavley:

The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) welcomed the opportunity to speak to the committee on February 25th on the very important and timely issue of adaptation to climate change.

California has been tremendously successful in developing and executing a plan to respond to the challenge of climate change. State actions supporting climate mitigation include the AB 32 Scoping Plan, the Low Carbon Fuel Standard, Building Code Title 24, and the Renewable Portfolio Standard. These efforts focus on cities, counties, industries, and technologies. But the scientific community has become increasingly alarmed that we will not be able to avoid the early impacts of climate change, and that while we continue mitigation efforts, we must also adapt to the changes already underway.

Californians have been responding for many years to changes in fire seasons, sea level rise, decreasing snowpacks, an extended drought exacerbated by above-average temperatures, flooding risk, and seasonal changes in precipitation and temperature affecting our agriculture production. Addressing these issues requires actions that consider the geographic footprint framing each of these crises, not just cities and counties but also watersheds, flood basins, forests, coastlines, and more. Providing a forum at the state level and in regions across California for these cross-jurisdictional, cross-sector discussions has been a key mission of ARCCA and each of our member regional collaboratives. Our responses to your questions follow. We have included several attachments:

- Slides from our oral presentation
- The ARCCA Principles for Adaptation
- A fact sheet on ARCCA

Question: To what extent are ARCCA and regional collaboratives working with local governments to plan for and implement climate adaptation and resiliency efforts in California? Highlighting project examples would be helpful.

ARCCA currently has five member regional Collaboratives, as outlined on slide two: The Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC), the San Diego Regional Climate Collaborative, the Capital Region Climate Resilience Collaborative, the Bay Area Climate and Ewnergy Resilience Project, and the Sierra Climate Adaptation and Mitigation Partnership (Sierra CAMP).

All have strong local government memberships. Examples include:

- LARC has the most formal organization with city council resolutions required to become a member.
- The Bay Area is a 300-person stakeholder network that includes many local governments. Bay Area is evolving toward a more formal structure, the Alliance for Climate Resilience.
- Sierra CAMP has three seats on their steering committee reserved for local government.

Some of our specific projects include:

- **LA Framework for Regional Climate Action:** LARC, in consultation with Metro, has received funds through the Strategic Growth Council Sustainable Communities Planning Grant and Incentives Program to develop a unifying structure for climate action in the region, from academia to municipalities to regional agencies. Beginning in October 2013, the Framework is a 3-year project.
- **Bay Area Nine-County Needs Assessment**: The report, produced for the San Francisco Foundation and the Bay Area Air Quality Management District, spotlights more than 100 Bay Area climate initiatives in the public, private, non-profit sectors. The assessment also identifies the top barriers facing cities, counties and others in the region as they address climate adaptation and mitigation.
- **Resilient Business Initiative:** The Sacramento regional collaborative is working with Valley Vision to develop a regionally focused tool that will assist medium and small businesses to identify their climate risks and vulnerabilities, and to provide them practicable steps to take to prepare for potential events.
- **Sierra CAMP & Climate Solutions University:** As part of Climate Solutions University's Model Forest Policy Program, Sierra CAMP will work with local governments and other Sierra stakeholders to create a model adaptation plan that includes the consolidation and organization of climate mitigation studies and efforts in the Sierra Nevada.
- **San Diego Regional Climate Collaborative:** Assisted San Diego County Office of Emergency Services and local districts to incorporate extreme heat, drought, and coastal flooding in the 2015 San Diego Multi-Jurisdictional Hazard Mitigation Plan.

Question: What have been the major challenges and successes to date for ARCCA and regional collaboratives working to plan and implement adaptation projects?

ARCCA Successes:

- **State engagement.** ARCCA has provided a regionally focused response to a number of key state documents.
- **Engagement with the public sector:** Each collaborative has done a great job engaging the public sector in their region and has strong support from local jurisdictional and regional agency participants.
- **Regional Collaborative Toolkit;** Developed by ARCCA out of the shared experience of all the regional collaboratives, this toolkit distills the key elements of forming a regional collaborative and provides various resources, case studies, and linked tools. The goal is to provide a framework and guidance for other regions interested in starting their own regional collaboratives. It is currently free and online at www.ARCCACalifornia.org/toolkit.
- **CivicSpark** — CivicSpark is a new Governor's initiative of AmeriCorps that focuses on building capacity for local governments in the areas of climate change and sustainability. Several regional collaboratives (San Diego, Capital Region, and the Sierra) are directly engaging with this program to provide resources to local governments to support specific adaptation projects (examining climate plans through an adaptation lens, conducting vulnerability assessments, and alleviating the urban heat island impact on health), while other regions (Bay Area and LA) are indirectly working with the program.

Challenges

- **Funding:** This is an emerging issue and one where the state could be helpful. Although we have had a successful start, continuing efforts will require sources of long-term, sustainable funding.
- **Moving to implementation:** Likewise, in order to sustain dialogue in the regions and with the state, each organization will need to build a structure that is sustainable over time, supported by a source of stable funding. Each region will want to develop a participation or membership structure that fits their local geographic and political constraints and has the necessary longevity to oversee and implement projects.
- **Engagement of the private sector:** While the public sector and the NGO community have engaged deeply with regional collaboratives, there is a lack of deep private sector engagement, despite different approaches to engage with businesses. Without across-the-board engagement on adaptation issues and initiatives from the private sector, the efficacy of these efforts will ultimately be hindered.
- **Greater engagement of elected officials:** Many local agency staff are eager to address climate adaptation in their jurisdictions, but they also frequently lack capacity and face competing priorities. It is difficult for staff to place adaptation high on the agenda when elected leadership may prioritize economic development and other immediate priorities. Greater engagement of elected officials and their active involvement is important for increasing public support. Expanding participation beyond the more progressive jurisdictions to a wide range of local governments and agencies representing rural and agricultural interests is another challenge.

Question: How do regional collaboratives work with both the state and local governments to aid in establishing climate adaptation and resiliency efforts? How could this process be improved?

- **Convening Regional Stakeholders:** To date, the most important local role of the regional collaboratives and ARCCA has been as a convener bringing stakeholders together. As communities around California are just beginning to understand the adaptation narrative and examine their risks and vulnerabilities, this conversation and exchange between stakeholders has been critical in each of the regions. Some regions are also actively working on funded projects through grants received from various funding organizations.
- **Adding the Regional Narrative to Key Documents**: A second key role for ARCCA is to ensure that the local/regional perspective is represented in emerging state climate adaptation initiatives, reports, and policies such as the Environmental Goals and Policies Report, Safeguarding California, the State Research Plan, and the SGC's Affordable Housing and Transportation grant program. The regional narrative and connection has been significantly improved in each document through a review and comment process with the respective agencies authoring the reports.
- **Supporting the California State Dialogue on Adaptation:** ARCCA was a major partner in planning for and presenting at the California Adaptation Forum in August 2014, a highly successful effort that brought together over 800 individuals representing agencies, organizations, cities, counties, and companies to discuss the latest adaptation issues facing Californian communities.
- **Participation in the National Adaptation Dialogue:** ARCCA members have been able to extend our "regional adaptation story" through participation in national events such as the National Adaptation Forum, New Partners for Smart Growth Conference, and the recent Sustainable Communities Leadership Academy held by the Institute for Sustainable Communities. Our goal is to encourage the creation of new regional climate collaboratives throughout the US. We will also attend and participate in panels at the National Adaptation Forum in Saint Louis in May 2015.

How to improve this process:

- **Institutionalize climate adaptation as a consideration in policy and funding documents.** Ensure all public expenditures for infrastructure and planning consider climate as an issue of growing impact over time.
- **Allocate greater funding and support for regions and local agencies to work on climate adaptation,** including funding and resources for a statewide downscaled climate impact study at a finer resolution than currently available. Develop resources and technical assistance for local governments, such as a clearinghouse to bring together all adaptation research and tools developed across state agencies.

We believe that our regional collaboratives will allow Californian communities to prepare for climate impacts more effectively and efficiently, through sharing dialogue, resources, funding opportunities, and best practices with one another. This spirit of collaboration and cooperation is part of California's unique identity and strength in overcoming past challenges, and is no less important today. Thank you again for the opportunity to provide information on ARCCA and the important role regional collaboratives can play in adapting to our changing climate in California.

Sincerely,

Krista Kline
ARCCA Chair
The Los Angeles Regional Collaborative

Larry Greene
ARCCA Vice-Chair
Capital Region Climate Readiness Collaborative

Cody Hooven
The San Diego Regional Climate Collaborative

Bruce Riordan
Bay Area Climate & Energy Resilience Project

Kerri Timmer
Sierra Climate Adaptation & Mitigation Partnership

ARCCA Alliance of Regional Collaboratives for Climate Adaptation

Introduction to ARCCA

The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) was formed in early 2012 out of the urgent need to prepare California's urban centers for the emerging impacts of climate change, including extreme storm events, heat waves, droughts, and sea level rise. ARCCA currently brings together five Regional Collaboratives—from San Diego, Los Angeles, the San Francisco Bay Area, Sacramento, and the Sierras — that are coordinating and supporting local climate partners in projects to enhance public health, protect natural. ARCCA will add additional California regions as they develop their own capacity and collaborative structures. At the same time, we will widen and deepen our joint state/regional agenda to make our urban centers stronger, more prosperous, and more sustainable.

ARCCA was formed by regional climate adaptation leaders in California's four largest urban centers in conjunction with the Governor's Office of Planning and Research. ARCCA's current membership includes the San Diego Climate Collaborative, the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC), the Bay Area Joint Policy Committee, the Capital Region Climate Readiness Collaborative, and the Sierra Climate Adaptation and Mitigation Partnership (Sierra CAMP). These regional groups include a wide range of public, private, non-profit, and academic institutions.

ARCCA's agenda for accelerated action includes two parallel tracks

1. ARRCA members are sharing information and intelligence among regions on best practices and lessons learned. We are identifying each region's most innovative and successful strategies and then determining how they could be adapted to another region's particular needs. This will reduce reinventing of the adaptation "wheel" while preserving regional identity and context.
2. The four regions are working collectively with state agencies to create a formal partnership that will make the most efficient use of our limited resources and streamline state and regional adaptation assistance to local governments. We see initial opportunities for on-the-ground state/regional joint initiatives on climate adaptation research, funding, training, and communications, with the great potential to create a long-term partnership around policies and programs that will benefit all Californians.

ARCCA Principles of Collaboration

- Composed of collaboratives organized to address climate in particular regions of California, ARCCA is dedicated to helping the state prepare for impacts of climate change
- Through collaboration each region will accomplish more than by working alone and can better help the State succeed in protecting Californians
- ARCCA will generally operate by democratic principles and seek to reach consensus as much as possible through dialogue and negotiation
- Recognizing that regions have different climate adaptation priorities, ARCAA will focus efforts where there is common ground
- Each collaborative will share information that it believes will be valuable to other regions, including pilot projects and case studies, best practices, funding models and partnerships
- We will seek to be inclusive of other regions in the state interested in participating and be a resource to those outside California where appropriate
- We will strive to find common objectives to develop joint funding opportunities
- Our common voice will increase the credibility and effectiveness of our efforts to inform state and federal policy, guidance and resource allocation

ARCCA Alliance of Regional Collaboratives for Climate Adaptation

ARCCA Principles of Adaptation[1]

Context

Climate change is happening now, and is expected to accelerate in the years ahead. California's economy, infrastructure, public health and natural systems will be significantly impacted by extreme storm events, flooding, wildfire, heat waves, loss of water supply, air quality degradation and sea level rise. We are facing a historic governing challenge from climate change. A $2 trillion annual economy and the needs of nearly 40 million residents ride on the outcome of the state's preparations and response.

California is already enacting an initial set of measures intended to prevent, prepare for, and adapt to climate change. While these efforts are an encouraging and positive sign, the measures are spread across a variety of sectors and agencies, and encompass a wide range of initial strategies. Reducing our risks and increasing our resiliency to the changes ahead will require a new and unprecedented degree of collaborative action throughout California. We must begin now to encourage this level of cooperation, starting with a shared set of goals and principles that allow us to balance economic, social and environmental needs as we seek to align state, regional and local governments, and bring them together with community organizations, businesses and other key stakeholders for the benefit of all Californians.

Principles

Work Within the Appropriate Scale and With Meaningful Partners

1. **Focus on the Regional Level**
   Communities are already bound together at a regional scale by shared geography and mutual reliance on certain resources. Additionally, local and regional adaptation efforts are more likely to have common goals, and be more nimble in application than efforts across broader, less connected geographic areas. For these reasons communities should work together inter-regionally on adaptation. All of these efforts should be in coordination with state and federal agencies active in this area to preserve resources, avoid duplication, and align with existing jurisdictional authority (MPOs, COGs, Water Districts, IRWMPs, AQMDs, etc.).
2. **Consider Health, Safety, and Equity of all Californians**
   Adapting to climate change is fundamentally about protecting people and the communities and resources we rely upon. Actions to increase resiliency and reduce risk must prioritize the health and safety of all Californians, especially our most vulnerable, by devising solutions that simultaneously encourage economic growth, improve environmental quality, and increase opportunity for all.
3. **Empower Collaboration Across All Sectors and Levels of Leadership**
   Empower action by establishing and/or expanding traditional and non-traditional alliances and networks to accelerate effective and durable problem-solving (e.g., between/among public and private resource managers, scientists, decision-makers); share knowledge openly and actively; regularly engage the public on the science as well as solutions; and build capacity for local community action. This includes

[1]The introductory text and principles are adapted from concepts, and language utilized in a number of key adaptation related resources and reports; The 2014 Safeguarding California Plan, the 2014 Little Hoover Commission Report on Climate Change Adaptation, National Wildlife Federation's Climate Smart Principles as framed by Point Blue Conservation Science, the Ahwahnee Principles for Climate Change, the California Adaptation Forum Action Framework, 2014 California Economic Summit, Resilient Rhode Island Act of 2014 (2592), the 2014 New York Community Risk and Resiliency Act, and content taken from ARCCA's various comment letters to state agencies

developing peer-to-peer horizontal linkages and vertical linkages across levels of leadership and related geographic areas to ensure economies of scale and consistency of effort.

4. **Provide Consistency at the State Level**
   The State of California should provide access to the best-available climate science, standardized sources of climate change information, and sophisticated risk assessment tools which help local governments, regional agencies and other climate practitioners take climate action to prepare for the impacts of climate change and make their communities more resilient to its effects.

Employ Key Strategies

5. **Utilize Existing Policy Mechanisms**
   In order to minimize disruptions and maximize existing institutional capacities in the face of change and uncertainty, adaptation should be integrated throughout existing local, regional and state plans, policies and decision-making, rather than creating new stand-alone policies.
6. **Prioritize Multiple Benefits**
   Because adapting to climate change will require significant resource investments, great changes to the status quo, and engagement of people from all sectors of society, it is important to prioritize those actions that yield the greatest collective benefits. For example; adopt landscape or watershed scale analyses; focus on natural system function and services; establish a preference for green or nature-based responses to the maximum extent feasible; evaluate changes in carbon stocks and give preference to actions that also help reduce the source of climate change – GHG emissions.
7. **Employ Forward-Looking, Adaptive Management Approaches**
   In order to realize timely, effective responses to continual change in climate, ecology and economics, as well as the evolution of our understanding due to new research and data, employ an adaptive management framework with regular monitoring and reassessments with a meaningful time horizon, at least up to 2050.
8. **Invest In Resiliency**
   Public dollars, as well as private, should be prioritized to invest in developing state, regional and local policies and projects that reduce our risks and increase our resiliency. Mitigating our GHG emissions and preparing for the impacts of climate change through targeted and smart investments can give California a competitive advantage over other states that are ill-prepared to deal with climate change and its effects.

Climate Adaptation in the San Diego Region

Update for ARCCA Meeting – 12.12.14

Several key activities form the basis for climate adaptation work in the San Diego region:

(1) Climate Collaborative – www.sdclimatecollaborative.org
Key activities of the Collaborative in second half of 2014 include:

- 6 new members in 2014
- Monthly Steering Committee meetings and Quarterly Network meetings
- Engaging in the California Adaptation Forum
- Convening the sea level rise working group
- Monthly newsletter
- Hosting trainings including a sea level rise training with USC Sea Grant
- Supporting individual members' adaptation/resilience efforts
- Support/coordination for various regional climate mitigation and adaptation projects

(2) **County Multi-Jurisdictional Hazard Mitigation Plan Update–** ICLEI-Local Governments for Sustainability, in partnership with The San Diego Foundation and Scripps Institution of Oceanography (SIO), is providing technical assistance and stakeholder engagement around the incorporation of climate change impacts and adaptation in the 2015 update to the San Diego County Multi-Jurisdictional Hazard Mitigation Plan. Deliverables the project will use to inform the County's process include case study and best practice research, training workshops, stakeholder engagement as well as climate science delivery and modeling from SIO. Most recently, ICLEI hosted a workshop in September 2014 to engage stakeholders in the planning effort, before the plan is submitted to FEMA for input in early 2015. The project has a website up here: http://www.icleiusa.org/climate_and_energy/Climate_Adaptation_Guidance/hazard-mitigation-planning-emergency-managers-as-partners-in-climate-adaptation

(3) **Individual agency/government-level planning to adapt to climate change**. An increasing number of jurisdictions in the San Diego region are incorporating preparedness into their own climate action planning processes and documents, for example:

- City of Chula Vista's adopted municipal climate adaptation strategies
- Port of San Diego adopted a Climate Action plan, and is now working on an adaptation plan and living shorelines pilot project
- City of San Diego has completed a draft revised Climate Action Plan which is expected to be finalized in 2015
- San Diego County Water Authority completed a Climate Action Plan in March 2014
- Tijuana River National Estuarine Research Reserve's (TRNERR) Climate Understanding & Resilience in the River Valley
- Imperial Beach –Received $300k grant to conduct a vulnerability assessment and support modeling (CoSMoS)
- Solana Beach – Developing a Climate Action Plan and developing a Local Coastal Plan that

considers climate change impacts with funding from

- Both the cities of Carlsbad and Del Mar have been recommended for 2015 funding to update their Local Coastal Plans to include assessment of, and policies for, adaptation to sea-level rise

(4) **Launch of CivicSpark in San Diego.** The San Diego Regional Climate Collaborative is the CivicSpark regional partner for the San Diego region and has helped to recruit local government participation and assist in placement of AmeriCorps members to help cities pursue projects that promote clean energy, reduce greenhouse gas emissions, safeguard against climate change impacts, or implement sustainable community strategies. Three AmeriCorps members have been recruited to work on a variety of projects with cities throughout the County such as greenhouse gas emissions inventories, alternative transportation projects, and climate action planning.

Upcoming priorities in 2015

- Supporting collaboration among cities on sea level rise projects through working group and implementation of State grants
- Completing hazard mitigation project with ICLEI and sharing lessons learned
- February 2015 facilitation workshop with NOAA, Climate Collaborative and TRNERR
- Supporting individual cities' adaptation work through collaboration, coordination, workshops and technical assistance
- Completing an economic analysis to determine resilience of the private sector in the region
- Support pipeline of projects for CivicSpark AmeriCorps members

Expanding Membership

The Sacramento Tree Foundation and Valley Vision, a local non-profit consultancy, have joined the Capital Region Climate Readiness Collaborative (CRC) as members this year. CRC plans to undertake a membership campaign in the coming months.

Business Resiliency in the Capital Region

Valley Vision is leading an initiative to help reduce the risk and economic impacts of weather-related disasters to businesses in the region. Key deliverables will include a toolkit of interventions to help businesses reduce risk and enhance business resiliency. The project will create a comprehensive assessment of risks facing the region; increase business and policymaker awareness and understanding of risks and their associated consequences; and conduct a strategic outreach effort to engage leaders from business, government, and the community to enhance planning for economic resiliency. Founding partners are Valley Vision, the Sacramento Metropolitan Air Quality Management District (SMAQMD), and the CRC. For more information about the initiative: http://bit.ly/1vmmneW

CivicSpark in the Capital Region

CivicSpark, a Governor's Initiative of AmeriCorps launched by the Local Government Commission, is working with CRC members on projects to increase regional climate resiliency. Two CivicSpark members are conducting a vulnerability assessment for the region's transportation network, with the goal of incorporating the findings into SACOG's update of its Sustainable Community Strategy. Another project focuses on developing a regional plan to increase the urban tree canopy for disadvantaged communities, with multiple benefits for public health, air quality, energy savings, housing value, and more. The third active project will help the City of Davis implement their One Cool City Campaign, specifically focused on climate mitigation and adaptation activities that address consumption, transportation, and energy.

Coordinating a Regional Response to Cap and Trade Funding

The SMAQMD and Valley Vision have been coordinating regional stakeholders to effectively respond to the 2013-2014 funding allocations from the Greenhouse Gas Reduction Fund. With multiple state agencies each responsible for grant processes, coordination is key to helping cities and counties, agencies, and non-profit organizations to design projects that maximize benefits for disadvantaged communities. Proposed projects include increasing urban forestry, electrifying bus routes, and developing an EV car share program.

Understanding Barriers to Climate Adaptation in the Water Sector

Working with a UC Berkeley graduate student, the CRC conducted a needs assessment of water agencies in the Sacramento region. Through stakeholder interviews and a review of planning documents, the assessment analyzed local water agencies' current understanding of climate risks for reliable water supply, and identified critical knowledge gaps and barriers to incorporating climate change into long-term planning. To read the report: http://bit.ly/1w4lmiy

Quarterly Meeting

The CRC is hosting Quarterly Meetings with the goal of bringing together regional stakeholders to increase understanding of critical issues, provide updates, identify opportunities for support and collaboration, and determine future goals and direction for the CRC. The first official Quarterly Meeting in October featured updates on climate impacts to water and wildfires and a number of updates on adaptation activities and opportunities in the Capital Region. Forty-four people from across the region, representing community organizations, non-profit organizations, academia, and local and regional governments were in attendance. The next Quarterly Meeting, scheduled for February, will bring hospital administrators and public health experts together to discuss how the healthcare sector is responding to the challenges and risks of climate change.

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Los Angeles Region Climate Action Initiatives, Programs, and Efforts
ARCCA All-Hands Meeting, December 12, 2014, San Diego

LOCALIZED RESEARCH AND DATA

GHG Emissions Inventory
LA County emissions inventory by city and by industry was released through our sub-regional Councils of Governments and is available on the LARC website.

Los Angeles Downscaled Climate Modeling
2 km scale downscaled data analysis for Los Angeles climate impacts by Dr. Alex Hall (UCLA, IPCC). Projections for years 2040 to 2060 for heat and local snowpack completed. Precipitation study released December 2014 and available on the Climate Resolve website; Santa Ana wind & Wildfire to be released in 2015. Soil moisture and Sierra Nevada snowpack studies to be completed, as well.

Interactive Web-based Energy Atlas for the County of LA
This LARC/CCSC/County of Los Angeles project combines an analysis of granular energy consumption data with an analysis of LA-specific energy and climate best practices and GIS technologies. The result will be a web-based energy atlas that can inform energy efficiency and climate action plans and policies across the region. This tool will provide detailed information about Los Angeles County energy consumption, greenhouse gas emissions and climate action strategies overlaid on census data in an interactive web-based format. Project funded by the County of Los Angeles and will be launched June 2015.

COASTAL

Regional AdaptLA
USC Sea Grant, with partners including LARC, launched a new project – *Regional AdaptLA: Sea Level Rise and Coastal Impacts*. This multi-year project is focused on providing planning guidance, building regional capacity, and linking the best available scientific tools with local governments as they plan for the impacts of sea level rise. Eleven coastal municipalities and L.A. County have joined the initiative, as well as a strong coalition of support organizations including LARC, Heal the Bay, the Santa Monica Bay Restoration Commission and others. Funding support is provided by the State Coastal Conservancy and the Ocean Protection Council.

- The project was launched at two public informational forums with over 100 attendees. USC Sea Grant partnered with L.A. County Department of Beaches & Harbors for the June open house held in Marina del Rey, an area at-risk for coastal flooding. For the second open house, USC Sea Grant targeted the more socially vulnerable community of Wilmington and the surrounding Harbor region, and partnered with the community-based environmental justice organization Communities for a Better Environment. The event was conducted in both English and Spanish with materials provided in both languages.
- In November, USC Sea Grant hosted the first in a series of professional development workshops for local and regional government planners and managers. The ability to build and maintain partnerships was a main goal of the workshop, which drew attendees from city governments across the region, including Santa Monica, Redondo Beach, Malibu, Los Angeles city and county, Long Beach, Hermosa Beach, El Segundo, and Torrance. Attendees discussed the various sea level rise planning efforts underway across the region, learned

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about sea level rise science and the forth-coming CoSMoS modeling, and participated in a training on vulnerability assessments.

For more information: http://dornsife.usc.edu/uscseagrant/adaptla/

Southern California Coastal Impacts Project – Outreach on the CoSMoS Model

USC Sea Grant is also leading a wider Southern California capacity building and outreach project. USC Sea Grant partnered with the US Geological Survey and the California State Coastal Conservancy to secure over $1 million to support downscaled sea level rise and coastal storm modeling for Southern California and capacity building for local communities. USC Sea Grant is tasked with providing the outreach, communication and training to ensure the model meets user needs and effectively supports policy and planning decisions. This includes in-person process and technical workshops in the 4 sub-regions of Southern California – Santa Barbara/Ventura, Los Angeles (in concert with Regional AdaptLA), Orange County, and San Diego – as well as a webinar series to enhance capacity and engagement.

- USC Sea Grant held its first sub-regional workshop in the San Diego region in October. USC Sea Grant partnered with the San Diego Climate Collaborative, the San Diego Foundation and the Tijuana River National Estuarine Research Reserve to deliver the workshop, which included 55 planners, leaders, and consultants working on sea level rise planning across San Diego. USC Sea Grant tailored the workshop to fit regional needs, including sea level rise modeling and tools comparison, an overview of the state policy and regulatory framework, adaptation planning process, as well as breakouts to spur regional collaboration.
- Other workshops are planned for Santa Barbara/Ventura and Orange County in early 2015. The webinar series will also commence in early 2015.For more information: http://dornsife.usc.edu/uscseagrant/sccip/

Education and Teacher Engagement on Climate Change

USC Sea Grant engages teachers and students about the science of climate change and the associated impacts on coastal communities. USC Sea Grant collaborated with Aquarium of the Pacific staff at NOAA Day to provide a teacher workshop with hands-on lessons to utilize in classrooms, and with the L.A. Unified School District to provide teachers with hands-on experiences to understand the impacts of sea level rise on beaches. USC Sea Grant also collaborated with King Tides Initiative to develop a lesson for educators to enable them to integrate information on sea level rise and to engage students in citizen science. USC Sea Grant is currently working with the Southern California Aquarium Collaborative to develop climate change curriculum for teachers.
For more information: http://dornsife.usc.edu/uscseagrant/king-tides/

HEAT AND PUBLIC HEALTH

Public Health Training Modules

The LA County Department of Public Health partnered with the UCLA School of Public Health to create training modules and conduct targeted outreach on the nexus between climate change impacts and public health issues. These training materials are available on the LARC website.

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ENERGY

South Bay Clean Power [Community Choice Aggregation]
The cities in the LA region's south bay are exploring the feasibility of creating a JPA for a Community Choice Aggregation. To date, 3 cities have passed resolutions to join in this effort. Outreach is occurring with the other dozen cities, as this effort gains very real traction.

PORTS

Port of Long Beach Climate Change Adaptation and Coastal Resiliency Strategic Plan
Phase 1 of the Port's Climate Change Adaptation and Coastal Resiliency Strategic Plan (CRS Plan) has been completed. This phase comprises the Port's climate impacts study, which includes an assessment of the current science available on climate change, a robust asset inventory of all infrastructure owned or leased by the port, a vulnerability and risk assessment of those assets by system, an assessment of the 3 sections of the Long Beach breakwater, and a series of sea level rise inundation maps assessing 6 different SLR scenarios within the port's harbor district. Phase 2 has recently commenced and will encompass the writing and implementation of the actual CRS Plan, including the associated mitigation and adaptation measures to be taken at the port to ensure business continuity now and into the future.

TRANSPORTATION & LAND USE

The South Bay Cities Council of Governments (SBCCOG) Climate Action Plans and Mobility Matrix - The SBCCOG and its partners [Metro as the lead applicant; San Diego State University; and LARC] has received SGC funding to enable the development of a Sustainable South Bay Transportation and Land Use Implementation Framework and to implement the Sustainable South Bay Strategy (SSBS). The SSBS is a policy framework for mutually reinforcing land use and transportation initiatives that have been field tested and are now ready for implementation by cities and incorporated into the regional policy framework. The new tools that will be developed consist of Climate Action Plan transportation and land use chapters that identify greenhouse gas (GHG) emissions reduction strategies at the sub-regional and local levels, a Sub-Regional Implementation Toolkit to provide technical assistance for local level adoption of GHG reduction strategies and a Mobility Matrix for the South Bay, which includes evaluation and screening criteria for identifying priority mobility projects.

TYING IT ALL TOGETHER…

LA Regional Framework for Climate Action - LARC, in consultation with Metro, has received funds through the Strategic Growth Council Sustainable Communities Planning Grant and Incentives Program to perform regional climate action work. The Framework is a structure for climate action. It will include: a comprehensive survey of existing localized research, information, practices, ordinances, policies and guidelines (called the "State of the Region"); recommended Priorities and Actions based on climate change mitigation responsibilities and local climate impacts; relevant Best Management Practices; a discussion of Roles and Responsibilities; an analysis of Financing and Funding; and, an assessment of tools and mechanisms to be developed for local practitioners and decision-makers to better enable them to take climate action. The Framework is a 3-year project, and began in October 2013.

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To date LARC has promulgated an engagement plan and has developed a methodology to determine regionally relevant climate action strategies. In addition, LARC will have a final-for-now State of the Region report, which includes all of the current locally relevant data, information, and research on climate change impacts in the LA region. Immediate next steps are to promulgate recommended Priorities and Actions for review by local stakeholders. This process will run through June 2015.

BAY AREA CLIMATE & ENERGY RESILIENCE PROJECT

Bay Area Report — December 12, 2014
Selected Highlights — Current and Planned Activities:

Climate Readiness Institute Workshop
Conducted December 9th workshop on best roles for cities and counties for adaptation and GHG reduction. Featured case studies/discussions with staff from San Mateo County and City of Berkeley to explore key actions by those entities and what they need from state, region, private sector, etc. to succeed. Topics: Heat, water, sea level rise and GHG reduction.

Climate Readiness In Coastal Cities **— Sustainability Research Network**
BACERP is providing key practitioner support to UC Berkeley, Stanford, and UC Davis proposal to NSF for Sustainability Research Network. Held reverse site visit 3-hour finalist interview on 12/8 for possible $12M 5-year grant. Key topic areas: Flooding (sea level rise, storms, tides), water supply, GHG reduction, governance, and equity.

Bay Conservation and Development Commission

- Rising Sea Level Commissioner Working Group will look at projects through the lens of "total water level," the impacts of sea level rise on public access to the bay, and how to talk about sea level rise with the public.
- Bay Fill Policies Commissioner Working Group will work with an advisory group to determine whether and how to amend BCDC's current Bay fill policies to ensure that appropriate fill is allowed in the Bay as a way to adapt to rising sea level (hardscape and softscape). NOAA grant will help fund staff.
- Staff will take the sea level rise/ART show on the road. Will visit all 9 countywide planners meetings to discuss ART and shoreline resilience planning.
- Staff is working to expand the ART program into northern Contra Costa County.
- Staff is taking part in Natural Resources Agency project to ensure coordination/collaboration among all coastal zone management agencies.
- Staff is working with Coastal Conservancy and ABAG to drive shoreline resilience program around the Bay.

SFPUC's *Guidance for Incorporating Sea Level Rise into Capital Planning*
Excellent new document from City/County of San Francisco turns climate science into practical guidance for capital planning.

Bay Area Air Quality Management District — Regional Climate Protection Strategy
BAAQMD is embarking on major initiative to develop 9-county GHG strategy to meet the tough 2050 goal (80% below 1990 levels).

Transition in 2015 from BACERP to the new Alliance for Climate Resilience
JPC, Kresge Foundation, San Francisco Foundation and stakeholders are designing new ACR for the Bay Area in 2015.

Local Government Commission
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February 25, 2015

The Honorable Bob Wieckowski
Chair, Senate Environmental Quality Committee
State Capital Building, Room 2205
Sacramento, CA 95814

Dear Chairman Wieckowski, Committee Members Gaines, Bates, Hill, Jackson, Leno and Pavley,

The Local Government Commission applauds the Senate Environmental Quality Committee's leadership in examining how to effectively adapt to changing climate conditions. We are glad to share our perspective on what local governments are doing to tackle climate change, and how the state can work effectively with them to address this challenge.

I. To what extent are climate adaptation efforts being planned for and implemented at the local government level in California? Highlighting a case study or project examples would be helpful.

Roughly 70% of California cities and counties have adopted or are planning to adopt policies or programs to reduce greenhouse gas emissions. In August of 2014, Over 800 people attended the first California Adaptation Forum of which 23% were local or regional government representatives. This widespread engagement with mitigation and strong interest in adaptation, gives us hope that local governments will become a key force for adaptation action throughout California, and sets the stage for me to share a few salient examples. These are by no means the only examples, but are ones that highlight the kinds of responses we need to scale throughout the state.

First, local governments are utilizing and leveraging existing funding and new financing approaches for resilient projects that offer broad benefits:

- The Town of Windsor was the first municipality to adopt a Pay as You Save (PAYS) water conservation and energy-efficiency upgrade program that provides residents with immediate savings on utility bills and requires no upfront cost or new debt. To date, Windsor has saved almost 6 million gallons in water and more than 72,000 kWh of electricity. Learn more here
- San Francisco recently became the first US City to adopt formal guidance for incorporating sea level rise into the over 25 billion in projected capital planning decisions the city will make in the coming decade. Learn more here
- Placer County and other sierra regional partners are looking at ways to ramp up sustainable forest management practices to protect air quality, human health, and community stability while also stimulating local economic development through biomass energy production, reduced wildfire costs and eventually carbon offset projects. Learn more here and here

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Second, we are seeing local governments look beyond traditional "hard" infrastructure responses, towards green infrastructure solutions that can protect natural resources, optimize environmental benefits and even save money.

- Los Angeles has used bonds and reallocated funds from hard-infrastructure projects to finance green infrastructure projects that achieve water conservation, water quality, flood protection and stormwater management objectives. This commitment has resulted in large-scale initiatives, such as the Sun Valley Watershed project, that integrate flood control, stormwater pollution reduction and water conservation efforts through infiltration and stormwater recycling practices. Learn more here
- The Napa River has seen 22 serious floods since 1862. After two hard-infrastructure approaches were rejected by voters, the community approved - by a 2/3 majority - a "living river" approach, which will reconnect the river to its historic flood plain, and support a continuous fish and riparian corridor. In addition to environmental restoration, the Napa River project has generated $898 million in public and private investment from 1997-2010. Learn more here

Finally, local governments are using their regulatory and policy-making authority to respond to climate risks and coordinate action at the local and regional level.

- In 2011, the city of Chula Vista approved one of the first standalone climate adaptation plans. The 11 strategies in the plan include measures to expand urban forests, incorporate "cool" roofs, promote water reuse, adjust open space management, and design future development to be resilient to sea level rise. Learn more here
- In 2012 the Sacramento Municipal Utility District adopted a Climate Readiness Strategy that treats climate impacts as an enterprise risk, has a 4 year update cycle, and will be applied to all long-term planning activities (>5 years). Learn more here
- In response to a projected 4-5 degree warming that will drive extreme heat public health risks, in December of 2014 the city of Los Angeles approved an ordinance that requires cool roof's – that both provide cooling and energy savings - on all new residential construction and re-roof's above 50% of the square footage. Learn more here
- Monterey Bay and San Diego County are both working to integrate climate change risks into their Multi-Jurisdictional Hazard Mitigation Plan. Although comprehensive documents, Hazard Mitigation Plans have not typically been developed to account for future risks, making this a potentially significant approach to addressing climate change by fostering coordination of public health, safety, and planning activities. Learn more here and here

It is important to note that many of these examples and many of the relevant projects to date are happening at the intersection of adaptation and mitigation because they are leveraging existing mitigation funding or planning mechanisms. This has been invaluable to progress, but also does impose some limits on the development of other adaptation efforts.

II. What have been the major challenges and successes to date for local governments working to plan and implement adaptation projects?

Across these efforts, we see the following themes of success:

- **Local Leadership:** Although they recognize that adaptation is beyond any one local government, some are stepping forward and demonstrating the local leadership we need. This leadership is indicative of 1) a recognition of the urgent need to take action, 2) a willingness to invest in the process and 3) the potential among local governments to create innovative and integrated models to respond to climate challenges.
- **Creative Application of Existing Mechanisms:** We are seeing interesting applications of existing policy mechanisms (Hazard Mitigation Plans, General Plans, Climate Action Plans, Local Coastal Plans) to the

climate adaptation concerns. Such creative approaches are creating solutions and opportunities for stakeholders to build momentum within existing frameworks.

- **Learning from mitigation experience:** Given the decade plus of robust local Climate Action Planning for mitigation, local governments are in a much better position to approach climate adaptation. The growth of staff expertise and supporting resources around mitigation planning has definitely given adaptation efforts an invaluable starting point.

Despite the many individual successes, the challenges remain significant:

- **Scale of the Problem:** Unlike mitigation planning, the magnitude of natural disasters under climate pose vast decision making / risk analysis challenges for local governments who do not have the information and skills to assess the full suite of their vulnerabilities, or plan for possible responses in a holistic way.

- **Lack of Standards:** Also unlike mitigation planning local governments as of yet, we do not have a widely accepted and well-developed "protocol" for adaptation, a body of field-tested "solutions", or any clear ways of defining or measuring outcomes to determine success. Absent a centralized approach or framework for action, local governments find themselves inventing solutions in isolation, leading to a patchwork of actions that may not be cohesive across a region, or effective at scale throughout the state.

- **Lack of Financial Resources**: Despite the obviousness, it bears mentioning that given the scale of the problem, local governments are woefully under resourced to take on adaptation at an individual jurisdiction level. So many of the problems we face from climate change are at least regional in scale, and so leaving local governments to respond with only the existing revenue generation tools will never succeed.

III. In what ways and to what extent do local governments work with the state when incorporating climate adaptation and resiliency efforts? How could this process be improved?

Local governments are finding ways to work with the state in a number of cases;

- **Information and Dialogue:** The state has been proactive in providing venues for information sharing with local government. OPR's efforts to serve as a coordinating body for conversations and information has been extremely valuable as evidenced by their participation in the Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) and partnership on CivicSpark – the new statewide climate change capacity building AmeriCorps program for local governments. We also see dialogue with Natural Resources through the safeguarding California Plan (and participation in the California Adaptation Forum. Additionally the tools and resources provided by the state (Cal-Adapt, the Adaptation Planning Guide) have been valuable resources for local governments to utilize.

- **Project Partnerships:** Some agency programs (Coastal Commission, Strategic Growth Council, Department of Water Resources, Department of Public Health, among others) are starting to work with specific jurisdictions on a project or grant basis. We saw the addition of specific adaptation criteria in the Strategic Growth Council's Affordable Housing and Sustainable Communities GHG Reduction Fund program as a very positive step towards mainstreaming adaptation considerations into state / local funding streams.

- **Use of Policy Mechanisms:** As noted above, some local governments are also attempting to use existing state/federal policy structures not specifically designed for adaptation (Hazard Mitigation Plans, General Plans, Climate Action Plans, etc.) as a means to address adaptation, leading to further interaction and dialogue about how we collectively respond.

- **Adapting to Rising Tides:** Finally, we want to point to a specific example that could be a prototype for how state and local partners can work together. Over the last couple of years a state agency - the Bay Conservation and Development District has been leading the Adapting to Rising Tides project, which is now growing into a larger Resilient Shorelines Initiative. Not only has ART piloted a strong holistic planning process designed to protect both resources and community well-being, but we have heard from some participants, that ART

has also enabled each partner (state, regional, local) to leverage it's own resources and insights resulting in a stronger engagement and ownership by all parties.

In terms of improving state and local coordination and collaboration, a number of points are worth mentioning. Through the 2014 Safeguarding California Plan, we already have a set of seven excellent action principles intended to guide state efforts. As good as these principles are they do not explicitly respond to local needs, nor provide a platform to integrate local governments into the process. Strategies must account for the different needs and resources of our state's unique regions. In light of this and our preceding comments, we suggest the following:

- **Create a Supportive Regulatory Environment:** Climate effects transcend our multiple layers of government – creating an extremely challenging regulatory environment. Authority should rest with the appropriate level. Land-use decisions are appropriately made at the city or county level, but better incentives are needed for coordination so decisions at each level help to reduce the risk of climate change and increase resiliency. In this context, we need to see this not as a "new" initiative, but the state could provide templates and funding to local governments so they can integrate adaptation into existing vehicles (Hazard Mitigation Plans, General plans, Climate Action Plans, and other relevant codes and ordinances)

- **Build Strong Local / State Collaborations:** The state can support and gather effective allies when developing its climate-change policies by creating an official forum to engage local governments early in the process and giving credibility to local and regional efforts. For example, the state could consider setting up Climate Risk / Resiliency Management Council, made up of local and state agency representatives to publically define a shared path forward.

- **Ensure Investment Alignment:** Past and present state funding for climate mitigation work contributed to the rapid adoption of policies across California. Similar state resources for planning and implementation are needed to catalyze adaptation efforts. For example, a "Resiliency in all Policies" approach would align state investments (capital outlay, permits, grants) so they do not support projects are located in at-risk areas vulnerable to sea level rise, flood, erosion, landslides and wildfire. Further, we must ensure that sufficient funding and other vital resources go to communities who are developing innovative models to successfully adapt to climate change. We must think about climate-change adaptation as the smart "investment" opportunity, instead of additional costs on top of already burdensome costs.

- **Provide Robust Decision Support, and Action Frameworks**: Local governments need up to date information and guidance from state agencies that account for future projections under climate change instead of outdated historical trends. As we move past the easy steps toward increasingly difficult, costly implementation measures, cities and counties will need fine-grain research on local impacts that can justify more expensive strategies. Within this arena, the state can provide transformative, tipping-point resources – an integrated toolbox for funding, techniques, templates and research – to strengthen partnerships with local governments and build a statewide engine for climate-change innovation and implementation.

Our responses to climate change – at the local level and the state – will be powerful forces in the coming years. We can protect our people and environment while we also grow a strong economic future but only if we take action together starting today.

Sincerely,

Kif Scheuer
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Local Government Commission
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Senate Committee on Environmental Quality

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CHAIR

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SCIENCE & TECHNOLOGY FELLOW
LAURIE HARRIS
COMMITTEE ASSISTANT
SUE FISCHBACH

INFORMATIONAL HEARING OF THE SENATE ENVIRONMENTAL QUALITY COMMITTEE
BOB WIECKOWSKI, CHAIR

Friday, May 29, 2015, 10:00 a.m.
OAKLAND CITY HALL, CITY COUNCIL CHAMBER, 3rd FLOOR
1 FRANK H. OGAWA PLAZA, OAKLAND, CA 94612

Bay Area Regional Adaptation Efforts to Climate Change Impacts

AGENDA

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1. **Climate Change Impacts and Adaptation Coordination in the Bay Area**
   a. William Collins, *Senior Scientist and Climate Science Department Head, Lawrence Berkeley National Lab*
   b. Bruce Riordan, *Program Director, Climate Readiness Institute*
   c. Cynthia Comerford, *Director, Climate and Health Program, San Francisco Department of Public Health*

2. **Regional Adaptation Efforts**
   a. Zack Wasserman, *Chair, San Francisco Bay Conservation and Development Commission (BCDC)*
   b. Danielle Mieler, *Resilience Program Coordinator, Association of Bay Area Governments (ABAG)*

3. **Local Government Adaptation Efforts**
   a. Suzanne Smith, *Executive Director, Regional Climate Protection Authority & Sonoma County Transportation Authority*
   b. Jack Liebster, *Planning Manager, County of Marin*
   c. Demetra McBride, *Director, Office of Sustainability and Climate, County of Santa Clara*
   d. Timothy Burroughs, *Chief Resilience Officer, City of Berkeley*

4. **Nonprofit and Community Adaptation Efforts & Environmental Justice Considerations**
   a. Parin Shah, *Senior Strategist, Asian Pacific Environmental Network (APEN)*

5. **Public Comment**

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Bay Area Regional Adaptation Efforts to Climate Change Impacts

BACKGROUND INFORMATION

Climate Change Impacts and the Bay Area

The climate is warming, largely due to human activities, with serious impacts for regions throughout the state.

Worldwide, as noted in the 5th assessment report from the Intergovernmental Panel on Climate Change (IPCC), 40% increases in carbon dioxide concentrations since pre-industrial times have led to a rise of average surface temperatures of approximately 1.4°F. Current research indicates that an increase in the global average temperature of 2.0°F above present levels poses severe risks to natural systems and human health and well-being, and sea levels have already risen by nearly eight inches.

Per the U.S. Environmental Protection Agency, every 2°F increase in global average temperature is expected to result in 5-15% reductions in crop yields, 3-10% increases in rainfall during heavy precipitation events, and 200-400% increases in areas burned by wildfires in the western U.S.

In California, the frequency of extreme events, including heat waves, wildfires, floods, and droughts, are expected to increase. Higher temperatures and more frequent and severe extreme events will have a range of consequences for public health through impacts to water quality, air quality, and infectious disease spread.

Water Quality and Sea Level Rise

Sea level change has impacts on coastal planning and development, land use, and water quality. Rising sea levels can increase risks for floods, erosion of coastlines, and intrusion of saltwater into freshwater aquifers leading to reduced water usability.

As noted in the 2012 "Sea Level Rise for the Coasts of California, Oregon, and Washington" report from the National Research Council (NRC), a significant amount of development in the San Francisco Bay is at risk. This includes two international airports, two ports, stadiums, and housing developments, which have been built on fill that is only a few feet above the highest tides. Additional systems at risk include electric utilities, powerplants, storm water and wastewater treatment plants and outfalls, wetlands, fisheries, hospitals, schools, and homes.

At just 1.3 feet of sea level rise, as predicted to occur within several decades, the San Francisco International Airport will begin to flood, as shown by the blue shading in Figure 1 from the NRC report. With 3.3 feet of sea level rise, the Pacific Institute estimates the costs of replacing properties in the San Francisco Bay area that are at risk from coastal flooding at $49 billion (at year 2000 cost).

Furthermore, 3.3 feet of rise puts 220,000 people at risk from flooding, with particularly large numbers impacted in Alameda, Marin, and Santa Clara Counties, as well as 40-45% of populations in San Mateo County.

According to the Public Policy Institute of California's (PPIC) 2008 "Adapting California's Water Management to Climate Change" report, sea water intrusion in the Delta could disrupt the state's water supply for months to years (Hanak and Lund, 2008).

Across California, groundwater accounts for over 40% of drinking water. Some counties in the Bay Area are already grappling with questions about how to handle coastal properties that lose access to fresh water due to salt water intrusion with rising sea levels.

In addition to coastal areas, flooding along rivers, streams, and lakes termed "riverine flooding," is a large concern during heavy rainfall periods in extreme weather events, which are expected to increase in both frequency and severity over the coming century. In 2006, the flood damage to the City of Napa and surrounding areas included 1,200 homes, 250 businesses, and totaled approximately $115 million according to the California Department of Water Resources's website.

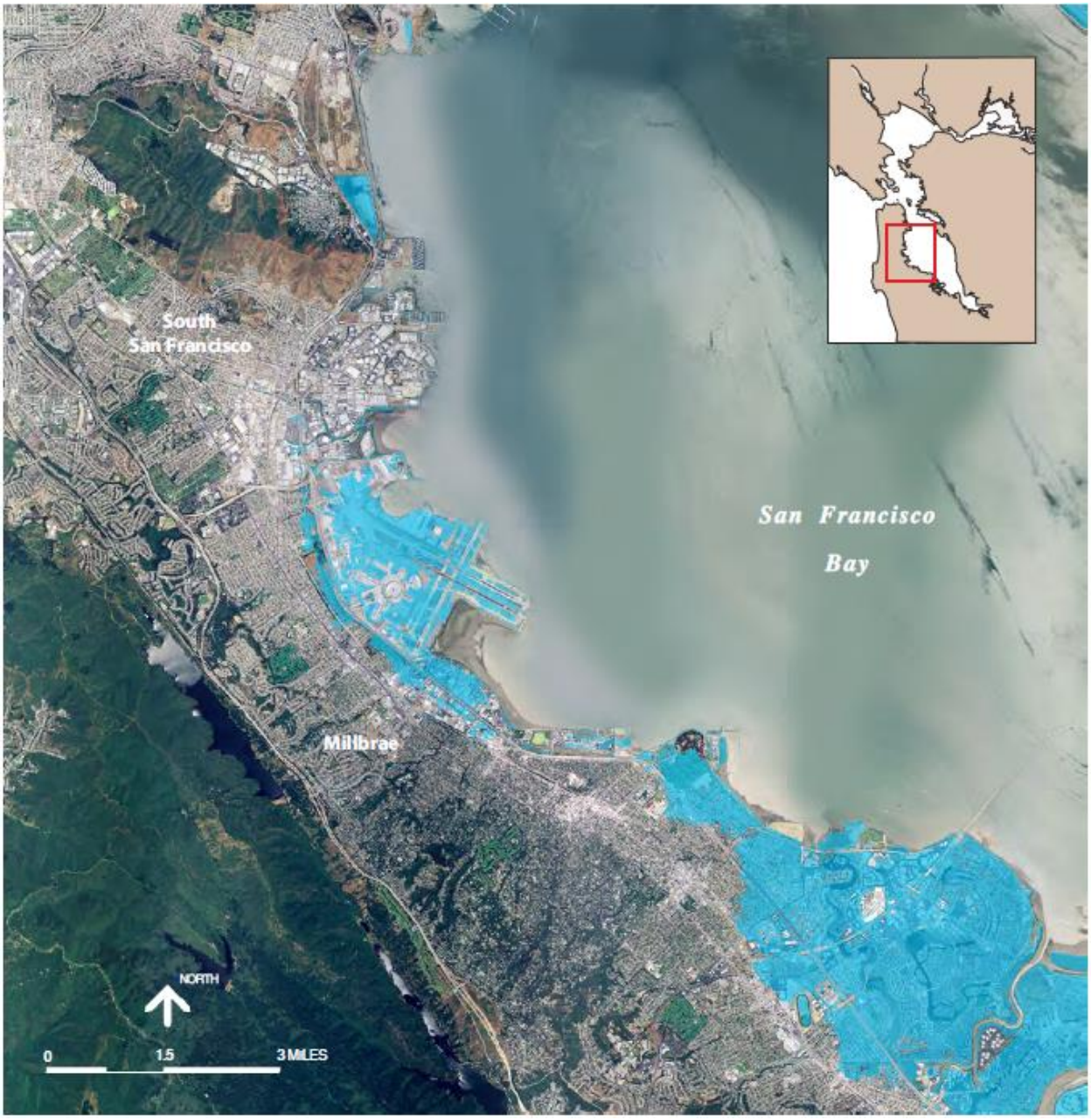

Figure 1. Expected inundation of low-lying areas, including the SF International Airport (center), in the San Francisco Bay Area with a 40 cm rise in sea level (light blue shading). SOURCE: Bay Conservation and Development Commission.

Along with sea level rise, drought is an important consideration for water quality. The nature of the current drought has likely been worsened due to the record temperatures across the state, which has additional implications on public health, job losses, and the economy, with an estimated 2.2 billion dollar price tag for California agriculture.

As river flows decline during extended drought periods, less fresh water from reservoirs is available to repel saltwater intrusion into areas of the delta where fresh water is drawn. As noted by Jon Burau at the United States Geological Survey (USGS), "Salinity is the central management challenge during a drought. People don't realize how much water we 'spend' repelling salinity intrusion to maintain water deliveries."

Though an overall reduction in rain amounts is expected with climate change, rainfall events will likely be more extreme, overwhelming sewage and water treatment facilities and resulting in further decreases in water quality. Overall, higher salinity water has reduced usability for both drinking water and agricultural purposes, and methods to obtain fresh water, such as desalination procedures, can be costly and energy-intensive, which can subsequently undermine mitigation efforts.

Air Quality and Wildfires

A number of impacts from climate change can lead to worsening air quality. Longer, hotter dry seasons lead to more ground-level pollutants like ozone and extended seasons for allergen-producing plants, which can result in increased respiratory illness and premature death. High temperatures combined with a worsening drought resulting in dry conditions lead to more wildfires. Scientific modeling has predicted 12-53% increase in large California wildfires by 2100 (Westerling and Bryant, 2006).

Wildfires can result in not only air pollution, but also concerns for water and power supply. For example, in 2013, water and power infrastructure supplying over 2.6 million Bay Area residents was threatened by the Rim Fire. During that fire, regular water testing was conducted to make sure that fallout from the fire was not jeopardizing water quality downstream.

Additionally, even in areas that are not at a high risk for wildfires, such as San Francisco, air pollution is a concern. According to the California Air Resources Board's "Wildfire Smoke Guide," for example, Santa Ana winds can reverse the typical onshore flow wind patterns and blow strongly towards the coast, bringing smoke from mountain fires into heavily populated areas. Smoke from wildfires can lead to minor eye and lung irritations to more serious asthma attacks, bronchitis, and premature death.

Public Health

Climate change can have a number of direct and indirect impacts on public health. For example, hot temperatures, as well as drought, facilitate the spread of diseases such as West Nile Virus (WNV) by aiding the development of mosquitoes, which spread the virus to people, birds, and other animals. Last year in California, the number of mosquitoes carrying WNV surged to unprecedented levels, and one-third of the state's virus-positive birds were found in Santa Clara County. Earlier this month, the non-native *Aedes aegypti* mosquito was found for the first time in Alameda County and has been found in recent years in San Mateo County. This species of mosquito has the potential to transmit viruses responsible for a number of diseases, including dengue, yellow fever, and chickungunya, often biting during the day and indoors. These mosquitoes lay eggs that can stay dormant for months to years in dry environments.

In San Francisco, an eight-fold increase is expected in the number of extreme heat days (up to 90 per year) by the end of the century, leading to subsequent increases in heat-related illness and deaths, particularly for vulnerable populations, including the poor, elderly, and young children (Morello-Frosch et al., 2009). The San Francisco Climate & Health Program has highlighted a number of the primary potential health impacts in the Bay Area, as shown in Figure 2.

HAZARD	CLIMATE IMAPCT	HEALTH IMPACT
Temperature 	Average yearly temperature to increase between 4.1 and 6.2 degrees Fahrenheit by 2100	· Heat-Related Illness o Dehydration o Heat Stroke
	Extreme Heat Days (over 85F) to increase by 15-40 by 2050, potentially 90 by 2100	· Heat-Related Mortality o Heart Disease · Air Quality Effects
	Increase in heat wave length and frequency.	o Respiratory Illness o Asthma o Allergies · Mental and Behavioral Health
Sea level Rise 	Projections indicate that in the most likely scenario, sea levels will rise between 7-15 inches by 2050 and 26-46 inches by 2100	· Fatal and Nonfatal Injury · Water-borne disease · Mental and Behavioral Stressors · Income Loss
Extreme Storms 	Bay Area precipitation levels are projected to fluctuate between wet and dry extremes. Currently California recieves 35% - 45% of its annual precipitation from 'Pineapple Express' extreme storm events. This number could increase by up to 11% by 2100.	· Fatal and Nonfatal Injury · Water-borne disease · Mental and Behavioral Stressors · Strain on public health infrastructure · Income Loss
Drought 	Bay Area precipitation levels are projected to fluctuate between wet and dry extremes. In dry years where the high-pressure system off the coast does not dissipate, the frequency and severity of droughts will increase.	· Income Loss · Food Insecurity o Malnutrition · Air Quality / Allergens o Respiratory Illness o Asthma o Allergies · Mental and Behavioral Health

Figure 2. San Francisco and Bay Area Climate Projections and impacts over the next century. SOURCE: San Francisco Climate & Health Profile (http://www.sfclimatehealth.org/san-francisco-climate-projections/)

In the winter, fewer nights where the temperatures reach freezing can impact both human and plant health. For example, according to the 2014 Climate Ready Sonoma County report, vulnerabilities include proliferation of pests and pathogens due to fewer cold nights, with subsequent increases in pesticide use to combat them. Additionally, a reduction in chill hours leads to lower yields and less bloom time for flowers, fruits, and nuts. This can subsequently result in food insecurity and rising food costs with disproportionate impacts on low-income households.

Climate Change and Environmental Justice Considerations

Socially and economically disadvantaged communities will be harder hit by, and less able to adapt to, the impacts of climate change. As noted by the Pacific Institute's 2013 report on sea level rise in the Bay Area, adaptation requires tremendous investment and decisions about what to protect, which raises environmental justice concerns. They note that "what we choose to protect and how we pay for it may have a disproportionate impact on low-income neighborhoods and communities of color." Lack of access to a vehicle to evacuate during emergencies, inability of renters to invest in major reinforcements for their homes, and lack of access to emergency communications for non-English speakers are some of the many important considerations in equitably preparing for climate change impacts.

Additionally, minorities and low-income people are more likely to live close to facilities such as powerplants and refineries (Boyce and Pastor, 2013) and hazardous materials sites. Not only are these residents regularly exposed to worsened air quality from high local emissions, such as particulate matter and nitrogen oxide, they are at risk of exposure to toxic chemicals during inundation from extreme events and flooding. The Pacific Institute found that, with a one meter sea level rise, 208 hazardous waste facilities along the San Francisco Bay are at risk from a 100-year flood event. As an example, one month after Hurricane Katrina, sediment samples in New Orleans had levels of arsenic, lead, and the gasoline constituent benzene in excess of drinking water standards (Adams et al. 2007).

Adapting and Building Resiliency to the Impacts

California has been a leader in pursuing policies and strategies to reduce greenhouse gases (GHGs). These reductions are an important part of the global effort to reduce the most severe impacts of climate change. However, even if all GHG emissions ceased today, many impacts of climate change would still be unavoidable because the climate system changes slowly. As we are already seeing the effects of climate change with many more impacts to come, developing comprehensive adaptation strategies to address them are of great importance.

State Efforts in Climate Adaptation

A number of state laws, regulations, and executive orders (EOs) have focused on GHG emission reduction efforts, while a subset address adaptation and resiliency. Governor Brown's recent EO, B-30-15, focused on state efforts to address climate adaptation by directing the Natural Resources Agency to coordinate regular updates to California's Climate Adaptation Strategy and all state agencies to consider climate change and adaptation in their planning and investment decisions. Last year, AB 2516 (Gordon), Chapter 522, Statutes of 2014, created a Planning for Sea Level Rise Database to inventory sea level rise planning in the state biannually.

State Resources & Planning Documents

State agencies have worked together, and through coordinating bodies such as the Climate Action Team and the Strategic Growth Council, to produce multiple climate change assessments

and guidance documents, as well as provide funding for affordable housing and sustainable communities. Key recent and upcoming documents include:

- The 2012 Adaptation Planning Guide (APG), which provides guidance and support for local governments and regional collaboratives in addressing the impacts of climate change;

- The 2014 Safeguarding California Report, an update to the 2009 California Climate Adaptation Strategy, which summarizes impacts from climate change across sectors and provides policy guidance for state decision makers and recommendations for adaptation strategies;

- The upcoming Fourth Climate Change Assessment, which will provide scientific information to support adaptation decisions, implement much of the state's Climate Change Research Plan to coordinate state research on climate change, and identify additional climate change research projects; and

- Cal-Adapt, which is a web-based climate adaptation planning tool intended to benefit local planning efforts by downscaling climate change scenarios and research for regions within California.

State Strategies and Recommendations

The Safeguarding California report listed key cross-sector strategies for adaptation, which included integrating climate change into government activities; considering vulnerable populations, significant and sustainable funding sources, and research data and tools; prioritizing projects with multiple benefits; and prioritizing communication, education, outreach, and collaborative, iterative processes. The guiding principles of this Climate Adaptation Strategy update included involving all relevant stakeholders and establishing partnerships across levels of government and between public and private sectors. This emphasis on collaboration from state agencies is further highlighted in the Adaptation Planning Guide, which states, "Climate adaptation requires a sustained iterative process meaning both local and regional staff and community members should be engaged throughout the process."

<u>Regional Efforts in Climate Adaptation</u>

The Bay Area has been very engaged in climate adaptation. Local leaders in this area have described both the laudable number and quality of adaptation partnerships and projects, as well as the ongoing need for improvements in regional structure and communications across stakeholder groups.

Regionally, there have been a number of initiatives focused on climate change in a variety of sectors. One of the regional coordinating bodies has been the Bay Area Joint Policy Committee (JPC), which coordinated the planning efforts of the Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), the Bay Conservation and Development Commission (BCDC), and the Metropolitan Transportation Commission

(MTC). The Bay Area Climate & Energy Resilience Project (BACERP) collaborative, a project of the Bay Area Joint Policy Committee (JPC), brought together over 300 public, private, and nonprofit stakeholders in the Bay Area. BACERP was also part of the larger Alliance of Regional Collaboratives for Climate Adaptation (ARCCA) network, which includes four additional collaboratives in the San Diego, Los Angeles, Capital, and Sierra Nevada regions.

In November 2014, many of the key projects and programs on climate adaptation in the region were summarized in BACERP's Bay Area Climate Asset Map, and included efforts focused on flooding, water, energy, natural systems, health, and multi-impact initiatives at the local, government, regional agency, non-profit, and private sector levels. Regional agency initiatives include ABAG's Regional Disaster Resilience Initiative, the Bay Area Regional Hazard Mitigation Plan, the BAAQMD Regional Climate Protection Strategy, and Plan Bay Area, which is an integrated transportation, housing, and land use strategy through 2040. Additionally, a number of local health departments have been working with the California Department of Public Health's (CDPH) "CalBRACE: California Building Resilience against Climate Effects" project to plan for and reduce health risks from climate change.

In addition to agency collaboration, regional coordination is occurring through broad partnerships in both the public and private sectors and across levels of government. From the many dynamic regional and subregional efforts in the Bay Area, some highlights include:

- Climate Readiness Institute (CRI): CRI is a partnership with universities, the regional collaborative, and leaders from the local government and non-profits developing climate science, adaptation strategies, and mitigation tools.

- Adaptation to Rising Tides (ART): Led by the BCDC and the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center, ART is a collaborative planning effort for adapting to sea level rise and storm flooding while protecting ecosystem and community services; ART engages stakeholders across levels of government, nonprofits, and private organizations.

- State Route 37 Stewardship Study: Through a partnership of Bay Area transportation, environmental groups, and resource protection agencies, this project works to determine planning solutions for both people using the highway and the natural environment regarding dangers from sea level rise.

<u>Local Efforts on Climate Adaptation</u>

County-Level

The nine counties of the Bay Area have been engaged in both climate mitigation and adaptation to varying extents. Planning and coordination efforts in climate adaptation were summarized recently in the 2014 "Bay Area Climate Adaptation & Resilience Nine County-Level Snapshots: Projects, Plans, Structures & Needs" report from BACERP. As noted in the report, throughout the process of creating it, the major points to come out of the discussions with stakeholders included moving from individual to more coordinated projects, identifying and developing

sustainable funding, building support and engagement with the public, and providing centralized information and assistance. A subset of the many county-level and sub-regional efforts covered in the report is highlighted below.

1) Alameda County
    a. *Hayward Area Shorelines Planning Agency's Sea Level Rise Project*: A study by the joint powers authority, this project brings together stakeholders to address sea level rise threats to wetlands and levees along over 4 miles of shoreline.
    b. *Alameda County Santa Rita Jail Smart Grid*: Through a partnership with the county and Chevron Energy Solutions, the project ensures stored, renewable power in the event of a disruption from the Bay Area power grid, and builds on previous projects implementing solar panels and wind turbines.

2) Contra Costa County
    a. *Flood Control*: County staff and the Flood Control 2.0 Project have been working to raise awareness of the need for flood control planning, while providing environmental benefits and cost-savings.
    b. *Health Services Climate Leadership*: County Health Services has worked on a white paper concerning the connection between climate change and health, and the Planning Integration Team for Community Health (PITCH) interdepartmental team integrates public health considerations into land use and transportation planning and engineering activities.
    c. *U.S. Environmental Protection Agency (EPA) Small Cities Climate Showcase Grant*: El Cerrito is one of four small Bay Area cities (with Albany, Piedmont, and San Pablo) helped by the EPA grant to partner on activities such as purchasing joint solar by pooling resources.

3) Marin County
    a. *Marin Climate & Energy Partnership (MCEP)*: Partners, including 11 cities and towns, the County, the Transportation Authority, and the Municipal Water District, are working to both reduce GHG emissions and build resilience.
    b. *Collaborating on Sea Level Rise*: *Marin Adaptation Response Team (C-SMART)*: With a grant from the Ocean Protection Council, the team is looking at vulnerabilities to sea level rise and protection from both natural systems improvements and engineering solutions; this is one of many sea level rise projects in the county.

4) Napa County
    a. *Measure A Flood Protection Project*: This project provides environmental restoration and economic development for 100-year flood protection and includes a range of partners such as Napa County and its cities, Sierra Club, and the Chamber of Commerce.
    b. *Napa Green – Sustainability in the Wine Industry*: A program for wine production and sustainable land use, developed by vintners and grape growers, as well as local industry and environmental groups, its goals are to meet and exceed over 20 local, state, and federal best practices in water and energy conservation, healthy environments, and restoration of wildlife habitat.

5) San Francisco County
    a. *SF Adapt*: Led by the Department of the Environment and the City Administrator, this is an inter-departmental effort to coordinate climate adaptation planning, including the Public Utilities Commission, port, airport, Transportation Agency, Public Health, and other agencies.
    b. *Climate Ready Initiative*: This is a project of San Francisco's Department of Public Health funded by the U.S. Centers for Disease Control and Prevention, to develop public health capacity for climate change, focusing on at-risk populations.

6) San Mateo County
    a. *Regionally Integrated Climate Action Planning Suite (RICAPS)*: With technical assistance and tools developed by the City and County Association of Governments for this project, each city develops its own Climate Action Plan (CAP), including a section on adaptation.
    b. *Sea Level Rise/Adaptation Workshops*: The County has led two workshops to bring all 20 cities together to discuss climate risks and strategies with panelists from academia, local and state government, and federal agencies.

7) Santa Clara County
    a. *Silicon Valley 2.0 (SV 2.0)*: Funded by the Strategic Growth Council, and working with local and regional agencies, private and nonprofit partners, the county has developed a climate adaptation plan and decision-making tool involving multiple sectors.
    b. *Santa Clara Valley Water District (SCVWD) Projects*: The SCVWD works on a number of adaptation activities concerning flood control, water reuse, efficiency, and conservation, and saltwater intrusion prevention.

8) Solano County
    a. *Multi-agency Climate Action Planning*: With funding from the Strategic Growth Council and Pacific Gas & Electric (PG&E), the county developed a CAP and implementation strategy, managed by the Solano Transportation Authority, focused mainly on GHG emissions reductions to date.
    b. *Suisun Marsh Restoration Project*: Federal, state, and local government and private partners work together to address sea level rise and reduced Delta water flows, which impact water quality for people and wildlife.

9) Sonoma County
    a. *Regional Climate Protection Authority (RCPA)*: Created by the legislature in 2009, the RCPA's goal is to improve cross-agency coordination and collaboration in the county on climate change issues.
    b. *Sonoma County Adaptation Forum*: Last month, a group of nonprofits, agencies, and businesses presented the forum in order to increase awareness of climate impacts in the county and strategies for resilience.

City-Level

As of March 2014, over 40 cities in the Bay Area have completed Climate Action Plans. Many CAPs focus mainly on GHG emissions reductions and may or may not address adaptation and resiliency planning. In the absence of a specific CAP, climate planning (mitigation +/- adaptation) may be included in a city's hazard mitigation plan, local general plan, or other official planning process.

In December 2014, 16 communities across the U.S. were recognized as leaders in climate change by the White House, including two in the Bay Area: San Francisco for a wide-range of climate and sustainability targets and goals to measure progress, and the Sonoma County Regional Climate Protection Authority (RCPA), as the first local government agency created to address climate change specifically and work across "silos," as departments are sometimes referred to when they do not frequently coordinate activities, on climate change goals.

Many of the cities in the Bay Area are engaged in climate adaptation to varying degrees. In 2013, the Rockefeller Foundation, through its Resilient Cities Centennial Challenge, selected four cities in California, including three in the Bay Area—Berkeley, Oakland, and San Francisco—to receive technical support, tools, and funding for hiring a Chief Resilience Officer and developing a resilience strategy.

<u>Engagement from the Business and Nonprofit Sectors</u>

In some cities, cross-sector groups are coming together to work on climate action and make sure planning is effective and equitable. One example is the Oakland Climate Action Coalition (OCAC), which has brought together over 30 community, environmental, labor, and other organizations since 2009, aided in developing the city's Energy and Climate Action Plan (ECAP), and aims to be a model for community engagement. OCAC's Resilience and Adaptation Subcommittee, co-chaired by members of the Pacific Institute and the West Oakland Environmental Indicators Project, has been very engaged in informing the development of equitable adaptation planning by working with community-based organizations. Some of the member groups include the Asian Pacific Environmental Network (APEN), Bay Localize, Communities for a Better Environment, Environmental Defense Fund, Local Clean Energy Alliance, Roots of Change, and many more.

The Contra Costa County Climate Leaders (4CL) nonprofit is a network that assists the county and its 19 cities by facilitating countywide action for both GHG reduction and adaptation by helping to inform, support, and encourage climate strategies. In the wider Bay Area, organizations such as the Business Council on Climate Change (BC_3) help businesses prioritize "climate solutions that require cross-company or cross-sector collaboration" with a current focus on corporate leadership in the areas of carbon sequestration and energy.

Summary

Much work has begun on climate adaptation in the Bay Area, thanks to a wealth of climate leadership. This work is often carried out through collaboratives and partnerships that aim to address broad-sector impacts from climate change. There is more work to be done at the state level to provide support, expertise, and resources for climate change initiatives, and to work with stakeholders to address challenges and coordinate state, regional, and local projects in order to develop comprehensive approaches to climate adaptation.

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California State Senate Committee on Environmental Quality
Oakland City Hall, City Council Chamber, 3rd Floor
1 Frank H. Ogawa Plaza
Oakland, California

May 29, 2015

Bay Area Regional Adaptation Efforts to Climate Change Impacts
Testimony of R. Zachary Wasserman, Chair
San Francisco Bay Conservation and Development Commission

Chair Wieckowski:

Thank you very much for holding this important hearing on regional climate change adaptation in my hometown of Oakland. I am Zack Wasserman. Governor Jerry Brown appointed me Chair of BCDC a little over three years ago. I am honored to give this testimony to a Committee whose Chair is a former BCDC Commissioner! Larry Goldzband, BCDC's Executive Director, accompanies me today.

BCDC is celebrating its 50th Anniversary this September. Since that time, BCDC has exercised direct regulatory authority over projects that propose to fill, or extract materials from, the Bay and has authority to maximize public access impacts within the Bay's 100-foot shoreline band. BCDC has approved projects worth billions of dollars, and we are proud of the Commission's record and commitment to work closely with all applicants – private and public – from a project's initial stages to ensure that they comply with state law. We continue to do so while we reassess how we can and should live with the Bay as it grows due to rising sea level. I have attached our much longer testimony before the Little Hoover Commission in late 2013 that describes in more detail BCDC's history, jurisdiction, authority, and regulatory and planning actions regarding rising sea level.

Since the passage of AB 2094 in 2008, BCDC has been the State agency responsible for leading the Bay Area's preparedness for, and resilience to, rising sea level, tides, and storm surge due to climate change. You will remember BCDC's efforts to amend the Bay Plan a few years ago to require project vulnerability assessments and adaptation measures such as resilient design, and the controversy that ensued. BCDC substantially revised its original plan to gain the support of local governments, the private sector, and the environmental community. Our policies now require projects to be resilient to rising sea level through at least mid-century – and beyond, given the project's expected life. Just as important, the amendments directed that a regional adaptation strategy be developed by the Bay Area's regional agencies.

Before I detail how BCDC is leading a collaboration of state, regional, and local government agencies to create and implement a regional adaptation and resilience strategy, I want to set the context in which adaptation is being discussed by BCDC and its collaborators.

Successful adaptation planning and implementation require all levels of government to act collaboratively with all public and private property owners within our jurisdiction and beyond who are affected by rising sea level. In some ways, this can be more complex than mitigation due to a host of governance issues, including local land use prerogatives and existing property rights. Complicating this task is our inability to forecast the extent to which our lives will change due to a rising Bay because we cannot fully predict that future. But I do commend Marin County's attempt, with its partners, to visualize what could happen to the shoreline off Mill Valley. A description of this effort is attached to my testimony.

To accomplish these challenges, and others, I think of our efforts as the vanguard of a five- to ten-year campaign to educate the public about three things: what we can do to adapt to rising sea level; what we should do considering reasonable priorities and unforeseen consequences; and, just as important, how we can fund successful adaptation strategies. At least five facts make this campaign very complex:

1. **Assets are Networked:** Individual assets such as highways, mass transit systems, railroads, airports, seaports, and wastewater treatment plants should be rehabilitated, adapted, or changed on a coordinated, not piecemeal basis. Passengers can't get to SFO without using 101 or BART, goods cannot be shipped from the Port of Oakland without using a truck or a rail car to get them there, and both wastewater treatment plants and endangered species need the Bay. These assets form a complex interwoven network that is only as strong as its weakest link and will only work together in the face of rising sea level if the entire network is analyzed and planned holistically and at a large enough scale. I have attached to my written testimony a third handout that demonstrates how the Bay Area's highway network is at risk and in need of complex and difficult community-based adaptation planning.

2. **Collaboration is Challenging:** Large-scale planning can succeed only when all public sector asset holders collaborate well with willing private sector and NGO partners, which is difficult, time-consuming, and expensive. We have been working with our Bay Area partners on adaptation for a few years, but the private sector, in general, is not yet at the table.

3. **Assets at Risk are Place-Based:** The assets I have spoken of so far are place- based and fixed, both literally and economically. They are expensive to buy, to replace, and to move.

4. **Underserved Communities Must be Part of any Solution:** Our discussion of assets and actions must include the most important asset of all – the public. Communities of interest, including underserved communities who have not taken part in many land use decision processes and too often do not have a voice that is heard, must be invited and encouraged to participate actively and constructively in this collaborative process and not be left behind.

5. **Time is a Valuable Asset:** We cannot plan now for the next hundred years. But we can and must plan for the next fifty years, and ensure that our decisions do not foreclose our children's, and their children's, options long after we depart.

The Governor's recent Executive Order is an excellent start to ensure that all of us in the Resources Agency and within state government collaborate internally and externally on our adaptation planning efforts. Now, I would like to talk briefly about the ways in which BCDC is fulfilling the Governor's directive.

1. **Adapting to Rising Tides (ART):** BCDC's groundbreaking ART program is a collaborative approach that assesses a community's vulnerabilities to rising sea level and works with local governments and special districts, businesses, residents, and other stakeholders to develop and implement a variety of adaptation approaches. This "retail" approach to adaptation planning is complex, time-consuming, expensive, **and critical**; it will require $12M to $15M over four years to complete the process regionwide. These community-led planning efforts are necessary to address multiple networked challenges in the densely developed shoreline areas and to strengthen networked infrastructure across multiple jurisdictions. The fourth attachment to this testimony is a summary of how stakeholders in Hayward have successfully developed a variety of such strategies. BCDC is now creating a "Help Desk" to disseminate our work to other jurisdictions. BCDC is

actively seeking funds within the Administration to implement ART throughout the nine-county Bay Area. Last year, the Legislature considered SB 1184 by Senator Hancock, which would have provided funding for ART, but it was held in the Appropriations Committee.

2. **Working Groups on Rising Sea Level and Bay Fill Policies:** BCDC has created two Commissioner-led working groups to advance our adaptation efforts. The Rising Sea Level Working Group is learning more about how adapt to an uncertain future and how to communicate about adaptation to further the campaign I spoke of earlier. The Bay Fills Working Group is working alongside a multi-stakeholder technical advisory group and BCDC staff to determine whether and/or how BCDC should revise its existing Bay fill policies that were conceived when the Bay was rapidly shrinking in the 1960s. Now that the Bay is growing, issues that will come to the forefront include where and how best to use natural and manmade structures and how to evaluate such projects that are "fill" under state law.

3. **Bay Area Regional Collaborative (BARC):** State and regional government agencies must work closely and cooperatively with local governments on adaptation issues. BARC, formerly known as the Joint Policy Committee, is now primarily devoted to climate change issues. ABAG, MTC, and BCDC are working together on adaptation issues both formally and informally through BARC, most notably with the Coastal Conservancy, as well, to develop the new "sustainability" chapter of the upcoming 2017 Sustainable Communities Strategy. Local elected officials form the vast majority of BARC Commissioners, and constantly ensure that the agencies collaborate with local governments on the ground.

4. **Natural Resources Agency:** The Natural Resources Agency is leading adaptation initiatives across the State government. The Ocean Protection Council is aggressively and appropriately ensuring that the State's coastal managers, including BCDC, collaborate on adaptation issues. Publication of "Safeguarding California," which identifies adaptation and risk management strategies, is one example of internal Administration coordination, collaboration, and partnership. In September, the Agency will release implementation action plans for the nine sectors identified in Safeguarding California to highlight successes and address gaps in adaptation efforts so far. While each of our challenges is different based upon the places that we regulate or manage, we continue to learn from, and provide guidance to, each other.

5. **Alliance for Climate Resilience (ACR):** BCDC is an original member of ACR, which includes state, regional, and local government representatives, the new Climate Readiness Institute formed by the University of California and Stanford, and philanthropists and environmental justice advocates. Our Commissioners expect that any successful regional adaptation strategy must not put underserved communities who are currently at risk from inundation at any further risk and, instead, must listen to their representatives and account for how those communities prosper in the future.

Let me finish by commenting on SB 246, legislation introduced by Senator Wieckowski to legislatively mandate a "Climate Action Team" headed by the CalEPA Secretary. The Commission has directed staff to work with your office to determine how this could best work, especially in light of the need to "thread the needle" between managing the Administration's collective work while recognizing that successful adaptation requires on-the-ground planning

across jurisdictions. We believe that there is room for discussion and we look forward to working with you as the State moves forward with the active involvement of the Legislature and the leadership of the Governor.

This completes my testimony, Mr. Chairman, and we look forward to answering your questions.

Senate Environmental Quality Committee
Bob Wieckowski, Chair
Informational Hearing on Climate Change Impacts and Adaptation Priorities in the Bay Area
May 29, 2015
Oakland, CA

Remarks of Danielle Mieler
Resilience Program Coordinator, Association of Bay Area Government

The Association of Bay Area Governments' (ABAG) is the Council of Governments for 9 Bay Area counties and 101 member cities. With the Metropolitan Transportation Commission, ABAG is responsible for implementation of SB375 and is currently undergoing the first update of the plan which reduces GHG emissions by linking jobs and housing near transportation. ABAG has several key roles in the region which apply to climate adaptation:

- Convening discussion about region's future
- Facilitating inter-jurisdictional cooperation
- Providing data and information to inform discussion
- Advocate for policies and strategies to create a sustainable, resilient, equitable region

For forty years, ABAG's planning department has included a resilience program which examines the impacts of natural hazards on our communities and makes plans to reduce their impact and quickly recover. Our primary focus has been on earthquakes as a major regional threat, though we have studied many natural hazards. As climate change impacts become more significant, we have adjusted our efforts to align with this priority. The resilience program is a conduit for infusing regional and local planning efforts with natural hazard and climate thinking.

Key climate change issues for the Bay Area

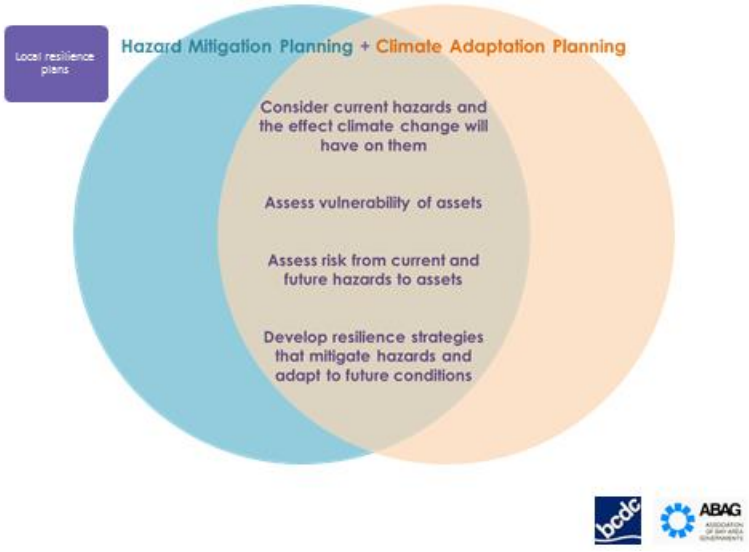
The Bay Area economy and assets are significant and threatened. Our challenge is to protect investments through mitigation and adaptation. Significant investments have been made by Bay Area voters to upgrade infrastructure systems, but more investment is needed, especially along the bay shoreline.

The Bay Area is impacted by both instantaneous and slow moving disasters. Due to climate change, we face increasing severity and frequency of flooding from sea level rise, wildfire, extreme heat, and we are currently experiencing an unprecedented drought that has increased in severity over the past four years. In addition, a large earthquake that could cause a suite of damage and impacts to the region, requiring years of recovery and rebuilding efforts.

Extreme events are exacerbated by other social and economic pressures. While the Bay Area is experiencing a second tech boom, not all residents are bolstered by the strong economy. The

region is experiencing a significant housing crisis that is dramatically and rapidly increasing the cost of housing and driving many longtime residents from their neighborhood. Natural disasters and climate impacts will add additional pressures to these already burdened communities and exacerbate these existing inequalities. Many of the communities that will be most impacted by current and future disasters are particularly vulnerable to displacement and lack the resources to effectively recover from disasters.

The Bay Area has led the nation in planning for natural hazards. ABAG's work and expertise in planning for earthquakes can be leveraged to plan for the changing landscape of the threats our region faces from natural hazards. We can leverage and align our work to plan for both current and future natural hazards. While the worlds of natural hazard planning and climate mitigation have traditionally been fairly separate and independent, at ABAG we see synergy between the two. The goals of reducing vulnerability and risk are largely the same as are many of the methods. By planning for both current and future hazards and integrating these efforts with other long-range planning efforts, we can more holistically build a more resilient region that is adaptive and bounces back quickly from extreme events.
As climate change intensifies many existing natural hazards, our years of planning and expertise for earthquakes provide a strong platform for planning to respond to climate related disasters.



This graphic shows the alignment of planning process and outcomes between natural hazard mitigation planning and climate adaptation planning. Better aligning these processes will lead to stronger outcomes, greater synergies and better use of resources.

A lot of work is already happening in the Bay Area already to address climate change at different scales. No single agency is responsible for addressing climate adaptation. It's a complex web of private, local, regional, state and federal agencies, non-profit organizations and

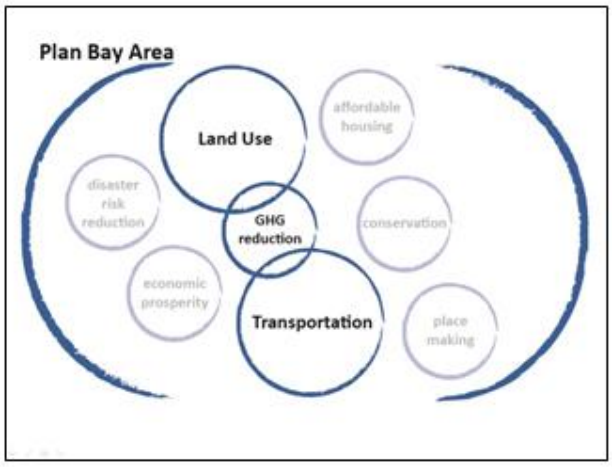
service providers. Each agency has its area of specialty and jurisdictional boundaries. The task will require significant coordination and cooperation. A major challenge is developing appropriate financing mechanisms that support cross agency coordination.

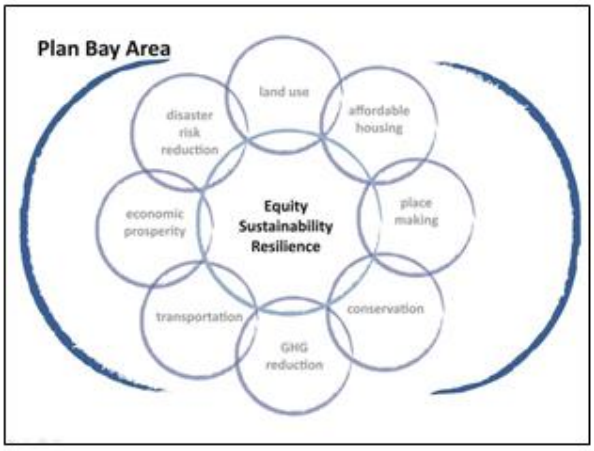
Looking forward

Climate change presents new challenges and will exacerbate existing challenges. We will be best positioned to address these challenges when we leverage existing institutional infrastructure and planning mechanisms, coordinate and collaborate, and address multiple hazards simultaneously.

Leverage existing planning mechanisms

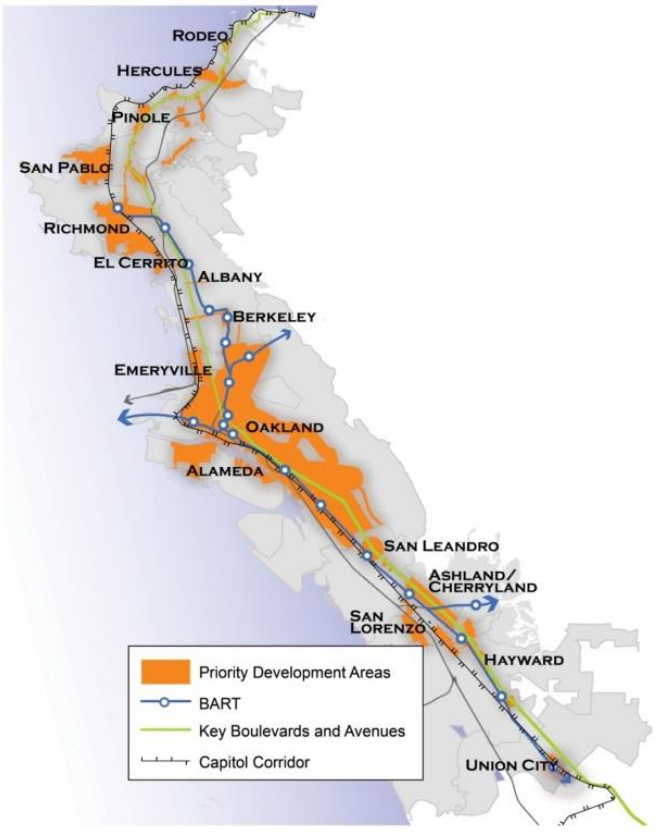
For example, SB375 mandates that regions create a Sustainable Communities Strategy that reduce GHG emissions in part by creating better transit linkages between jobs and housing. *Plan Bay Area,* as the SCS is called, has become the long-term vision that guides development in the region and seeks to address some of the major challenges faced by the region. In order to achieve our vision for the future, we need to be resilient to disasters. Achieving the vision of this plan has required the regional agencies to bring together a number of historically disparate elements, including equity, access to transportation, housing affordability, quality neighborhoods, earthquake safety, and climate readiness. This effort has allowed us the space to expand the perspective of each of these disciplines and allow for integration and collaboration across topic areas. Plan Bay Area has also become a vehicle to talk with local jurisdictions about mitigation and adaptation to natural hazards and climate change. The 2017 update of Plan Bay Area will be crafted through a resilience, sustainability, and equity lens





Integrating planning efforts

While the process of developing Plan Bay Area has led to an expansion of thinking, the implementation and coordination of the plan has also had a focusing effect. Through the *East Bay Corridors* project, ABAG is coordinating fourteen cities between Rodeo and Union City to address common challenges of housing affordability and access to opportunity, improved public spaces, and resilience in the face of natural disasters and to capitalize on shared opportunities to implement local priorities emanating from Plan Bay Area. The Healthy Homes Initiative within the Corridor is exploring incentives to retrofit housing and reduce seismic and flooding risk, increase energy and water efficiency, and improve indoor air quality through creative financing mechanisms. This project is an example of how aligning efforts achieves multiple benefits - if successful, we will not only lesson the impacts of a changing regional economy on vulnerable residents, but also ensure that these residents are not permanently displaced after a future earthquake or by rising sea levels.

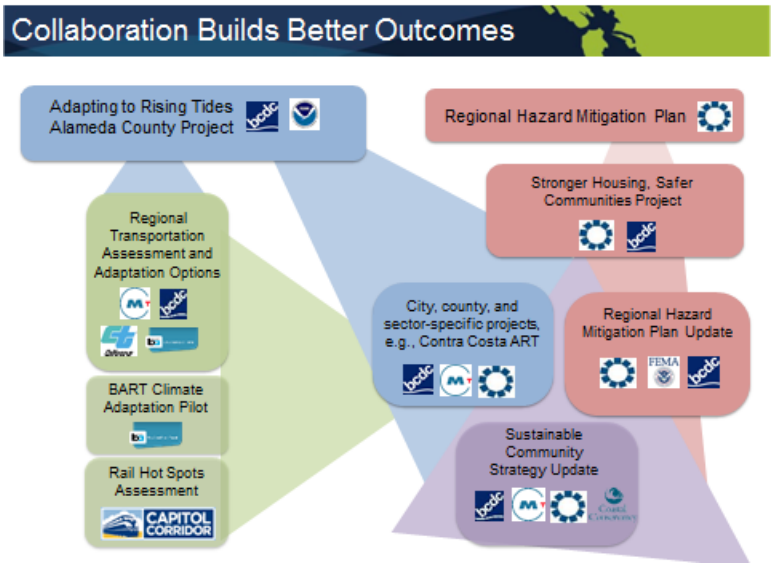


The East Bay Corridor Initiative

Collaboration

We have found that good collaboration between agencies leverages the expertise, work, data, processes and relationships built across various agencies to further the work and lead toward

action. By bringing the work for current and future hazards together it is possible to work with stakeholders together on preparing for both issues, rather than having agencies and organizations participating in two separate, but similar, efforts. Since 2011 the ABAG Resilience Team and BCDC ART team have aligned and coordinated several projects to achieve stronger outcomes for both teams.



This graphic demonstrates the way that projects that started separately back in 2011, are now, in 2015, being brought together in way that makes the work more meaningful, more efficient, easier to participate in and reduces conflicts and confusion for stakeholders.

Stronger Housing, Safer Communities – This was the first project where we really worked together with BCDC and aligned our efforts to look at vulnerable housing in floods and earthquakes. The residents in these areas shown on the map are disproportionately vulnerable and less like to recover from hazard impacts. These are areas where we need to focus investment to build resilience and reduce vulnerability.

Regional Hazard Mitigation and Climate Plans - ABAG has supported local governments to develop local hazard mitigation plans, required by FEMA, since 2005. Since many jurisdictions are also preparing climate adaptation plans, we examined the requirements for both plans and found they closely align with each other. In this plan update process we have partnered with BCDC to support local governments in developing hazard mitigation and climate adaptation plans concurrently.

Coordination

Bay Area Regional Collaborative coordinates efforts among Bay Area's four regional agencies around climate adaptation and supporting better alignment of efforts. ABAG is a member and provides funding and staff time to support the effort.

Success and challenges to creating effective regional structures across levels of government for addressing climate change and adaptation.

Successes

- Bay Area expertise in planning for earthquakes and natural disasters will enhance climate adaptation efforts
- Opportunities to align and coordinate work on current and future hazards will lead to better outcomes
- Leveraging existing structures and planning mechanisms, such as Plan Bay Area, leads to stronger outcomes that better position us to address the multi-faceted challenges we face

Challenges

- Need to better align planning requirements current and future hazards – Natural hazard mitigation plans, climate adaptation plans, general plans
- Governance – ABAG studying recommendations for governance and financing
- Need state, federal support to address serious threats from intensification of existing hazards.
- Financing mechanisms that support cross agency collaboration

May 29, 2015

Honorable Bob Wieckowski
Chair, Senate Environmental Quality Committee
State Capitol, Room 2205
Sacramento, CA 95814

RE: Testimony at special hearing regarding adaptation - May 29, 2015

Dear Chairman Wieckowski:

Thank you for the opportunity to speak with you today about local government's role in addressing climate change impacts, our adaptation priorities and our on-going planning efforts in Sonoma County.

The Sonoma County Transportation Authority and the Regional Climate Protection Authority are two local government entities that serve as long term planning and funding agencies fostering collaboration among all of the local government bodies in Sonoma County. While many of you may be familiar with the Transportation Authority model – most all counties have a Congestion Management Agency or Transportation Authority – the Climate Protection Authority is a unique governance structure that Sonoma County's jurisdiction sought to create in 2009 in order to better address climate change and the local government response to reducing GHG emissions.

Sonoma County communities had been working on climate change in various ways since the early 2000s, by adopting GHG reduction targets, developing municipal climate action plans, and pursuing individual projects and programs. However, many of these efforts were being done one agency or jurisdiction at a time, and only as funding allowed. The idea for the RCPA emerged in the late 2000s, after the passage of AB 32 and the stimulus funding directed to energy efficiency and conservation block grants.

It became apparent that the state and federal landscape for climate policy and funding was evolving rapidly. It was also apparent that our jurisdictions could better navigate the challenges created by climate change by working together. The RCPA was created to mirror the model of the transportation authority – to pool resources, maximize the efficiency of programs, and create structured platforms for collaboration. Our agencies also serve as a conduit for funding for implementation on a local level and as a liaison to state and federal agencies.

The RCPA is currently in the process of writing Climate Action 2020 - a community climate action plan focused on the implementation of reduction strategies; but it also includes adaptation. One of the first elements we completed in the planning effort was a hazards and vulnerabilities assessment (http://sctainfo.org/pdf/Climate%20Ready_Hazards_Vulnerabilities.pdf). We also adopted a list of adaptation goals and objectives that was vetted among a diverse group of 80 community leaders at a Climate Ready Roadmap Workshop last week.

Reducing GHG emissions is our central focus but we recognize there will be new challenges brought about by climate change and we as local governments need to be informed on what to expect and how we might best be able to plan; especially since we are the entities responsible for protecting public health and safety, for building and operating critical infrastructure, and for conducting long range community planning. The good news is that much of what we anticipate happening is a more intensive version of vulnerabilities we currently handle: flood events, heat waves, droughts. The bad news is we will be seeing more of them and with greater intensity.

There are a number of Statewide tools that can help guide efforts related to planning for resilient communities but our vulnerabilities study takes it to a more granular level in order to understand what we might expect in the future in our own backyard.

Our assessment focuses on three areas of impact: people and social systems, the built environment and natural and working lands.

The impacts we expect in Sonoma County include:

More extreme heat events
Longer and more frequent droughts
Greater frequency and intensity of wildfires
Fewer nights that freeze
More variable rain
Bigger and more frequent floods
More frequent inundation, increased erosion and saltwater intrusion

However I can't emphasize enough that there is no one size solution to adaptation. The impacts of rising temperatures and more volatile precipitation are very dependent upon micro-climates, terrain, geology, demographics, politics, and history.

The risks, uncertainties and volatility associated with climate change pose potentially high costs to communities in terms of public health, safety, economic vitality, security and quality of life. While our models may not be perfect in their ability to predict the precise degree of climate impacts,

preparing now will yield more effective, cost-effective, and flexible strategies than delaying action and reacting to each one off event.

Also, using historic data to predict future conditions is no longer adequate for long term planning or policy making. Local jurisdictions should have the tools to predict climate impacts in their community in order to best plan for the future.

Sonoma County is fortunate to be the beneficiary of a number of cutting edge efforts seeking to understand climate trends. We have been able to pull together research collaboratives, NGOs, academic institutions, and local governments to help refine climate projections and make them more relevant to local decision-making.

Our local partners include: Sonoma County Water Agency (SCWA), Sonoma County Agricultural Preservation and Open Space District (SCAPOSD), Sonoma Clean Power, all nine of our cities, County of Sonoma, and a science based collaborative called the North Bay Climate Adaptation Initiative.

We also have great partners at the regional, State and federal level on a number of discrete planning efforts such as:

The Hwy 37 corridor planning with UC Davis, Caltrans, and MTC (http://hwy37.ucdavis.edu/project/highway-37-stewardship-study)is assessing how this infrastructure and its bay lands surroundings will be impacted by rising sea levels but also how best to address needed congestion relief and environmental enhancements in a critical wetlands area.

The Sonoma County Vegetation Mapping and LiDAR project (http://sonomavegmap.org/) is a cutting edge example of work to characterize the topographic, physical and biotic features in Sonoma County that provide valuable ecosystem services such as buffer zones, groundwater recharge, and carbon sequestration. Partners in this effort include SCWA, SCAPOSD, California Department of Fish and Wildlife, the United States Geological Survey, The Nature Conservancy, the City of Petaluma, NASA, and the University of Maryland.

In addition, the Center for Western Weather and Water Extremes (http://woodland.ucsd.edu/?cat=9) is working to improve reservoir operations for flood control and water supply by improving our ability to predict atmospheric river events. Partners include NASA, Scripps, NOAA and the SCWA.

Local government is critical to addressing climate adaptation. Site-specific risks matter tremendously for land use and infrastructure decisions. Impacts and actions related to adaptation are truly local but they will affect regional and statewide systems.

What do we hope to achieve in the future?

First and foremost is the need to daylight the information in the vulnerabilities assessment. Sharing the data with the agriculture industry, business groups, emergency responders, decision makers and thought leaders is critical to building understanding as well as coalitions that can help respond to protect members of our community and valuable community assets.

At our workshop on building a climate ready roadmap, it was apparent to me that many people are concerned about significant changes to our way of life. The agricultural identify of Sonoma County is deep rooted, and concerns over water supply, crop viability, biodiversity, pests, and fire risk seem at the forefront for many.

Equity is also of great concern. Those members of our community most vulnerable to climate change often lack the resources to respond, even in finding the time to participate in conversations about how we address the issue as a whole community.

Economic disruptions represent an overall concern. Should infrastructure, working lands or social services be overburdened or overly disrupted due to climate related events, the reliability of our economy suffers. Diminishing the manner in which we conduct business can take a personal toll to employees and employers but it also harms the overall economy of the State and thus our State budget. How we identify and quantify the costs of NOT adapting to climate change is critical to demonstrating why we must take action now.

Another concern is limited local resources for data, planning and implementation. While the RCPA is a powerful model for pooling resources, the challenge to prepare for climate change at a local level requires more support than we can provide with our two full time staff.

Institutionalizing knowledge of local risks in all jurisdictions, in many different departments could entail a full time strategy to educate planners, engineers, emergency responders and public health workers. It should also put useful data products in their hands, facilitate scenario planning and design criteria revisions, and develop public communications tools to build community support for the trade-offs that may need to be made to prepare for local climate impacts

We believe the State's investment of funding to reduce emissions and prepare for climate change should be flexible enough to afford creative, opportunistic investments that are specific to local needs. What works in Sonoma County may not work in Fresno or Arcata or Long Beach.

However across communities as disparate as those, there are likely to be common themes. Collective impact strategies that pool resources around shared goals will be increasingly important since climate adaptation objectives overlap completely with many sector specific goals such as health, water, and food systems. To the extent possible, the State should remove barriers or criteria that constrain implementation funding. More sustainable financing strategies could evolve to replace subsidies and incentives. The State may be able to play a role in facilitating better access to capital – both public and private – to implement climate adaptation projects.

We must also invest more in capacity building – through education and funding – that enables staff and decision makers to understand how their responsibilities are changing. Lastly, all public sector leadership would benefit from tools to help them better understand the economic risks to their community of doing nothing on climate change. Or more positively, to help them understand the return on investments from early investments to reduce and respond to climate impacts.

Sonoma and the RCPA aspires to be a R&D center for local actions that compliment state, federal, and private sector action to prove that success in fighting climate change is not only possible but profitable. Thank you for the opportunity to share our thoughts with you on climate adaptation and the role of local government.

Sincerely,

Suzanne Smith
Executive Director, SCTA/RCPA

INFORMATIONAL HEARING OF THE SENATE EVIRONMENTAL QUALITY COMMITTEE

BOB WIECKOWSKI, CHAIR
Friday, May 29, 2015, 10:00 a.m.
Oakland, CA

Remarks of Jack Liebster
(Currently Planning Manager, Marin County Community Development Agency)

Committee Staff request: We would like for you to present for 7-10 minutes to give an overview of adaptation and resiliency efforts from the county perspective in Marin, incorporating the following points generally, as appropriate:

1. **The main climate change impacts of concern for the county and how these potentially vary between sea- and bay-side communities;**

Honorable Members of the Committee,

I am Jack Liebster, Planning Manager for Marin County, though today I am relaying my personal observations on the questions posed, which do not necessarily reflect the still-developing official views of Marin County.

Marin County is second most at risk in the Bay Area for projected impacts from sea level rise (SLR), flooding and storms (Pacific Institute 2012). While Marin has only 4% of the Bay Area's population, it makes up 18% of the region's population at risk from storm, flood, and sea level rise, with potential losses of $8.5 billion worth of buildings and contents on the bay shoreline and $220 million along the ocean coast (Pacific Institute, 2012, 2009). Projected SLR also threatens serious impact to Marin's wetlands, creeks, beaches, other natural resources, and approximately 11 square miles of adjacent lands.

The nature of the danger is different between the Bayside and the Coastside. Human development is more intense along the Bay shoreline, and thus a greater amount is

potentially exposed. But the Bayside is more sheltered than the open coast, which is subject to stronger, higher waves, especially if, as many scientists expect, storms become more powerful in the future while the surface of the sea continues to rise.

The topography and geology of the coast also pose distinct risks- many homes in the Stinson Beach area are literally built on sand, while others are on bluffs that could collapse as a result of more rapid erosion at their base could under future conditions.

Our fundamental principle in responding to SLR can be summarized in the old Scout motto: "Be prepared." In order to do that, we are carefully assessing the varying conditions that exist along our shores and tailoring our response to the specific needs of each situation.

2. An overview of the county's planning and coordinating efforts regarding adapting to the impacts of climate change, including how the county has worked across cities and departments to coordinate strategies;

In asking about the planning and coordination needed between cities and the county, and in turn the numerous regional, state and federal agencies currently or soon to be involved in sea level rise, I believe the Committee has put its finger on potentially the most intractable aspect of this issue – that is **Governance**: how we engage and adapt the multiple layers of overlapping jurisdictions in a coordinated, coherent, effective and efficient arrangement capable of responding to and managing this growing problem over the long term. While we may not be able to blow up boxes, tear down silos, eliminate turf boundaries that hinder joint action, we must create working relationships that can produce the bottom line results that doing all those things would allow.

Here's how Marin is just beginning to do this. Marin County and its 11 cities share alternating parts of our Bay shoreline in a hopscotch fashion. The Bay simply has no respect for these boundaries, and in some cases we need to act as if they were not there.

Fortunately, many local elected officials and their staffs recognize this need. To lubricate that machinery, the County Board of Supervisors has authorized a third of

a million dollars to begin a Countywide SLR Vulnerability Assessment that will actively engage each of the Cities in the process at multiple levels. We hope the County's investment will soon be augmented by an additional quarter of a million dollars through a Climate Ready grant. The precise details of the project's collaborative structure are still being worked out, because we all recognize it is more important to get this **right** than to get **it in a hurry**.

Generally it will probably look something like this:

A Policy group consisting of 2 County Supervisors and one City Council member from **each** participating City will take up the mandate to:

1. Work with other members of the group to provide overall direction to the Vulnerability Assessment process.
2. Communicate progress to their own Councils/Board and constituents;
3. Convey information, ideas, and concerns from their home town constituents into the collaborative process.

A Technical Group would consist of one key staff member from each City to act as a primary point of contact, draw upon specific expertise within local agency staff to advise project staff and review project products, and directly communicate, educate and engage their own jurisdiction's officials, staff and community in all aspects of the project.

It is expected **key staff from special districts** particularly affected by Sea Level Rise will participate on the Technical Group.

An Executive or Steering Group will be drawn from the other two groups to respond to the general operational needs of the project staff .

At some point, these arrangements may be formalized through vehicles of Memoranda of Agreement or a Joint Powers Authority, but at this point we want to avoid any barriers to participation, and rely instead on informal, collegial cooperation. In this we are emulating the highly successful Marin Clean Energy program, which started its program in exactly this manner. This is one way we've applied lessons learned.

I would like to very briefly mention our public outreach, education and involvement program. It is driven by a couple of principles derived from our year of work on the coast. While we offer an extensive schedule of our own public workshops and meetings, we do not rely on people coming to us, rather we go to them where they already are, such as homeowner's and service group meetings, business breakfasts and established community functions. We use civic engagement over the internet so they can participate from home.

We also target involvement of communities of color and the economically disadvantaged, in part because these occupy locations that are among the first to feel significant SLR impacts.

3. **How the county coordinates with other counties, regional agencies, organizations, etc. to identify vulnerabilities and coordinate adaptation strategies, highlighting examples from relevant projects where helpful;**

We are keenly aware of, and working hard to tap into, the opportunities afforded by the growing community of other local governments, regional, state and federal agencies and non-governmental organizations involved in SLR planning. C-SMART, our coastside SLR program, now about a year old, would not been able to go forward as early as it did, had we not taken entrepreneurial, opportunistic initiatives to partner with the federal USGS and Gulf of the Farallones National Marine Sanctuary and the non-profit Point Blue Conservation Science (formerly Point Reyes Bird Observatory) to integrate their sophisticated SLR modelling – which we otherwise never could have afforded - into the county planning process.

We are so committed to this kind of cooperative engagement that it is built into our name: C-SMART stands for "**Collaboration:** Sea-level Marin Adaptation Response Team".

We dedicated a specific part of our work program to gathering the most useful information from other organizations and sharing our work with them. Especially when the public has paid for research and studies, my motto is "Don't evade your eyes, plagiarize," something I plagiarized from old Tom Lehrer.

We have cooperated in establishing the California Adaptation Network, a list-serve where state SLR grantees can communicate about specific work we are engaged in. But we really need to do more than that. There are a burgeoning number of organizations and web portals offering reams of SLR information.. But volume does not translate to value in this case, and from the point of view of a poor practitioner at the local level, this proliferation of portals appears so repetitive and overwhelming that it just leaves me perplexed and lost.

2. Successes and challenges to implementing climate adaptation projects, highlighting relevant projects and community engagement work.

I was asked to comment about successes and challenges. I think the most important success to date for us is that we are actually beginning the work. A colleague says that SLR is like being run over by a turtle – it not immediate and dramatic. Keeping with the amphibian analogy, recall the old story about how to cook a frog. If you drop it in boiling water, it will just hop out. But if you put in in a pot of water and gradually increase the heat, it will just stay there until it's boiled. We could have been that frog, but we're not, because we are wisely starting to work before the crisis occurs.

My time is short, but I'd like to leave you with two ideas.

I haven't yet found anything that really fits the bill of a **curated** source of existing and developing information that specifically applies to the work we are doing and would help avoid incessantly reinventing the wheel. Someplace you could call and ask something like "*what information is there on restoring dunes as a "green" adaptation measure in California?"*

> ***Content*** *curation is the process of collecting, organizing and displaying information relevant to a particular topic or area of interest. Services or people that implement* ***content*** *curation are called* ***curators****. Curation services can be used by businesses as well as end users.*

It could even include a YELP-like feature so practitioners could rate the value of the content. There is one key requirement for those who would carry out this mission –they must be solely dedicated to serving the people in the field, and have

no desire to aggrandize their own agency or push their own agenda or point of view.

My second modest proposal is to put some proof in the pudding of adaptation. I make no claim to knowing much about the tech world – my smart phone is clearly much smarter than me- but I have heard about the concept of prototyping. Wikipedia defines it thus:

> *A **prototype** is an early sample, model, or release of a product built to test a concept or process or to act as a thing to be replicated or learned from.*

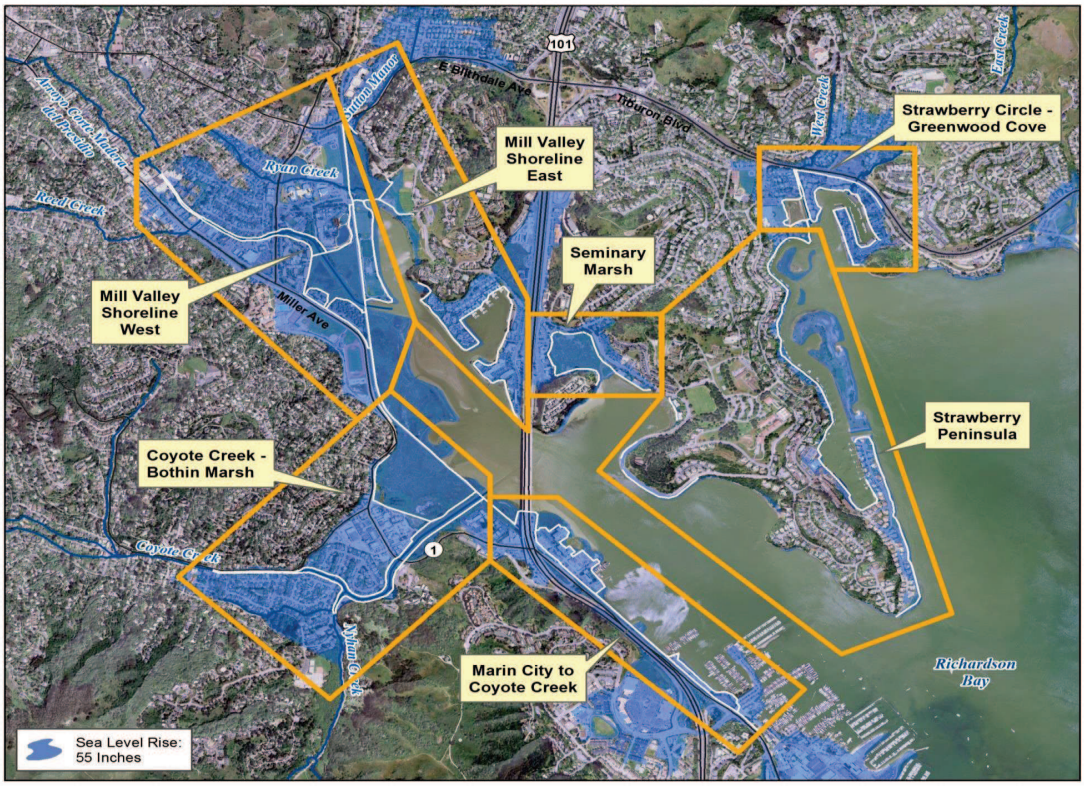
Let's do some of that! When I was with the Coastal Conservancy, one of my colleagues carried out a small project in the Tijuana River National Estuarine Reserve. It had five plots side by side, each using a different method of wetland restoration to see which would be most successful. The results were hugely valuable and quickly applicable. If a picture is worth a thousand words, a working prototype proving a concept and providing design details is worth millions.

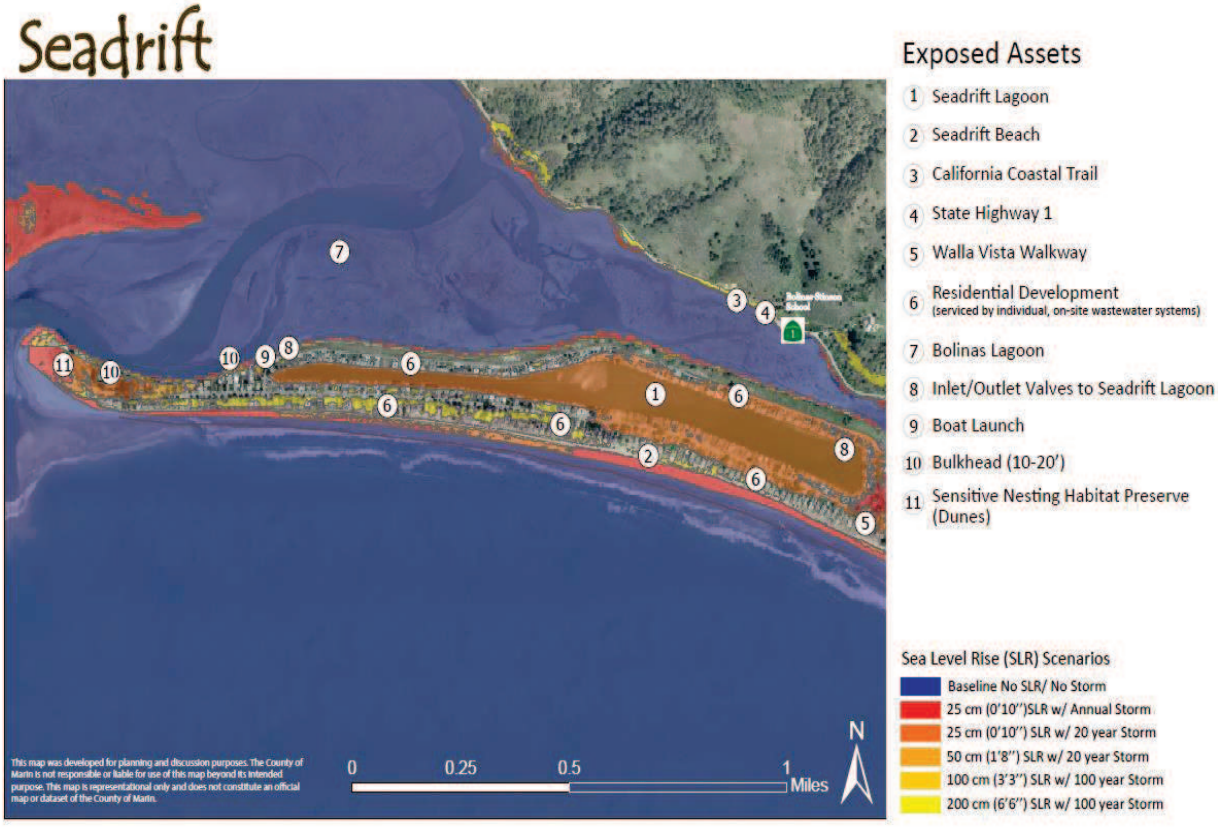
Take for example the idea of a Horizontal Levee. I love this idea- it looks like a win-win. But most likely it could not be built under current regional state and federal regulations. Our project is proposing to take that picture, and do initial engineering design to develop cost and feasibility information for this potential break-through idea.

We need support at the highest Regional, State and Federal levels to transcend the routine red-tape limiting innovation. We need changes that support prototyping and on-the-ground experimentation so that in even a limited number of appropriate situations, with funding provided for needed mitigation, the regulatory agencies could be encouraged, or legislated if necessary, to allow for a few such prototypes to be pursued to determine if they can live up to their promise. This could go a long way to opening up imagination and innovation for new ways to respond to Sea Level Rise

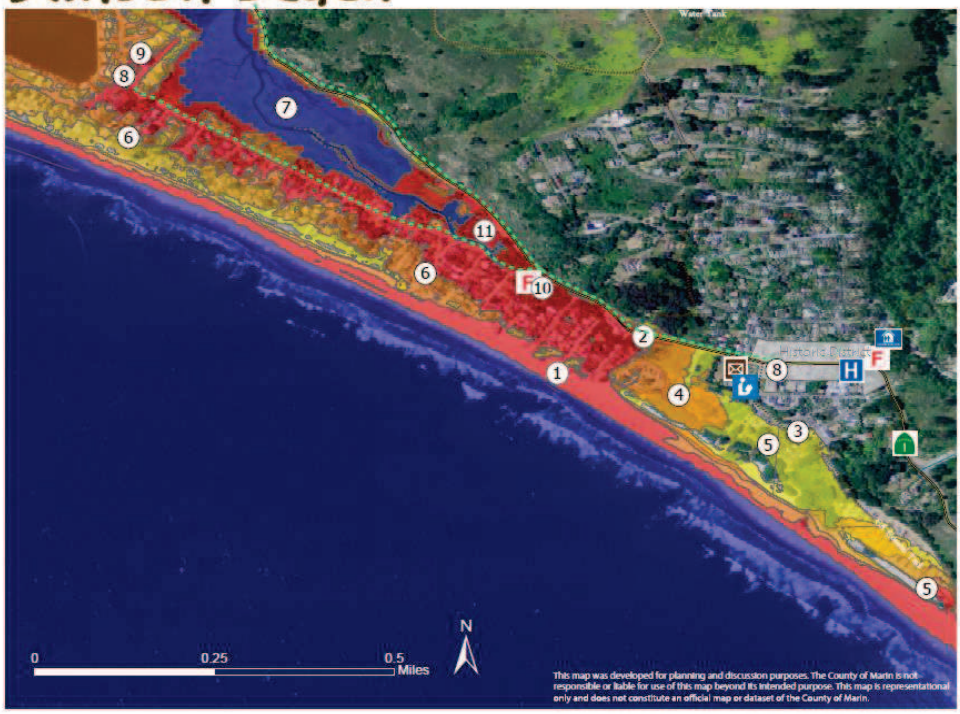
Thank you for the opportunity to contribute to the dialogue. All of us in Marin wish you the best on your important work.

Southern Marin – Mill Valley to Sausalito





Stinson Beach



Exposed Assets

1. Stinson Beach
2. State Highway 1
3. California Coastal Trail
4. Picnic Area
5. Stinson Beach Parking Lots
6. Commercial/Residential Development
7. Bolinas Lagoon
8. Tsunami Evacuation Route
9. Emergency Generator
10. Fire Station
11. Water District Office

Additional Natural Resources include Steelhead Trout habitat, Harbor Seal Haul Outs, Brown Pelican Roosting Sites, Wetlands

Sea Level Rise (SLR) Scenarios

- Baseline No SLR/ No Storm
- 25 cm (0'10'')SLR w/ Annual Storm
- 25 cm (0'10'') SLR w/ 20 year Storm
- 50 cm (1'8'') SLR w/ 20 year Storm
- 100 cm (3'3'') SLR w/ 100 year Storm
- 200 cm (6'6'') SLR w/ 100 year Storm

Properties Exposed

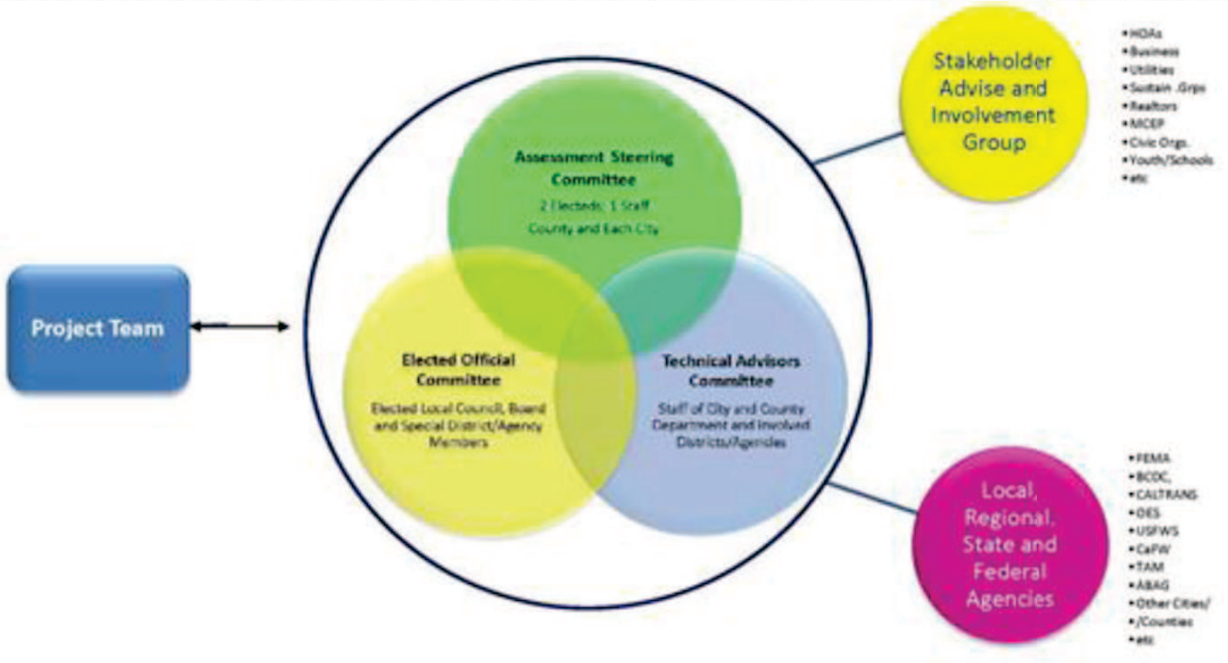
2	398
120	490
250	

December 3, 2014 - Mill Valley

December 3, 2014 - Mill Valley

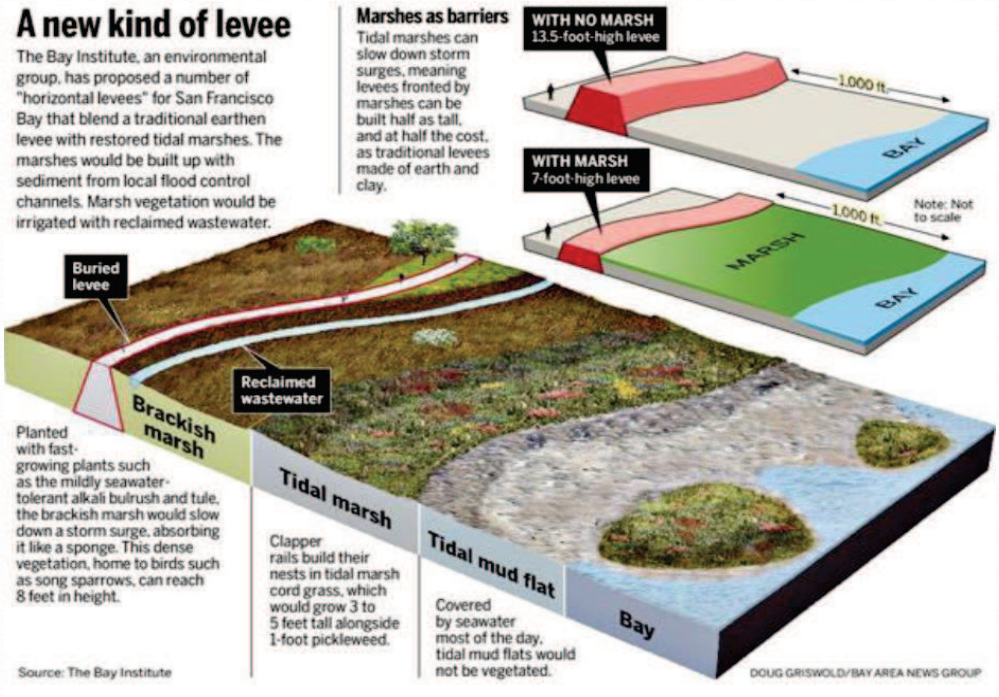
Very Preliminary Draft Governance Framework – Marin SLR Study

Local Collaboration AND Local Control

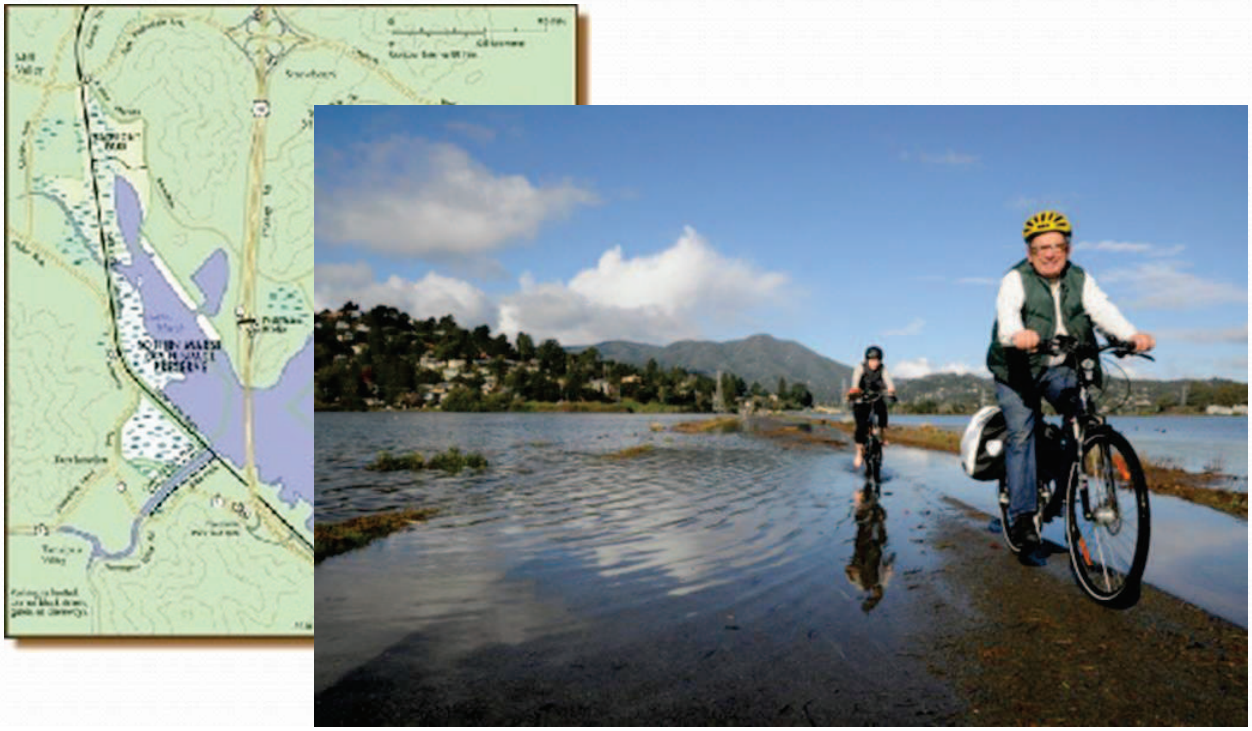


Draft Marin Countywide Vulnerability Assessment Organizational Framework

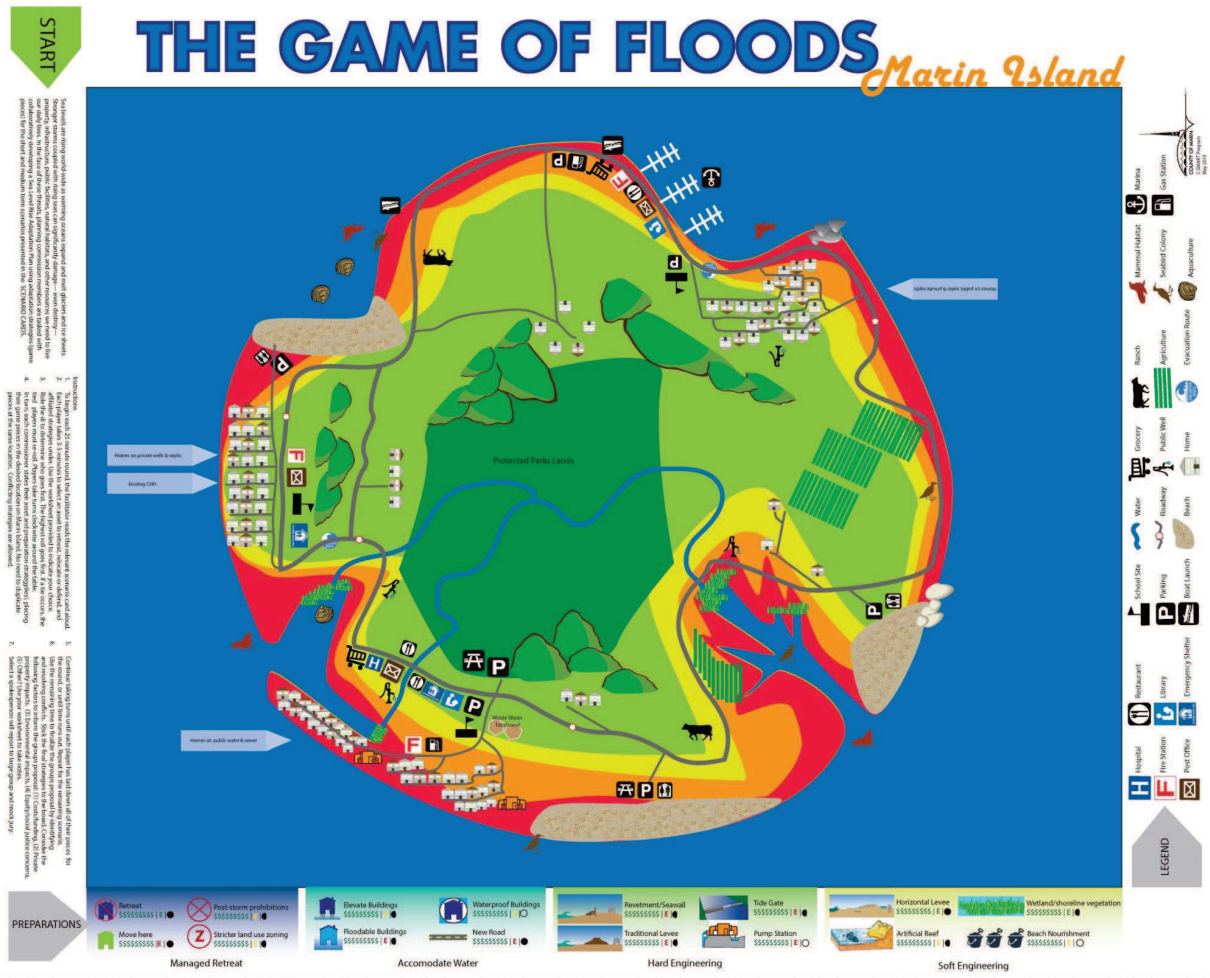
Horizontal ("Natural") Levee



Bothin Marsh Natural Levee Prototype Site



Tam High SLR Adaptation Game



www.MarinSLR.org

Photo Credit: Dianne Arrigoni

Community Development Agency
3501 Civic Center Drive, Suite 308
San Rafael, CA 94903
415 473 6269 T / 415 473 7880 F
marinslr.org

May 29, 2015

SILICON VALLEY 2.0

Senate Environmental Quality Committee

29 MAY 2015

County of Santa Clara Office of Sustainability

THE Strategic Growth Council

AECOM

THE GENESIS OF SILICON VALLEY 2.0

THE 5 FAULTY PRESUMPTIONS = ADAPTATION DEFERRED

- It is too speculative
- It is too far away
- It has no present benefits
- It costs too much
- (Re) Insurance and FEMA Will Take Care of It

SILICON VALLEY 2.0 PROJECT GOALS

A regional effort to minimize the anticipated impacts of climate change

- Identify driving climate stressors
- Identify assets threatened by climate change and the magnitude of the potential economic, social, and environmental impacts
- Identify potential strategies to minimize these impacts
- Develop a geo-economic decision-support tool
- Build the region's top priorities and strategies for an effective regional scale adaptation response
- Facilitate and coordinate regional climate adaptation planning and implementation efforts for Silicon Valley

SILICON VALLEY 2.0

KEY REGIONAL CLIMATE CHANGE VARIABLES

- Sea Level Rise
- Coastal Storm Surge
- Riverine Flooding
- Wildfire
- Extreme Heat

VULNERABILITY ASSESSMENT

METHODOLOGY

- Analyses the vulnerability of each asset sector to each climate variable
- Comprised of three parts:

(1) Exposure analysis

- Based on GIS overlays of asset locations + climate variables

(2) Sensitivity analysis

- Sensitivity ratings (i.e. the impact of a climate variable on the asset's functionality) defined from literature reviews, expert interviews, and input from the TAC and other technical experts

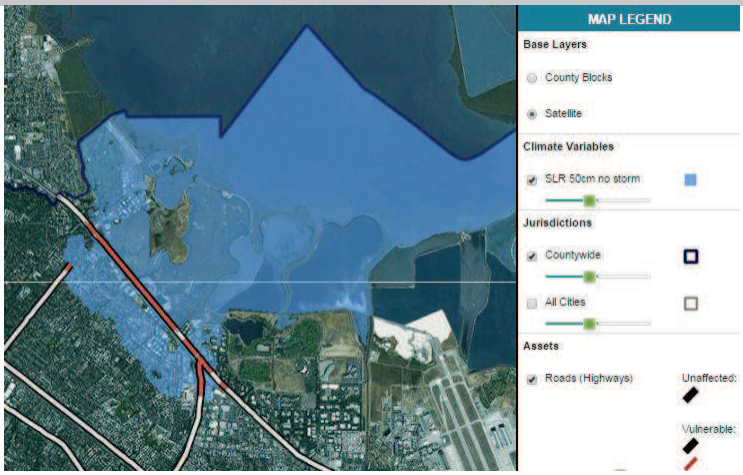
(3) Adaptive capacity

- Based on literature gap analysis

VULNERABILITY ASSESSMENT EXAMPLE

MILES OF HIGHWAY BY CLIMATE VARIABLE AND TIMEFRAME

- Exposure analysis: GIS based (from Caltrans, 2013)
- Sensitivity analysis:
  - High: roads permanently inundated
  - Medium: traffic delays
- Adaptive capacity: Low



ROADS (HIGHWAYS)	SLR	SLR + STORM SURGE	ADDITIONAL IMPACTS CAUSED BY STORM SURGE	RIVERINE FLOODING	WILDFIRE	EXTREME HEAT
Mid-Century Vulnerability	2	3	1	67	65	None
End-of-Century Vulnerability	3	6	3	67	65	288

PRIVATE/PUBLIC PARTICIPATION

SILICON VALLEY 2.0

7

TECHNICAL ADVISORY COMMITTEE

KEY CONTRIBUTORS + PARTNERS

- Bay Area Joint Policy Committee
- Bay Area Climate Collaborative
- Bay Conservation and Development Commission
- City of Cupertino
- City of Mountain View
- City of San Jose
- Joint Venture Silicon Valley
- Pacific Gas & Electric
- Santa Clara County Public Health Department
- Santa Clara Valley Transportation Authority
- Santa Clara Valley Water District
- Sustainable Silicon Valley
- U.S. Army Corp of Engineers
- U.S. Geological Survey

NELSON NYGAARD raimi+associates the nature of community Point Blue AECOM

KEY CONTRIBUTORS & PARTNERS

LOCAL PARTNERS + STATE AGENCY SUPPORT

Working Groups

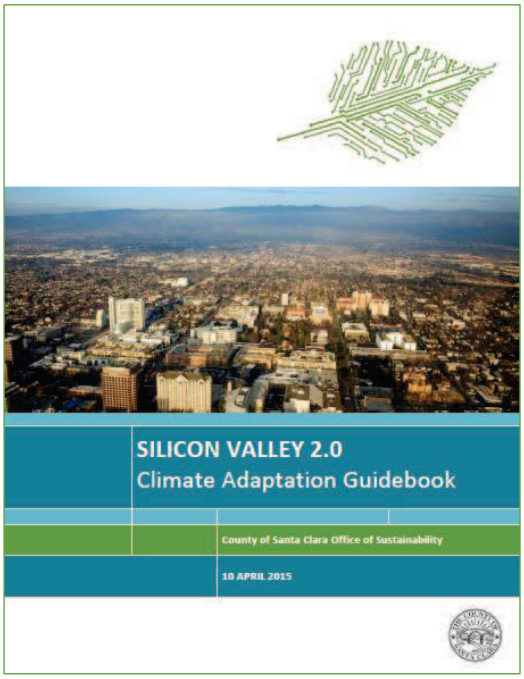
- **Ecosystems:** University of California Berkeley; Creekside Center for Earth Observation:; Point Blue; County of Santa Clara Planning Department; Santa Clara Valley Habitat Agency; ICF International
- **Public Health:** County of Santa Clara Public Health Department; Valley Medical Center; County Planning and Development Department Working Group for the Public Health Element of the General Plan
- **Solid Waste:** City of Sunnyvale; City of Palo Alto; Zanker Recycling

Project Partners

City of Palo Alto; FEMA; NASA-Ames Earth Science Division; FEMA; SPUR, Santa Clara County Department of Emergency Services; Association of Bay Area Governments, Santa Clara County Association of Planning Officials; Silicon Valley Leadership Group

CLIMATE ADAPTATION GUIDEBOOK

- A living Guidebook that provides a recommended set of short, mid, and long term strategies for implementation
- Contains recommended strategies containing details on timing, partners needed, co benefits, implementation steps and precedents
- Helps establish a proactive framework for collaboration between the County, cities, agencies, stakeholders



ECONOMIC CONSEQUENCES

METHODOLOGY

» RATING SCALE (ACROSS ALL 4 CRITERIA)

- Dynamic rating scale uses percentages of economic loss that can be applied across different criteria and jurisdictions.
- Uses the economic loss experienced in Santa Clara County during the 2008–2009 recession as the threshold for an "extreme" economic consequence rating (i.e., 8% of jobs were lost).

Ranges of Percent Economic Loss for Ratings

Low	0.0%	to less than	0.1%
Moderate	0.1%	to less than	0.3%
High	0.3%	to less than	1.6%
Very High	1.6%	to less than	8%
Extreme	8%	or greater	

ECONOMIC CONSEQUENCES

METHODOLOGY

» RATING SCALE, AS APPLIED COUNTYWIDE

- Rating scale for Replacement Costs, Interruption of Economic Activity, and Operational Costs based on estimated Countywide GDP
- Rating scale for loss of fiscal revenue based on estimated County and local jurisdiction property and sales tax revenue
- *NOTE: all values = 2014$*

Rating Scale for Replacement Costs, Interruption of Economic Activity, and Operational Costs

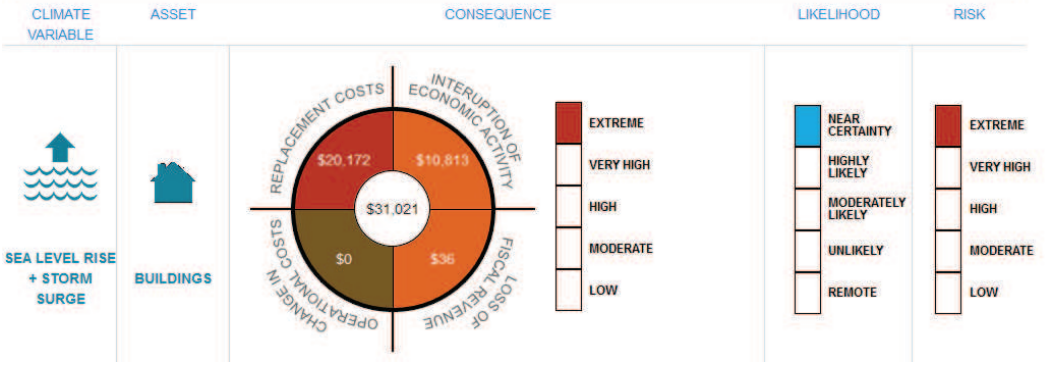
Low	$1	to less than	$100 million
Moderate	$100 million	to less than	$500 million
High	$500 million	to less than	$3 billion
Very High	$3 billion	to less than	$13 billion
Extreme	$13 billion	or greater	

Rating Scale for Fiscal Revenue Loss

Low	$1	to less than	$1,000,000
Moderate	$1,000,000	to less than	$4,000,000
High	$4,000,000	to less than	$18,000,000
Very High	$18,000,000	to less than	$90,000,000
Extreme	$90,000,000	or more	

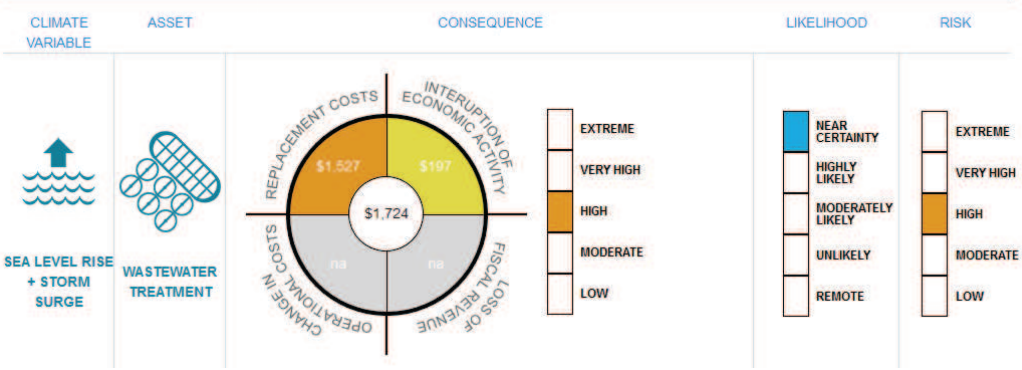
RISK FOR BUILDINGS / COUNTYWIDE

SEA LEVEL RISE [100 CM] + STORM SURGE [100-YEAR]



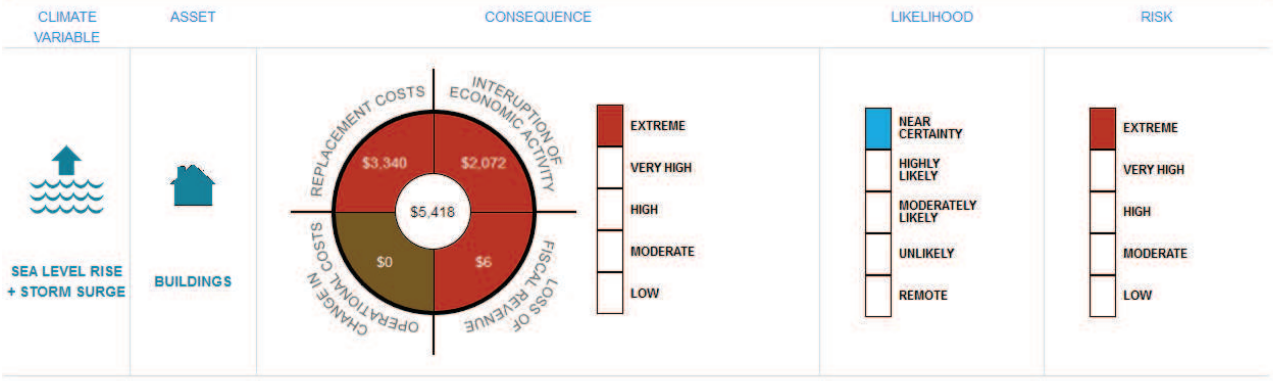
RISK FOR WASTEWATER TREATMENT / COUNTYWIDE

SEA LEVEL RISE [100 CM] + NO STORM SURGE



RISK FOR BUILDINGS / PALO ALTO

SEA LEVEL RISE [100 CM] + STORM SURGE [100-YEAR]



Rating Scale for Replacement Costs, Interruption of Economic Activity, and Operational Costs

Low	$1	to less than	$10,000
Moderate	$10,000	to less than	$100 million
High	$100 million	to less than	$300 million
Very High	$300 million	to less than	$1.4 billion
Extreme	$1.4 billion	or greater	

Rating Scale for Fiscal Revenue Loss

Low	$1	to less than	$40,000
Moderate	$40,000	to less than	$200,000
High	$200,000	to less than	$1 million
Very High	$1 million	to less than	$5 million
Extreme	$5 million	or more	

"ALL THE ARROWS IN THE QUIVER"

PARTNERSHIPS, GUIDANCE, TOOLS AND PROGRAMS

» **FOUNDATIONAL DATA**

- Geospatial – maps impacts of climate vulnerabilities
- Geo-economic – connects environmental impacts to social assets and economic exposure

» **IMPLEMENTATION**

- Engagement frameworks
  - Owners, operators, policy-makers, private sector, regulatory agencies and capital projects drivers
- Structured Timeframes
  - Near- and medium-term "attainables"/measurables
  - Deliberate long-term planning (adaptation does not lend itself to deferred planning or reactive measures)
- Leaders and Teams
  - Who is responsible? Who is necessary? Who benefits?
- Tracking and Reporting
  - "Implementation Data" propels and improves implementation

STATE CAPITOL
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California Legislature

Senate Committee on Environmental Quality

BOB WIECKOWSKI
CHAIR

CONSULTANTS
RACHEL MACHI WAGONER
REBECCA NEWHOUSE
JOANNE ROY
SCIENCE & TECHNOLOGY FELLOW
LAURIE HARRIS
COMMITTEE ASSISTANT
SUE FISCHBACH

INFORMATIONAL HEARING OF THE SENATE ENVIRONMENTAL QUALITY COMMITTEE
BOB WIECKOWSKI, CHAIR

Tuesday, September 22, 2015
11:00 a.m.
CALIFORNIA ROOM, VISITOR'S CENTER
UNIVERSITY OF CALIFORNIA, MERCED
5200 N. LAKE ROAD, MERCED, CA 95343

Central Valley Regional Adaptation Efforts to Climate Change Impacts

AGENDA

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1. **Climate Change Impacts in the Central Valley**
   Roger Bales, *Professor of Engineering and Director, Sierra Nevada Research Institute, University of California, Merced*

2. **State Adaptation Efforts**
   a. Jim Houston, *Undersecretary, California Department of Food and Agriculture (CDFA)*
   b. Kim Carr, *Assistant Deputy Director for Climate and Energy*, and David Shew, *Staff Chief, Department of Forestry and Fire Protection (CAL FIRE)*

3. **Regional Adaptation Efforts**
   a. Nichole Morgan, *Supervising Water Resources Control Engineer*, on behalf of Andrew Altevogt, *Assistant Executive Director, Central Valley Regional Water Quality Control Board*
   b. Tom Jordan, *Senior Policy Advisor, San Joaquin Valley Air Pollution Control District*

4. **Environmental Justice and Local Outreach Considerations**
   a. Phoebe Seaton, *Co-Director, Leadership Counsel for Justice & Accountability*
   b. Tapan Pathak, *Cooperative Extension Specialist, Sierra Nevada Research Institute, University of California, Merced*

5. **Public Comment**

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Central Valley Regional Adaptation Efforts to Climate Change Impacts

BACKGROUND INFORMATION

Climate Change Impacts and the Central Valley

Currently, climate change is impacting infrastructure, public health, and economies across the world. According to modeling from the Scripps Institution for the California Energy Commission's Public Interest Energy Research (PIER) Program, temperatures in the Central Valley are likely to be 2.3°F-3.6°F hotter in 2050, regardless of greenhouse gas (GHG) mitigation efforts. According to the 5th assessment report from the Intergovernmental Panel on Climate Change (IPCC), worldwide average surface temperatures have already risen approximately 1.4°F since pre-industrial times, and current research notes that an average increase of 2°F above present temperatures poses severe risks to natural systems and human health and well-being.

For every 2°F increase in global average temperature, the U.S. Environmental Protection Agency predicts 5-15% reductions in crop yields, 3-10% increases in rainfall during heavy precipitation events, and 200-400% increases in areas burned by wildfires in the western U.S.

In the Central Valley, which is already one of the most heavily pollution-burdened areas of the U.S., the expected increases in heat waves, wildfires, extreme rainfall events, and droughts will have severe consequences for public health and environmental quality, especially for the state's most vulnerable populations.

The California Communities Environmental Health Screening Tool (CalEnviroScreen) was developed by the Office of Environmental Health Hazard Assessment (OEHHA) to determine a list of disadvantaged communities in California that are the most vulnerable and pollution-burdened. Indicators in the tool include those for exposures, such as ozone concentrations, particulate matter [PM] 2.5 concentrations, drinking water contaminants, and toxic releases from facilities; environmental effects, such as groundwater threats, hazardous waste, and impaired water bodies; sensitive populations; and socioeconomic factors.

According to statewide results from CalEnviroScreen 2.0 last year, the Central Valley has high pollution burdens and population sensitivities, as shown by the dark red colors in Figure 1 below.

Air Quality and Wildfires

All eight counties of the San Joaquin Valley (Fresno, Kern, Kings, Madera, Merced, Tulare, San Joaquin, and Stanislaus) are currently listed as moderate to severe nonattainment counties for multiple criteria air pollutants according to the U.S. EPA. A "nonattainment" designation means that the air pollution in these areas persistently exceeds national ambient air quality standards.

Air quality problems have a number of health impacts, particularly for sensitive populations, including the infirm, elderly, and children. Relatively low levels of ozone can cause airway irritation, leading to coughing, shortness of breath, and chest pain, as well as worsening of chronic respiratory diseases such as asthma. Urban particulate matter (PM) has been linked to increased risks of heart attacks, arrhythmias, and other health problems in people with cardiovascular disease. As well, particulate air pollution can compromise the immune system defenses in the lungs, which may increase susceptibility to bacterial or viral respiratory infections.

A number of impacts from climate change can lead to worsening air quality. Longer, hotter days during the dry seasons result in more ground-level pollutants like ozone. Additionally, dry conditions from high temperatures and worsening drought lead to longer fire seasons and increasing wildfire frequency and intensity. Previous scientific modeling has predicted a 12-53% increase in large California wildfires by 2100 (Westerling and Bryant, 2006). According to the California Department of Forestry and Fire Protection (CAL FIRE), additional impacts from climate change for forests and rangelands include declines in the health and productivity of certain tree species, ecosystem disturbances, potential increases in drought, insects, and disease, and increased spread of invasive species.

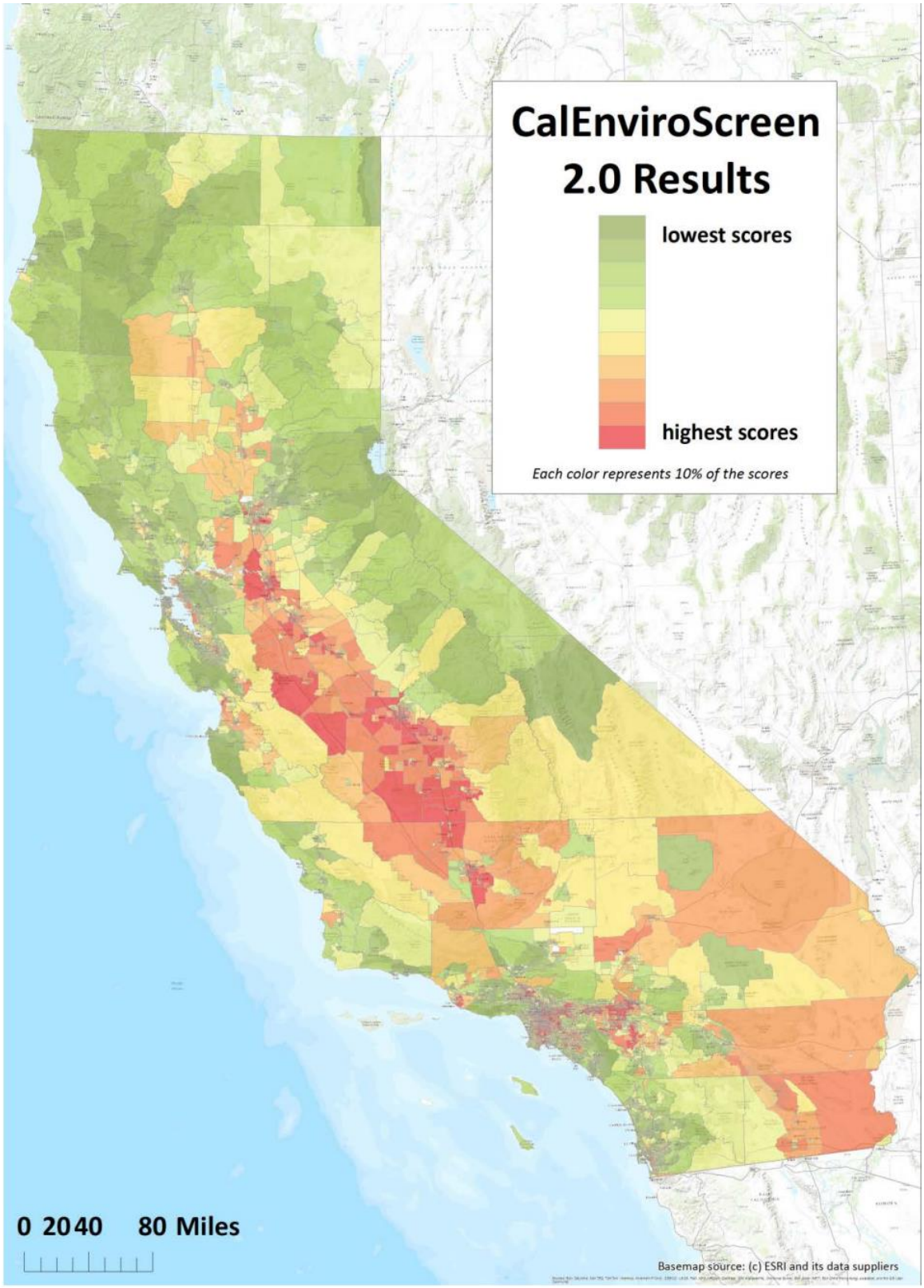

Figure 1. Source: California Communities Environmental Health Screening Tool, Version 2.0 (CalEnviroScreen 2.0), Guidance and Screening Tool, October 2014. Accessed at: http://oehha.ca.gov/ej/pdf/CES20FinalReportUpdateOct2014.pdf

Even in those areas not at high risk for forest wildfires in the Central Valley, air pollution is still a concern, as strong winds can spread smoke plumes over large distances, bringing smoke from mountain fires into heavily populated areas. According to the California Air Resources Board's "Wildfire Smoke Guide," the smoke can lead to minor eye and lung irritations or more serious asthma attacks, bronchitis, and premature death, especially because particles from smoke tend to be very small and, therefore, can be inhaled deeply into the lungs.

Worsening air quality as a result of climate change is especially alarming given the current rates of respiratory ailments in children. Using data from the California Environmental Health Tracking Program at the California Department of Public Health (CDPH), a recent report from Kaiser Health News noted that asthma ER visits for children ages 5-17 have been on the rise from 2005-2012, especially in many Central Valley counties. Compared to the California state average of a 17.9% increase in asthma-related ER visits over that period, the increase was 44% in Fresno County, 66.3% in Kern, 88.6% in Merced, and 108.2% in Madera.

Water Quality and Supply

According to the Sacramento and San Joaquin Basins Climate Impact Assessment by the U.S. Bureau of Land Reclamation in 2014, reductions in precipitation from 3-10% are expected in the San Joaquin and Tulare Lake basins of the Central Valley through 2100. Combined with higher temperatures, more of the precipitation will occur as rainfall, leading to increased runoff and reduced snowpack. Per the assessment, with current reservoir capacities, excess runoff would need to be released from reservoirs early for flood control, which would lead to overall reductions in the amount of stored water available for use over the dry months.

Climate change can also lead to more frequent and extreme weather. This includes heavy rainfall events, which can trigger landslides and debris flows that are especially problematic in areas where wildfires have occurred. Heavy rain events can also overwhelm sewage and water treatment facilities with negative impacts to water quality.

Additionally, drought is an important consideration for water quality. The nature of the current drought has likely been worsened due to the record temperatures across the state, which has additional implications on public health, lost jobs, and an estimated price tag of $2.2 billion for California agriculture. Because of reduced water reserves, groundwater pumping may continue to increase, resulting in higher concentration of pollutants in drinking water.

For example, nitrate contamination of drinking water is already an acute problem in many areas in the Central Valley and may be further exacerbated by this scenario, leading to more residents who are not able to drink water safely from their tap. According to the Pacific Institute's report "The Human Costs of Nitrate-contaminated Drinking Water in the San Joaquin Valley," 75% of nitrate exceedances in the state in 2007 occurred in Valley water systems. They also note that nitrate exposure is associated with respiratory and reproductive conditions; impacts to spleen, kidney, and thyroid functions; and some forms of cancer.

Excessive groundwater pumping can also lead to increased subsidence. According to the California Department of Water Resources, some areas of the Valley are sinking nearly 2 inches

per month, which can damage infrastructure, including bridges, roads, aqueducts, and well casings. Subsidence can also increase vulnerability to flooding during extreme rain events and permanently reduce the capacity of underground aquifers to store water.

Agriculture

Per the California Department of Food and Agriculture (CDFA), California's specialty crops make up over half of the nation's fruits, nuts, and vegetables, and nearly $7 billion of worldwide exports. A variety of climate change impacts threaten these crops, including reduced water supplies; plant heat stress from more frequent and hotter high heat days; fewer winter chill hours leading to lower yields and less bloom time for flowers, fruits and nuts; shifts in pollinator life cycles and distributions; and the spread of invasive species.

According to the California Climate Change Center's "Potential for Adaptation to Climate Change in an Agricultural Landscape in the Central Valley of California" report, the Central Valley is highly vulnerable to impacts from climate change over the next 50 years. They report that, in order to adapt to the impacts, many changes in the crop mix are needed. As well, additional research is necessary to inform farmers and other agriculture industries in the areas of irrigation methods, fertilization and tillage practices, and land management, to name a few.

In addition to plant breeding and cropping system considerations, climate change will likely lead to increasing disease and pest pressures on crops, as pathogens and parasites are able to better survive and proliferate with earlier spring arrival dates and warmer winter temperatures. Higher temperatures, increasing populations, and urbanization can contribute to uncertainty in the water supply for agricultural purposes. As well, high summer temperatures can contribute to decreased livestock production and decreased availability of irrigated crops for livestock feed.

Infectious Diseases and Health Services

Hot temperatures and drought can facilitate the spread of diseases such as Valley Fever. For the past few years, public health officials have noted that the disease is on the rise, particularly in the San Joaquin Valley region, as shown in Figure 2, where over 75% of cases occur.

The disease, also called coccidioidomycosis, is caused by a fungus that lives in the soil. During hot, dry summer seasons, both people and animals can inhale the fungus by breathing in dust, which can result in flu-like symptoms lasting up to a month or more. Rarely, this can lead to pneumonia and infection of the brain, joints, bone, skin, or other organs. However, even with respiratory illness alone, the health and economic impacts can be substantial, particularly for people who work with soil and dirt (agriculture, construction, etc.).

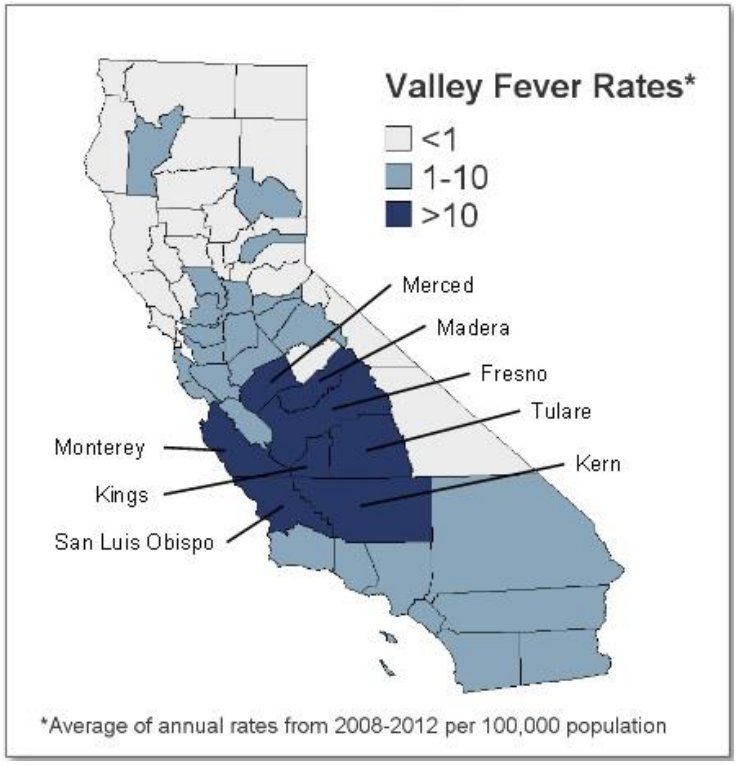

Figure 2. Rates of reported Valley Fever cases in California counties from 2008-2012. Darkest colored counties had the highest rates of disease. Source: California Department of Public Health, Valley Fever Fact Sheet, September 2013.

High heat and drought can also facilitate the spread of West Nile Virus (WNV) by aiding the development of mosquitoes, which spread the virus to people, birds, and other animals. Last year in California, the number of mosquitoes carrying WNV surged to unprecedented levels.

According to the 2014 Safeguarding California report, food-borne pathogens, such as Salmonella and Campylobacter bacteria in farm animal products also display a distinct seasonal pattern, which has been associated with climate variability, such as heat waves and flooding. As climate change will increase the frequency and intensity of these extreme events, the incidence of the diseases may also increase.

Furthermore, regular access to health services is already a challenge in certain parts of the Central Valley. Extreme events such as flooding and wildfire, could threaten infrastructure needed for access to vital services, and the influx of additional patients from heat stress, respiratory ailments, and infectious diseases, etc., could further stress the region's health care services.

Environmental Justice Considerations

Vulnerable populations and disadvantaged communities will be harder hit by the impacts of climate change and less able to adapt to them. This "climate gap," is of particular concern for

California which has one of the most ethnically and economically diverse populations in the U.S. (Morello-Frosch et al., 2009).

For example, according to the Pacific Institute's report, some communities in the San Joaquin Valley have already been waiting many years to have safe drinking water restored to their taps. Especially in small communities, water systems tend to have persistent nitrate violations and cannot afford to independently finance projects to reduce contaminants. Per the report, these communities also tend to be low-income with a high percentage of Latino households, in which Spanish-speakers are less likely to be aware of the contamination.

Additionally, minorities and low-income people are more likely to live close to facilities such as powerplants and refineries (Boyce and Pastor, 2013) and hazardous materials sites. These residents are regularly exposed not only to worsened air quality from high local emissions, but also to toxic chemicals during inundation from extreme events and flooding.

In the Salinas Valley, some of the state's worst air and water quality overlaps with areas of severe poverty, where per capita income is 26% lower than the state average (Fougeres, 2007). Local dust storms, field burning, farm machine use, and high numbers of shipping trucks can all contribute to high levels of local air pollutants in these severely burdened communities.

Adapting and Building Resiliency

California has implemented aggressive greenhouse gas reduction goals as part of the global effort to prevent the worst effects of climate change. However, even if all GHG emissions ceased today, many impacts of climate change would still be unavoidable because the climate system changes slowly. As we're already seeing the effects of climate change, with more impacts to come, planning and implementation of climate adaptation measures can help reduce the growing risks of impacts to public health, the environment, and economy.

State Efforts in Climate Adaptation

California has developed numerous policies focused on GHG emission reduction efforts, with a subset addressing adaptation and resiliency. Governor Brown's recent Executive Order (EO), B-30-15, focused on the state's efforts to address climate adaptation, directing the Natural Resources Agency to coordinate regular updates to California's Climate Adaptation Strategy and all state agencies to consider climate change and adaptation in their planning and investment decisions.

State Resources & Planning Documents

Many state agencies have worked together to produce multiple climate change assessments and guidance documents, as well as provide funding for affordable housing and sustainable communities. Key documents that summarize climate impacts in sectors and regions and provide adaptation guidance include the 2014 Safeguarding California report, focused at the state level, and the 2012 Adaptation Planning Guide to support local governments and regional collaboratives.

The upcoming Fourth Climate Change Assessment will provide scientific information to support adaptation decisions, implement much of the state's plan to coordinate state research on climate change, and identify additional research projects. Additionally, Cal-Adapt is a web-based climate adaptation planning tool for local planning efforts with downscaled climate change scenarios and research for regions within California.

State Strategies and Recommendations

Broadly, the Safeguarding California report listed key cross-sector strategies for adaptation, including: integrating climate change into government activities; considering vulnerable populations, significant and sustainable funding sources, and research data and tools; prioritizing projects with multiple benefits; and prioritizing communication, education, outreach, and collaborative, iterative processes. The guiding principles of the Climate Adaptation Strategy update included involving all relevant stakeholders and establishing partnerships across levels of government and between public and private sectors. This emphasis on collaboration from state agencies is further highlighted in the Adaptation Planning Guide, which states, "Climate adaptation requires a sustained iterative process meaning both local and regional staff and community members should be engaged throughout the process."

Example: Agriculture Sector

An example of this multi-stakeholder process is highlighted by CDFA's Consortium for Specialty Crops, established in 2012 to identify specific climate change adaptation strategies for growers. The Consortium discussed strategies across levels, including individual growers, local, regional, and state planning, and across multiple categories, including education and outreach, planning and research, technology and innovation. Some of the recommendations included supporting economic and environmental studies, improving technical assistance and training for growers, promoting collaborations among individual producers and regional water boards, and supporting policies to help producers adapt to climate change.

Other initiatives from CDFA can promote both mitigation and adaptation goals. For example, the Healthy Soils Initiative works to ensure that agricultural soils have adequate organic matter to sequester carbon, increase water retention, reduce erosion and dust, and improve plant health and yields.

Example: Forests and Fire Prevention Sector

CAL FIRE defines adaptation as any action adjustment to natural or human systems to minimize harm or take advantage of benefits from climate change. Fostering forest adaptation involves three main areas: forest ecosystem health and productivity, protection from wildfire, and biomass utilization for energy.

In order to address adaptation in all of these areas, CAL FIRE prioritizes monitoring forest health for pests and diseases, propagating tree species that are better adapted to climate changes, and using manual thinning, prescribed burning, and land use planning to reduce fire hazards, among

other strategies. Additionally, urban forests are important for both carbon sequestration and adaptation to reduce heat islands, absorb and filter storm runoff and flooding, and protect air quality.

Regional Efforts in Climate Adaptation

Regional agencies, including the Central Valley Regional Water Quality Control Board (Water Board) and the San Joaquin Valley Air Pollution Control District (Air District), have been working to consider the impacts of climate change in their planning and to collaborate with other levels of government and stakeholder groups.

For example, the Water Board recently held a public workshop on the effects of climate change on water quality in the Central Valley Region in March. The goals were to assess the impacts of climate change in the region, the policy responses of other government entities, and the needs and concerns of stakeholders in the Valley, in order to inform the development of a Climate Change Work Plan for the Water Board.

Additionally, the state and regional water boards have been working together in order to determine their data needs across the state and inform a coordinated work plan. The Water Board also works with local communities to assess water quality concerns.

The Air District adopted a Climate Change Action Plan in 2008. Much of the work on climate change has been focused on meeting the mitigation goals and complying with State and Federal mandates. However, the agency also recommends measures that have adaptation co-benefits by improving air quality (e.g. using methane from the dairy industry as renewable energy for low nitrogen oxides [NOx] trucks). To protect public health while promoting forest management, the agency works with land managers to coordinate small-scale prescribed burns on days when the air quality forecast allows for it. Additionally, the agency's advisory committee for ozone includes government, industry, and environmental justice representatives.

Local Efforts on Climate Adaptation

In the Central Valley, academic institutions, counties, and cities are also engaged in climate change mitigation, adaptation, and research to varying degrees. Included here are some examples from each of these stakeholder groups.

Academic Institutions

The Institute of Climate Change, Oceans and Atmosphere (ICOA) at California State University, Fresno was created to foster interdisciplinary research and teaching in the climate change, oceanography, and atmospheric science. For ICOA's purposes, oceans are broadly interpreted to include all elements of the water cycle, including precipitation, runoff/recharge, surface water, and ground water. The areas of interest within the Institute include a broad range: soil and water, health, climate, agriculture, air quality and pollution, and environmental education. As well, in 2008 the ICOA assisted the City of Fresno in evaluating potential effects of climate change and

developing strategies to reduce the impacts and GHG emissions in the Climate Change Assessment Report for the Greater Fresno Area.

Fresno State's Office of Community and Economic Development was also selected as a regional partner in the state-run CivicSpark program. CivicSpark is Governor Brown's AmeriCorps program for building local government capacity to address climate change, administered by the Local Government Commission (LGC) in partnership with the Governor's Office of Planning and Research. In the San Joaquin Valley, there are five projects within the program, including development support for the Merced County Climate Action Plan and for urban forestry in the Valley.

The University of California, Merced (UC Merced) is engaged in climate change efforts in a variety of ways. The Sierra Nevada Research Institute (SNRI) has over 35 affiliated researchers focusing on sustainability, the ecosystem, water, drought, climate and more, using the Valley as a "living laboratory." Recently, the University hired a UC Cooperative Extension specialist, housed in the SNRI, to help farmers and ranchers adapt to the impacts of a changing climate and to collaborate with UC colleagues, state, and federal agencies in California's efforts to address climate change adaptation and mitigation. Additionally, UC Merced has its own Climate Action Plan, which includes the goals of becoming "climate neutral" by 2020 and starting a dialogue on regional solutions to global warming.

County-Level

A number of county public health departments have been working with the California Department of Public Health's (CDPH) "CalBRACE: California Building Resilience against Climate Effects" project to plan for and reduce health risks from climate change. For example, the Merced County Public Health Department received a small grant from the program to conduct a survey on climate change efforts in their county.

In 2010, stakeholders in Fresno and San Luis Obispo Counties, including elected leaders, county planners, land managers, public health officials, and citizens, with the help of the LGC, investigated regional climate change impacts and approaches to climate change, and produced the report, "Adaptation Strategies across Socioeconomic and Natural Systems in Fresno and San Luis Obispo Counties." They noted in the report that, based on climate change projections, "Adaptation is the next critical step if California cities and counties are to be prepared for the potentially devastating impacts of climate change."

Additionally, Tulare County includes a section on adaptation in the areas of water supply, agriculture and forest land, and flooding in their 2010 Climate Action Plan, and the Kern County Regional Transportation Plan touches on the topic.

City-Level

The City of Madera released a draft of their Climate Action Plan (CAP) in August. The CAP includes a section on adaptation measures which notes that adaptation planning for climate change impacts should be done across sectors and incorporated into local hazard mitigation plan

development. Furthermore, this section describes existing and/or completed efforts, general plan policies and actions, and additional implementation actions for multiple sectors, such as public health, water management, and agriculture.

In 2012, the City of Merced adopted a CAP with long-term goals through 2020. The main focus of the plan is GHG emissions reductions and sustainability. Though GHG mitigation strategies can often have adaptation co-benefits, adaptation efforts are not always called out specifically as such. Given the state's early focus on mitigation, many CAPs throughout the state follow this lead, though more are beginning to incorporate adaptation considerations and planning.

Summary

In a 2014 report, "Governing California Through Climate Change," the Little Hoover Commission noted the need for a greater emphasis on adaptation and a comprehensive administrative structure in California for creating adaptation policy. From previous hearings of this committee on climate change adaptation at the state and regional levels, the need for additional resources and tools for local governments, as well as regional coordination structures, has been a consistent theme.

These needs exist for the Central Valley as well. Because this region suffers from some of the most severe air and water quality problems in the country, and is highly dependent on water supplies to support an economy based heavily in agriculture, adaptation measures are an important part of sustaining and improving the environmental quality, public health and economic vitality of the region.

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Scientific overview of climate change impacts and adaptation priorities in the Central Valley, and links to research

Presentation to California Senate Environmental Quality Committee

September 22, 2015 – Merced, CA

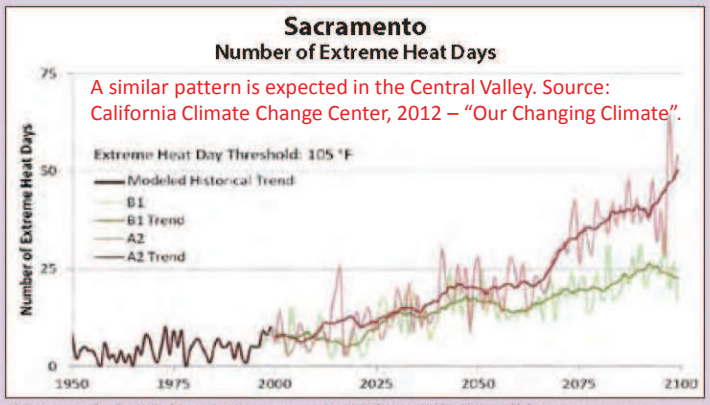
Roger Bales, Professor of Engineering & Director of the Sierra Nevada Research Institute, UC Merced
Director of UC Water Security & Sustainability Research Initiative

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – overview

As the Earth's temperature increases, corresponding increases in the Central Valley's minimum night-time, maximum daytime and daily average temperature over the annual cycle will affect agricultural crops, air pollution, worker productivity, electricity demand and many other aspects of our lives, ecosystems and economy.

Increases in temperature and shifts in precipitation together will affect water storage, inter-annual availability of water for agriculture and cities, groundwater withdrawals, drought incidence, evaporative demand across the landscape, wildfire incidence and extent, wildlife habitat, and more.

These impacts are outlined in the 2012 California Climate Assessment "Our Changing Climate".



"Extremely hot" days in Sacramento (at least 105°F) will become more common with climate change. By the middle of this century, the number of extremely hot days could increase fivefold (up to 20 days) compared to the historical period (black curve). By the end of this century, under the higher emissions scenario (red curve), they could occur as much as ten times more often than historically. Following a lower emissions scenario (green curve) could make a big difference: Sacramento would see only half that increase.

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – heat

Extreme heat several days in succession will affect outdoor workers, particularly in agriculture. Public health will also be affected by impacts of warming on air quality, food production, the amount and quality of water supplies, energy pricing and availability, and the spread of infectious diseases.

For example, warmer temperatures affect ozone production, as well as smoke form wildfires. Both have known health impacts.

These impacts fall especially hard on poor rural populations characteristic of the Central Valley, owing to the lower level of capacity to cope with and adapt to the impacts of warming.

A strategic area of research and education for UC Merced is inequality, power and social justice. Several faculty and other researchers at UC Merced use the Central Valley as a laboratory for their research, and help build the knowledge base for social solutions.

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – water

Many impacts of climate change on the Central Valley will be felt through changes in the water cycle.

These start in the Sierra Nevada, with snow/rain shifts and earlier snowmelt; and these shifts affect water availability in storage for use during annual and multi-year dry periods. Critical storage includes water in the snowpack, in mountain soils, behind dams and in groundwater).

Further impacts in the region occur through groundwater depletion and quality; and also affect land subsidence.

Several SNRI faculty and researchers at UC Merced focus on hydrology, climate and water resources challenges in the Sierra Nevada and Central Valley.

In particular, SNI research emphasizes the critical importance of measurements and data as the key foundation for systems understanding and thus predictions.

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – water (cont.)

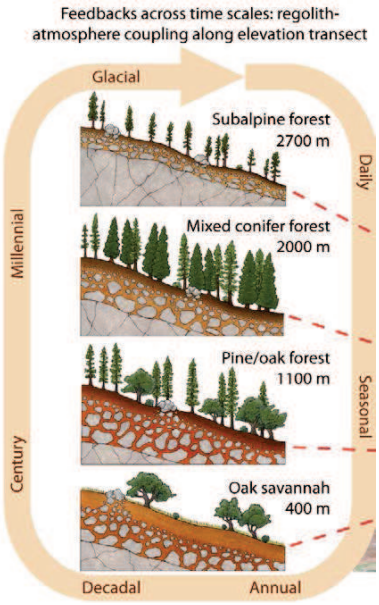
One example of the multi-disciplinary water and ecosystem research is the Southern Sierra Critical Zone Observatory (SSCZO), https://criticalzone.org/sierra.

Four SNRI faculty form the core leadership of this multi-million dollar, internationally recognized program, which engages tens of other researchers, students and collaborators from UC Merced, other UC campuses, and a variety of research organizations around the world.

The SSCZO began in 2007, and is supported by the U.S. National Science Foundation.

SSCZO researchers have established quantitative links between precipitation patterns, temperature, subsurface water storage and ecosystem health in Sierra Nevada forests.

The quantitative predictive capabilities they have developed provide a more-solid foundation for both water and forest management.



Scientific overview of climate change impacts and adaptation priorities in the Central Valley – water (cont.)

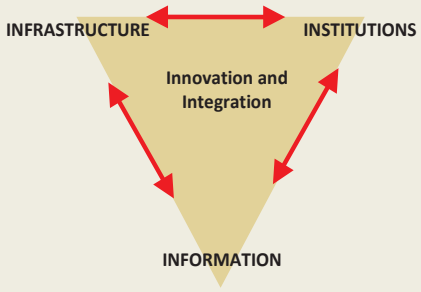
A second example of how UC Merced is addressing the state's critical water challenges is the recently established UC Water Security and Sustainability Research Initiative (UC Water), http://ucwater.org.

Three SNRI faculty plus three faculty from other UC campuses form the leadership core of this multi-million dollar, multi-campus initiative, which has base support through the UC Office of the President.

UC WATER

- is developing innovative, quantitative water accounting and analysis methods, and introducing modern information systems into California's aging infrastructure,
- is improving our understanding of the way water flows through the natural environment, and how it is extracted, conveyed and stored in built and natural infrastructure,
- tightly weaves in legal and policy research, and
- integrates from headwaters through groundwater.

We define water security as the reliable availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production, coupled with an acceptable level of water-related risks. Sustaining water security in the face of interrelated changes in population, climate and land cover requires investments in three tightly-linked areas:



Scientific overview of climate change impacts and adaptation priorities in the Central Valley – <u>energy supply</u>

Electricity demand is affected by temperature, particularly the demand for summer cooling.

Drought conditions result in less hydropower production, and thus more production of electricity by fossil fuels.

SNRI researchers are working with hydropower utilities to improve forecasting and thus operation of mountain plants thought improved hydrologic information.

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – <u>energy supply</u> (cont.)

The Central has tremendous potential for production of renewable energy.

UC Merced is committed to become carbon neutral on its campus by 2025, which is aligned with UC President Napolitano's goal of carbon neutrality for UC as a whole.

UC Merced is the lead campus in UC Solar, a multi-million dollar strategic research program, with base support through the UC Office of the President.

UC efforts are aimed at developing technology and approaches for the Central Valley and California as a whole to become carbon neutral.

SNRI researchers also have a vigorous research program around biomass energy, including production of biogas from waste feedstocks.

The Central Valley has the potential to help the state displace natural gas with more-renewable fuels.


UC Merced, 1 MW PV array

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – <u>ecosystems</u>

Ecosystem health and the ability of forests, grasslands, riparian areas to yield ecosystem services is affected by climate change, and resource managers need new levels of both knowledge and resources to meet current and future challenges.

Drought stress, tree mortality and high-intensity wildfire in the Sierra Nevada, and associated effects on water and other ecosystem services are of particular concern.

Many SNRI researchers are engaged in research that builds he knowledge base for better ecosystem management, particularly in the Sierra Nevada and foothills.

SNRI research includes climate-wildfire links and predictions, ecosystem health, shifts in ecosystem species as the climate warms, and verification of the water implications of forest management.

Scientific overview of climate change impacts and adaptation priorities in the Central Valley – <u>climate communications</u>

In the Central Valley and across the American public there is a sizable political divide on the issue of global warming; and flows of political messages and news concerning global warming have contributed to substantial growth of this divide over the past decade.

There is, however, evidence that climate-change acceptance and thus support for adaption and mitigation is increased by mechanism-explaining interventions (wisdom deficit). Framing and use of a trusted message source are essential.

UC Merced's Center for Climate Communications, conducts and promotes research on communicating climate issues, including climate variability and adaptation.

<u>The Center</u>

- examines the meaning and presentation of climate reports from varied sources, and studies how the presentation of climate information influences the public;
- works with stakeholders to develop better ways to talk about and think about climate issues; and
- hosts and carries out outreach activities.

Climate change is a "wicked problem", and engaging the public in a discussion of complex scientific issues is especially difficult because of the basic neurological wiring of the human brain. A wicked problem has no solution that is positive across all values.

> Wicked problems
> Some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them.
> Laurence J. Peter
> (of Peter Principle)

Challenges and successes in coordinating adaptation efforts among academic, federal, and state partners, and how the state might be helpful in supporting and improving these efforts

The current multi-year drought and rise in high-intensity wildfire activity highlight that the Sierra Nevada is at a tipping point with respect to water temperature effects on both ecosystems and water supply.

The region needs a sustained effort for restoring our Sierra Nevada forests to a sustainable conditions, including the provision of traditional ecosystem services such as habitat, biodiversity, recreation, timber, grazing and water security; and also further opportunities for renewable energy and carbon sequestration.

UC Merced and SNRI work closely with resource managers such as the U.S. Forest Service and California Resources Agency to develop the knowledge base and tools for better, adaptive resource management. The UC and our resource-management partners need opportunities and incentives to sustain this support for doing strategic research and translating it to management actions through bond funding for water and conservation, and other leveraging.


Thinning small trees, Stanislaus-Tuolumne Experimental Forest

Challenges and successes in coordinating adaptation efforts among academic, federal, and state partners, and how the state might be helpful in supporting and improving these efforts

The region (and whole state) would benefit from an accurate, transparent, timely water-resources accounting system to support decision making. This system needs to extend from the Sierra Nevada headwaters (including snow and soil-moisture storage, rain, snowmelt, evapotranspiration and runoff flows) through Central Valley agriculture (including diversions and evapotranspiration) and groundwater (storage, recharge and withdrawals). While these quantities are estimated by models, they are measured in very few places if at all.

UC and private-sector technology provides the opportunity to transform water decision making.

Modest investments now will have very large immediate and long-term benefits.


Low-cost measurement node, part of a distributed water-resources information system

Challenges and successes in coordinating adaptation efforts among academic, federal, and state partners, and how the state might be helpful in supporting and improving these efforts

The region can move to a healthier, lower-carbon economy through investments and incentives to move our cities, towns, farms and daily lives to renewable energy. State agencies and elected officials from coastal areas must work with Central Valley elected officials, businesses and the UC and Cal State to achieve this.

Transportation poses particular problems, both inter-regional and intra-regional.

A sustained effort in climate communications will benefit the region's economy and can garner greater regional support for actions aimed at achieving a sustainable energy and water future for the state, a healthier living environment, healthy ecosystems and a stronger economy.

SNRI and UC Merced as a whole are committed to both the education and strategic research in social science, engineering and natural science that address the region's climate challenges.

As a research university, our products are both our graduates, and new knowledge.

Challenges and successes in coordinating adaptation efforts among academic, federal, and state partners, and how the state might be helpful in supporting and improving these efforts

A sustained effort to develop climate solutions through research and development, and public-private partnerships would speed the region's transitions to a renewable energy future.

UC Merced is part of the broader UC effort to develop climate solutions. The legislature has a critical role to play in facilitating this cooperation through support for development of knowledge and technology, incentives for cooperation and adoption, and climate literacy.

CDFA EFFORTS ON AGRICULTURAL CLIMATE CHANGE ADAPTATION

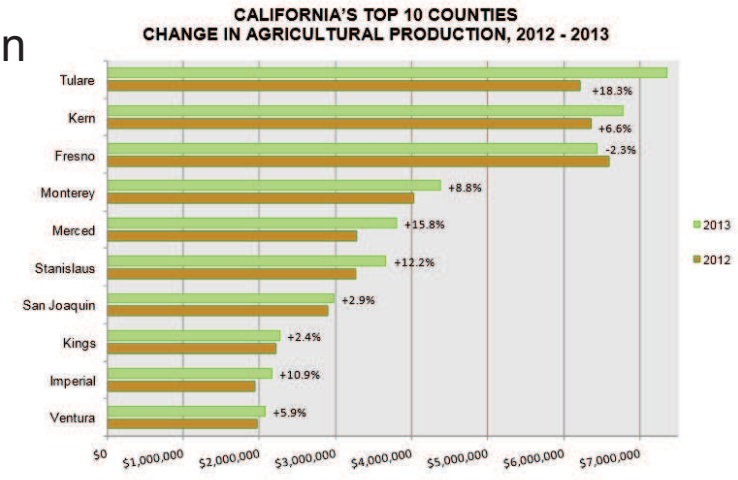
SENATE COMMITTEE ON ENVIRONMENTAL QUALITY

SEPTEMBER 22, 2015

Amrith Gunasekara, PhD. Science Advisor
California Department of Food and Agriculture

CALIFORNIA AGRICULTURAL PRODUCTION

- California is the nation's leading agricultural production state and has been for more than 50 years
- The Central Valley counties lead the state in agricultural production; 8 of the 10 leading production counties
- CDFA climate change adaptation has statewide applicability



Data Source: 2012 Annual Crop Report by USDA NASS

CALIFORNIA'S CENTRAL VALLEY

3

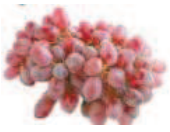
TOP 15 COMMODITIES IN CALIFORNIA Highlights by Rank and County Percentage of State Total, 2012-2013	
Milk and Cream	Tulare leads again with over 27 percent of the State total
Grapes, All	Kern takes the lead with almost 25 percent of the State total
Almonds	Stanislaus overtakes Fresno and Kern this year as the leading county
Cattle and Calves	Tulare is No. 1 again, Imperial moves to rank 2nd this year
Nursery Products	San Diego continues to lead
Strawberries	Monterey and Ventura lead with more than 60 percent of the total value
Walnuts (English)	San Joaquin leads with over 20 percent of the total value, followed by Butte
Lettuce	Monterey leads with almost 66 percent of the total value
Alfalfa Hay	Kern leads with 15 percent, followed by Imperial at 12 percent of the total value
Oranges	Tulare leads with almost 63 percent of the State total value
Pistachios	Kern leads with more than 31 percent of the total value
Silage, All	Tulare holds over 34 percent of the total value
Chickens	Fresno leads with over 44 percent of the total value, Merced follows with 32 percent
Rice (Excl. Seed)	Colusa leads with 28 percent of the State total value
Tomatoes, Processing	Fresno leads with over 37 percent of the total value, followed by Yolo and Kings

Data Source: CDFA County Agricultural Commissioners' Reports, 2013

CALIFORNIA "SPECIALTY" CROPS

4

- Leads the nations in producing 90 commodities
- California is the sole producers (>99% production) of some crops – Almonds, artichokes, dates, figs, grapes (raisins), kiwifruit, olives, clingstone peaches, pistachios, dried plums, pomegranates, walnuts

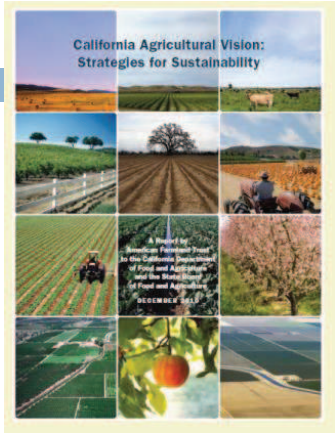






Data Source: 2012 Annual Crop Report by USDA NASS

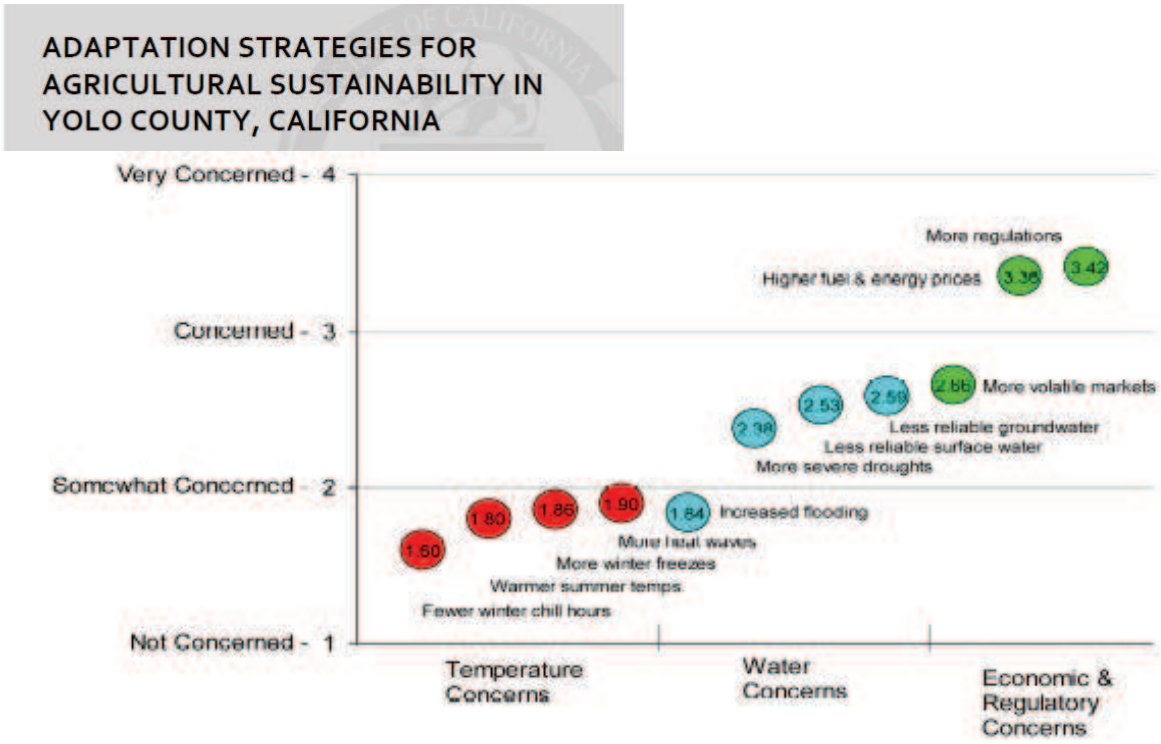
AG VISION- 2010



Strategy 9

Assure Agricultural Adaptation to Climate Change

"Assure that all sectors of California agriculture can adapt to the most likely climate related changes in seasonal weather, water supply, pests and diseases, and other factors affecting agricultural production."



Jackson et al. *Adaptation Strategies for Agricultural Sustainability in Yolo Co., California*. CEC report, submitted.

Challenge – how do we engage the agricultural community on climate change and identify adaptation needs?

News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

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CDFA TO ESTABLISH CLIMATE CHANGE CONSORTIUM TO HELP SPECIALTY CROP GROWERS PLAN FOR FUTURE IMPACTS

cdfa

Release #12-029
Print This Release

SACRAMENTO, August 2, 2012- California's specialty crops account for more than half of the nation's fruits, vegetables, and nuts as well as nearly $7 billion dollars of exports worldwide. California's production of diverse specialty crops is threatened by potential climate-related phenomena, including reduced water supplies, increased plant heat stress, decreased chill hours, shifts in pollinator lifecycles and increased influx of invasive species. Addressing these risks to ensure agricultural adaptation to climate change will require a concerted effort and is an objective of California Agricultural Vision: Strategies for Sustainability.

CCC PARTICIPANTS

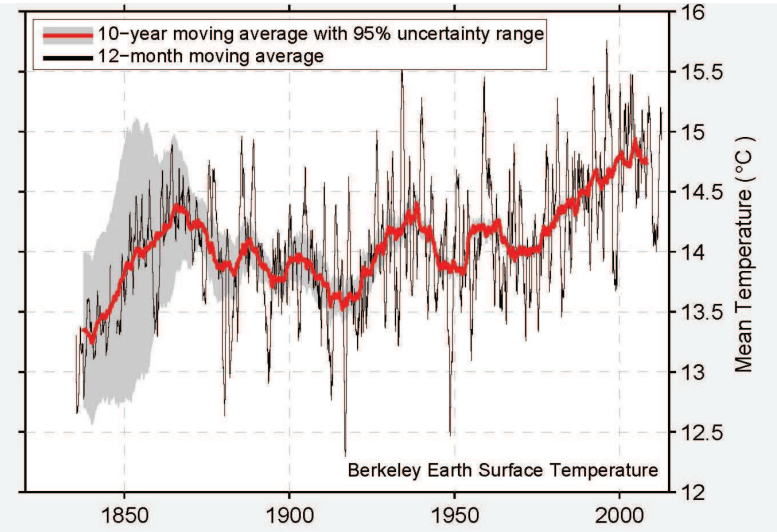
- Three members from different agricultural associations
- One grower of each of the following specialty food crops; grapes, strawberries, almonds, tomatoes, walnuts, lettuce, citrus, pistachios, broccoli, and tree fruits.
- One scientist from the University of California system
- One extension specialist from the University of California
- Two scientists from the California State University system
- One Pest Control Adviser/Crop Control Adviser
- One member that is an Agricultural Commissioner
- One member from the California Resource Conservation Districts
- One member from the Local Government Commission

CCC DISCUSSIONS

9

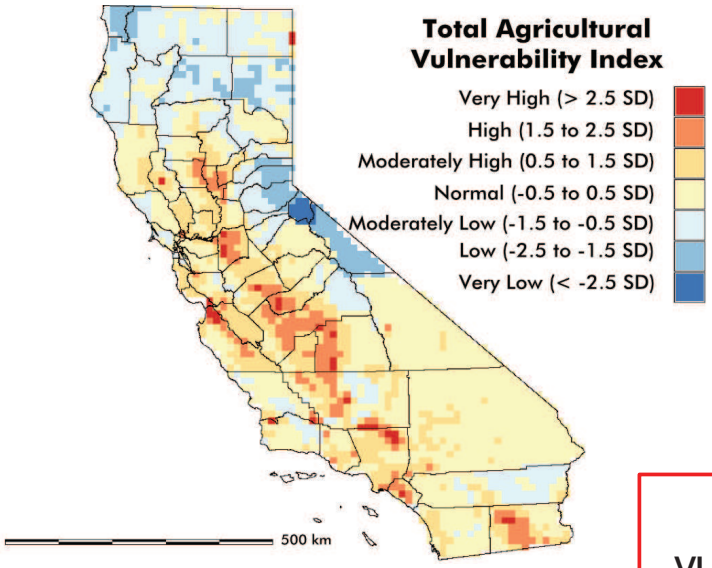
Example of Information shared - Temperature increase is one variable that is used to measure climate change and need for adaptation

This figure shows the average warming observed in the San Joaquin Valley near Modesto, Merced, and Turlock, California.



CCC DISCUSSIONS

10



Vulnerability Index uses 4 sub indices:

1. Climate
2. Crop
3. Land use
4. Socioeconomic

Total modeled agricultural vulnerability in some areas of the state is very high

Data Source: Jackson et al. UC Davis. Energy Commission Study. 2012. http://www.energy.ca.gov/2012publications/CEC-500-2012-031/CEC-500-2012-031.pdf

CCC DISCUSSIONS

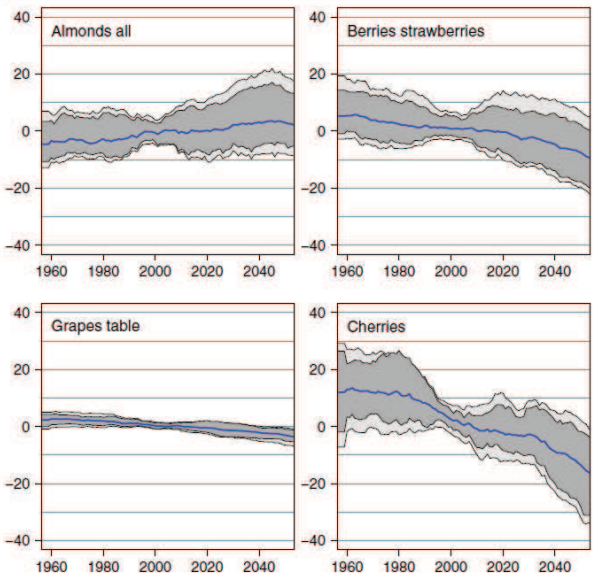


Fig. 9 Simulated change in crop yields for four crops with most reliable crop models. The thick blue line shows the average of all projections, the dark shaded area shows 5%–95% range of projections when using multiple climate models, and the light shaded area shows 5%–95% range when using multiple climate models and multiple crop models (based on bootstrap resampling). The results are presented as percent changes from the 1995–2005 average yields, and as 21-year moving averages in order to emphasize the trend rather than year-to-year variability

Climatic Change (2011) 109 (Suppl 1):S317–S333
DOI 10.1007/s10584-011-0303-6

California perennial crops in a changing climate

David B. Lobell · Christopher B. Field

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C. B. Field
Department of Global Ecology, Carnegie Institution, Stanford, CA 94305, USA

Impacts on Specialty Crops will vary by the specific crop and location

CCC ACTIVITIES

Questions for CCC -

1. What activities and strategies are growers taking now to adapt to climate change?

2. What can CDFA do to help the agricultural sector prepare for climate change?

- Report and Final Recommendations were completed in September 2013

News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

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CLIMATE CHANGE CONSORTIUM FOR SPECIALTY CROPS FINAL REPORT IDENTIFIES CHALLENGES AND MAKES RECOMMENDATIONS FOR AGRICULTURE

cdfa

Release #13-032
Print This Release

SACRAMENTO - October 3, 2013 - As part of the ongoing effort to ensure that California is prepared for the impacts of climate change, the Climate Change Consortium for Specialty Crops has produced a report, *Climate Change Consortium for Specialty Crops - Impacts and Strategies for Resilience*, which identifies recommendations to address the challenges posed by climate change to producers of specialty crops. As a member of the Governor's Climate Action Team, the California Department of Food and Agriculture (CDFA) convened the Consortium to prepare the report. Climate change is expected to have significant and widespread impacts on California's economy and environment.

CCC RECOMMENDATIONS

1. Research Needs
2. Planning and Resource Optimization
3. Outreach and Education
4. Technology and Innovation

Information from report used in;

- Safeguarding California Report
- Safeguarding California Implementation Plan
- 4th Climate Change Assessment Research
- USDA NRCS Climate Sub-hub discussions

EXAMPLE

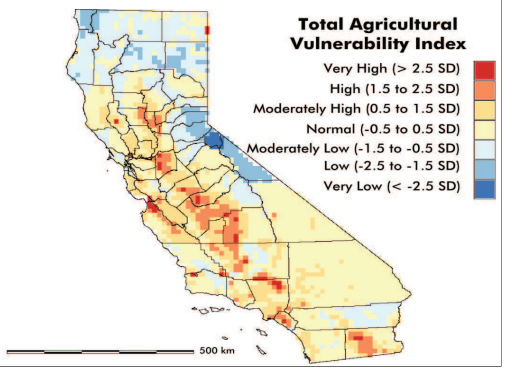
Recommendation

Research Needs

Economic and Environmental Studies of the Costs, Benefits, and Risks of:

- Crop relocation, including infrastructure considerations, and climate analogues; define where crops will be best suited under future climate conditions considering soil type, topography, water availability, and potential hazards;

- This recommendation has been included in the 4th Climate Change Assessment Research request for proposals to begin in 2015



NEXT STEPS - MOVING FORWARD

Recommendation

Research Needs

Economic and Environmental Studies of the Costs, Benefits, and Risks of:

- Water Management, in terms of:
  - Increasing above and below ground water storage capacity;
  - Groundwater recharge;
  - Use of recycled/reused or desalinated water;
  - Efficient irrigation technology implementation;
  - Reduction of evaporation from irrigation canals using solar panels or chemicals;
  - Sustainable forest management practices to enhance water resource availability for agricultural systems downstream.

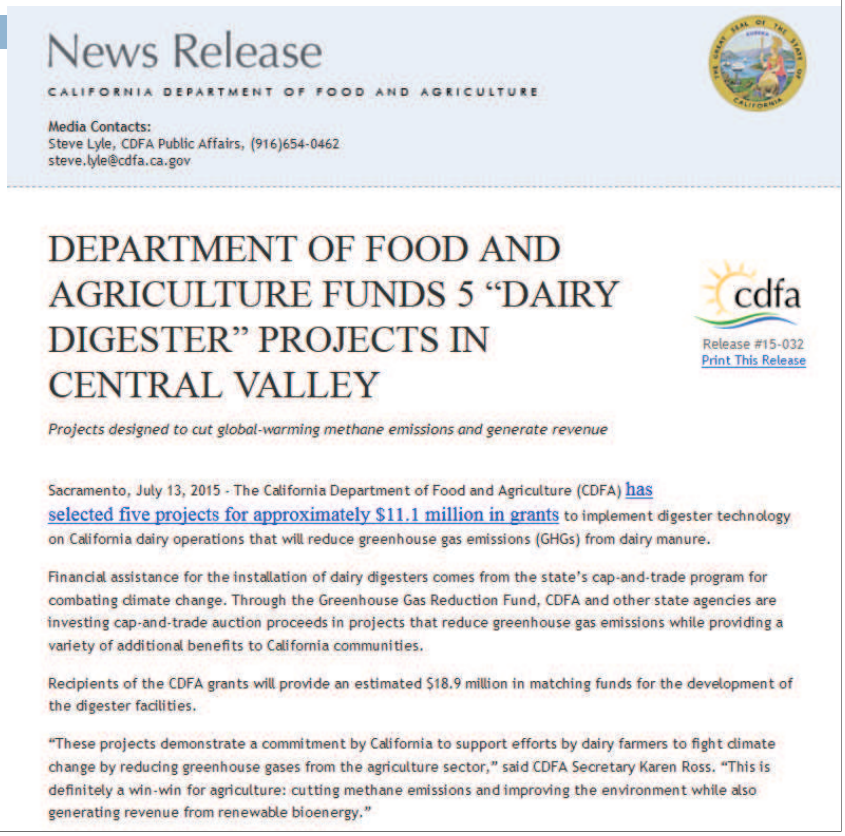
State Water Efficiency and Enhancement Program

- Incentivizes the implementation of efficient irrigation system that reduce GHGs and save water

GHG REDUCTIONS - MITIGATION

Dairy Digester Research and Development Program

- CDFA was appropriated $12 million dollars from the Greenhouse Gas Reduction Fund to provide financial assistance for the installation of dairy digesters in California, which will result in reduced greenhouse gas emissions.
- $500,000 of $12 million will be for research



News Release

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

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DEPARTMENT OF FOOD AND AGRICULTURE FUNDS 5 "DAIRY DIGESTER" PROJECTS IN CENTRAL VALLEY

cdfa

Release #15-032
Print This Release

Projects designed to cut global-warming methane emissions and generate revenue

Sacramento, July 13, 2015 - The California Department of Food and Agriculture (CDFA) has selected five projects for approximately $11.1 million in grants to implement digester technology on California dairy operations that will reduce greenhouse gas emissions (GHGs) from dairy manure.

Financial assistance for the installation of dairy digesters comes from the state's cap-and-trade program for combating climate change. Through the Greenhouse Gas Reduction Fund, CDFA and other state agencies are investing cap-and-trade auction proceeds in projects that reduce greenhouse gas emissions while providing a variety of additional benefits to California communities.

Recipients of the CDFA grants will provide an estimated $18.9 million in matching funds for the development of the digester facilities.

"These projects demonstrate a commitment by California to support efforts by dairy farmers to fight climate change by reducing greenhouse gases from the agriculture sector," said CDFA Secretary Karen Ross. "This is definitely a win-win for agriculture: cutting methane emissions and improving the environment while also generating revenue from renewable bioenergy."

NEXT STEPS - CDFA

1. Evaluate the potential to tailor RFP's and seek funding for research and outreach needs
2. Interagency coordination
    1. CAT Research Plan update
    2. Safeguarding California Implementation Plan
3. Annual California Adaption Conference
4. Opportunity for CDFA to be an information hub
5. Database of adaptation management practices by studying climate analogues
6. Integration of activities with existing CDFA programs – Office of Environmental Farming and Innovation
7. Close coordination with the scientists – Dr. Tapan Pathak, specialist for climate adaptation in agriculture, UCCE, Merced

NEXT STEPS – STATE ASSISTANCE

- Assisting through initiatives such as the 4th Climate Change Assessment for Research

Research

(e.g., water efficient technologies)

↓

Management practices for adaptation and mitigation

(e.g., quantifiable GHG reduction practices)

↓

Incentives for implementation of practices including demonstration projects (e.g., SWEEP)

THANK YOU

Jim Houston
Undersecretary

Amrith (Ami) Gunasekara, PhD
Science Advisor to the Secretary

California Department of Food and Agriculture
916-654-0433
amrith.gunasekara@cdfa.ca.gov

cdfa
CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

TEN HIGHEST PRIORITIES ESTABLISHED BY THE CLIMATE CHANGE CONSORTIUM

1. Support economic and environmental studies of the costs, benefits, and risks of adaptation strategies;
2. Facilitate a reinvestment in grower technical assistance and trainings specific to climate change adaptation;
3. Include grower interests in the Integrated Regional Water Management discussions;
4. Perform or fund a review of regulatory barriers to adaptation mechanisms, such as food safety and other regulations;
5. Facilitate interagency coordination on the recommendations of the Climate Change Consortium;

TEN HIGHEST PRIORITIES ESTABLISHED BY THE CLIMATE CHANGE CONSORTIUM

6. Compile a list of grower needs for weather data and forecast products;
7. Develop research plots to study adaptation strategies and new technologies and products;
8. Promote farmland conservation;
9. Recognize growers who develop or adopt novel strategies to adapt to climate change;
10. Support USDA NRCS in a review and/or creation of policies to improve growers' ability to adapt to climate change.

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California Legislature
Senate Committee on Environmental Quality

BOB WIECKOWSKI
CHAIR

CONSULTANTS
RACHEL MACHI WAGONER
REBECCA NEWHOUSE
JOANNE ROY
SCIENCE & TECHNOLOGY FELLOW
LAURIE HARRIS
COMMITTEE ASSISTANT
SUE FISCHBACH

INFORMATIONAL HEARING OF THE SENATE ENVIRONMENTAL QUALITY COMMITTEE
BOB WIECKOWSKI, CHAIR

Friday, October 16, 2015
1:00 p.m.
RONALD REAGAN STATE BUILDING, AUDITORIUM
300 S. SPRING STREET, LOS ANGELES, CA 90013

Southern California Regional Adaptation Efforts to Climate Change Impacts

AGENDA

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1. **Southern California Climate Change Impacts and Environmental Justice Considerations**
   a. Alex Hall, *Professor, Department of Atmospheric and Oceanic Sciences and Institute of the Environment and Sustainability, and Director, Center for Climate Change Solutions, University of California, Los Angeles (UCLA)*
   b. Manuel Pastor, *Professor, Sociology and American Studies & Ethnicity, and Director, Program for Environmental and Regional Equity (PERE), University of Southern California (USC)*

2. **Regional Adaptation Efforts and Coordination**
   a. *Krista Kline, Managing Director, Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC)*
   b. Elizabeth Rhoades, *Climate Change Liaison, Los Angeles County Department of Public Health*
   c. *Kenn Fujioka, Manager, San Gabriel Valley Mosquito and Vector Control District, and President-Elect, Mosquito and Vector Control Association of California (MVCAC)*

3. **Local Government and Nonprofit Adaptation Efforts**
   a. Matt Petersen, *Chief Sustainability Officer, City of Los Angeles*
   b. Jonathan Parfrey, *Executive Director, Climate Resolve*

4. **Public Comment**

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Southern California Regional Adaptation Efforts to Climate Change Impacts

BACKGROUND INFORMATION

Climate Change Impacts in Southern California

Climate change is having global impacts that are occurring in response to greenhouse gas (GHG) emissions from human activities, as noted in the 5th assessment of the Intergovernmental Panel on Climate Change (IPCC). These global changes are manifesting in varied environmental health and infrastructure consequences for different countries, regions, and states, necessitating a change in public policy decision making in order to adapt to a new environment.

In Southern California, the University of California, Los Angeles (UCLA) has conducted the Climate Change in the Los Angeles Region project, researching climate change impacts using new techniques to downscale information and produce neighborhood level projections. Their results showed that warming will vary across the region, being more severe for inland communities as compared to coastal areas. On average, mid-century temperatures in the region will be 3°F hotter, even under mitigation scenarios in which countries come together to reduce GHG emissions.

Though a certain amount of warming is inevitable, without mitigation efforts, average regional temperature increases are projected to range from 4.3°F by mid-century to 8.2°F by the end of the century. Researchers conclude that some changes are inevitable by 2050 and must be adapted to, and through mitigation, we can prevent further changes by 2100.

In other words, as described in the "Framework for Addressing Climate Change" report by the Los Angeles County Department of Public Health (DPH), adaptation is managing the unavoidable impacts of climate change, while mitigation is avoiding the unmanageable impacts of climate change, and they are "both vital to protecting health in the long term."

Air Quality, Wildfires, and Extreme Heat

Increasing numbers of extreme heat days are projected in the coming decades. The "Public Health-Related Impacts of Climate Change in California" report points out that increasing high heat days from climate change have a number of impacts on communities, including direct heat-related mortalities and worsening of chronic health conditions (Drechsler et al. 2006). Southern California already experiences energy shortages, and higher demand from more frequent and intense high heat days could further impact health.

As noted by the Union of Concerned Scientists (UCS) in the 2012 report "Preparing for Climate Change Impacts in Los Angeles: Strategies and Solutions for Protecting Local Communities," extreme heat days can lead to dehydration, heat exhaustion, and fatal heat stroke, in addition to worsening existing medical conditions, including respiratory disease, diabetes, kidney and heart disease. They report that recent research has shown that Los Angeles County has the largest number of residents in California who will be exposed to extreme heat days and at greatest risk for related health problems. Reasons for this high amount of risk include a combination of lack of air conditioning or shaded areas, outdoor work exposure to air pollutants, and preexisting health conditions.

Both wildfires and high heat contribute to reduced air quality, through the elevated levels of particulate matter and ozone pollution, with implications for public health. A 2011 report by the UCS discusses the "climate penalty on ozone," demonstrating how increasing temperatures could increase ozone pollution. In 2020 alone, impacts from ozone formation associated with this penalty could result in nearly 443,000 additional cases of serious respiratory illness and cost over $729 million.

In recent decades, southern California has experienced an increase in the area burned by wildfires. According to the Southern California Fires Interdisciplinary Project, the 2003 southern California fires, which were widely considered a 100-year event (Figure 1), and the 2007 fires, were responsible for billions of dollars in costs from fire fighting, property damage, environmental erosion, ecosystem services, and human health impacts. By 2050, the region's fire season is projected to last three weeks longer with an increase of 20-30% in the annual amount of acreage burned (Yue et al. 2013). As well, many of the power transmission lines in the Los Angeles region are vulnerable to wildfire damage (UCS 2012).

Figure 1. Wildfires and smoke plumes over Southern California on October 26, 2003. Source: NASA Earth Observatory via the Moderate Resolution Imaging Spectroradiometer (MODIS) on the Terra satellite. Accessed at http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=12373&eocn=image&eoci=related_image.

Wildfire smoke can result in both short-term and long-term health impacts, from minor lung and eye irritation to premature death. Research on health impacts from the 2003 Southern California wildfires showed an increase in hospital admissions for respiratory problems during the fires, including asthma attacks, acute bronchitis, and chronic obstructive pulmonary disorder (COPD), with small increases in cardiovascular admissions. The research further suggested that improved prevention measures are needed to reduce illness in vulnerable populations (Delfino et al. 2009).

Water Quality and Supply and Sea Level Rise

As is true for the San Francisco Bay Area, sea level rise is a concern along Southern California coastlines. For the City of Los Angeles alone, there are two power plants and two wastewater

treatment plants approximately 10 feet above mean sea level (Figure 2; Grifman et al. 2013). These facilities are already vulnerable to flooding during storms and high tide events, and current projections estimate up to 2 feet of sea level rise by 2050 and up to 5.6 feet by 2100 (National Research Center (NRC) 2012). Climate researchers predict that storms will impact the coastline more powerfully in the future because sea level rise will raise wave run-up on beaches and storm surges, causing more erosion, as well as more frequent and extensive flooding and damages.

Figure 2. Image of the Hyperion Wastewater Treatment Plant and the Scattergood Generating Plant, two coastal assets in the City of Los Angeles. (Photo credit: Kenneth & Gabrielle Adelman, California Coastal Records Project, www.Californiacoastline.org). Source: Grifman et al. 2013.

According to the Los Angeles Regional Water Quality Control Board's document, "Los Angeles Region Framework for Climate Change Adaptation and Mitigation," from July of this year, though overall mean precipitation amounts are expected to change very little, climate change will likely impact water demand, supply, and quality of both surface and ground water.

The Los Angeles Region Framework notes that mountains around Los Angeles are expected to lose at least 31% of snowfall, which will melt faster with increasing temperatures and begin melting 16 days earlier on average. With decreased stream flows and higher temperatures, impacts could include a reduction of fish habitat, increased surface water temperatures, pollutant levels, and sedimentation, intensified algal growth, and subsequently, more harmful algal blooms.

With more extreme precipitation events, flood risks will worsen, increasing the likelihood of damaging infrastructure, increasing erosion, and overwhelming sewage treatment systems, further reducing water quality and impacting public health.

For groundwater, the potential for salt water intrusion into aquifers with sea level rise could be worsened by overpumping. The decreased water quality could further deteriorate as pollutant concentrations increase due to reduced water levels and recharge from drought and diminished snowpack.

Public Health Impacts and Vector-Borne Diseases

In addition to the aforementioned health impacts, hot temperatures and drought conditions can contribute to the spread of diseases by aiding development and spread of the vectors that transmit them (Drechsler et al. 2006). A vector-borne disease (VBD) is one caused by a virus, bacteria, or protozoan that spends part of its life cycle in a host species (e.g. mosquitoes, ticks, fleas, rodents), which subsequently spreads the disease to other animals and people.

Regional research assessments have previously concluded that climate change and variability are highly likely to influence current VBD spread, including both short-term outbreaks and shifts in long-term disease trends. For example, as temperatures rise, mosquito reproductive cycles are shortened, allowing more breeding cycles each season, and viral transmission rates rise sharply (Githeko et al. 2000). Mosquitoes are an increasing vector of concern, particularly those species that have been introduced from other countries because changes in temperature and precipitation conditions can allow exotic species to become established in places where they could not previously survive year-round.

In Los Angeles County, there are three invasive mosquito species. One of these is the Asian tiger mosquito, which has been identified in the San Gabriel Valley. These invasive mosquitoes bite aggressively during the day and can spread a variety of disease, including chikungunya, yellow fever, and dengue, as with recent outbreaks in Florida and Texas. As noted in a recent Special Report on invasive mosquitoes in Los Angeles County by the San Gabriel Valley and Los Angeles Mosquito and Vector Control Districts, once established, the mosquitoes can reproduce in extremely small amounts of water and are very difficult to control.

The California Department of Public Health further notes three vector-borne diseases that climate change may impact in the state: hantavirus, Lyme disease, and West Nile Virus (WNV). As the ecology of vectors changes with climate, exposure to disease in people may increase significantly.

According to the Los Angeles County DPH, in 2013, WNV contributed to 9 deaths and 165 infections in the county. A previous pulmonary (lung) hantavirus epidemic in the southwest was attributed in part to rodent population growth related to climate conditions, and previous clusters of the disease have been linked spatially to areas impacted by El Nino rainfall. Furthermore, after heavy rain periods, flea-borne plague has been associated with heavy regional precipitation events. Rodents can also spread leptospirosis in their urine and harbor ticks that spread Lyme disease (Githeko et al. 2000).

Environmental Justice Considerations

Climate change impacts affect people of color and the poor hardest, an idea previously called the "climate gap" (Morello-Frosch et al., 2009). Researchers at the University of Southern California who have worked on this issue note that by recognizing these inequities and working to protect the most vulnerable, communities help better protect everyone.

In recent years, the City of Los Angeles produced a Sea Level Rise Vulnerability study which included a social vulnerability assessment. The assessment highlighted that, while per capita income for Los Angeles tends to be higher on the coast than inland, certain coastal communities have some of the lowest income levels in the county. For example, portions of Wilmington and San Pedro have an average income of $13,000 per year with over 76% of the population below the federal poverty line in some census tracts. A combination of low income and high poverty correlates to high vulnerability to disasters and lower capacity for responding and adapting to climate change.

For inner city communities, people are vulnerable to urban heat island effects, in which dark materials used for roads and buildings absorb and retain heat, releasing it much more slowly than natural materials such as grass, soil, and trees. Combined with a reduced access to resources such as air conditioning or a car to move to cooling centers during extreme heat events, vulnerable populations are at an increased risk of adverse health impacts from both temperatures and air pollution on extreme heat days. Los Angeles is one of the smoggiest cities in California while also having one of the highest projections of ambient ozone increases associated with climate change and highest densities of people of color and low-income residents. These same communities are likely to lack health insurance, which can lead to even greater health impacts from air pollution and climate change (Cordova et al. 2006; Morello-Frosch et al., 2009).

Environmental justice researchers in California have looked at the relationship between disparities and exposures to a variety of health, environmental, climate and social vulnerabilities regionally. Overall, even when controlling for other possible explanatory factors, they have found consistent evidence of significant disparities in exposure by racial and socioeconomic factors (Pastor et al. 2013).

Adapting and Building Resiliency

California has developed a number of GHG emission reduction efforts, and numerous state agencies have worked together to produce climate change assessments and guidance documents. Key documents that summarize climate impacts in sectors and regions and provide adaptation guidance include the 2014 Safeguarding California report, focused at the state level, and the 2012 Adaptation Planning Guide to support local governments and regional collaboratives. Additionally, Cal-Adapt was designed to be a web-based climate adaptation planning tool for local planning efforts with downscaled climate change scenarios and research for regions within California.

The guiding principles of the most recent Climate Adaptation Strategy update, Safeguarding California, included involving all relevant stakeholders and establishing partnerships across levels of government and between public and private sectors. The Adaptation Planning Guide echoes the importance of having a sustained, iterative process involving local and regional staff and community members. Additionally, the Little Hoover Commission's "Governing California Through Climate Change" report highlighted the need for more adaptation emphasis in existing programs and a more unified approach to adaptation from the state.

In Southern California, there are a number of regional collaboratives, agencies, academic institutions, counties, and cities engaged in climate change mitigation, adaptation, and research. A subset of the work from these many stakeholder groups is highlighted here.

Regional Efforts in Climate Adaptation

The Alliance of Regional Collaboratives for Climate Adaptation (ARCCA), a network of regional collaboratives across the state, includes two in Southern California: the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC) and the San Diego Regional Climate Collaborative.

LARC, with support from the UCLA Institute of the Environment and Sustainability (IoES), fosters a network of local and regional decision-makers in the Los Angeles County region for both climate mitigation and adaptation work across sectors and locally focused research on impacts. Members include groups from academia, cities, Los Angeles County, regional agencies, nonprofits, and businesses.

Part of LARC's goals includes serving as a convening body to ensure consistency in performance, collaboration, and coordination of climate actions to maximize limited resources. They also facilitate the exchange of the latest scientific research, best practices for policy development, information systems, and education efforts. One example of this is LARC's ongoing development of the Framework, a resource to support local development of climate actions by providing regional information synthesis across sectors on vulnerabilities, adaptation strategies, and applicable federal, state, and local mandates.

The San Diego Collaborative is a network of public agencies that partners with academia, nonprofits, and businesses. The group works to aid collaboration in the region by coordinating strategies and resources, organizing workshops and training events, and facilitating networking by members of the collaborative.

Additionally, the state and regional water boards have been working to coordinate climate action planning. The Los Angeles Regional Water Quality Control Board's document, "Los Angeles Region Framework for Climate Change Adaptation and Mitigation," notes that the regional board has been engaging in a dialogue with state and federal colleagues to develop a framework for adaptation within their programs. The framework is a living document meant to be updated and expanded, in addition to serving as the first step in developing a regional climate action plan for the Board.

Local Efforts in Climate Adaptation

The Port of San Diego's Board of Port Commissioners adopted a Climate Action Plan (CAP) in 2013 to reduce GHG emissions and prepare for the impacts of climate change. The plan addresses goals in multiple sectors, including transportation, land use, energy, water, waste reduction and recycling, and supports the Green Port Program to achieve long-term environmental, societal, and economic benefits and sustainability. As part of the GHG emissions reductions plans, within sectors in the CAP, co-benefits are specified, including air quality, public health improvement, water quality/supply improvement, and adaptation strategy support.

The Port of Los Angeles is one of the busiest in the world, contributing over $63 billion to the state's economy, with over 40% of all U.S. imports coming through the Ports of Los Angeles and Long Beach (Grifman et al. 2013). In 2012, the Port of Los Angeles received a Climate Leadership Award from the United States Environmental Protection Agency (U.S. EPA) for their work on climate change and cutting carbon pollution, and they have been working on a climate adaptation study as noted in their 2011 Sustainability Report.

Many nonprofits and businesses are also engaged in climate change efforts in the region. One example, Climate Resolve, is a nonprofit with a mission of helping to inspire Southern California to reduce GHG pollution and prepare for climate impacts. To do so, their website notes that they help develop communication strategies to make impacts relatable to local people, build collaboratives to implement climate initiatives, promote practical regional solutions, and share their work as a model for other cities and regions. Recently, Climate Resolve was engaged in the Cool Roofs initiative, which resulted in the Los Angeles City Council updating the municipal building code to require that all new and refurbished homes have a "cool roof," using material that naturally reflects sunlight and can result in a more than 50°F cooler surface on summer days.

County-Level

The Los Angeles County Department of Public Health (DPH) has a focus on inter-departmental collaboration, which has led to the development of a "Five-Point Plan to Reduce the Health Impacts of Climate Change." The Plan includes the following goals to:

- Inform and engage the public.
- Promote local policies that support the design of healthy and sustainable communities.
- Provide guidance on local climate preparedness.
- Build the capacity of departmental staff and programs.
- Adopt best management practices within departments.

An example of the DPH's work includes their Los Angeles Climate & Health Workshop Series to build healthier and more resilient communities. This series was developed in collaboration with LARC and materials are provided as a template for other public health departments to train their staff. For the public, the DPH has developed reports to inform residents about specific, local-level health impacts of climate change and how they can reduce their contributions to climate change. As noted in these reports, addressing climate change requires "the foresight, commitment, and creativity of a host of agencies" working together.

Additionally, the Western Riverside Council of Governments (WRCOG) has developed a subregional CAP focusing on mitigation strategies. The document notes that a key next step is the evaluation and integration of climate adaptation and resiliency strategies across sectors and jurisdictions.

San Luis Obispo County adopted a CAP, named EnergyWise Plan, in 2011. In the Plan, there is a focus on adaptation, highlighting short- and long-term adaptation measures in multiple sectors and noting the importance of balancing mitigation and adaptation goals and efforts (Figure 3).

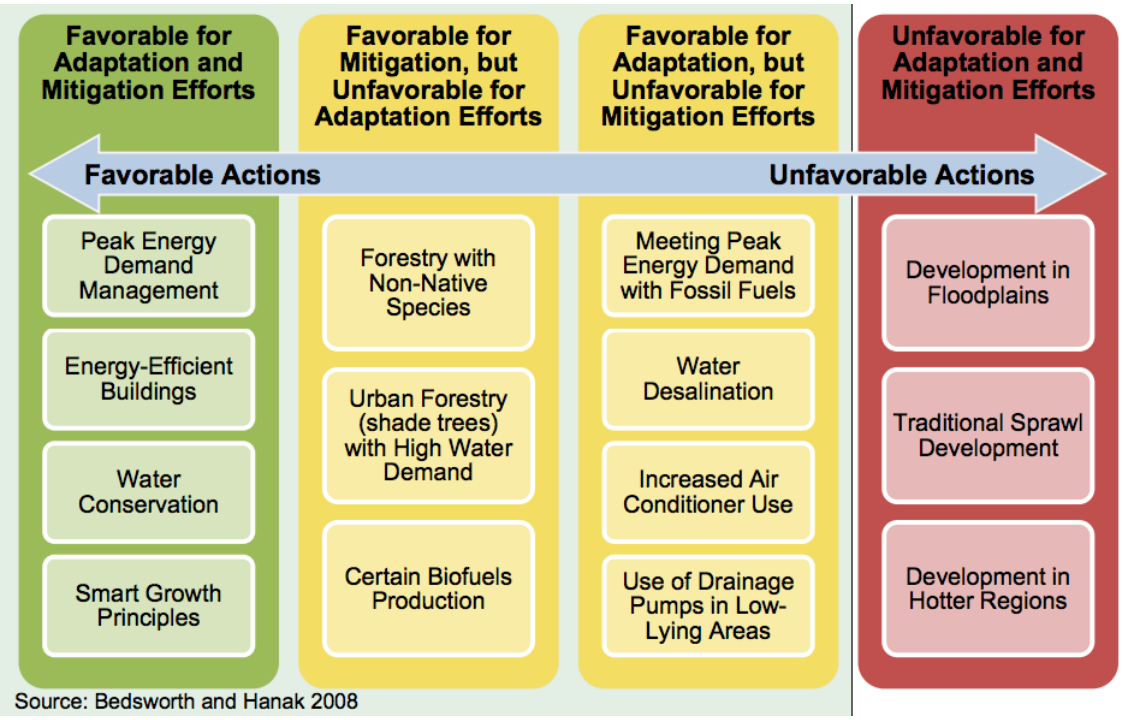

Figure 3. Complimentary and conflicting mitigation and adaptation actions. Source: San Luis Obispo EnergyWise Plan.

The County of Santa Barbara has a Sustainability Action Plan, and as of May 2015, an Energy and Climate Action Plan as of May 2015, which largely focuses on reductions of GHG emissions. Ventura County has a Climate Protection Plan (CPP), which includes both mitigation goals and adaptation commitments, such as creating a climate adaptation workgroup and establishing countywide education and outreach on climate change and protection.

City-Level

LARC is currently working on a comprehensive, searchable index of climate policies and plans for Los Angeles County and its 88 municipalities.

The City of Los Angeles released its CAP, GreenLA, in 2007, focused on GHG emissions reductions, and ClimateLA is the implementation program for its detailed action items. By 2010, Los Angeles reached the goal of deriving 20% of its energy from renewable sources and reported reduced water consumption and pollution at the Port, increased energy efficiency, expanded public transportation, additional city tree canopy, and multiple green building standards.

In 2012, the City of LA's "Adapt LA Fact Sheet" reported the importance of both mitigation and adaptation efforts. In considering adaptation, the fact sheet noted the importance of standards that protect buildings from increasing temperatures, programs to plant more trees and add new parks, and the development of an adaptation strategy, focusing on:

- Evaluating impacts using sound science with the help of academic partners;
- Assessing vulnerability and risks to infrastructure and assets;
- Promoting partnerships regionally and across agencies; and
- Increasing public awareness and engagement.

The 2015 Sustainable City pLAn is a cross-sector 20-year planning document which builds on the City's previous work to address climate change impacts with a long-term goal of sustainability in 14 topic areas, including preparedness and resiliency, carbon and climate leadership, and environmental justice.

Within San Diego County, all 18 cities have performed GHG emissions inventories, and over half are working on, or have completed, CAPs. The City of San Diego's draft CAP, released last year, notes five bold strategies to address climate change, including 1) energy and water efficient buildings; 2) clean and renewable energy; 3) bicycling, walking, transit and land use; 4) zero waste; and 5) climate resiliency. Main points of focus of the CAP include social equity and job creation through climate policies, as well as current and recommended adaptation strategies for identified impacts.

Summary

A number of cities and counties in the diverse Southern California region have begun incorporating climate change mitigation, and to a certain extent, adaptation, into their planning. The regional collaboratives have been an integral part of connecting various regional stakeholders. As with other areas of the state, many groups still stress a variety of ongoing challenges in addressing climate adaptation. Such challenges include the need for improved regional coordination, as well as scientific and planning expertise, particularly for smaller governments and those in the initial planning stages.

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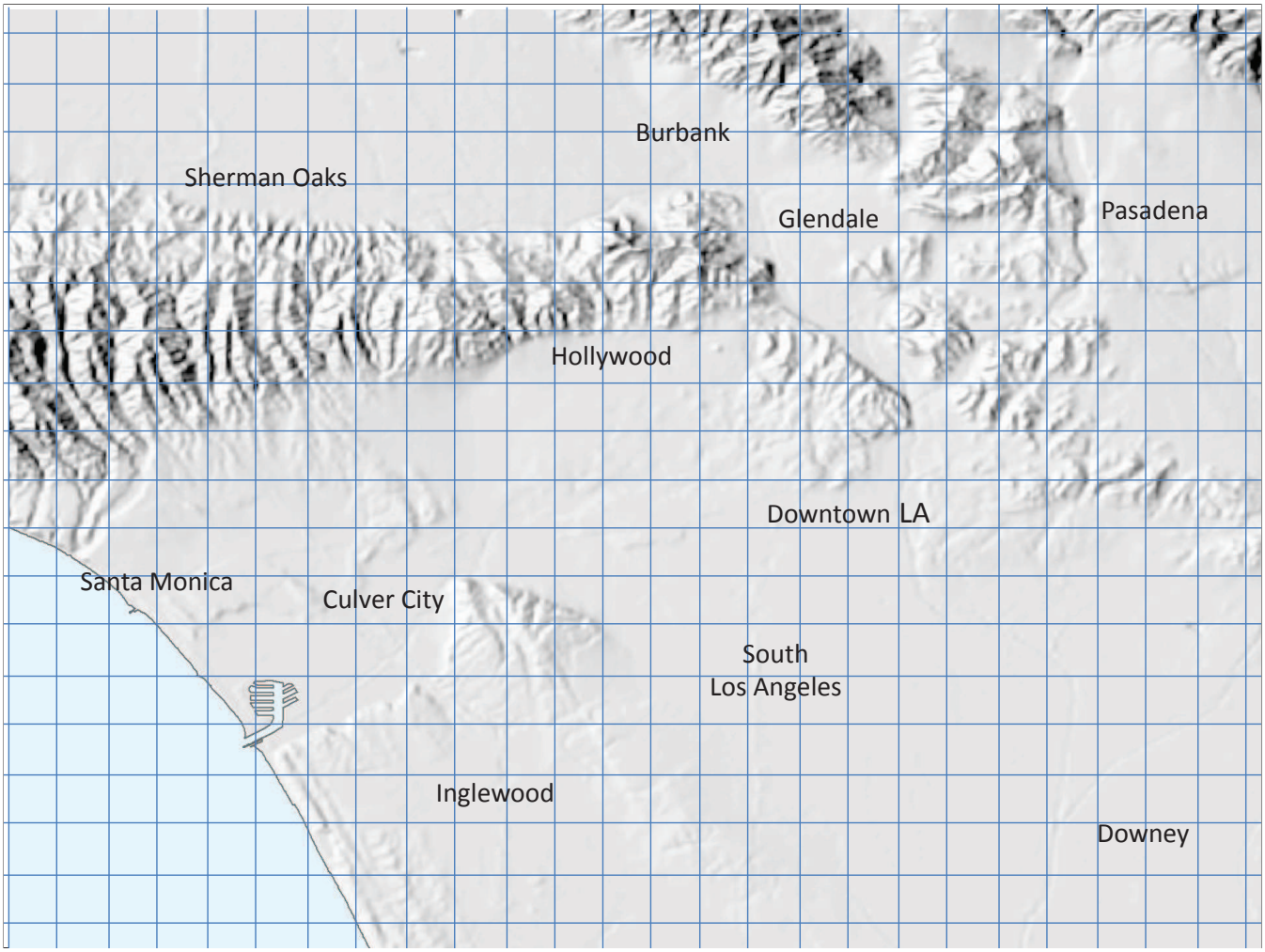
What Climate Change Means for LA

Alex Hall
Faculty Director, UCLA Center for Climate Change Solutions
Professor, Atmospheric and Oceanic Sciences and Institute of the Environment and Sustainability
October 16, 2015

Understanding climate change on a policy-relevant scale

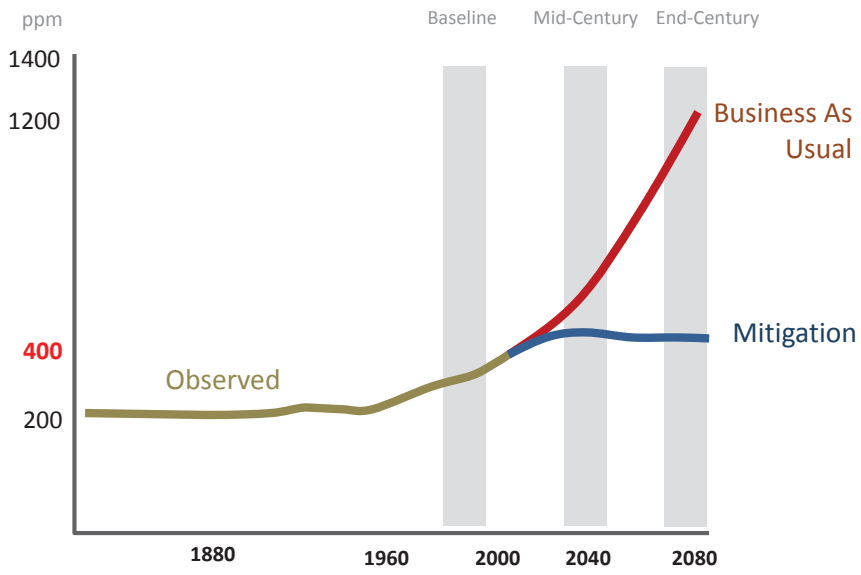
- UCLA's Center for Climate Change Solutions fosters real-world solutions to climate change by conducting interdisciplinary climate impacts research of practical use to stakeholders.
- Detailed projections of future climate change impacts can start crucial conversations about adaptation and mitigation.
- Our best tools for projecting future climate — global climate models (GCMs) — are too low in resolution to capture what happens in a region with complex topography, such as the Los Angeles region.


Palmdale
Ventura
San Fernando
Valley
San Bernardino
Downtown LA
Santa Monica
Long Beach

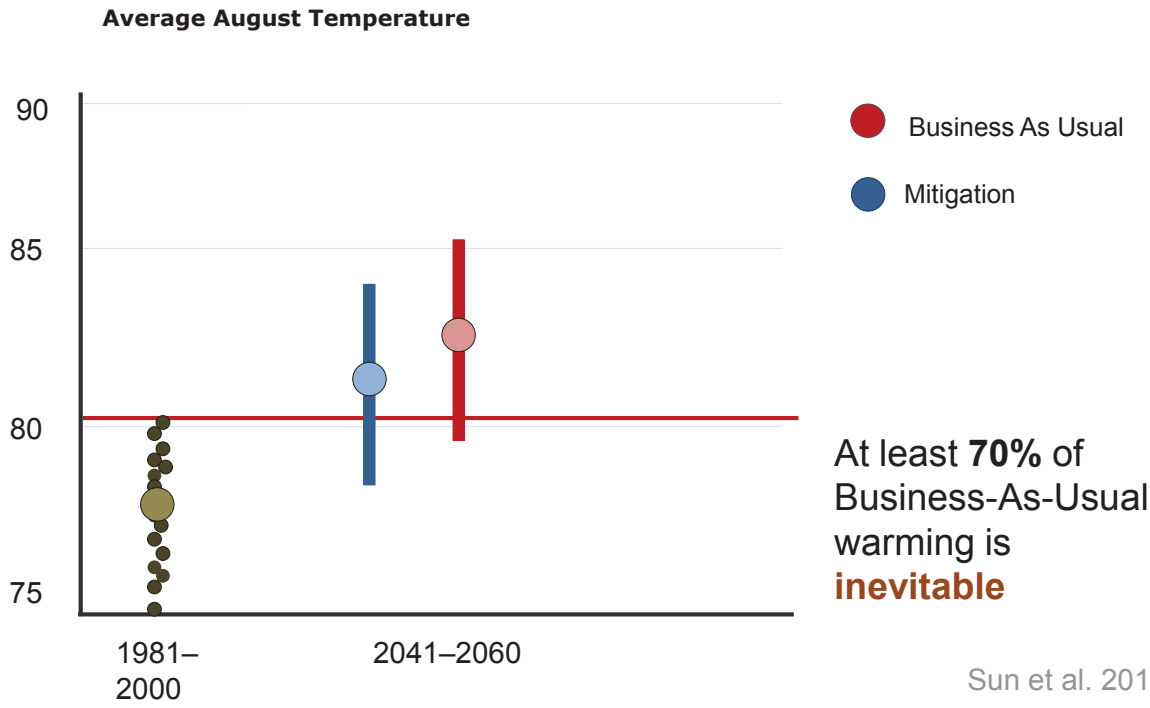

Burbank
Sherman Oaks
Glendale
Pasadena
Hollywood
Downtown LA
Santa Monica
Culver City
South
Los Angeles
Inglewood
Downey

Climate Change in the Los Angeles Region Project

- This project was facilitated by LARC and funded by the City of LA with DOE ARRA funds. Supplemental funding came from NSF and NASA.
- We *downscaled* 30+ GCMs to project climate change impacts at 2-km resolution — a neighborhood-by-neighborhood scale.
- We looked at several aspects of climate, including temperature, precipitation, snowfall, and wildfire.
- We looked at two scenarios of greenhouse gas concentrations…
- …and three time periods.
- The next slides focus on our temperature and wildfire findings.



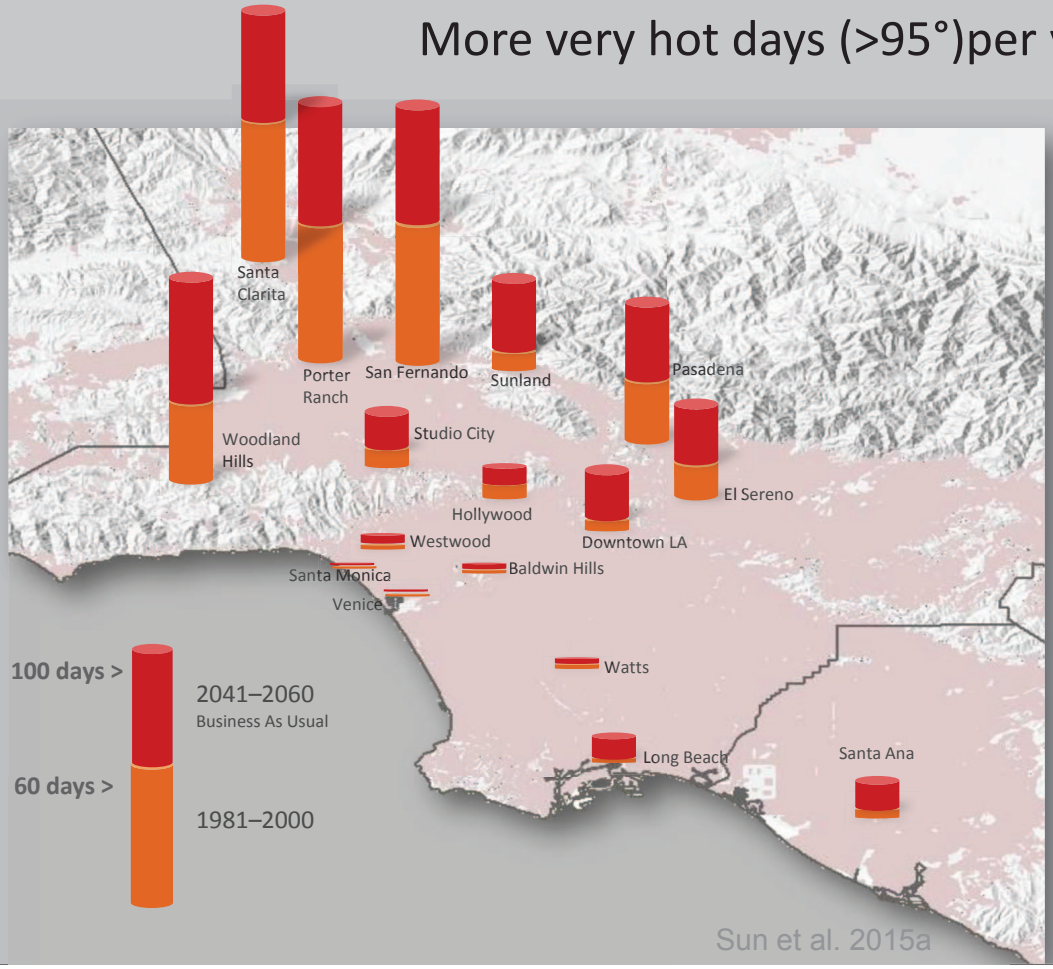
Higher average temperatures



At least **70%** of Business-As-Usual warming is **inevitable**

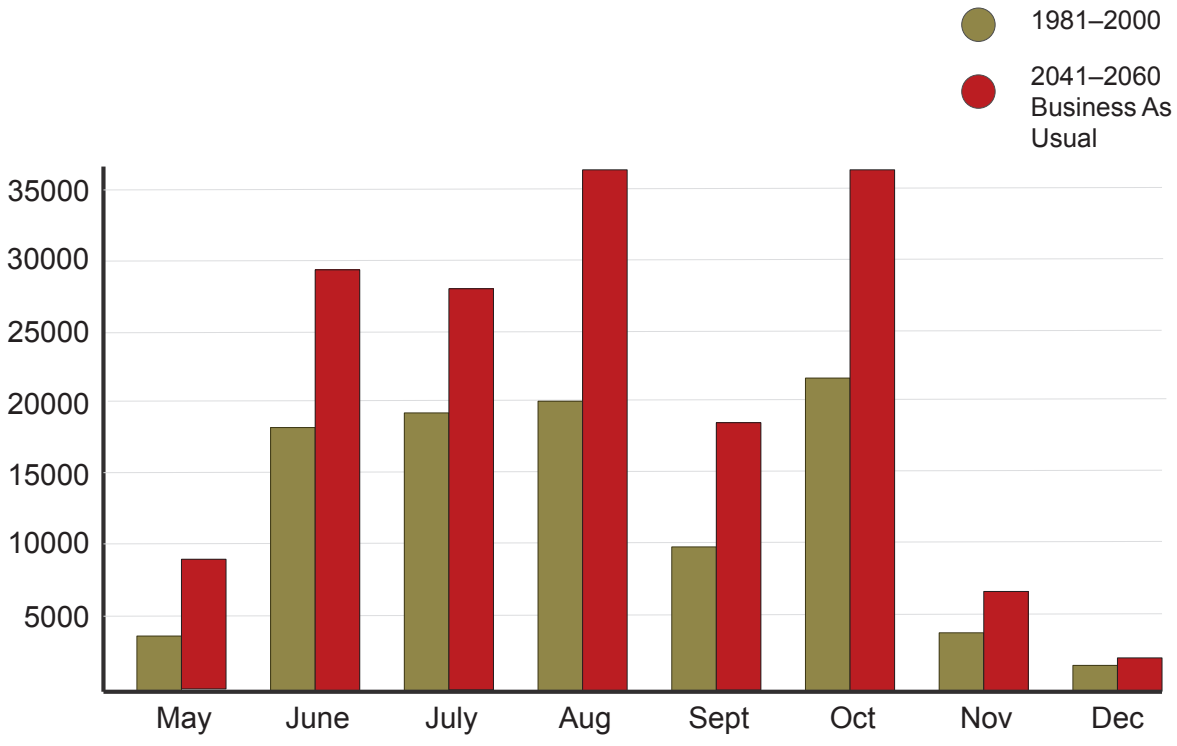
Sun et al. 2015a

More very hot days (>95°)per year



Sun et al. 2015a

Acres burned by wildfires



Jin et al. 2015

Applications and policy outcomes

- Testimony to Little Hoover Commission included in report "Governing California though Climate Change" calling for **coordinated climate adaptation** and providing support for SB 246.
- Our findings on warming and extreme heat were an impetus for **cool roof ordinances** in LA and Pasadena to reduce urban temperatures.
- LA County MTA used our temperature data to perform a **transportation grid vulnerability analysis**.
- Study results used in workshop series by UCLA Fielding School of Public Health to engage LA County Dept. of Public Health employees in **climate action planning**.
- Data to be used in CEC-funded collaboration with between UCLA and University of Arizona to study **electric grid vulnerability** to future extreme heat.
- Wildfire data planned for use in **CA 4th Climate Assessment**.
- Findings presented at LA Mayor's Office, CARB, State Water Control Board, South Coast AQMD.
- Communications effort with Climate Resolve led to wide reporting of study results in LA and regional media.

Challenges

- Supplying data for applied research is costly:
  - Data sets are large and complex; researchers must extract what's needed for purpose at hand
  - Education and consulting required to help non-scientists use data appropriately
- We haven't yet answered some key policy-relevant questions, such as how the character of individual precipitation events may change, or how air quality will be impacted by warming. (Low-income communities and communities of color are expected to be especially vulnerable to air quality changes.)
- Additional expertise needed to translate climate change information into impacts on human and natural systems, e.g., water resource infrastructure, economics, specific ecosystems.

The UCLA Center for Climate Change Solutions will address these issues by:

- Building an easy to use data access and education tool
- Further developing downscaling techniques
- Organizing interdisciplinary climate impacts research projects

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Climate Change & Environmental Justice:
Community Issues & Concerns in Southern CA

PERE
USC Program for Environmental & Regional Equity

10.16.15

MANUEL PASTOR @Prof_MPastor

OUR RESEARCH TEAM

- Manuel Pastor, Ph.D. in Economics, responsible for project coordination, statistical analyses, including multivariate and spatial modeling, and popularization
- James Sadd, Ph.D. in Geology, responsible for developing and maintaining geographic information systems (GIS), including location of site and sophisticated geo-processing
- Rachel Morello-Frosch, Ph.D. in Environmental Health Science, responsible for statistical analysis, health end-points, and estimates of risk.

ENVIRONMENTAL GAPS IN CALIFORNIA & U.S.

Three main findings:

1. Disparities in exposures to environmental hazards between racial and socioeconomic groups are significant and are linked to adverse health risks

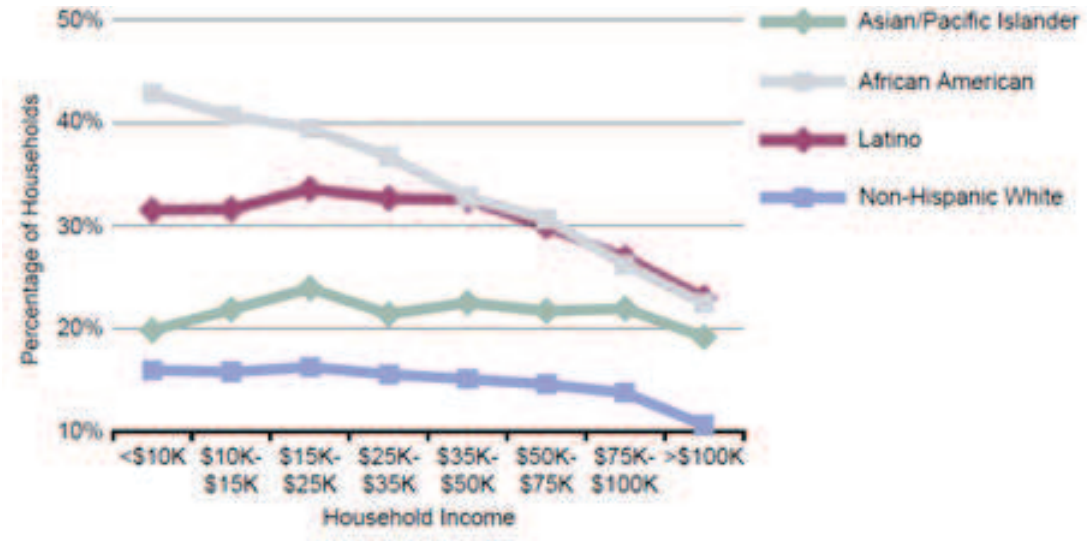
2. Patterns of inequality are not just attributable to income or land use—race matters, too

3. This actually matters for everyone: environmental quality is linked to environmental inequality

Source: http://www.plataformaurbana.cl/wp-content/uploads/2011/04/1302103641_los_angeles_pollution.jpg

RACE MATTERS

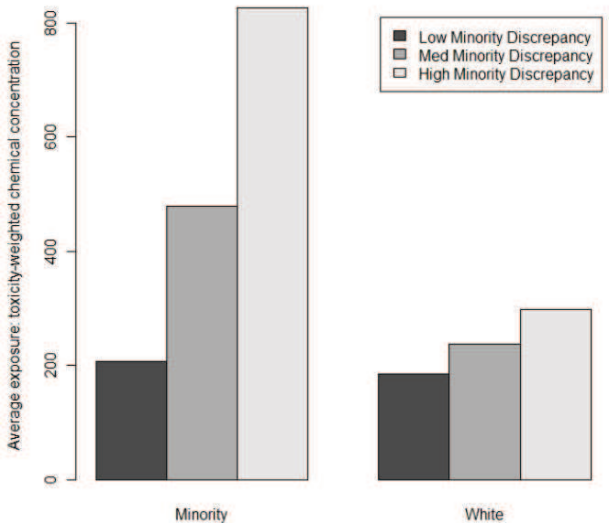
Income is important, but race is actually a stronger factor in predicting the degree of environmental inequity.



Source: Manuel Pastor, Rachel Morello-Frosch and James Sadd, *Still Toxic After All These Years: Air Quality and Environmental Justice in the San Francisco Bay Area* (Santa Cruz, CA: Center for Justice, Tolerance and Community, University of California, Santa Cruz, 2007).

CONSIDERING EJ CAN HELP EVERYONE

In regions with higher disparities in exposure rates between whites and people of color, exposure rates are higher—for everyone.



Average exposure by race/ethnicity in Metros with low, medium and high minority discrepancy scores

Source: Michael Ash et al., *Is Environmental Justice Good for White Folks?* (Amherst, MA: University of Massachusetts, Amherst, Department of Economics, Working Paper 2010-05, July 2010).

CLIMATE GAP IS REAL

Heat Islands

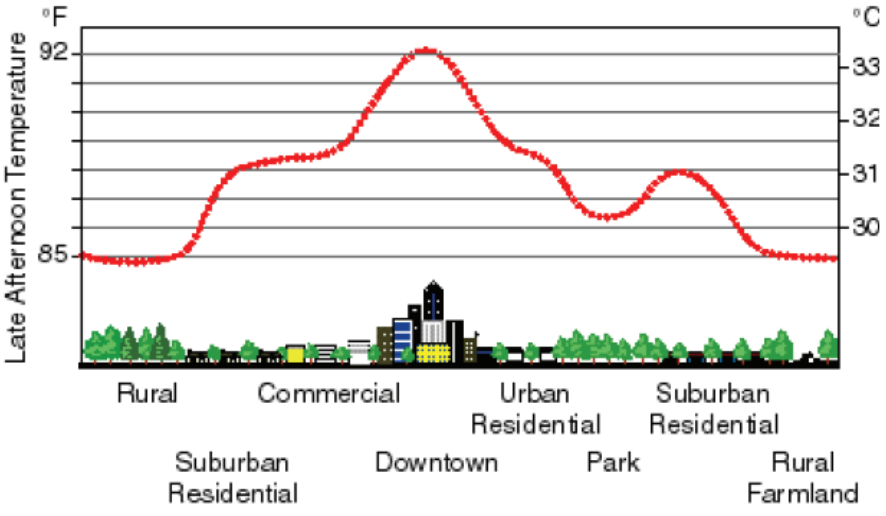
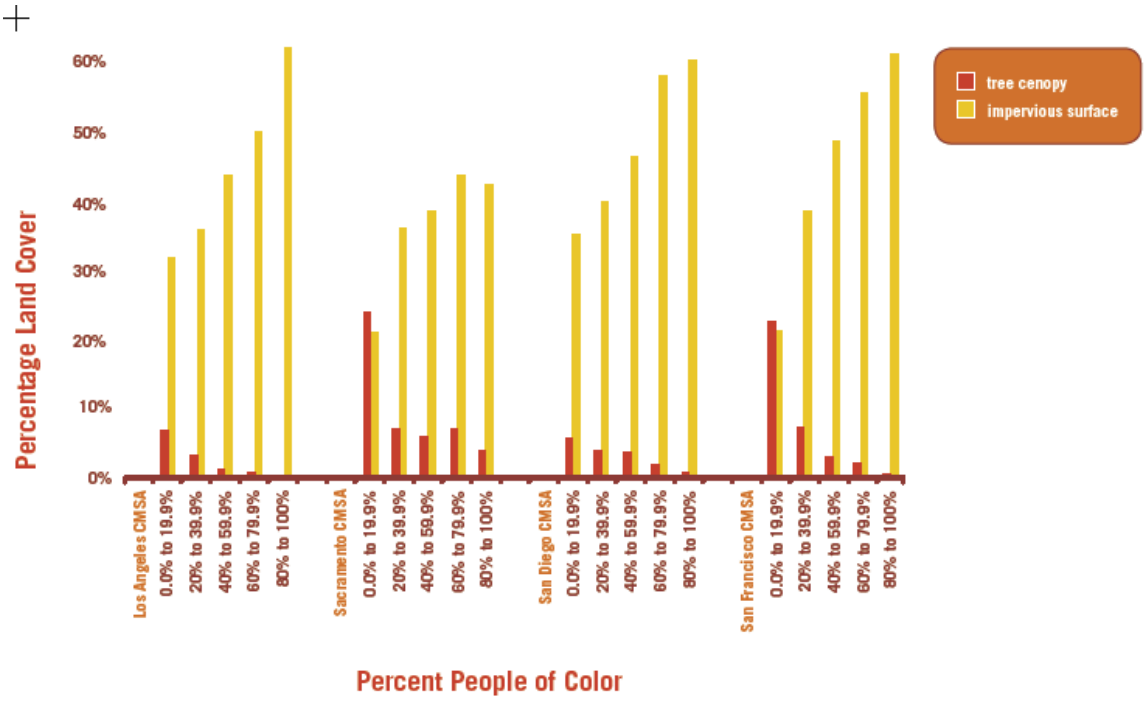


Figure 2.4: Temperature profile of an urban heat island.
(http://www.epa.gov/globalwarming/greenhouse/greenhouse14/reduction.html)

CLIMATE GAP IS REAL

Heat Islands

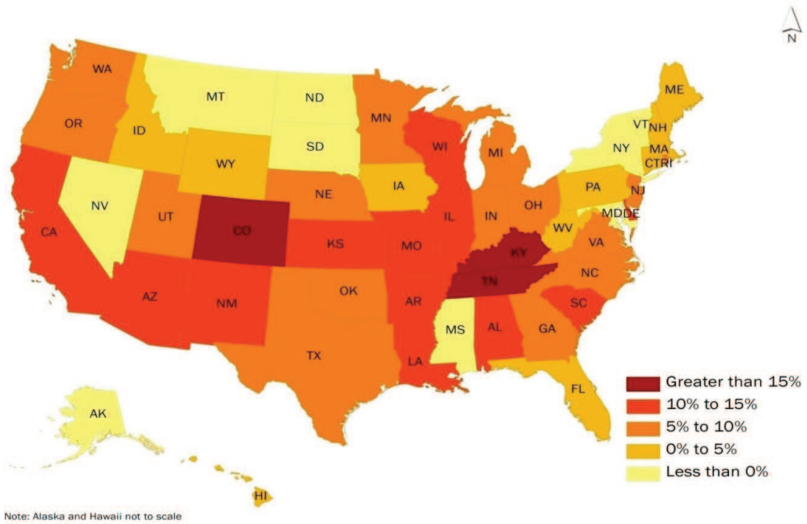


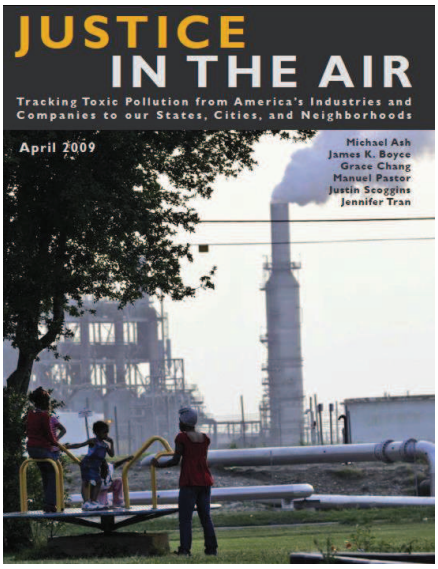
Shonkoff, Morello-Frosch et al. Climatic Change 2012.

CLIMATE GAP IS REAL

Already existing disproportionality

Difference between the minority share of health risk from industrial air toxics and the minority share of the population by state

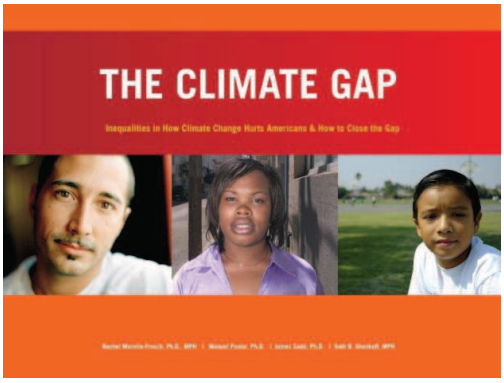


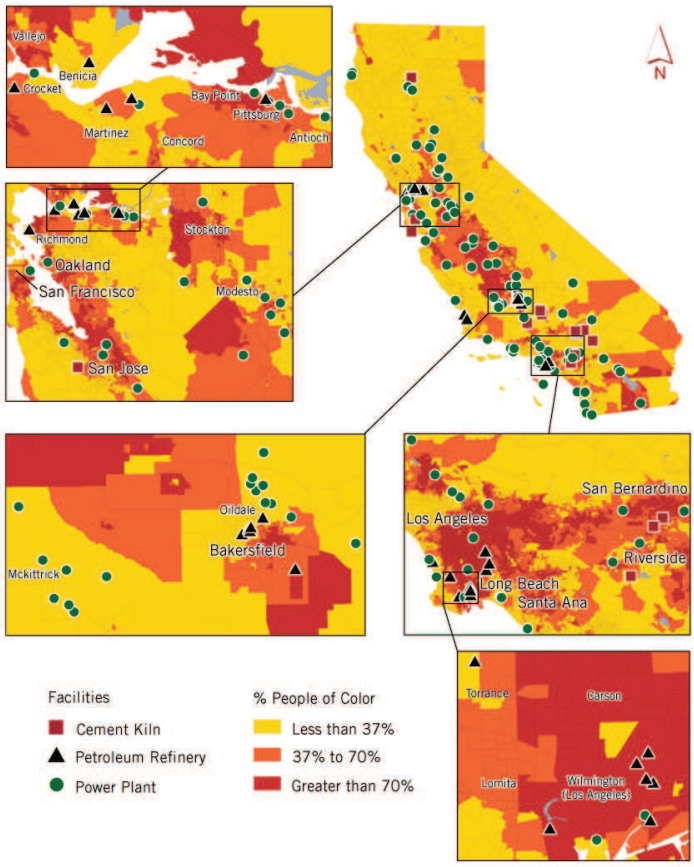


Source: Michael Ash et al., 2009, *Justice in the Air: Tracking Toxic Pollution from America's Industries and Companies to our States, Cities, and Neighborhoods (*Amherst, MA: University of Massachusetts Political Economy Research Institute and University of Southern California Program for Environmental and Regional Equity, 2009).

CLIMATE GAP IS REAL

Concerns about co-pollutants are significant





WHY CO-BENEFITS MATTER

The intuitive case…

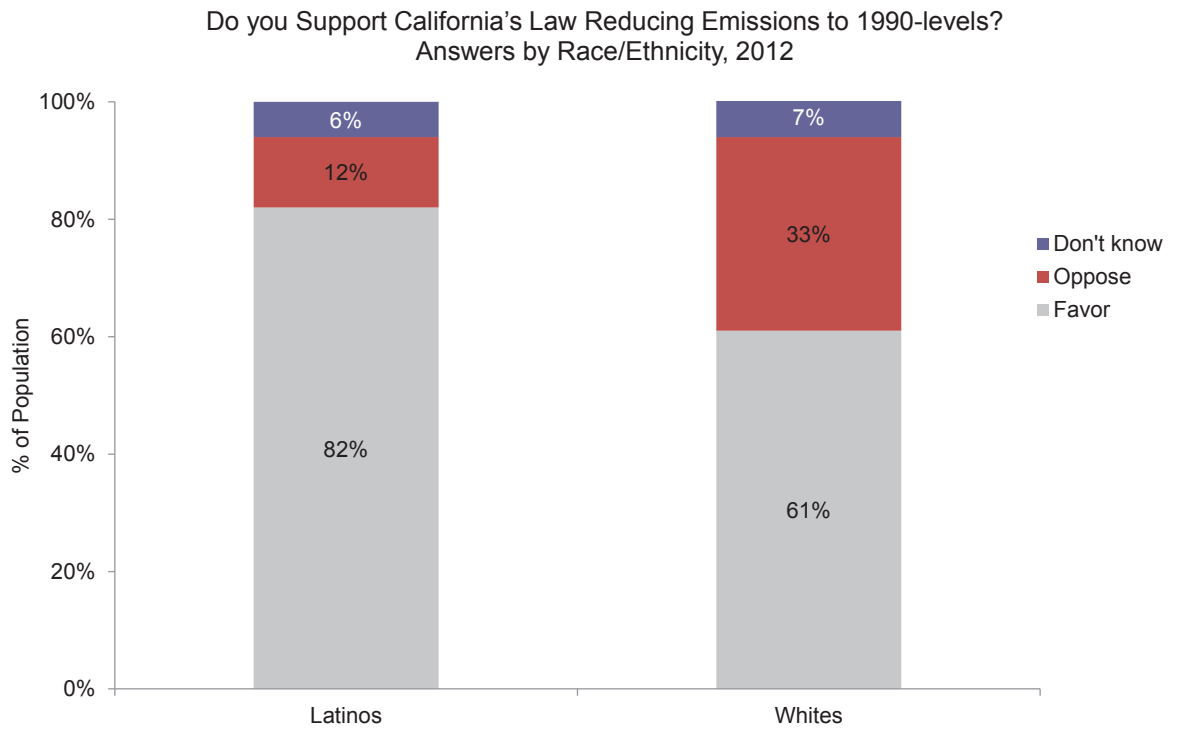
Power plant near Bakersfield, California

PM emissions: 50 tons/yr
Population within 6-mi radius: 600

Oil refinery in Torrance, California

PM emissions: 350 tons/yr
Population within 6-mi radius: 800,000

CLIMATE GAP IS REAL IN ANOTHER WAY



Source: Public Policy Institute of California, July 2012.

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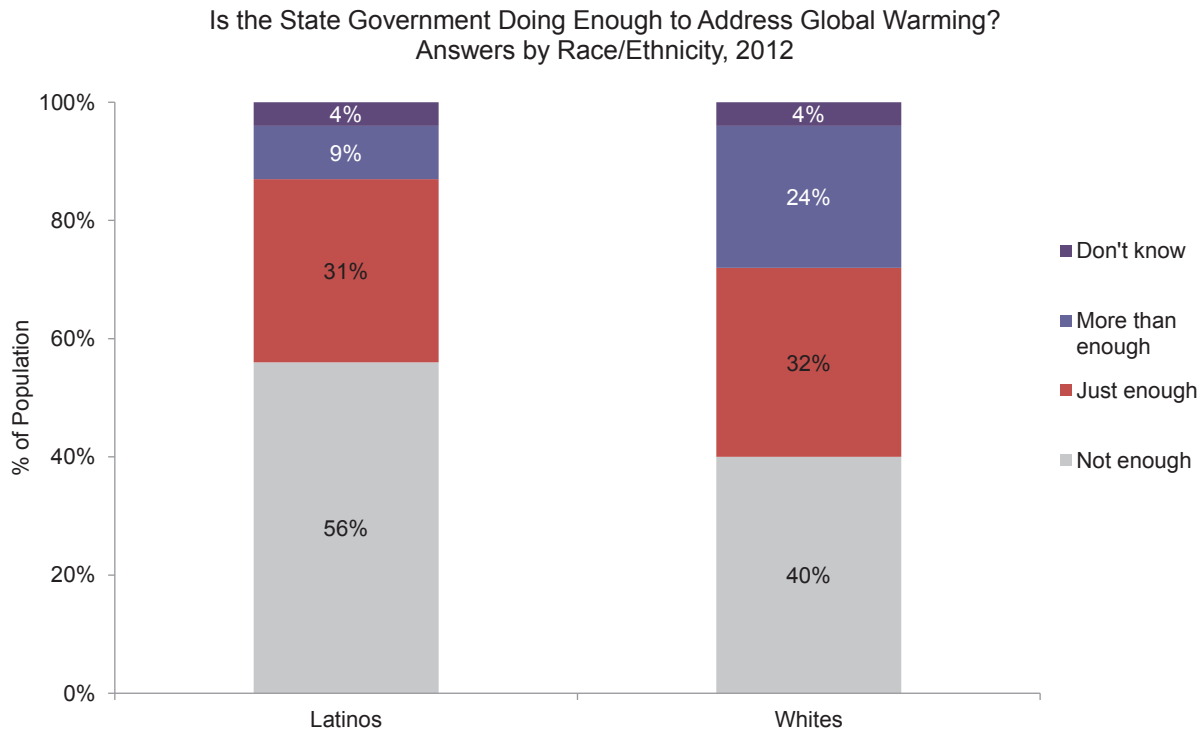

Source: Public Policy Institute of California, July 2012.

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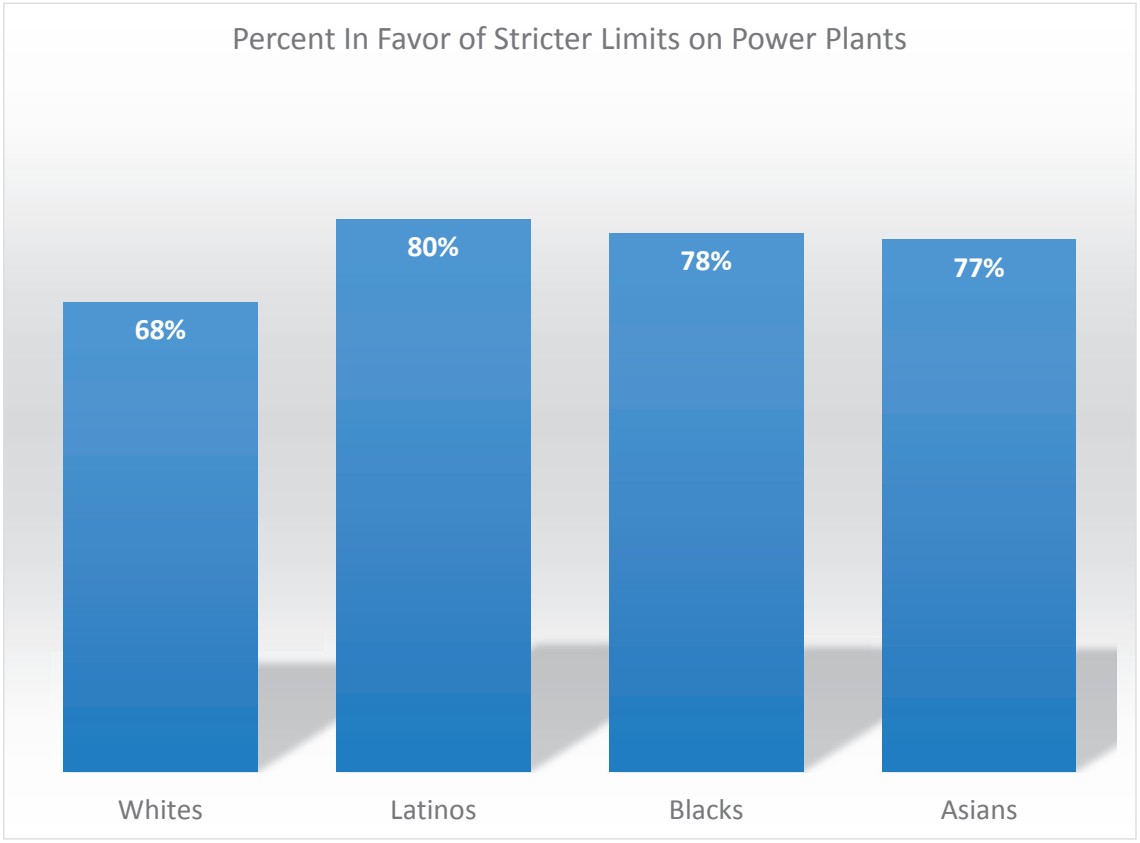

Source: Public Policy Institute of California, July 2015.

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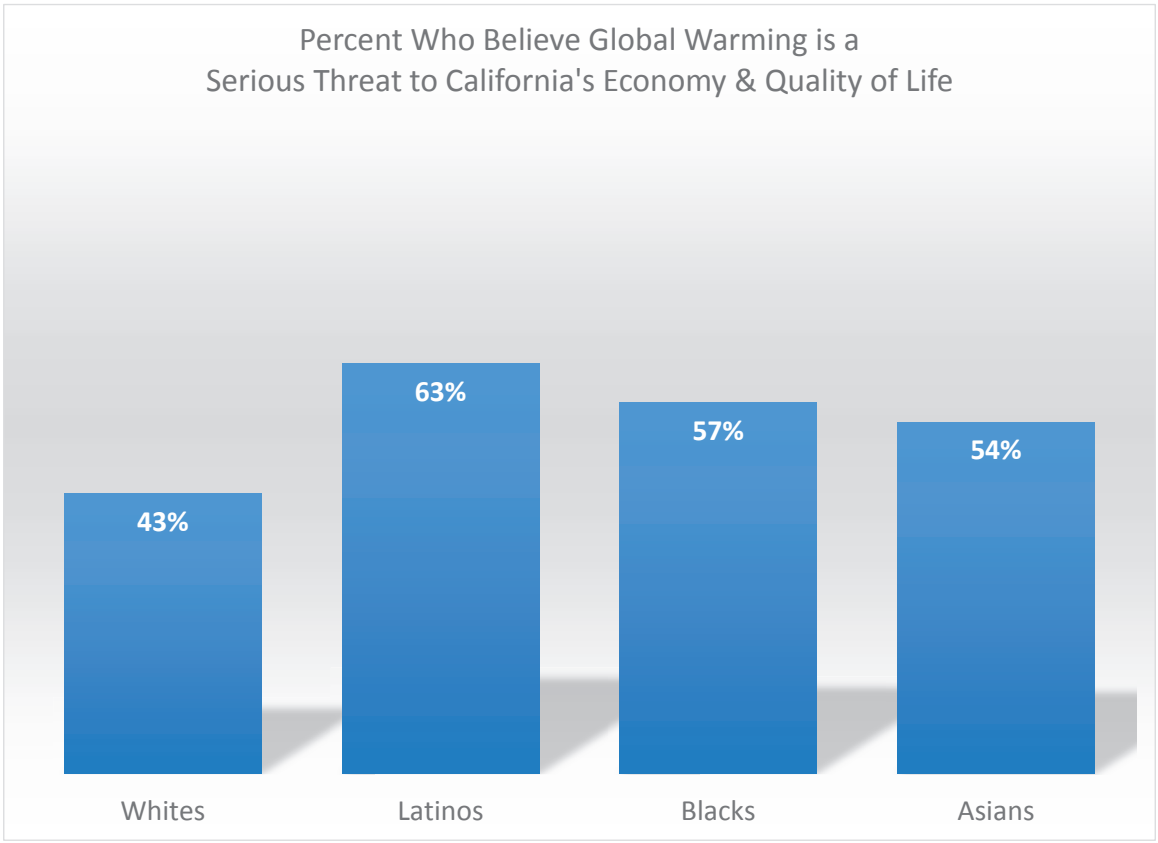


Source: Public Policy Institute of California, July 2015.

LOOKING FORWARD

RECOMMENDATION 1: STRENGTHEN CARBON EMISSION REDUCTION TARGETS

Reducing reliance on fossil fuels is especially important. In addition, air-quality co-benefits should be counted in setting policy objectives for carbon emissions reduction.

LOOKING FORWARD

RECOMMENDATION 2: CO-POLLUTANT MONITORING

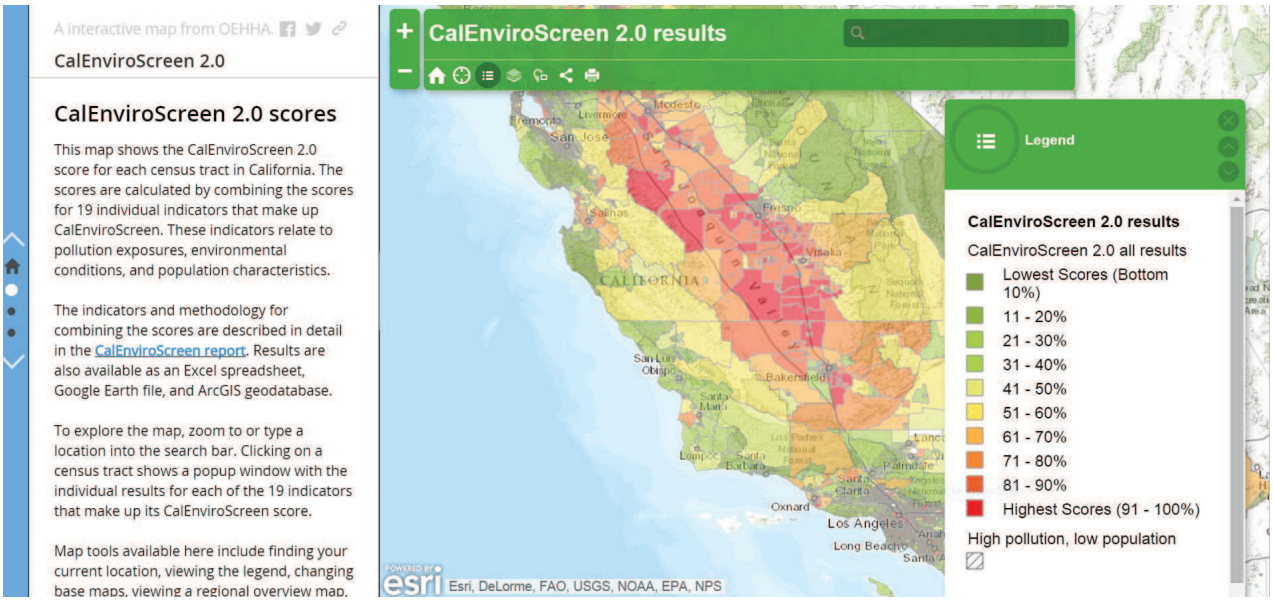
Climate-policy implementation should be accompanied by monitoring of co-pollutant emissions. Remedial policies should be introduced if monitoring reveals the widening of disproportional co-pollutant impacts on low-income communities and minorities.

LOOKING FORWARD

RECOMMENDATION 3: REFINE HIGH-PRIORITY ZONES

Climate-policy design has included identification of high-priority zones where air-quality co-benefits are especially large. CalEnviroScreen is a strong tool but could perhaps be improved by adding proximity metrics, regional scoring (as a check) and climate vulnerability layers.

SCREENING FOR JUSTICE



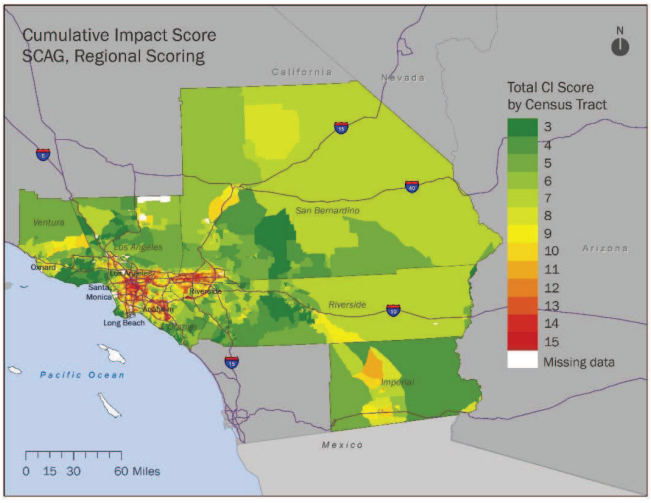
CalEnviroScreen http://oehha.ca.gov/ej

EJSM OVERVIEW

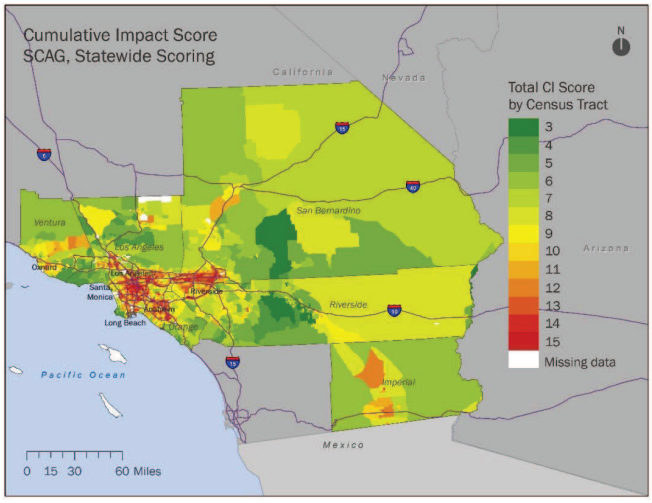
- Screens for “cumulative impact” using a variety of indicators
- Combines environmental burdens and social vulnerability
- Includes hazard proximity, of key concern to EJ communities
- Statewide coverage, but regional scoring
- Includes climate change vulnerability

EJSM: SCAG – NO CLIMATE VULNERABILITY

Regional Scoring

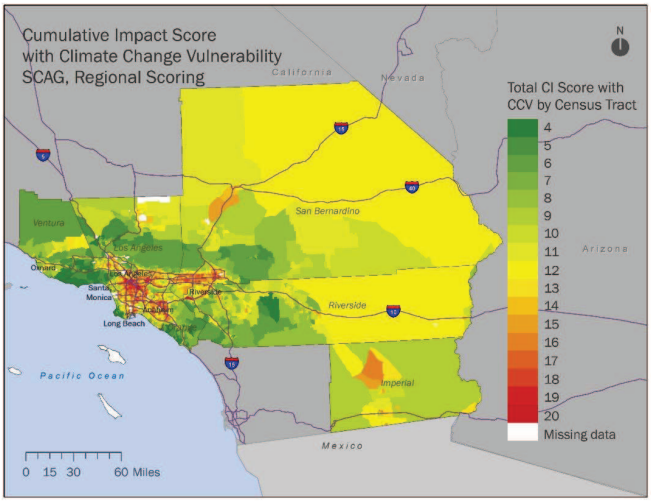


Statewide Scoring

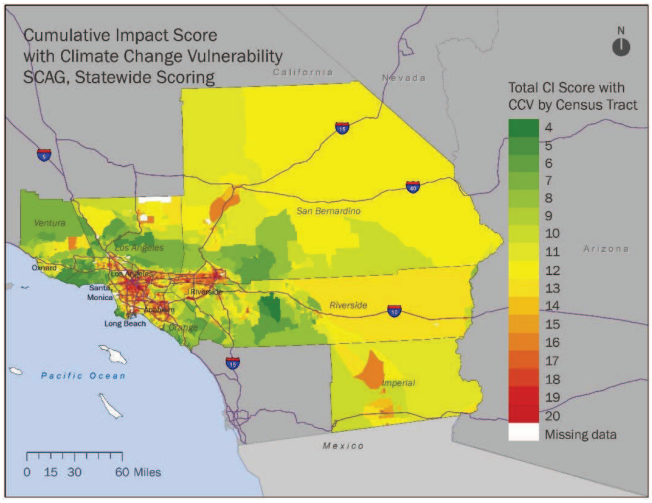


EJSM: SCAG – WITH CLIMATE VULNERABILITY

Regional Scoring

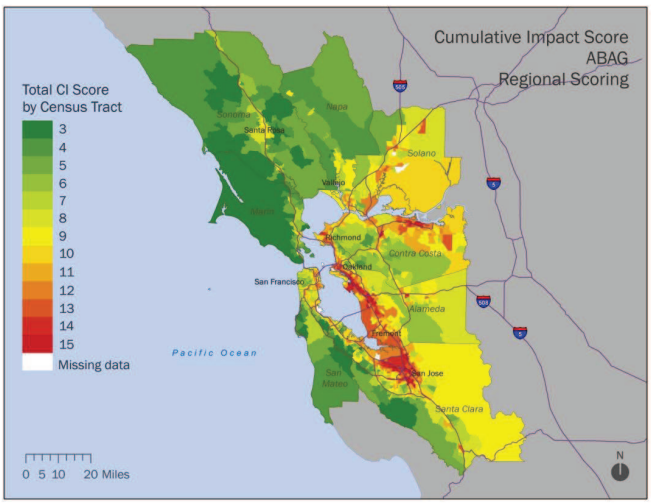


Statewide Scoring

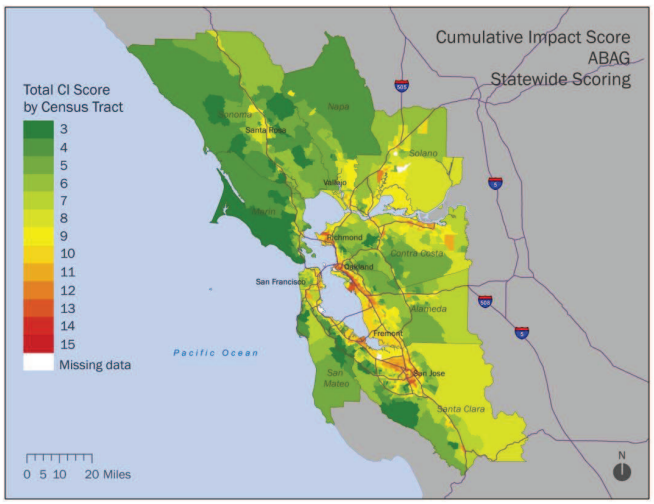


EJSM: SF BAY AREA – NO CLIMATE VULNERABILITY

Regional Scoring

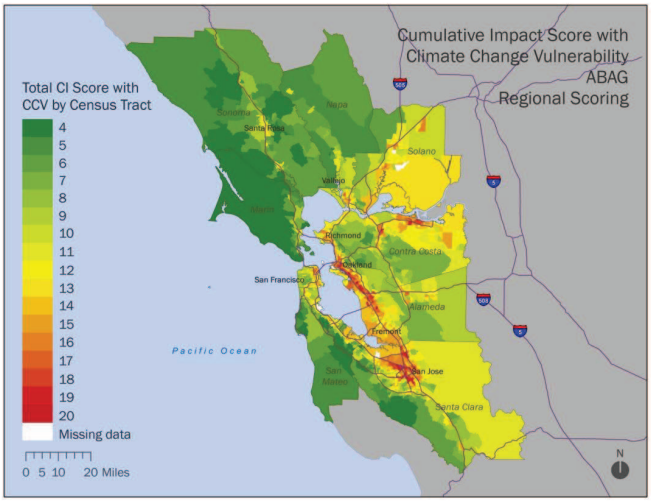


Statewide Scoring

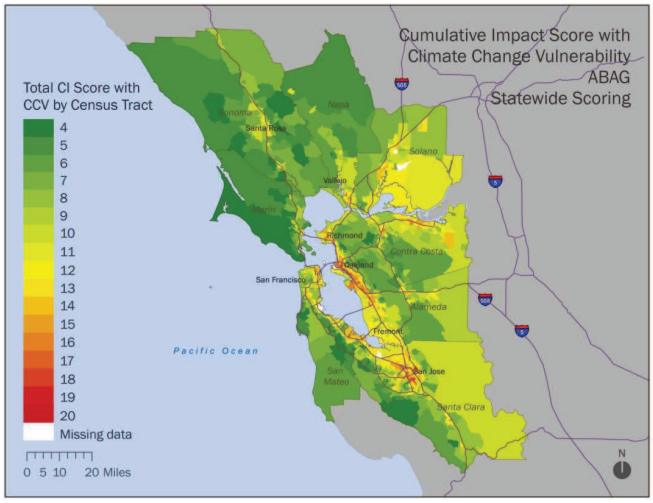


EJSM: SF BAY AREA – WITH CLIMATE VULNERABILITY

Regional Scoring



Statewide Scoring

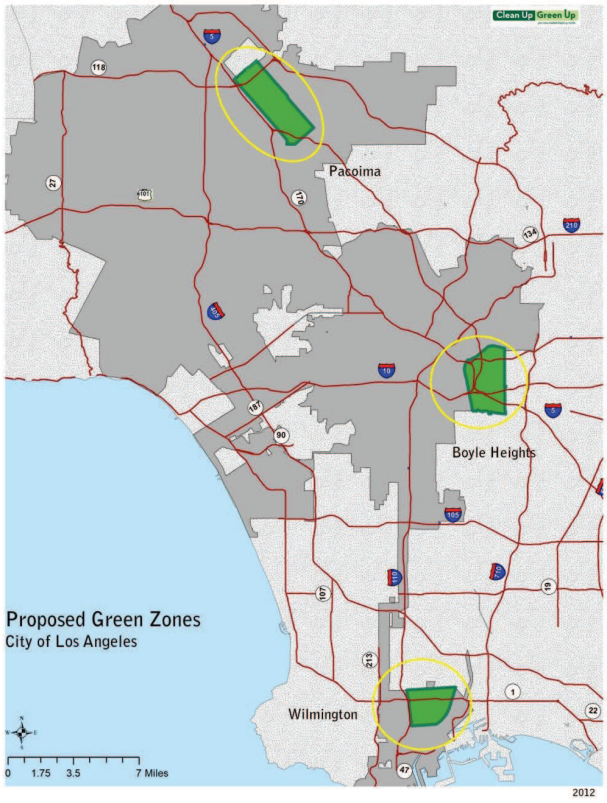


CLEAN UP, GREEN UP INITIATIVE

- Campaign aims to provide special assistance to prevent new siting while also helping businesses convert to safer, cleaner processes
- EJSM helped identify environmentally overburdened and socially vulnerable communities
- Researchers have also trained and collaborated with community on data gathering, analysis, and presentation

CLEAN UP, GREEN UP INITIATIVE

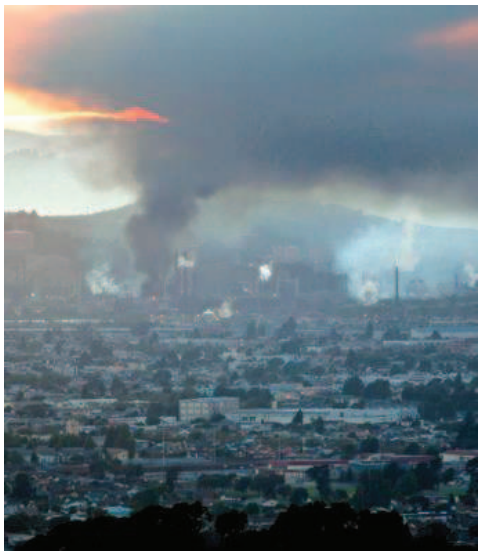
Creates pilot “Green Zones” in three target communities



LOOKING FORWARD

RECOMMENDATION 4: TARGET HIGH-PRIORITY SECTORS & FACILITIES

Priority for carbon emissions reductions should be assigned to industrial sectors & facilities that pose high co-pollutant burdens and have disproportionate impacts on minorities and low-income communities. Policy should ensure that emissions reductions in high-priority sectors and facilities equal or exceed the average reductions achieved by the policy as a whole.



LOOKING FORWARD

RECOMMENDATION 5:
TRACK COMMUNITY BENEFIT FUNDS

Part of the carbon rent generated by price-based climate-policy instruments is being devoted to public investments to support environmental and public-health improvements in disadvantaged communities; tracking is key.

LOOKING FORWARD

RECOMMENDATION 6:
DEVELOP NEW METRICS FOR PROGRESS

As state increasingly turns its attention to reducing VMT, needs to pay attention to co-pollutant issue as well as potential side effect of compact development, including concentrations of emissions and unintended displacement from transit-oriented development.

LOOKING FORWARD

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

RECOMMENDATION 7: ENSURE EQUITY IN NEW OPPORTUNITIES

Work to make sure that both location of projects and employment and training opportunities reflect workforce of future and bring benefits to local levels.

FOR MORE . . .

USC Dornsife
Program for Environmental and Regional Equity

USC Dornsife
Center for the Study of Immigrant Integration

@Prof_MPastor @PERE_USC @CSII_USC

Relevant research & information

Relevant outreach & training

Good decision-making, policy development, & action

LARC

Los Angeles Regional Collaborative for Climate Action and Sustainability

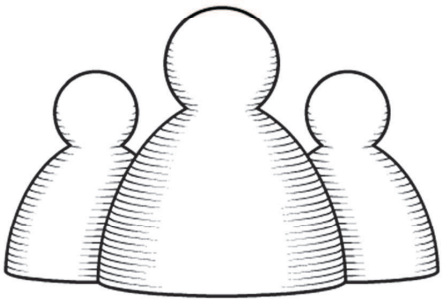
Krista Kline, *Managing Director*

What do we do?

Cultivate partnerships to connect **climate research & policy**

Our members are:

- **NGOs**
- **Government**
- **Academia**
- **Community Groups**
- **Business Community**
- **Students**



Our current members:

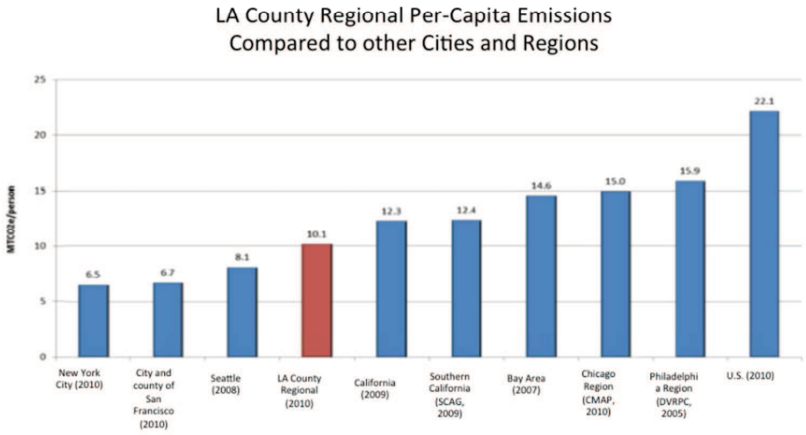
ANTIOCH UNIVERSITY LOS ANGELES
AQUARIUM OF THE PACIFIC
LA CLEANTECH INCUBATOR
The Port of LONG BEACH
Sea Grant University of Southern California
AQMD
City of Santa Monica
GLOBAL GREEN USA
Lewis Center UCLA School of Public Affairs
RIVERS AND MOUNTAINS CONSERVANCY
METRO
UCLA Institute of the Environment and Sustainability
SGVCOG
CLIMATE RESOLVE
Council for Watershed Health
LOYOLA MARYMOUNT UNIVERSITY LOS ANGELES
SOUTH BAY CITIES COUNCIL OF GOVERNMENTS
the Energy Coalition Generating Capital Through Energy
U.S. GREEN BUILDING COUNCIL
ICLEI Local Governments for Sustainability USA
CCSC
CITY OF LONG BEACH INCORPORATED 1897
CITY OF LOS ANGELES FOUNDED 1781
COUNTY OF LOS ANGELES CALIFORNIA
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Prezi

3rd Month Forums

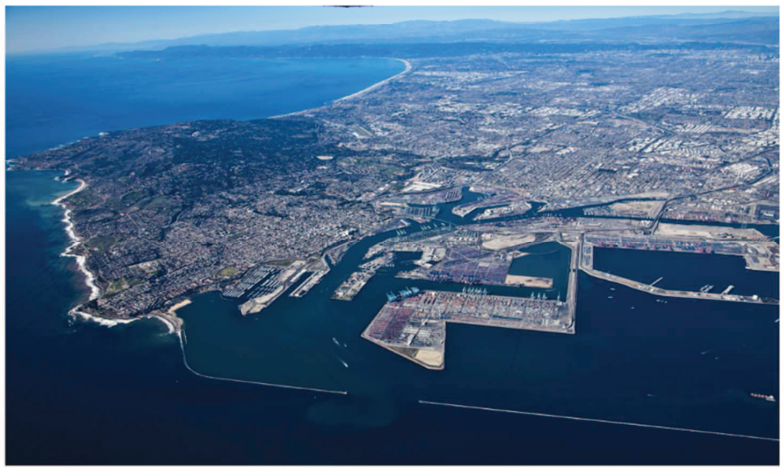
The 3rd Month Forum is a public event series held quarterly to explore climate action efforts in the Los Angeles region.

LAC Community Greenhouse Gas (GHG) Inventory



In partnership with Los Angeles County Internal Services Division Office of Sustainability, recently released 2010 community GHG inventories for every city in LA County. These data serve as a baseline and starting point for critical climate action planning work that must occur throughout the region to comply with the mandates set forth in AB 32.

AdaptLA: Sea Level Rise Vulnerability Studies



In development: develop a comprehensive shoreline change and coastal erosion model for the Los Angeles region.

And our biggest project...

A Greater LA: The Framework for Climate Action & Sustainability

WHAT

A practical and place-based resource to support effective climate action planning

WHY

To minimize the burden of mandates, while maximizing the effectiveness of action

WHO

By practitioners for practitioners

With the help of the Strategic Growth Grant...

METRO

California Strategic Growth Council

The Framework will include:

- State of the Region
- Priorities and Actions
- Tools & Trainings
- Implementation Strategies

& Best Practices Compendium

The State of the Region

The State of the Region report will summarize and synthesize the best knowledge available on climate change science and policy related to LA.

Goals

1) To be the singular resource for decision-makers working on climate action in the region.
2) To provide the basis for Framework priorities and actions.

Next Steps

Meet with scientists and other experts to fill-in gaps
Meet with community organizers and others working on resilience

Provide State of the Region Assessment

- Analyze GHG inventories
- Climate science
- State & local policies
- local/regional plans

Identify Region Specific Priorities

Based on best available science and existing policy

Recommended Actions

Actions to achieve resiliency, especially actions with multiple benefits

Evaluate Implementation Strategies

Analysis of governance, funding, and financing structures

Create Tools and Trainings

Begin building a coalition to implement actions through information sharing and collaborations

Build Support

And the ultimate alliance...

The Alliance of Regional Collaboratives on Climate Action

CAPITAL REGION CLIMATE READINESS COLLABORATIVE

Bay Area Regional Collaborative

SIERRA CAMP

LARC
Los Angeles Regional Collaborative for Climate Action and Sustainability

Climate Collaborative
SAN DIEGO REGION

Thank you.

LARC

Los Angeles Regional Collaborative
for Climate Action and Sustainability


larc@ioes.ucla.edu


LARegionalCollaborative.com


@The_LARC

Climate Adaptation from a Public Health Perspective

Elizabeth Rhoades, Ph.D.
Los Angeles County Department of Public Health
Environmental Health Division

October 16, 2015

Overview

- Health impacts of climate change in the Los Angeles region
- Climate adaptation planning at the Department of Public Health
- Future needs and directions

Climate Change in Los Angeles means

- Higher average temperatures
  - More extreme heat days (over 95°F)
- Worse air quality
- More acres burned by wildfires
- Greater incidence of vector-borne diseases

County of Los Angeles Public Health

Health impact: Heat

- Hundreds of deaths in the US:
  - Philadelphia (1993): **118 deaths**[1]
  - Chicago (1995): **739 deaths**[2]
  - California (2006): **> 650 deaths**[3]

- More deaths than floods, storms, and lightning combined[4]

County of Los Angeles Public Health

Photo © Monica Almeida/The New York Times

Health impact: Heat

California Heat Wave of 2006

- Illness
  - 16,166 excess ER visits; 1,182 excess hospitalizations
  - More ER visits for heat-related illness, acute kidney failure, cardiovascular diseases, diabetes, electrolyte imbalance, nephritis (kidney inflammation)[5]

County of Los Angeles Public Health

Health impact: Heat

Los Angeles County

- 3.6 x as many heat-related Emergency Dept. visits and 5.6 x as many emergency calls on days ≥ 100°F vs. days 80-89°F[6]
- Only known region in the country to experience winter heat-related mortality

County of Los Angeles Public Health

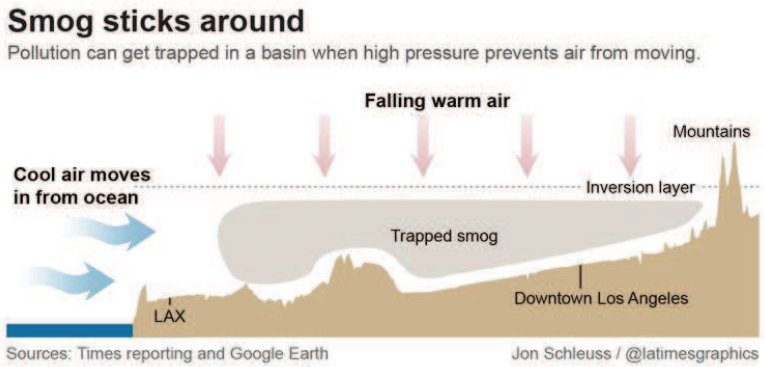
Heat: Vulnerable populations

- Outdoor workers
- The elderly
- Young children
- Athletes
- People with chronic medical conditions
- Homeless
- Low income
- People without air conditioning
- People in areas with minimal tree canopy or green space

County of Los Angeles Public Health

Health impact: Air quality

- Heat worsens air quality
  - More creation of ground-level ozone
  - More temperature inversions
  - Wildfires



County of Los Angeles Public Health

Health impact: Wildfires

- Asthma and other respiratory illnesses
- Displacement and trauma
- Interruption of public services

9

Five Point Plan to Reduce the Health Impacts of Climate Change

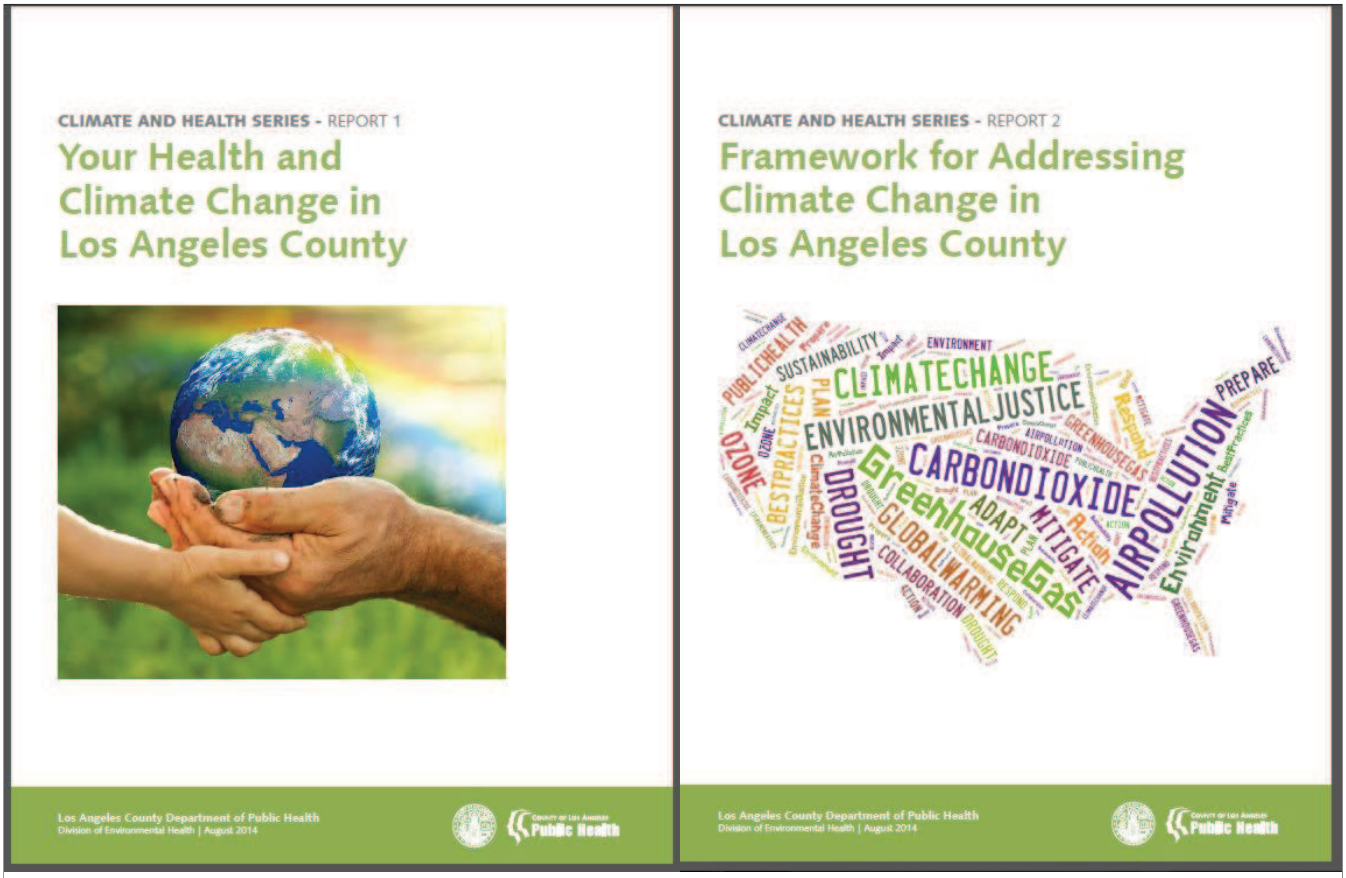
Inform
...and engage the general public about the nature of climate change and the health co-benefits associated with taking action to reduce carbon emissions.

Promote
...local planning, land use, transportation, water, and energy policies that reduce carbon emissions and support the design of healthy and sustainable communities.

Provide
...guidance on climate preparedness to local government and community partners to reduce health risks and create more resilient communities.

Build
...the capacity of Departmental staff and programs to monitor health impacts, integrate climate preparedness, and improve climate response.

Adopt
...best management practices to reduce carbon emissions associated with Departmental facilities and internal operations.



Staff capacity building

- Climate & Health Workshop Series
  - Presentations developed by UCLA
  - Locally-specific projections
  - Brainstorming sessions informed development of *Five Point Plan*

Cross-departmental collaboration

- Climate Committee
  - Formed in 2014
  - Focused on advancing projects related to climate change
  - Comprised of Public Health, Public Works, Regional Planning, Parks and Recreation, Fire, Internal Services, CEO

Cross-departmental collaboration

- Hallmarks of Climate Committee
  - Consensus-building
  - Agreed-upon criteria for selecting projects
  - Action-oriented (clear, concrete, and achievable goals)
  - Focus on assisting each member meet existing mandates

Urban heat island effect in LA

89.3 KPCC LISTEN LIVE NEWS PROGRAMS EVENTS SUPPORT US ABOUT US DONATE NOW

Environment & Science

LA area has highest urban heat island effect in California

Sanden Totten September 21 2015

Downtown Los Angeles. DAVID MCNEW/GETTY IMAGES

County of Los Angeles Public Health

Reducing the urban heat island

- Saves lives
- Lowers energy costs
- Allows people to exercise and play outside
- Improves air quality

County of Los Angeles Public Health

Measures to reduce urban heat island

- Trees
- Green space
- Cool roofs
- Cool and permeable pavements

County of Los Angeles Public Health

Tree Committee

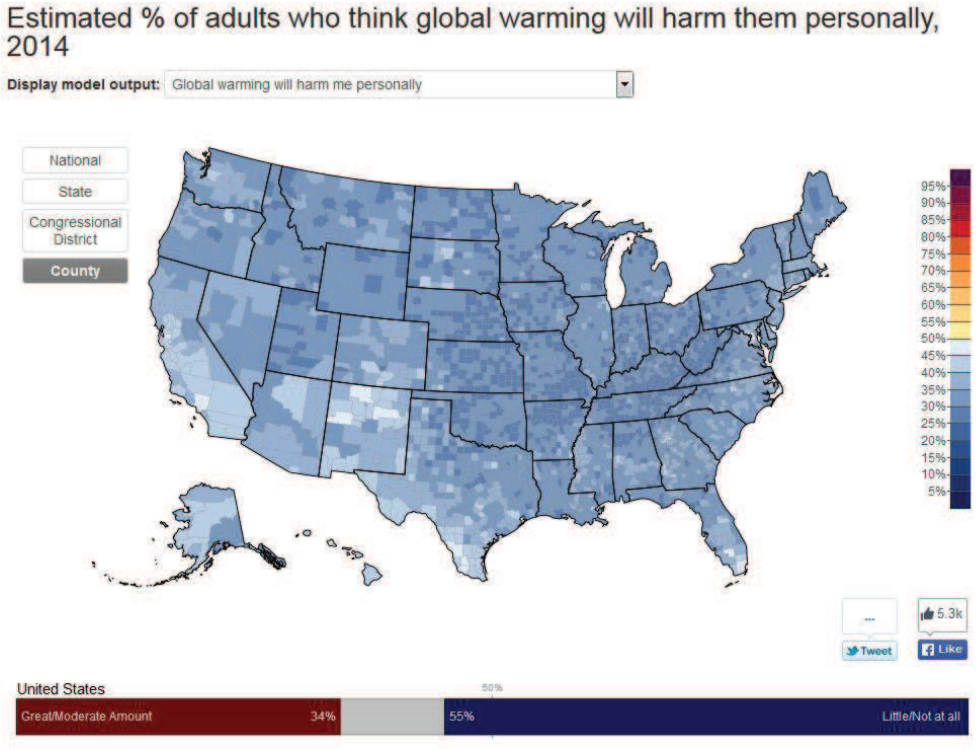
- Interdepartmental collaboration to expand and maintain the urban forest

County of Los Angeles Public Health

Public concerns

- Lack of green space and parks
- No air conditioning
- Asthma and allergies
- Elderly neighbors can't reach cooling centers

Public opinions about climate change



Source: Yale Project on Climate Communication (http://environment.yale.edu/poe/v2014/)

The public health frame

- Framing climate change with a "public health focus was the most likely to elicit emotional reactions consistent with support for climate change mitigation and adaptation."

Source: Myers, T.A., Nisbet, M.C., Maibach, E.W., Leiserowitz, A.A. (2012). A public health frame arouses hopeful emotions about climate change. *Climatic Change 113:* 1105-1112. (http://link.springer.com/article/10.1007%2Fs10584-012-0513-6)

Future needs and directions

- Coordination
- Communication
- Capacity

Future needs and directions

- Increase **Coordination** with other counties and the State
- Expand **Communication**, with an emphasis on public health framing
- Develop staff **Capacity** ("climate literacy")

County of Los Angeles Public Health

References

1. Centers for Disease Control and Prevention. (1994). Heat-related deaths – Philadelphia and United States, 1993-1994. *MMWR, 43*(25), 453-455.
2. Klinenberg, E. (2002). *Heat wave: A social autopsy of disaster in Chicago.*
3. California heat wave: Margolis, H.G., et al. (2008). 2006 California heat wave high death toll: Insights gained from coroner's reports and meteorological characteristics of event. *Epidemiology, 19*(6), S363-S364.
4. Berko, J., Ingram, D.D., Saha, S., Parker, P. (2014). Deaths attributed to heat, cold, and other weather events in the United States, 2006-2010. *National Health Statistics Report No. 76.*
5. Knowlton, K., Rotkin-Ellman, M., King, G., Margolis, H.G., Smith, D., Solomon, G. Trent, R., & English, P. (2009). The 2006 California heat wave: Impacts on hospitalizations and emergency department visits. *Environmental Health Perspectives, 117*(1), 61-67.
6. Kajita, E., Araki, P., Luarca, M., & Huang, B. (2012). Monitoring the impact of heat waves with emergency service utilization data in Los Angeles County, January 1, 2010 to October 15, 2012. *Acute Communicable Disease Control 2012 Special Report.*

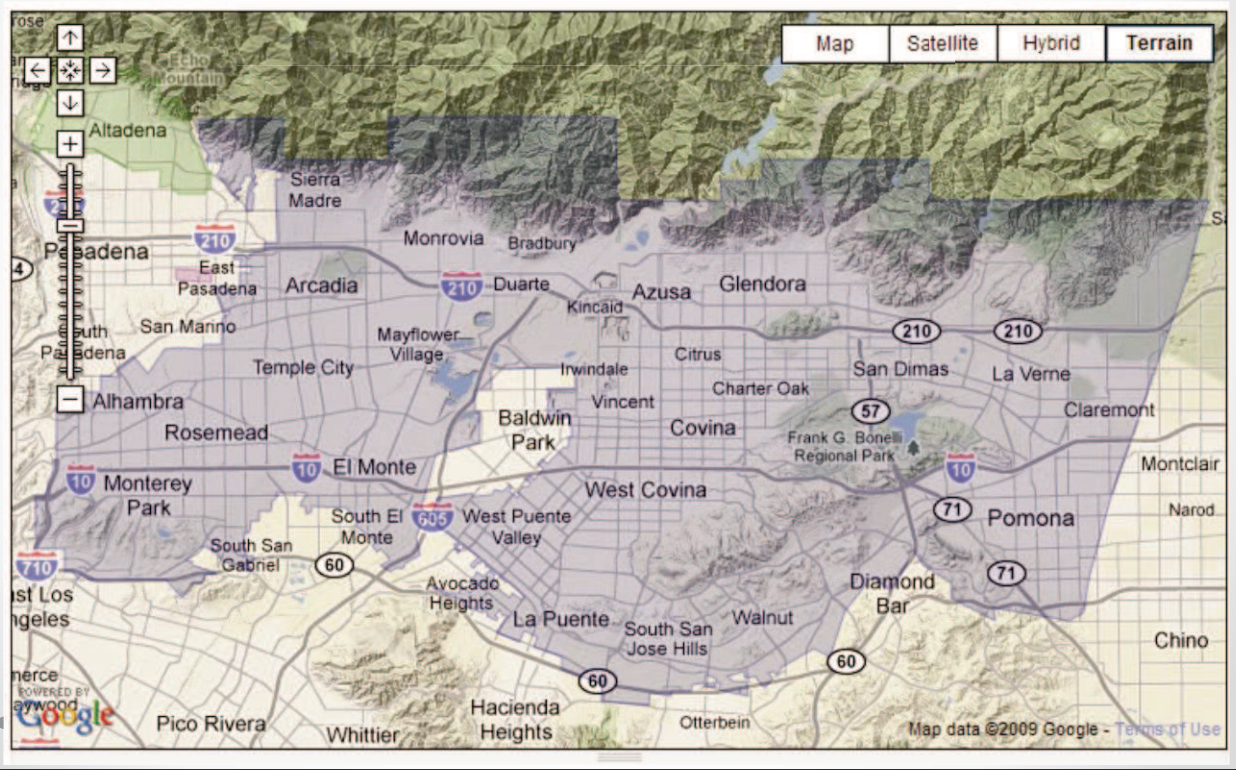
County of Los Angeles Public Health

Regional Adaptation to Climate Change by the San Gabriel Valley Mosquito and Vector Control District, Los Angeles County, California

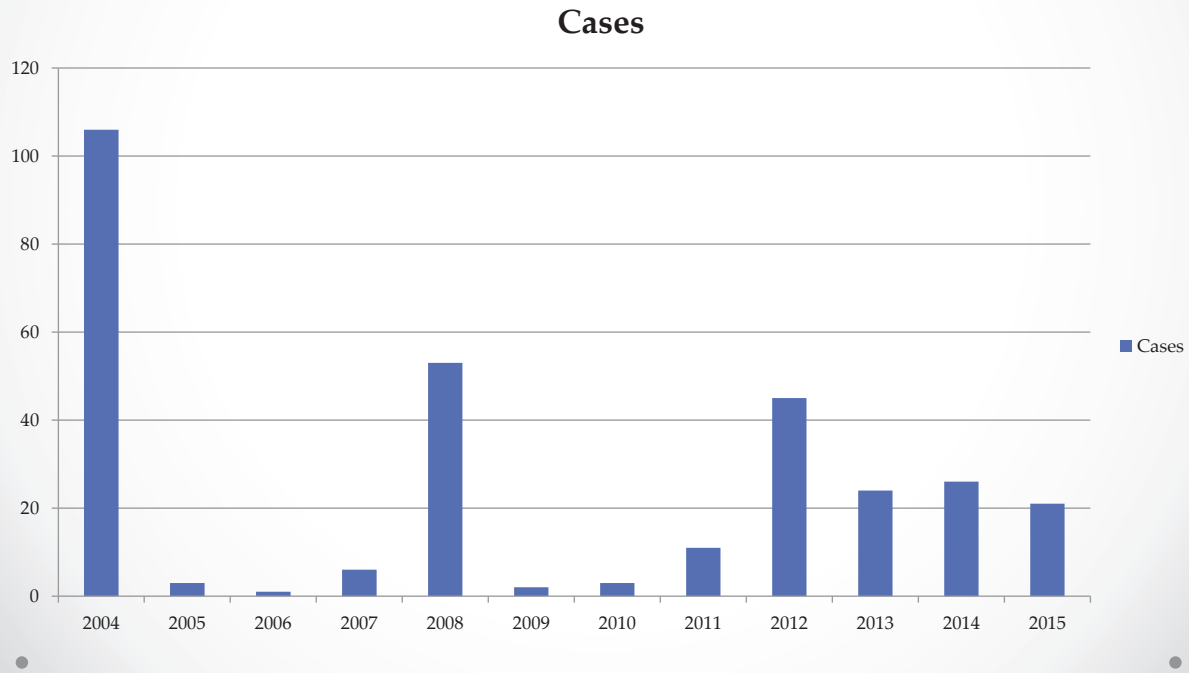
Kenn K. Fujioka, PhD

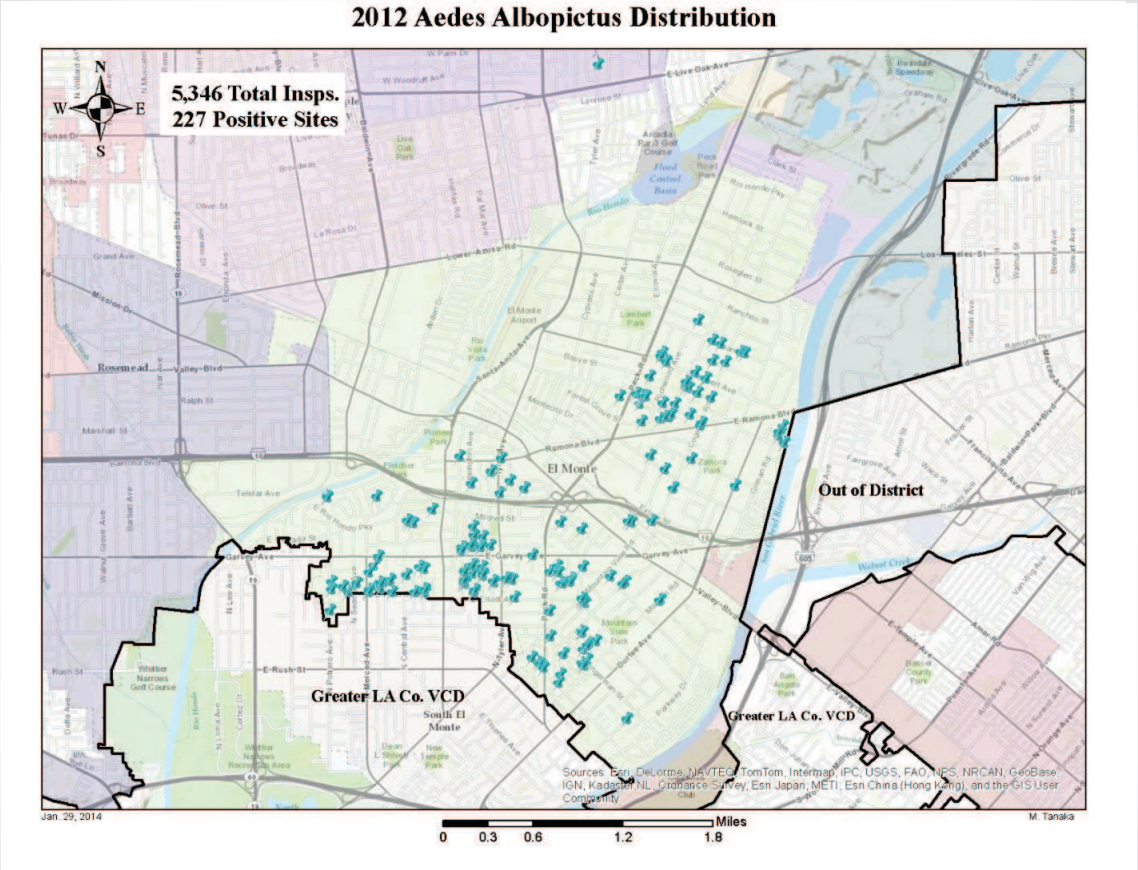
San Gabriel Valley Mosquito & Vector Control District

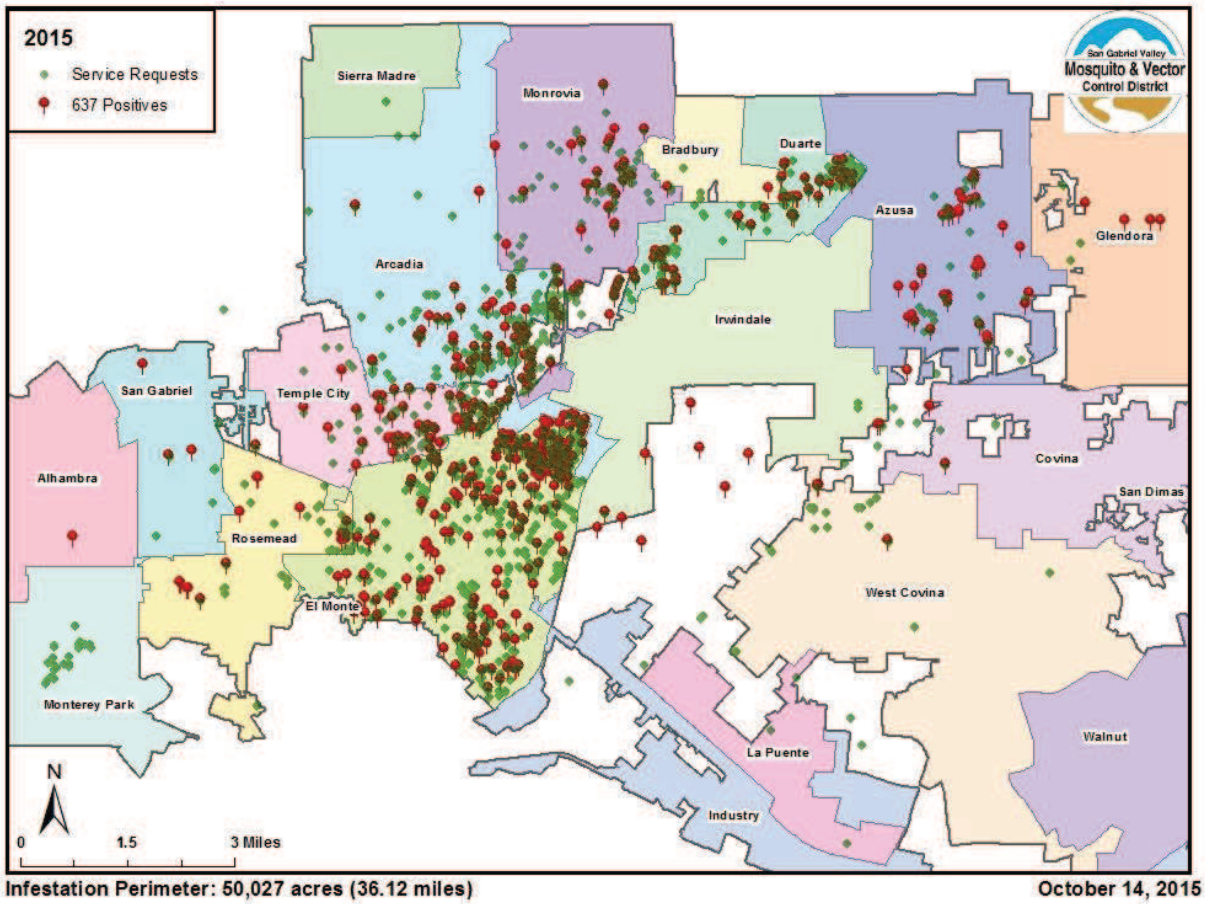
Service Area

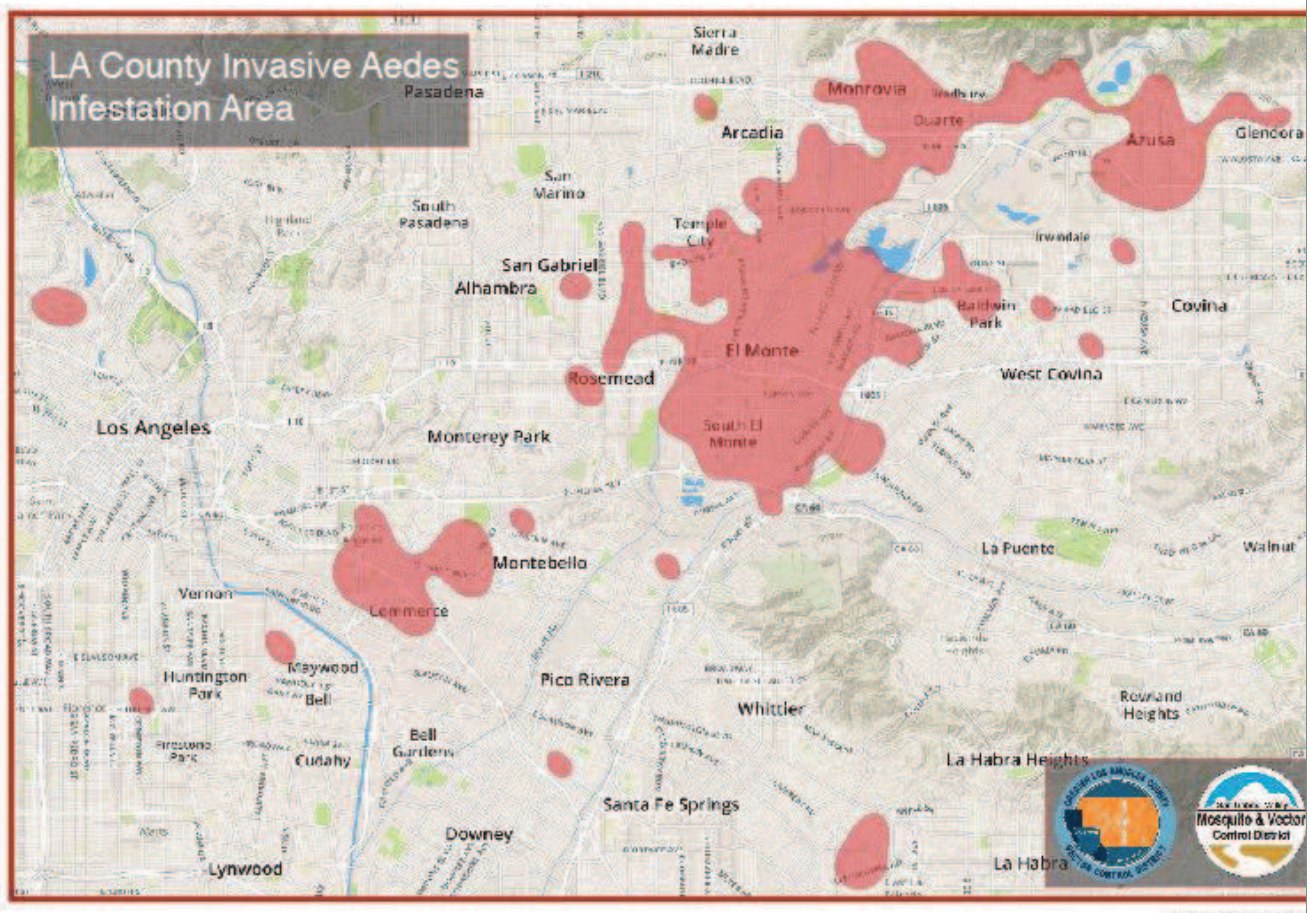


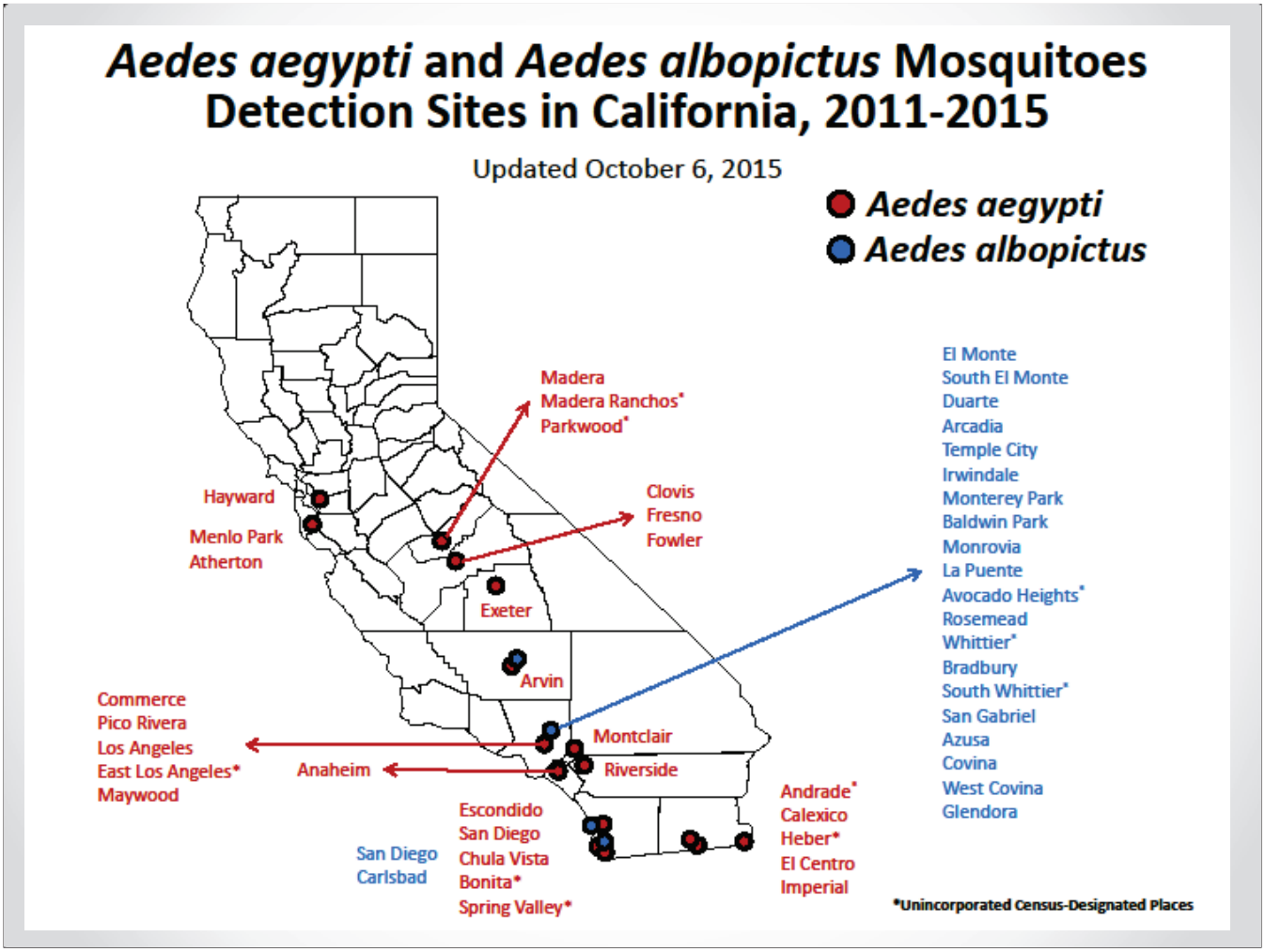
Human infections with West Vile virus, San Gabriel Valley MVCD, CA 2004-2015



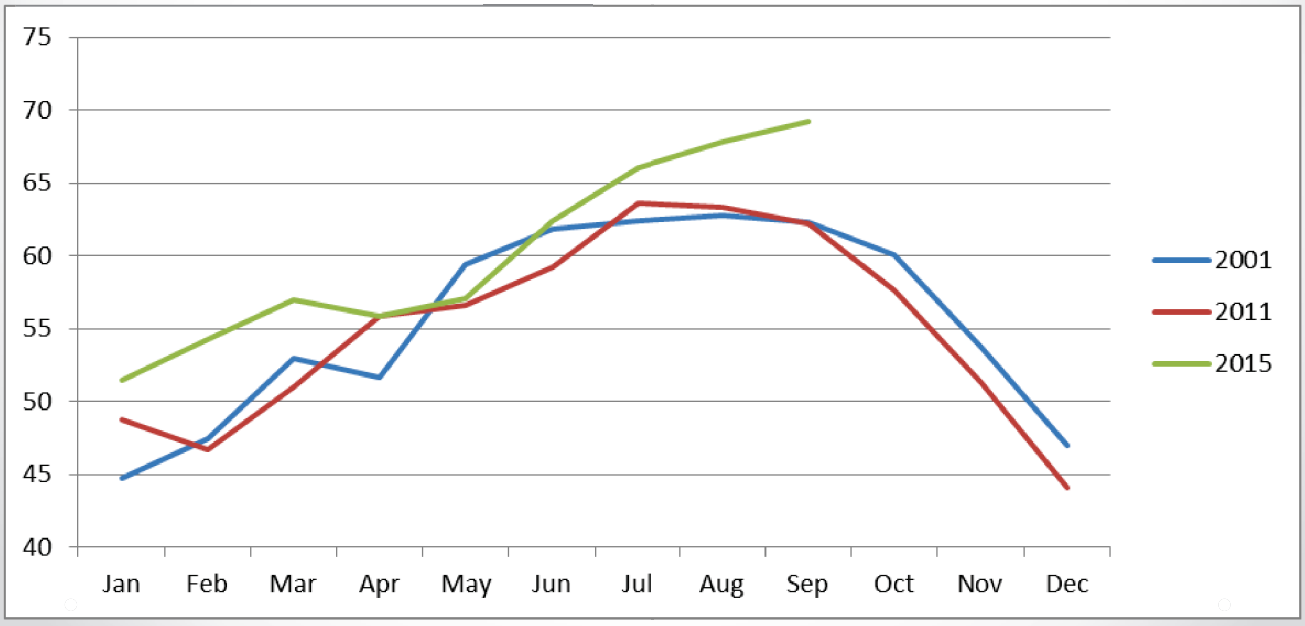



2015
Service Requests
637 Positives
San Gabriel Valley Mosquito & Vector Control District
Sierra Madre
Monrovia
Bradbury
Duarte
Azusa
Glendora
Arcadia
Irwindale
San Gabriel
Temple City
Alhambra
Covina
San Dimas
Rosemead
West Covina
El Monte
Monterey Park
La Puente
Walnut
Industry
N
0
1.5
3 Miles
Infestation Perimeter: 50,027 acres (36.12 miles)
October 14, 2015


LA County Invasive Aedes Infestation Area
Pasadena
Sierra Madre
Monrovia
Arcadia
Duarte
Azusa
Glendora
San Marino
South Pasadena
Temple City
Irwindale
San Gabriel
Alhambra
Baldwin Park
Covina
El Monte
Rosemead
West Covina
Los Angeles
Monterey Park
South El Monte
Montebello
La Puente
Walnut
Vernon
Commerce
Huntington Park
Maywood
Bell
Pico Rivera
Whittier
Rowland Heights
Bell Gardens
Cudahy
La Habra Heights
Santa Fe Springs
Downey
Lynwood
La Habra
Mosquito & Vector Control District
Updated 10.09.1



Monthly mean minimum temperature by month, Los Angeles Civic Center 2001, 2011, 2015



What can we do?

- Regular, long-term collection of data
- Patterns of disease in the US
- Patterns of diseases in wildlife
- International trends for disease

Who we work with-other public health agencies

- Mosquito and Vector Control Association of California (MVCAC)
- County Health Department
- California Department of Public Health
- Centers for Disease Control
- Department of Public Works and Water Agencies

Who we work with-academia

- University of California Davis Arbovirus Research and Training (DART) lab
- UC Riverside
- UCLA School of Public Health

Who we work with-California

- Office of Planning and Research
- State Water Resources Control Board
- California Department of Fish and Wildlife

Climate Change in Southern California

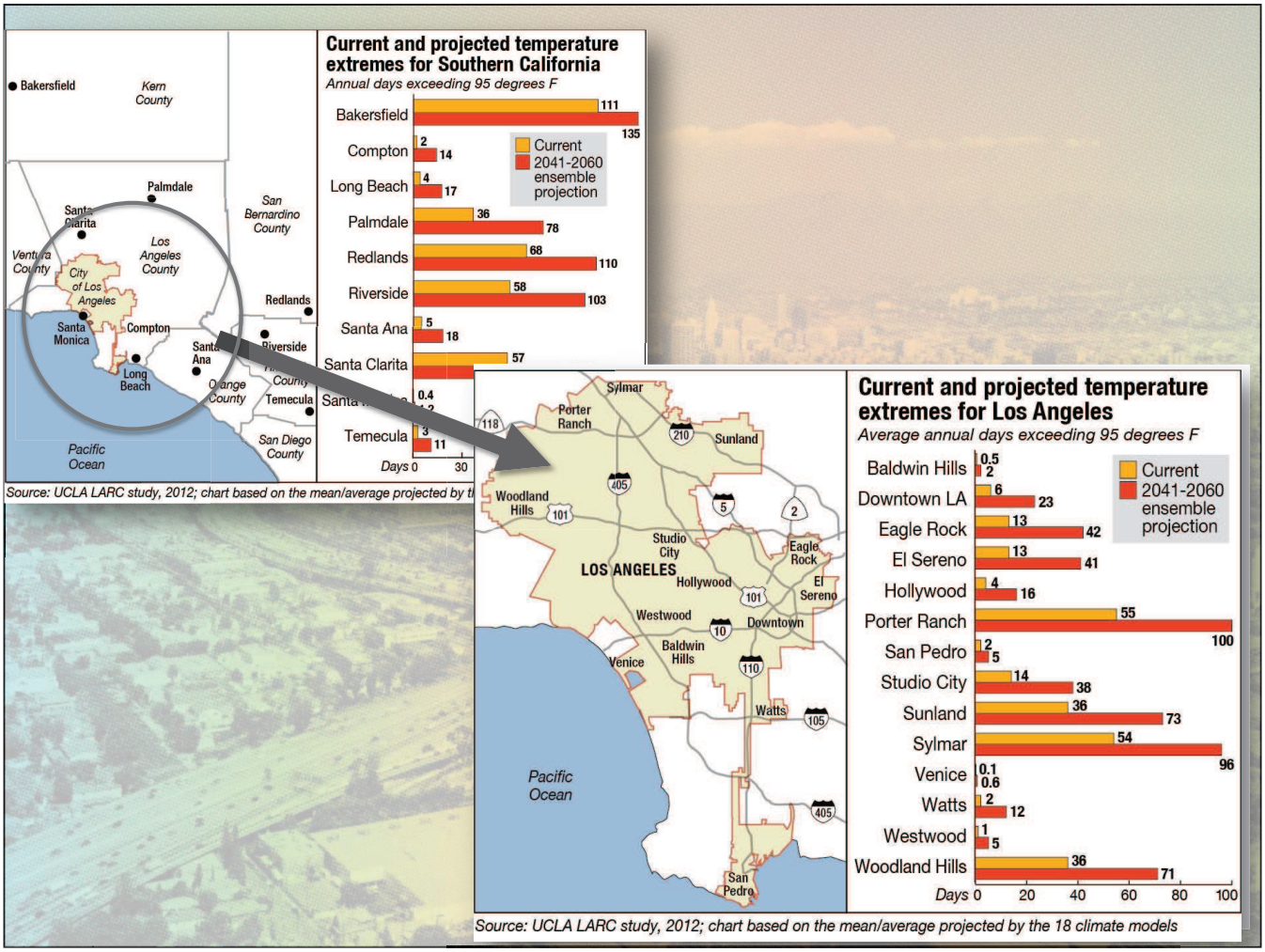
Addressing our Era's Extraordinary Challenge

October 14, 2015

Jonathan Parfrey Climate Resolve

CLIMATE RESOLVE

SoCal Temperature • 2041-2060



Rain & Snow in Southern California

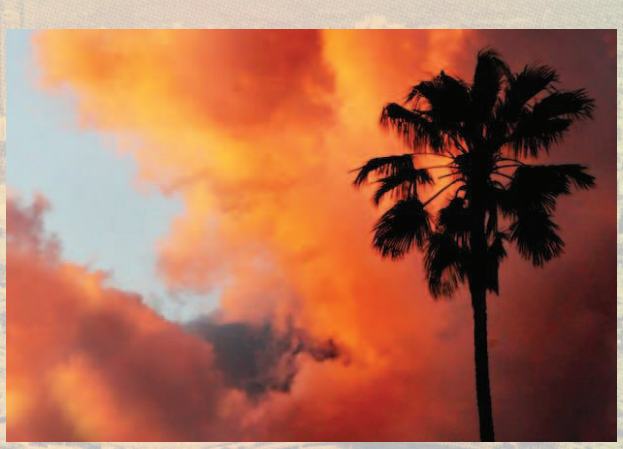
Wind & Wildfire

Wildfire 2041-2060

UC Davis, UC Irvine, UCLA, JPL, USFS

September 2015

- **Two kinds of wildfire**
  - **Santa Ana fires (October to April)**
  - **Summer fires (June to September)**
- More intense (but not more frequent) Santa Ana wind events
- Area burned by Santa Ana fires will increase by 64%
- Area burned in summer fires will increase by 77%, mainly due to an increase in temperature.



Sea Level Rise & Storm Surges

USC Sea Grant – January 2014 study on a 10-year storm

- sanitation pipes
- flooding in Venice
- property damage in Wilmington and San Pedro
- next study: other coastal cities

ACHIEVING CLIMATE SOLUTIONS

Cool California

Green outdoor space and community gardens at schools

TREEPEOPLE

El Sereno - Public Street Plaza near Food 4 Less

Green LA coalition

My Figueroa: Complete street improvements

myFIGUEROA.
MyFIGUEROA.
MyFIGUEROA.
GO figueroa

My Figueroa - Multi-Modal Connections

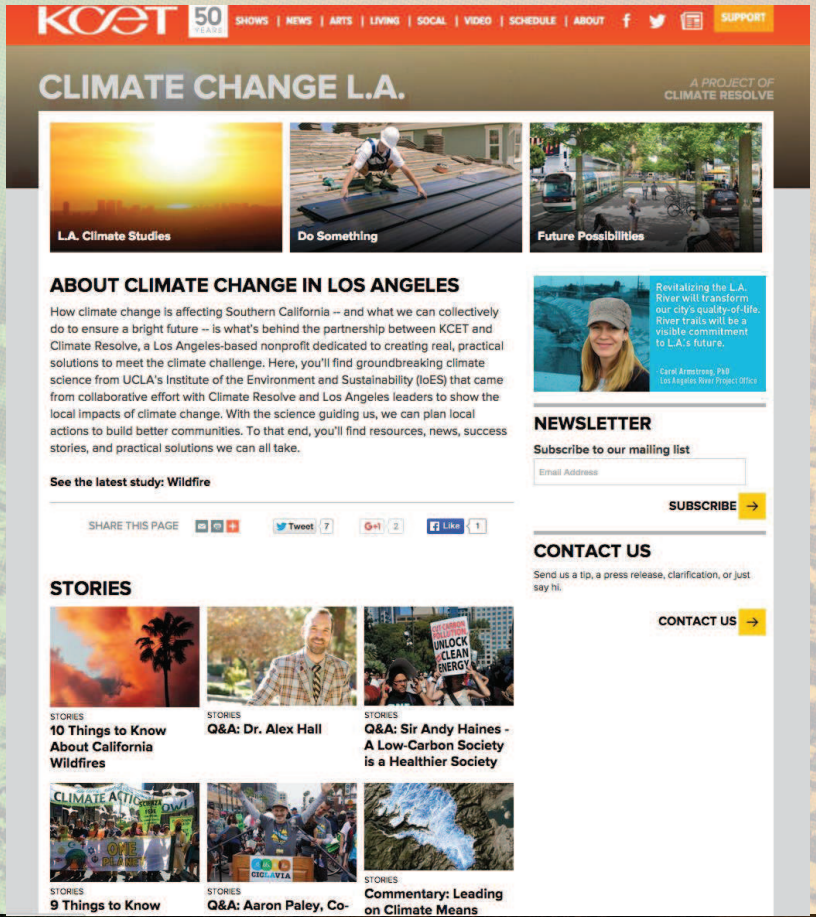
myFIGUEROA.
MyFIGUEROA.
MyFIGUEROA.
GO figueroa

Permeable street surfaces replenish ground water

LA River - "greening" of sections through Canoga Park

LA River: Terraced seating and native wildlife habitat

LA River - cantilevered greenway trail



Jonathan Parfrey
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(213) 346 3200 ext.303

Senate Bill No. 246

CHAPTER 606

An act to amend Section 75123 of, and to add Part 4.5 (commencing with Section 71350) to Division 34 of, the Public Resources Code, relating to environmental protection.

[Approved by Governor October 8, 2015. Filed with Secretary of State October 8, 2015.]

LEGISLATIVE COUNSEL'S DIGEST

SB 246, Wieckowski. Climate change adaptation.

(1) The Global Warming Solutions Act of 2006 designates the State Air Resources Board as the state agency charged with monitoring and regulating sources of emissions of greenhouse gases. The state board is required to adopt a statewide greenhouse gas emissions limit equivalent to the statewide greenhouse gas emissions level in 1990 to be achieved by 2020 and to adopt rules and regulations in an open public process to achieve the maximum, technologically feasible, and cost-effective greenhouse gas emissions reductions. The act requires all state agencies to consider and implement strategies to reduce their greenhouse gas emissions. An executive order establishes a climate action team consisting of specified ex officio members and requires the team to make a specified biannual report to the Legislature and Governor.

This bill would establish the Integrated Climate Adaptation and Resiliency Program to be administered by the Office of Planning and Research to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change, as specified. The bill also would require, within one year of an update to the Safeguarding California Plan, the Office of Emergency Services, in coordination with the Natural Resources Agency, the Office of Planning and Research, and relevant public and private entities, to review and update, as necessary, the Adaptation Planning Guide, as specified. The bill would establish an advisory council, as specified, to support the goals of the Office of Planning and Research as identified by the bill. The bill would require the Office of Planning and Research to establish a clearinghouse for climate adaptation information, as specified.

(2) The Bagley-Keene Open Meeting Act, with specified exceptions, requires that meetings of a state body be open and public and that all persons be permitted to attend.

Existing law establishes the Strategic Growth Council and requires the council, among other things, to identify and review the activities and funding programs of member state agencies that may be coordinated to improve air

and water quality. Existing law also requires the council's meetings be open to the public and subject to the Bagley-Keene Open Meeting Act.

This bill would specify certain council meetings that are not subject to the Bagley-Keene Open Meeting Act.

The people of the State of California do enact as follows:

SECTION 1. Part 4.5 (commencing with Section 71350) is added to Division 34 of the Public Resources Code, to read:

PART 4.5. INTEGRATED CLIMATE ADAPTATION AND RESILIENCY PROGRAM

71350. For purposes of this part, "office" means the Office of Planning and Research.

71352. The Legislature finds and declares:

(a) The state has been a leader in climate mitigation efforts to reduce greenhouse gas emissions. Now, and in the coming years, it is critical for California and the global community to continue and intensify those efforts in order to avoid the most severe impacts from a changing climate. However, because the global climate system changes slowly, impacts are ongoing and will inevitably worsen. In order to address the challenges posed by a changing climate, the state must invest in building resiliency and strengthening adaptation efforts at the state, regional, and local levels using the best-available science.

(b) A principle of the state's adaptation strategy document, Safeguarding California, is to prioritize actions that not only reduce greenhouse gas emissions, but also help the state prepare for climate change impacts. Improved coordination, implementation, and integration of adaptation planning efforts and funding in the state's climate policies can directly protect the state's infrastructure, communities, environmental quality, public health, safety and security, natural resources, and economy from the unavoidable impacts of climate change for decades to come.

(c) In order to have a cohesive and comprehensive response to climate change impacts, the state must have integrated planning with coordinated strategies across state, regional, and local governments and agencies.

(d) The office is established as the comprehensive state planning agency that shall engage in the formulation, evaluation, and updating of long-range goals for factors that shape statewide development patterns and significantly influence the quality of the state's environment, in addition to assisting state, regional, and local agencies in a variety of research and planning efforts, pursuant to Section 65040 of the Government Code. Therefore, the office is well-positioned to work with regional and local entities across the state, coordinating with state climate adaptation strategies.

(e) It is the intent of the Legislature, therefore, that adaptation strategies to build resiliency to the risks and impacts from climate change be integrated

in state policies, projects, and permitting processes, and that the office serve as a coordinating body for adaptation projects and goals across California.

71354. The Integrated Climate Adaptation and Resiliency Program is hereby established to be administered by the office. No later than January 1, 2017, the Director of State Planning and Research shall establish the program to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change with, to the extent feasible, an emphasis on climate equity considerations across sectors and regions and strategies that benefit both greenhouse gas emissions reductions and adaptation efforts, in order to facilitate the development of holistic, complimentary strategies for adapting to climate change impacts. In order to achieve these goals, the program shall include, but not be limited to, all of the following:

(a) Working with and coordinating local and regional efforts for climate adaptation and resilience, including, but not limited to, the following:

(1) Developing tools and guidance.

(2) Promoting and coordinating state agency support for local and regional efforts.

(3) Informing state-led programs, including state planning processes, grant programs, and guideline development, to better reflect the goals, efforts, and challenges faced by local and regional entities pursuing adaptation, preparedness, and resilience. This should occur through regular coordination between the office, the Climate Action Team, which was established by Executive Order S-3-05, the Strategic Growth Council, and other state agencies, including, but not limited to, the Office of Emergency Services, the California Environmental Protection Agency, the Natural Resources Agency, the Transportation Agency, the State Department of Public Health, and the Department of Food and Agriculture.

(b) Assisting the Office of Emergency Services and other relevant state agencies with coordinating regular reviews and updates, as needed, to the Adaptation Planning Guide, pursuant to Section 71356, and maintaining a copy of the guide, or an electronic link to a copy of the guide posted, at a minimum, on the state's Climate Change Portal and the office's Internet Web site.

(c) Coordinating and maintaining the state's clearinghouse for climate adaptation information, pursuant to Section 71360.

(d) Conducting regular meetings with the advisory council established pursuant to Section 71358 in order to have technical support, as well as expertise and advice from regional and local experts working in climate adaptation throughout the research and planning processes, as described in this section.

71356. (a) Within one year of an update to the Safeguarding California Plan, the Office of Emergency Services, in coordination with the Natural Resources Agency, the office, and relevant public and private entities, shall review and update, as necessary, the Adaptation Planning Guide to provide tools and guidance to regional and local governments and agencies in creating and implementing climate adaptation and community resiliency

plans and projects. An Adaptation Planning Guide update shall be informed by the climate adaptation clearinghouse established pursuant to Section 71360 and the scientific assessments and recommendations in the most recent update of the Safeguarding California Plan. An Adaptation Planning Guide update shall consider the nexus between climate adaptation, community resiliency, public safety, and security, provide information and planning support for assessing climate vulnerabilities across impact sectors and regions and developing adaptation strategies that can be tailored to meet local needs, and include, at a minimum, all of the following:

(1) Guidance for coordinating adaptation planning activities among state and local governments and regional collaboratives.

(2) Adaptation planning guidance and strategies for natural hazards exacerbated by climate change.

(3) Guidance for conducting vulnerability assessments and identifying risk reduction strategies for communities.

(4) Identification of climate impact regions and descriptions of climate impacts to be considered for each region.

(5) Assistance with the interpretation of climate science as it relates to local and regional impacts.

(b) As part of updating the Adaptation Planning Guide, the Office of Emergency Services, in consultation with the office and, as needed, with the advisory council created pursuant to Section 71358, shall hold public meetings in the northern, southern, and central regions of the state to obtain input from the public and leaders in local and regional climate preparedness.

71358. (a) An advisory council to the office is hereby established. The advisory council shall be comprised of members from a range of disciplines, in order to provide scientific and technical support, and from regional and local governments and entities. The advisory council shall support the office's goals, as identified in this part, to facilitate coordination among state, regional, and local agency efforts to adapt to the impacts of climate change.

(b) Members of the advisory council shall have expertise in the intersection of climate change and areas that include, but need not be limited to, any of the following:

(1) Public health.
(2) Environmental quality.
(3) Environmental justice.
(4) Agriculture.
(5) Transportation and housing.
(6) Energy.
(7) Natural resources and water.
(8) Planning.
(9) Recycling and waste management.
(10) Local or regional government.
(11) Tribal issues.
(12) Emergency services and public safety.

(c) The advisory council shall meet with the office as needed, but not less than three times a year.

71360. (a) (1) The office shall coordinate with appropriate entities, including state, regional, or local agencies, to establish a clearinghouse for climate adaptation information for use by state, regional, and local entities.

(2) The clearinghouse shall be a centralized source of information that provides available climate data to guide decisionmakers at state, regional, and local levels when planning for and implementing climate adaptation projects to promote resiliency to climate change. The clearinghouse may include, but is not limited to, any of the following:

(A) A collection of the best-available resources that may include projections and models, vulnerability assessments, and downscaled data for climate change impacts throughout the state, when available, at statewide, regional, and local levels for both near-term and longer term timescales, including year 2050 and year 2100 projections. Climate change impacts may include, but are not limited to, impacts to public health, natural resources, environmental quality, and infrastructure.

(B) Tools that allow for the visualization or identification of regional and local impacts across the state and that integrate best-available data on vulnerable populations and infrastructure.

(C) A library of relevant white papers, case studies, research articles, and climate adaptation best practices that are searchable by relevance to region, locality, and sector.

(D) Information concerning funding opportunities for adaptation research, planning, and projects.

(E) Regionally prioritized best-practice adaptation projects that, as appropriate, integrate efforts to reduce greenhouse gas emissions across the state.

(b) The clearinghouse shall be regularly updated.

SEC. 2. The Legislature finds that because the Strategic Growth Council consists primarily of the Governor's cabinet members and because the council is designed to facilitate communication, coordinate policy outcomes, and improve efficiencies among member agencies and departments, informal discussion and interaction between and among agency secretaries and their staff should be encouraged and is a normal function of government.

SEC. 3. Section 75123 of the Public Resources Code is amended to read:

75123. (a) A meeting of the council, including a meeting related to the development of grant guidelines and policies and the approval of grants, shall be subject to the Bagley-Keene Open Meeting Act (Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 of the Government Code), except that, for purposes of this section, "meeting" shall not include a meeting at which:

(1) Council members are meeting as members of the Governor's cabinet.

(2) Council staff and member agency staff are meeting to discuss, but not take final action on, any of the following:

(A) State agency coordination to improve air and water quality, improve natural resource protection, increase the availability of affordable housing,

improve transportation, revitalize urban and community centers in a sustainable manner, and other priorities specified in subdivision (a) of Section 75125.

(B) Preliminary policy recommendations and investment strategies to the Governor, the Legislature, and appropriate state agencies to encourage the development of sustainable communities, as set forth in subdivision (b) of Section 75125.

(C) Developing grant guidelines, such as those specified in Section 75125, that are otherwise subject to public participation process requirements.

(b) The council may sponsor conferences, symposia, and other public forums, to seek a broad range of public advice regarding local, regional, and natural resource planning, sustainable development, and strategies to reduce and mitigate climate change.

O

Office of Senate Floor Analyses
(916) 651-1520 Fax: (916) 327-4478

UNFINISHED BUSINESS

Bill No: SB 246
Author: Wieckowski (D)
Amended: 9/4/15
Vote: 21

SENATE ENVIRONMENTAL QUALITY COMMITTEE: 6-0, 4/29/15
AYES: Wieckowski, Gaines, Hill, Jackson, Leno, Pavley
NO VOTE RECORDED: Bates

SENATE APPROPRIATIONS COMMITTEE: 5-2, 5/28/15
AYES: Lara, Beall, Hill, Leyva, Mendoza
NOES: Bates, Nielsen

SENATE FLOOR: 26-11, 6/3/15
AYES: Allen, Beall, Block, De León, Gaines, Galgiani, Glazer, Hall, Hernandez, Hertzberg, Hill, Hueso, Jackson, Lara, Leno, Leyva, Liu, McGuire, Mendoza, Mitchell, Monning, Pan, Pavley, Roth, Wieckowski, Wolk
NOES: Anderson, Bates, Fuller, Huff, Moorlach, Morrell, Nguyen, Nielsen, Runner, Stone, Vidak
NO VOTE RECORDED: Berryhill, Cannella, Hancock

ASSEMBLY FLOOR: 56-23, 9/8/15 - See last page for vote

SUBJECT: Climate change adaptation

SOURCE: Author

DIGEST: This bill establishes the Integrated Climate Adaptation and Resiliency Program (Program) through the Office of Planning and Research (OPR) to coordinate regional and local adaptation efforts with state climate adaptation strategies.

Assembly Amendments establish the Program within OPR to coordinate among local, regional, and state adaptation efforts and to aid the Office of Emergency

Services (OES) in reviewing and updating the Adaptation Planning Guide (APG), including the goals and information specified. The amendments also establish an advisory council to support the Program goals, including the listed areas of expertise, establish a clearinghouse of climate adaptation resources, and remove the provision to regularly update the Safeguarding California Plan. Finally, the amendments exempt from the Bagley-Keene Open Meeting Act (OMA) Strategic Growth Council (SGC) meetings of council staff and member agency staff when they are meeting to discuss, but not take final action on, specified topics.

ANALYSIS:

Existing law:

1) Establishes the Greenhouse Gas Reduction Fund (GGRF) as a special fund in the State Treasury; requires all moneys, except fines and penalties, collected pursuant to a market-based mechanism be deposited in the fund; and requires the Department of Finance, in consultation with the California Air Resources Board and any other relevant state agency, to develop, as specified, a three-year investment plan for the moneys deposited in the GGRF. (Government Code (GOV) §16428.8)

2) Requires that moneys deposited in the GGRF be used to facilitate the achievement of greenhouse gas (GHG) emissions reductions in the state and, where applicable and as feasible, lessen the impacts and effects of climate change on the state's communities, economy, and environment, among other potential specified co-benefits. (Health and Safety Code (HSC) §39712)

3) Establishes the SGC, consisting of the Director of the OPR, the Secretary of the California Natural Resources Agency (CNRA), the Secretary of the Environmental Protection Agency (CalEPA), the Secretary of Transportation, the Secretary of Health and Human Services (HHS), the Secretary of Business, Consumer Services, and Housing, the Secretary of the California Department of Food and Agriculture (CDFA), and three members of the public. (Public Resources Code (PRC) §75121)

4) Requires SGC to identify and review activities and funding programs of member agencies to improve air and water quality, meet the goals of AB 32 (Nunez/Pavley, Chapter 488, Statutes of 2006), encourage sustainable land use, and revitalize urban and community centers in a sustainable manner, in addition

to helping local and regional bodies develop and plan sustainable communities. (PRC §75125)

5) Requires OPR to serve the Governor and Cabinet as staff for long-range planning and research, constituting the comprehensive state planning agency, with a focus on factors influencing the quality of the state's environment. (GOV §65040)

This bill:

1) Declares the Legislature's findings and that climate change impacts are ongoing and a threat to safety and security, as well as intent to have a cohesive and comprehensive adaptation response with OPR serving as the coordinating body for regional and local efforts with state strategies.

2) Requires the Director of OPR to establish the Program by January 1, 2017, to coordinate regional and local efforts with state climate adaptation strategies with, to the extent feasible, an emphasis on climate equity and strategies that benefit both GHG emissions reductions and adaptation efforts. Requires the Program to include:

   a) Working with and coordinating local and regional adaptation efforts, including developing tools and guidance, promoting and coordinating state agency support, and informing state-led programs, planning processes, grant programs, and guidelines development through regular coordination among state agencies, the Climate Action Team (CAT), and SGC.

   b) Assisting OES and other relevant agencies with coordinating regular reviews and updates to the APG.

   c) Coordinating and maintaining the state's clearinghouse for climate adaptation information.

   d) Conducting regular meetings with the advisory council as established.

3) Requires within one year of an update to the Safeguarding California Plan, OES, in coordination with the CNRA, OPR, and relevant public and private entities to review and update, as necessary, the APG, and maintain an electronic copy on the state's Climate Change Portal and OPR's website.

4) Establishes an advisory council, with a range of experience, to support OPR by providing scientific and technical support and to facilitate coordination among

state, regional, and local agency efforts to adapt to the impacts of climate change.

5) Requires OPR to coordinate with appropriate state, regional, and local agencies to establish a clearinghouse of climate adaptation information, as specified, to guide decisionmakers when planning and implementing climate adaptation projects.

6) Exempts certain discussions by SGC staff and member agency staff from the OMA, including state agency coordination for state goals, preliminary policy recommendations and investment strategies, and the development of grant guidelines that are otherwise subject to public participation process requirements, as specified in Section 75125 of the PRC.

Background

Executive Orders Relating to State Agencies and Adaptation. Executive Order S-3-05 established GHG emission reduction targets, created the CAT, and directed the Secretary of CalEPA to coordinate efforts to meet the targets with the heads of other state agencies. The Order required the Secretary to report back to the Governor and Legislature biannually on progress toward meeting the GHG targets, GHG impacts to California, as well as mitigation and adaptation plans. Executive Order S-13-08 directed state agencies to plan for climate impacts specifically from sea level rise. It further directed the CNRA, through the CAT, to coordinate the California Climate Adaptation Strategy by June 2009, noting "California must begin now to adapt and build our resiliency to coming climate changes through a thoughtful and sensible approach with local, regional, state and federal government using the best available science."

Recent Executive Order B-30-15, in addition to setting GHG-related goals, directs the CNRA to update the Plan every three years and include vulnerabilities to climate change by sector and region, as specified, primary risks and priority actions regarding climate change impacts, and identification of lead agencies for each sector, which then report back to the CNRA on their actions taken. The Order further directs state agencies to take climate change into account in planning and investment decisions, guided by specified principles, and directs OPR to establish a technical, advisory group to help state agencies in their efforts.

California's Adaptation Documents. The 2009 California Climate Adaptation Strategy is a statewide strategy that includes a summary of impacts from climate change, provides recommendations for adaptation strategies in seven sectors, and

provides guidance for establishing adaptation and resiliency actions for the state. The 2014 Safeguarding California Plan is an update that augments adaptation strategies based on new climate science and risk management options.

The 2012 California APG, prepared and promoted by OPR, the CNRA, and OES, was designed to provide guidance and support for local governments and regional collaboratives in addressing the impacts of climate change. The guide consists of an overview document and three companion documents for use in defining local and regional impacts, understanding regional characteristics, and identifying adaptation strategies. The guide is meant to allow for flexibility in time, money, and effort available for adaptation across communities.

Comments

Purpose of Bill. According to the author, "Currently, the state lacks a coordinated, comprehensive approach for adapting to the impacts of climate change. While California has been a leader in climate mitigation efforts, the state alone cannot prevent global climate change and must prepare for the inevitable impacts through planning and implementing adaptation strategies in addition to continuing mitigation efforts.

"As noted in the 'Governing California Through Climate Change' report by the Little Hoover Commission (LHC) as well as multiple hearings on state and regional climate adaptation by the State Senate Environmental Quality Committee this year, there is a need for improved communication and coordination in climate adaptation efforts among levels of government in California, as well as for a centralized source of information and tools for planning and implementing adaptation efforts.

"SB 246 provides a framework for coordinating regional and local adaptation planning with state policies and strategies through the Program. The bill also ensures regular review of the APG and creates a central hub for information to avoid duplication of adaptation planning efforts, as well as improved communications among levels of government through an advisory council to help ensure that adaptation efforts are coordinated to provide resiliency to climate impacts for communities across California."

The Need for Improving Adaptation Efforts in California. According to the 2014 independent report by the LHC—a bipartisan state oversight agency—based on hearings, meetings, and interviews with climate change experts and stakeholders,

there is a need for a more unified approach to adaptation from the state government. The report notes that most adaptation strategies at the state level are still advisory and have been developed without coordination with local governments and the private sector, which have largely been planning and implementing projects individually or with regional collaboratives.

Specific recommendations from the LHC's report included:

- That the Governor and Legislature create a new state entity or enhance the institutional capacity of an existing organization, which should include an independent science board; and

- That the SGC expand its focus beyond reduction of carbon emissions to include a greater emphasis on adaptation.

Legislative Hearings on Climate Adaptation. This year, the Senate Environmental Quality Committee has conducted hearings on climate adaptation in California. The first hearing was focused mainly on state efforts to adapt to climate change impacts with testimony from the Secretaries of CalEPA, CNRA, CDFA, HHS, as well as the Deputy Directors of OPR and OES, and testimony from regional and local representatives and the LHC.

A second hearing was conducted in Oakland which focused on regional adaptation efforts and coordination in the Bay Area. Speakers included a member of the Nobel Prize-winning Intergovernmental Panel on Climate Change and representatives from the San Francisco Department of Public Health, the Climate Readiness Institute, the Bay Conservation and Development Commission, the Association of Bay Area Governments, the Counties of Marin, Sonoma, and Santa Clara, the City of Berkeley, and the Asian Pacific Environmental Network.

Testimony highlighted that there remains a lack of statutory direction that clearly articulates the roles at each level of government to ensure coordination and prioritization of adaptation throughout the state. Testimony also underscored the current and worsening impacts from climate change and the need for coordinating knowledge, tools, and funding so that adaptation is approached efficiently and holistically across government levels and regions.

Related/Prior Legislation

AB 1482 (Gordon, 2015) requires the CNRA to regularly update the Safeguarding California Plan, requires state agencies to maximize specified objectives across sector vulnerabilities, and requires the SGC review activities and funding to meet the priorities of the Plan. AB 1482 is on the Assembly Floor for concurrence.

SB 1217 (Leno, 2014) would have required the CNRA and SGC to prepare a climate risk assessment and strategy evaluating California's vulnerability and risk for climate change impacts and to identify and prioritize climate resiliency projects. SB 1217 died in the Assembly Appropriations Committee.

AB 2329 (Ruskin/Chesbro, 2010) would have enacted the CAT Act of 2010 to coordinate oversight of state agency efforts to meet GHG reduction targets, including development and implementation of mitigation and adaptation plans. AB 2329 failed on the Senate Floor.

SB 721 (Steinberg, 2009) was a reintroduction of SB 1760 (Perata, 2008), which was vetoed. SB 721 would also have required the CAT to biennially prepare and adopt a climate change impact mitigation and adaptation plan including specified information. SB 721 died in the Senate Appropriations Committee.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: No

According to the Assembly Appropriations Committee:

1) Increased annual General Fund (GF) costs of $200,000 for OPR to administer the Program.

2) One-time GF costs of $50,000 for data base development.

3) Ongoing annual costs GF costs of $50,000 for OPR to reimburse the Cal Tech Agency for webhosting.

SUPPORT: (Verified 9/8/15)

Audubon California
California Climate & Agricultural Network
California League of Conservation Voters
Center for Climate Protection
Climate Resolve
Coalition for Clean Air
Defenders of Wildlife

Environment California
Friends of the River
Little Hoover Commission
Local Government Commission
Mosquito and Vector Control Association of California
Natural Resources Defense Council
Public Health Institute's Center for Climate Change & Health
The Nature Conservancy
TreePeople
Sacramento Metropolitan Air Quality Management District
Sierra Business Council
Sierra Club California

OPPOSITION: (Verified 9/8/15)

None received

ARGUMENTS IN SUPPORT: A coalition of environmental, conservation, business, and public health interests notes, "SB 246 provides a framework with which California governments can adapt to the impacts of climate change. Through optimizations and efficiencies in adaptation planning offered by SB 246, the state will help avert unnecessary and redundant costs resulting from the absence of proper coordination and adoption of best practices."

ASSEMBLY FLOOR: 56-23, 9/8/15
AYES: Achadjian, Alejo, Baker, Bloom, Bonilla, Bonta, Brown, Burke, Calderon, Campos, Chau, Chiu, Chu, Cooley, Cooper, Dababneh, Daly, Dodd, Eggman, Frazier, Cristina Garcia, Eduardo Garcia, Gatto, Gipson, Gomez, Gonzalez, Gordon, Hadley, Roger Hernández, Holden, Irwin, Jones-Sawyer, Lackey, Levine, Lopez, Low, Maienschein, McCarty, Medina, Mullin, Nazarian, O'Donnell, Perea, Quirk, Rendon, Ridley-Thomas, Rodriguez, Salas, Santiago, Mark Stone, Thurmond, Ting, Weber, Williams, Wood, Atkins
NOES: Travis Allen, Bigelow, Brough, Chang, Dahle, Beth Gaines, Gallagher, Gray, Grove, Harper, Jones, Kim, Linder, Mathis, Mayes, Melendez, Obernolte, Olsen, Patterson, Steinorth, Wagner, Waldron, Wilk
NO VOTE RECORDED: Chávez

Prepared by: Laurie Harris / E.Q. / (916) 651-4108
9/8/15 22:02:42

****** END ******

Senate Bill No. 379

CHAPTER 608

An act to amend Section 65302 of the Government Code, relating to land use.

[Approved by Governor October 8, 2015. Filed with Secretary of State October 8, 2015.]

LEGISLATIVE COUNSEL'S DIGEST

SB 379, Jackson. Land use: general plan: safety element.

The Planning and Zoning Law requires the legislative body of a city or county to adopt a comprehensive, long-term general plan that includes various elements, including, among others, a safety element for the protection of the community from unreasonable risks associated with the effects of various geologic hazards, flooding, and wildland and urban fires.

This bill would, upon the next revision of a local hazard mitigation plan on or after January 1, 2017, or, if the local jurisdiction has not adopted a local hazard mitigation plan, beginning on or before January 1, 2022, require the safety element to be reviewed and updated as necessary to address climate adaptation and resiliency strategies applicable to that city or county. The bill would require the update to include a set of goals, policies, and objectives based on a vulnerability assessment, identifying the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, and specified information from federal, state, regional, and local agencies. By imposing new duties on cities and counties, the bill would impose a state-mandated local program.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

The people of the State of California do enact as follows:

SECTION 1. Section 65302 of the Government Code is amended to read:

65302. The general plan shall consist of a statement of development policies and shall include a diagram or diagrams and text setting forth objectives, principles, standards, and plan proposals. The plan shall include the following elements:

(a) A land use element that designates the proposed general distribution and general location and extent of the uses of the land for housing, business,

industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of land. The location and designation of the extent of the uses of the land for public and private uses shall consider the identification of land and natural resources pursuant to paragraph (3) of subdivision (d). The land use element shall include a statement of the standards of population density and building intensity recommended for the various districts and other territory covered by the plan. The land use element shall identify and annually review those areas covered by the plan that are subject to flooding identified by flood plain mapping prepared by the Federal Emergency Management Agency (FEMA) or the Department of Water Resources. The land use element shall also do both of the following:

(1) Designate in a land use category that provides for timber production those parcels of real property zoned for timberland production pursuant to the California Timberland Productivity Act of 1982 (Chapter 6.7 (commencing with Section 51100) of Part 1 of Division 1 of Title 5).

(2) Consider the impact of new growth on military readiness activities carried out on military bases, installations, and operating and training areas, when proposing zoning ordinances or designating land uses covered by the general plan for land, or other territory adjacent to military facilities, or underlying designated military aviation routes and airspace.

(A) In determining the impact of new growth on military readiness activities, information provided by military facilities shall be considered. Cities and counties shall address military impacts based on information from the military and other sources.

(B) The following definitions govern this paragraph:

(i) "Military readiness activities" mean all of the following:

(I) Training, support, and operations that prepare the men and women of the military for combat.

(II) Operation, maintenance, and security of any military installation.

(III) Testing of military equipment, vehicles, weapons, and sensors for proper operation or suitability for combat use.

(ii) "Military installation" means a base, camp, post, station, yard, center, homeport facility for any ship, or other activity under the jurisdiction of the United States Department of Defense as defined in paragraph (1) of subsection (g) of Section 2687 of Title 10 of the United States Code.

(b) (1) A circulation element consisting of the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, any military airports and ports, and other local public utilities and facilities, all correlated with the land use element of the plan.

(2) (A) Commencing January 1, 2011, upon any substantive revision of the circulation element, the legislative body shall modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways for safe and convenient travel in a manner that is suitable to the rural, suburban, or urban context of the general plan.

(B) For purposes of this paragraph, "users of streets, roads, and highways" mean bicyclists, children, persons with disabilities, motorists, movers of commercial goods, pedestrians, users of public transportation, and seniors.

(c) A housing element as provided in Article 10.6 (commencing with Section 65580).

(d) (1) A conservation element for the conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources. The conservation element shall consider the effect of development within the jurisdiction, as described in the land use element, on natural resources located on public lands, including military installations. That portion of the conservation element including waters shall be developed in coordination with any countywide water agency and with all district and city agencies, including flood management, water conservation, or groundwater agencies that have developed, served, controlled, managed, or conserved water of any type for any purpose in the county or city for which the plan is prepared. Coordination shall include the discussion and evaluation of any water supply and demand information described in Section 65352.5, if that information has been submitted by the water agency to the city or county.

(2) The conservation element may also cover all of the following:

(A) The reclamation of land and waters.

(B) Prevention and control of the pollution of streams and other waters.

(C) Regulation of the use of land in stream channels and other areas required for the accomplishment of the conservation plan.

(D) Prevention, control, and correction of the erosion of soils, beaches, and shores.

(E) Protection of watersheds.

(F) The location, quantity and quality of the rock, sand, and gravel resources.

(3) Upon the next revision of the housing element on or after January 1, 2009, the conservation element shall identify rivers, creeks, streams, flood corridors, riparian habitats, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management.

(e) An open-space element as provided in Article 10.5 (commencing with Section 65560).

(f) (1) A noise element that shall identify and appraise noise problems in the community. The noise element shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

(A) Highways and freeways.

(B) Primary arterials and major local streets.

(C) Passenger and freight online railroad operations and ground rapid transit systems.

(D) Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.

(E) Local industrial plants, including, but not limited to, railroad classification yards.

(F) Other ground stationary noise sources, including, but not limited to, military installations, identified by local agencies as contributing to the community noise environment.

(2) Noise contours shall be shown for all of these sources and stated in terms of community noise equivalent level (CNEL) or day-night average sound level (L_{dn}). The noise contours shall be prepared on the basis of noise monitoring or following generally accepted noise modeling techniques for the various sources identified in paragraphs (1) to (6), inclusive.

(3) The noise contours shall be used as a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise.

(4) The noise element shall include implementation measures and possible solutions that address existing and foreseeable noise problems, if any. The adopted noise element shall serve as a guideline for compliance with the state's noise insulation standards.

(g) (1) A safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence; liquefaction; and other seismic hazards identified pursuant to Chapter 7.8 (commencing with Section 2690) of Division 2 of the Public Resources Code, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires. The safety element shall include mapping of known seismic and other geologic hazards. It shall also address evacuation routes, military installations, peakload water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards.

(2) The safety element, upon the next revision of the housing element on or after January 1, 2009, shall also do the following:

(A) Identify information regarding flood hazards, including, but not limited to, the following:

(i) Flood hazard zones. As used in this subdivision, "flood hazard zone" means an area subject to flooding that is delineated as either a special hazard area or an area of moderate or minimal hazard on an official flood insurance rate map issued by the Federal Emergency Management Agency (FEMA). The identification of a flood hazard zone does not imply that areas outside the flood hazard zones or uses permitted within flood hazard zones will be free from flooding or flood damage.

(ii) National Flood Insurance Program maps published by FEMA.

(iii) Information about flood hazards that is available from the United States Army Corps of Engineers.

(iv) Designated floodway maps that are available from the Central Valley Flood Protection Board.

(v) Dam failure inundation maps prepared pursuant to Section 8589.5 that are available from the Office of Emergency Services.

(vi) Awareness Floodplain Mapping Program maps and 200-year flood plain maps that are or may be available from, or accepted by, the Department of Water Resources.

(vii) Maps of levee protection zones.

(viii) Areas subject to inundation in the event of the failure of project or nonproject levees or floodwalls.

(ix) Historical data on flooding, including locally prepared maps of areas that are subject to flooding, areas that are vulnerable to flooding after wildfires, and sites that have been repeatedly damaged by flooding.

(x) Existing and planned development in flood hazard zones, including structures, roads, utilities, and essential public facilities.

(xi) Local, state, and federal agencies with responsibility for flood protection, including special districts and local offices of emergency services.

(B) Establish a set of comprehensive goals, policies, and objectives based on the information identified pursuant to subparagraph (A), for the protection of the community from the unreasonable risks of flooding, including, but not limited to:

(i) Avoiding or minimizing the risks of flooding to new development.

(ii) Evaluating whether new development should be located in flood hazard zones, and identifying construction methods or other methods to minimize damage if new development is located in flood hazard zones.

(iii) Maintaining the structural and operational integrity of essential public facilities during flooding.

(iv) Locating, when feasible, new essential public facilities outside of flood hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities or identifying construction methods or other methods to minimize damage if these facilities are located in flood hazard zones.

(v) Establishing cooperative working relationships among public agencies with responsibility for flood protection.

(C) Establish a set of feasible implementation measures designed to carry out the goals, policies, and objectives established pursuant to subparagraph (B).

(3) Upon the next revision of the housing element on or after January 1, 2014, the safety element shall be reviewed and updated as necessary to address the risk of fire for land classified as state responsibility areas, as defined in Section 4102 of the Public Resources Code, and land classified as very high fire hazard severity zones, as defined in Section 51177. This review shall consider the advice included in the Office of Planning and Research's most recent publication of "Fire Hazard Planning, General Plan Technical Advice Series" and shall also include all of the following:

(A) Information regarding fire hazards, including, but not limited to, all of the following:

(i) Fire hazard severity zone maps available from the Department of Forestry and Fire Protection.

(ii) Any historical data on wildfires available from local agencies or a reference to where the data can be found.

(iii) Information about wildfire hazard areas that may be available from the United States Geological Survey.

(iv) General location and distribution of existing and planned uses of land in very high fire hazard severity zones and in state responsibility areas, including structures, roads, utilities, and essential public facilities. The location and distribution of planned uses of land shall not require defensible space compliance measures required by state law or local ordinance to occur on publicly owned lands or open space designations of homeowner associations.

(v) Local, state, and federal agencies with responsibility for fire protection, including special districts and local offices of emergency services.

(B) A set of goals, policies, and objectives based on the information identified pursuant to subparagraph (A) for the protection of the community from the unreasonable risk of wildfire.

(C) A set of feasible implementation measures designed to carry out the goals, policies, and objectives based on the information identified pursuant to subparagraph (B) including, but not limited to, all of the following:

(i) Avoiding or minimizing the wildfire hazards associated with new uses of land.

(ii) Locating, when feasible, new essential public facilities outside of high fire risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in a state responsibility area or very high fire hazard severity zone.

(iii) Designing adequate infrastructure if a new development is located in a state responsibility area or in a very high fire hazard severity zone, including safe access for emergency response vehicles, visible street signs, and water supplies for structural fire suppression.

(iv) Working cooperatively with public agencies with responsibility for fire protection.

(D) If a city or county has adopted a fire safety plan or document separate from the general plan, an attachment of, or reference to, a city or county's adopted fire safety plan or document that fulfills commensurate goals and objectives and contains information required pursuant to this paragraph.

(4) Upon the next revision of a local hazard mitigation plan, adopted in accordance with the federal Disaster Mitigation Act of 2000 (Public Law 106-390), on or after January 1, 2017, or, if a local jurisdiction has not adopted a local hazard mitigation plan, beginning on or before January 1, 2022, the safety element shall be reviewed and updated as necessary to address climate adaptation and resiliency strategies applicable to the city or county. This review shall consider advice provided in the Office of Planning and Research's General Plan Guidelines and shall include all of the following:

(A) (i) A vulnerability assessment that identifies the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, including, but not limited to, an assessment of how climate change may affect the risks addressed pursuant to paragraphs (2) and (3).

(ii) Information that may be available from federal, state, regional, and local agencies that will assist in developing the vulnerability assessment and the adaptation policies and strategies required pursuant to subparagraph (B), including, but not limited to, all of the following:

(I) Information from the Internet-based Cal-Adapt tool.

(II) Information from the most recent version of the California Adaptation Planning Guide.

(III) Information from local agencies on the types of assets, resources, and populations that will be sensitive to various climate change exposures.

(IV) Information from local agencies on their current ability to deal with the impacts of climate change.

(V) Historical data on natural events and hazards, including locally prepared maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged.

(VI) Existing and planned development in identified at-risk areas, including structures, roads, utilities, and essential public facilities.

(VII) Federal, state, regional, and local agencies with responsibility for the protection of public health and safety and the environment, including special districts and local offices of emergency services.

(B) A set of adaptation and resilience goals, policies, and objectives based on the information specified in subparagraph (A) for the protection of the community.

(C) A set of feasible implementation measures designed to carry out the goals, policies, and objectives identified pursuant to subparagraph (B) including, but not limited to, all of the following:

(i) Feasible methods to avoid or minimize climate change impacts associated with new uses of land.

(ii) The location, when feasible, of new essential public facilities outside of at-risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in at-risk areas.

(iii) The designation of adequate and feasible infrastructure located in an at-risk area.

(iv) Guidelines for working cooperatively with relevant local, regional, state, and federal agencies.

(v) The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan shall use existing natural features and ecosystem processes, or the restoration of natural features and ecosystem processes, when developing alternatives for consideration. For the purposes of this clause, “natural infrastructure” means the preservation or restoration of ecological systems, or utilization of

engineered systems that use ecological processes, to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but is not limited to, floodplain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days.

(D) (i) If a city or county has adopted the local hazard mitigation plan, or other climate adaptation plan or document that fulfills commensurate goals and objectives and contains the information required pursuant to this paragraph, separate from the general plan, an attachment of, or reference to, the local hazard mitigation plan or other climate adaptation plan or document.

(ii) Cities or counties that have an adopted hazard mitigation plan, or other climate adaptation plan or document that substantially complies with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions, climate adaptation plan or document, specifically showing how each requirement of this subdivision has been met.

(5) After the initial revision of the safety element pursuant to paragraphs (2), (3), and (4) upon each revision of the housing element, the planning agency shall review and, if necessary, revise the safety element to identify new information that was not available during the previous revision of the safety element.

(6) Cities and counties that have flood plain management ordinances that have been approved by FEMA that substantially comply with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions or the flood plain ordinance, specifically showing how each requirement of this subdivision has been met.

(7) Prior to the periodic review of its general plan and prior to preparing or revising its safety element, each city and county shall consult the California Geological Survey of the Department of Conservation, the Central Valley Flood Protection Board, if the city or county is located within the boundaries of the Sacramento and San Joaquin Drainage District, as set forth in Section 8501 of the Water Code, and the Office of Emergency Services for the purpose of including information known by and available to the department, the agency, and the board required by this subdivision.

(8) To the extent that a county's safety element is sufficiently detailed and contains appropriate policies and programs for adoption by a city, a city may adopt that portion of the county's safety element that pertains to the city's planning area in satisfaction of the requirement imposed by this subdivision.

SEC. 2. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or

school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

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UNFINISHED BUSINESS

Bill No: SB 379
Author: Jackson (D)
Amended: 7/6/15
Vote: 21

SENATE GOVERNANCE & FIN. COMMITTEE: 5-2, 4/15/15
AYES: Hertzberg, Beall, Hernandez, Lara, Pavley
NOES: Nguyen, Bates

SENATE ENVIRONMENTAL QUALITY COMMITTEE: 5-0, 4/29/15
AYES: Wieckowski, Hill, Jackson, Leno, Pavley
NO VOTE RECORDED: Gaines, Bates

SENATE APPROPRIATIONS COMMITTEE: Senate Rule 28.8

SENATE FLOOR: 23-16, 6/3/15
AYES: Allen, Beall, Block, De León, Hall, Hancock, Hernandez, Hertzberg, Hill, Hueso, Jackson, Lara, Leno, Leyva, Liu, McGuire, Mendoza, Mitchell, Monning, Pan, Pavley, Wieckowski, Wolk
NOES: Anderson, Bates, Berryhill, Cannella, Fuller, Gaines, Galgiani, Huff, Moorlach, Morrell, Nguyen, Nielsen, Roth, Runner, Stone, Vidak
NO VOTE RECORDED: Glazer

ASSEMBLY FLOOR: 55-25, 8/31/15 - See last page for vote

SUBJECT: Land use: general plan: safety element

SOURCE: Author

DIGEST: This bill requires cities and counties to review and update their general plans' safety elements to address risks posed by climate change.

Assembly Amendments:

- Clarify the timeline by which a local jurisdiction must comply with this bill's provisions.
- Require that specified general plan revisions mandated by this bill must include identification of natural infrastructure that may be used in adaptation projects, where feasible and, where feasible, must use existing natural features and ecosystem processes, or the restoration of natural features and ecosystem processes, when developing alternatives for consideration.
- Allows cities or counties that have an adopted hazard mitigation plan, or other climate adaptation plan or document that substantially complies with this bill's requirements, or have substantially equivalent provisions in their general plans, to use that information in the safety element to comply with this bill's provisions.

ANALYSIS: Existing law requires every county and city to adopt a general plan with seven mandatory elements: land use, circulation, housing, conservation, open space, noise, and safety.

This bill requires cities and counties to review and update their general plans' safety elements to address climate adaptation and resiliency strategies applicable to the city or county. Local officials must act either the next time they revise their local hazard mitigation plans on or after January 1, 2017, or, if a local agency has not adopted a hazard mitigation plan, on or before January 1, 2022. Specifically, this bill:

1) Requires cities and counties to consider the Governor's Office of Planning and Research (OPR) General Plan Guidelines and expands the required contents of safety elements to include:

   a) A vulnerability assessment that identifies what risks climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, including an assessment of how climate change may affect fire and flood risks addressed elsewhere in the safety element.

   b) Specified information about climate change risks, including:

      i) Information from the Web-based Cal-Adapt tool;

      ii) Information from the most recent version of the California Adaptation Planning Guide;

iii) Information from local agencies on the types of assets, resources, and populations that will be sensitive to various climate change exposures;

iv) Information from local agencies on their current ability to deal with the impacts of climate change;

v) Historical data on natural events/hazards, including locally prepared maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged;

vi) Existing and planned development in identified at-risk areas, including structures, roads, utilities, and essential public facilities; and

vii) Public agencies with responsibility for the protection of public health, safety, and the environment.

c) Based on that information, a set of adaptation and resilience goals, policies, and objectives for the protection of the community from climate change risks identified in the vulnerability assessment.

d) To carry out those goals, policies, and objectives, a set of feasible implementation measures, including:

i) Feasible methods to avoid or minimize climate change impacts associated with new uses of land.

ii) The location, when feasible, of new essential public facilities outside of at-risk areas, including hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in at-risk areas.

iii) The designation of adequate and feasible infrastructure located in an at-risk area.

iv) Guidelines for working cooperatively with relevant public agencies.

v) The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan must use existing natural features and ecosystem processes, or the restoration of natural features and ecosystem processes, when developing alternatives

for consideration. "Natural infrastructure" means the preservation or restoration of ecological systems, or utilization of engineered systems that use ecological processes, to increase resiliency to climate change, manage other environmental hazards, or both. This may include floodplain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days.

2) Allows a city or county to update its safety element by attaching or making reference to a local hazard mitigation plan or other climate adaptation plan or document that fulfills commensurate goals and objectives and contains information required by this bill.

3) Allows cities or counties that have an adopted hazard mitigation plan, or other climate adaptation plan or document that substantially complies with this bill's provisions, or have substantially equivalent provisions in their general plans, to use that information in the safety element to comply with this bill. Requires a city or county to summarize and incorporate by reference into the safety element the other general plan provisions, climate adaptation plan or document, specifically showing how each requirement of this bill's provisions has been met.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: Yes

According to the Assembly Appropriations Committee, negligible state cost. Local agencies have the authority to charge fees to pay for the required updates, therefore, local mandate costs are not reimbursable.

SUPPORT: (Verified 8/31/15)
American Planning Association, California Chapter
Audubon California
California Coastal Environmental Rights Foundation
California Fire Chiefs Association
California League of Conservation Voters
California Professional Firefighters
California ReLeaf
California Urban Forests
City of Oakland
City and County of San Francisco
Climate Resolve
County of Santa Barbara

Environment California
Little Hoover Commission
Local Government Commission
Nature Conservancy
Public Health Institute Center for Climate Change and Health
San Francisco Bay Conservation and Development Commission
Sierra Club
Tree People
West Marin Environmental Action Committee

OPPOSITION: (Verified 8/31/15)

League of California Cities

ARGUMENTS IN SUPPORT: Comprehensive land use planning serves two purposes. First, it helps public officials avoid problems when they make decisions about the future. Second, it helps public officials solve past problems. The Legislature promoted both of those purposes in 2007 and 2012 when it increased the local planning requirements for flood and fire hazards. Legislators required local general plans' safety elements to present information, set goals and policies based on that information, and come up with feasible measures to carry out those goals and policies. That three-part approach helps city councils and county supervisors make better land use decisions that avoid or minimize the risks of flooding and fires. This bill applies the same three-part approach to the risks associated with climate change. California's 2009 Climate Adaptation Strategy recommends that "communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies." Using the accepted three-part approach to land use planning, this bill will help local officials make better land use decisions in anticipation of climate change's impacts.

ARGUMENTS IN OPPOSITION: The Legislature first required cities and counties to adopt general plans in 1937 (AB 722, Weber, Chapter 665, Statutes of 1937). Over the last 70 years, legislators have insisted on increasingly detailed local plans. The recent trend has been to require general plans to pay more attention to specialized topics: San Joaquin Valley's air quality (AB 170, Reyes, Chapter 472, Statutes of 2003), wildland fires (AB 3065, Kehoe, Chapter 951, Statutes of 2004, and AB 1241, Kehoe, Chapter 311, Statutes of 2012), tribal cultural places (SB 18, Burton, Chapter 905, Statutes of 2004), military operating areas (SB 926, Knight, Chapter 907, Statutes of 2004), and flood hazards (AB 162,

Wolk, Chapter 369, Statutes of 2007). When land use problems hit the headlines, the Legislature imposes new planning chores on cities and counties. But, California doesn't invest State General Fund money in long-range, comprehensive, local planning. The burden of funding these new state mandated local programs falls on local general funds and on the property owners who apply for development permits. This bill is another well-intentioned, but unfunded, state mandated local program.

ASSEMBLY FLOOR: 55-25, 8/31/15
AYES: Alejo, Bloom, Bonilla, Bonta, Brown, Burke, Calderon, Campos, Chau, Chiu, Chu, Cooley, Cooper, Dababneh, Daly, Dodd, Eggman, Frazier, Cristina Garcia, Eduardo Garcia, Gatto, Gipson, Gomez, Gonzalez, Gordon, Gray, Hadley, Roger Hernández, Holden, Irwin, Jones-Sawyer, Levine, Linder, Lopez, Low, Maienschein, McCarty, Medina, Mullin, Nazarian, O'Donnell, Perea, Quirk, Rendon, Ridley-Thomas, Rodriguez, Salas, Santiago, Mark Stone, Thurmond, Ting, Weber, Williams, Wood, Atkins
NOES: Achadjian, Travis Allen, Baker, Bigelow, Brough, Chang, Chávez, Dahle, Beth Gaines, Gallagher, Grove, Harper, Jones, Kim, Lackey, Mathis, Mayes, Melendez, Obernolte, Olsen, Patterson, Steinorth, Wagner, Waldron, Wilk

Prepared by: Brian Weinberger / GOV. & F. / (916) 651-4119
8/31/15 19:58:23

****** END ******

Assembly Bill No. 1482

CHAPTER 603

An act to amend Section 75125 of, and to add Part 3.7 (commencing with Section 71150) to Division 34 of, the Public Resources Code, relating to climate change.

[Approved by Governor October 8, 2015. Filed with Secretary of State October 8, 2015.]

LEGISLATIVE COUNSEL'S DIGEST

AB 1482, Gordon. Climate adaptation.

Existing law establishes the Natural Resources Agency, comprised of departments, boards, conservancies, and commissions responsible for the restoration, protection, and management of the state's natural and cultural resources.

Existing law establishes the Strategic Growth Council in state government and assigns to the council certain duties, including providing, funding, and distributing data and information to local governments and regional agencies that will assist in the development and planning of sustainable communities.

This bill would require the agency, by July 1, 2017, and every 3 years thereafter, to update the state's climate adaptation strategy, as provided. The bill would require the agency, by January 1, 2017, and every 3 years thereafter, to release a draft climate adaptation strategy, as provided. The bill would require state agencies to maximize specified objectives, including, among others, promoting the use of the climate adaptation strategy to inform planning decisions and ensure that state investments consider climate change impacts, as well as promote the use of natural systems and natural infrastructure, as defined, when developing physical infrastructure to address adaptation.

This bill also would expand the duties of the council to include identifying and reviewing the activities and funding programs of all state agencies, instead of only the state agencies that are members of the council, to coordinate specified state objectives, including, among others, meeting the goals of the state's climate adaptation strategy.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds and declares all of the following:

(a) California's climate is changing, posing an escalated threat to public health, the environment, the economy, and public and private property in the state. The increasing frequency of extreme weather events, including floods and heat waves, fires, rising sea levels, and changes in hydrology,

including diminishing snowpacks and more frequent droughts, among other climate change impacts, will affect every part of residents' lives in the next century and beyond. Planning appropriately for these impacts will help us be better prepared for the future.

(b) The impacts of climate change, including longer droughts, extended floods, prolonged fire seasons with larger and more intense fires, heat waves, and sea level rise, are already creating challenges for public health and safety and causing destructive property damage.

(c) Climate change poses a threat not just to the lives and health of residents but also to the state's economy and to the financial health of our local governments.

(d) According to the Natural Resources Agency's report, "Safeguarding California: Reducing Climate Risk," state-of-the-art modeling shows that a single extreme winter storm in California could cost on the order of $725,000,000,000, including total direct property losses of nearly $400,000,000,000 and devastating impacts to residents, the economy, and natural resources.

(e) Adapting to climate change, in addition to reducing the impacts of climate change on California's natural resources and infrastructure, is essential to protecting the state's environment and economy over time and will require coordination across all state departments and agencies.

(f) Given the potential impacts and the long-term nature of effective planning, California needs to take action now.

SEC. 2. Part 3.7 (commencing with Section 71150) is added to Division 34 of the Public Resources Code, to read:

PART 3.7. CLIMATE CHANGE AND CLIMATE ADAPTATION

71150. For purposes of this part, the following terms have the following meanings:

(a) "Agency" means the Natural Resources Agency.

(b) "Council" means the Strategic Growth Council.

(c) "Plan" means the Safeguarding California Plan.

71152. It is the intent of the Legislature to prioritize the state's response to the impacts resulting from climate change by ensuring all state departments and agencies prepare for and are ready to respond to the impacts of climate change, such as extreme weather events, the urban heat island effect, habitat loss, wildfire, sea-level rise, and drought. It also is the intent of the Legislature that the agency consider developing policies to address the impacts of climate change and climate adaptation with a focus on people, places, and water and that actions taken to address climate adaptation should be consistent with the plan.

71153. (a) By July 1, 2017, and every three years thereafter, the agency shall update the state's climate adaptation strategy, known as the plan. As part of the update, the agency shall coordinate with other state agencies to

identify a lead agency or group of agencies to lead adaptation efforts in each sector. The updates to the plan shall include all of the following:

(1) Vulnerabilities to climate change by sector, as identified by the lead agency or group of agencies, and regions, including, at a minimum, the following sectors:

(A) Water.

(B) Energy.

(C) Transportation.

(D) Public health.

(E) Agriculture.

(F) Emergency services.

(G) Forestry.

(H) Biodiversity and habitat.

(I) Ocean and coastal resources.

(2) Priority actions needed to reduce risks in those sectors, as identified by the lead agency or group of agencies.

(b) By January 1, 2017, and every three years thereafter, the agency shall release a draft plan. Between the release of the draft plan and the publication of the final update of the plan, the agency shall hold at least three public hearings for the purpose of providing an opportunity for the public to review and provide written and oral comments on the draft plan. The public hearings shall be held in northern California, the central valley of California, and southern California.

(c) The agency shall annually report to the Legislature, consistent with Section 9795 of the Government Code, on actions taken by each applicable agency to implement the plan.

71154. To address the vulnerabilities identified in the plan, state agencies shall work to maximize, where applicable and feasible, the following objectives:

(a) Educating the public about the consequences of climate change, such as sea-level rise, extreme weather events, the urban heat island effect, habitat loss, wildfire, drought, threats to infrastructure and agriculture, worsening air and water quality, and public health impacts.

(b) Ensuring there is a continued repository for scientific data on climate change and climate adaptation in the state in order to facilitate educated state and local policy decisions and to help identify primary risks from climate change to residents, property, communities, and natural systems across the state.

(c) (1) Promoting the use of the plan to inform planning decisions and ensure that state investments consider climate change impacts, as well as promote the use of natural systems and natural infrastructure, when developing physical infrastructure to address adaptation.

(2) When developing infrastructure to address adaptation, where feasible, a project alternative should be developed that utilizes existing natural features and ecosystem processes or the restoration of natural features and ecosystem processes to meet the project's goals.

(3) For purposes of this subdivision, "natural infrastructure" means the preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days.

(d) Encouraging regional collaborative planning efforts to address regional climate change impacts and adaptation strategies.

(e) Promoting drought resiliency through an integrated water supply, delivery, and capture system that is coordinated and that can be resilient to a multiyear drought scenario while protecting water quality and the public health. Establishing both drought preparation programs, which will help create sustainable water systems in the future, and immediate drought response programs, which will reduce water demand or increase supply within one to five years of any declared drought.

(f) Building resilient communities by developing urban greening projects that reduce air pollution and heat reflection in urban areas and create livable, sustainable communities in urban cores to promote infill development and reduce greenhouse gas emissions.

(g) Protecting and enhancing habitat, species strongholds, and wildlife corridors that are critical to the preservation of species that are at risk from the consequences of climate change.

(h) Promoting actions to ensure healthy soils and sustainable agriculture; inform reliable transportation planning; improve emergency management response across sectors; ensure sufficient, reliable, and safe energy; improve capacity to reduce and respond to public health threats; address the impacts of climate change on disadvantaged communities; and protect cultural resources from the impacts of climate change.

SEC. 3. Section 75125 of the Public Resources Code is amended to read:

75125. The council shall do all of the following:

(a) Identify and review activities and funding programs of state agencies that may be coordinated to improve air and water quality, improve natural resource protection, increase the availability of affordable housing, improve transportation, meet the goals of the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code) and the strategies and priorities developed in the state's climate adaptation strategy known as the Safeguarding California Plan adopted pursuant to Section 71152, encourage sustainable land use planning, and revitalize urban and community centers in a sustainable manner. At a minimum, the council shall review and comment on the five-year infrastructure plan developed pursuant to Article 2 (commencing with Section 13100) of Chapter 2 of Part 3 of Division 3 of Title 2 of the Government Code and the State Environmental Goals and Policy Report developed pursuant to Section 65041 of the Government Code.

(b) Recommend policies and investment strategies and priorities to the Governor, the Legislature, and to appropriate state agencies to encourage

the development of sustainable communities, such as those communities that promote equity, strengthen the economy, protect the environment, and promote public health and safety, consistent with subdivisions (a) and (c) of Section 75065.

(c) Provide, fund, and distribute data and information to local governments and regional agencies that will assist in developing and planning sustainable communities.

(d) Manage and award grants and loans to support the planning and development of sustainable communities, pursuant to Sections 75127, 75128, and 75129. To implement this subdivision, the council may do all of the following:

(1) Develop guidelines for awarding financial assistance, including criteria for eligibility and additional consideration.

(2) Develop criteria for determining the amount of financial assistance to be awarded. The council shall award a revolving loan to an applicant for a planning project, unless the council determines that the applicant lacks the fiscal capacity to carry out the project without a grant. The council may establish criteria that would allow the applicant to illustrate an ongoing commitment of financial resources to ensure the completion of the proposed plan or project.

(3) Provide for payments of interest on loans made pursuant to this article. The rate of interest shall not exceed the rate earned by the Pooled Money Investment Board.

(4) Provide for the time period for repaying a loan made pursuant to this article.

(5) Provide for the recovery of funds from an applicant that fails to complete the project for which financial assistance was awarded. The council shall direct the Controller to recover funds by any available means.

(6) Provide technical assistance for application preparation.

(7) Designate a state agency or department to administer technical and financial assistance programs for the disbursing of grants and loans to support the planning and development of sustainable communities, pursuant to Sections 75127, 75128, and 75129.

(e) Provide an annual report to the Legislature that shall include, but need not be limited to, all of the following:

(1) A list of applicants for financial assistance.

(2) Identification of which applications were approved.

(3) The amounts awarded for each approved application.

(4) The remaining balance of available funds.

(5) A report on the proposed or ongoing management of each funded project.

(6) Any additional minimum requirements and priorities for a project or plan proposed in a grant or loan application developed and adopted by the council pursuant to subdivision (c) of Section 75126.

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THIRD READING

Bill No: AB 1482
Author: Gordon (D), et al.
Amended: 9/1/15 in Senate
Vote: 21

SENATE NATURAL RES. & WATER COMMITTEE: 7-2, 6/23/15
AYES: Pavley, Allen, Hertzberg, Hueso, Jackson, Monning, Wolk
NOES: Stone, Vidak

SENATE ENVIRONMENTAL QUALITY COMMITTEE: 5-1, 7/1/15
AYES: Wieckowski, Hill, Jackson, Leno, Pavley
NOES: Bates
NO VOTE RECORDED: Gaines

SENATE APPROPRIATIONS COMMITTEE: 5-2, 8/27/15
AYES: Lara, Beall, Hill, Leyva, Mendoza
NOES: Bates, Nielsen

ASSEMBLY FLOOR: 63-12, 6/2/15 - See last page for vote

SUBJECT: Climate adaptation

SOURCE: Audubon California
TreePeople

DIGEST: This bill requires the California Natural Resources Agency (CNRA) to update its climate adaptation strategy, the Safeguarding California Plan (Plan), by July 1, 2017, and every three years thereafter by coordinating adaption activities among lead state agencies in each sector. This bill also requires the relevant state agencies to maximize specified objectives across sectors to address vulnerabilities identified in the Plan and requires the Strategic Growth Council (SGC) to identify and review activities and funding programs of state agencies that may be coordinated to meet the goals of the strategies and priorities in the Plan.

ANALYSIS:

Existing law:

1) Establishes the Greenhouse Gas Reduction Fund (GGRF) as a special fund in the State Treasury; requires all moneys, except fines and penalties, collected pursuant to a market-based mechanism be deposited in the fund; and requires the Department of Finance, in consultation with the California Air Resources Board and any other relevant state agency, to develop, as specified, a three-year investment plan for the moneys deposited in the GGRF. (Government Code (GOV) §16428.8)

2) Requires that moneys deposited in the GGRF be used to facilitate the achievement of greenhouse gas (GHG) emissions reductions in the state and, where applicable and to the extent feasible, lessen the impacts and effects of climate change on the state's communities, economy, and environment, among other potential specified co-benefits. (Health and Safety Code (HSC) §39712)

3) Establishes the SGC, consisting of the Director of the Governor's Office of Planning and Research (OPR), the Secretary of the CNRA, the Secretary of the Environmental Protection Agency (CalEPA), the Secretary of Transportation, the Secretary of Health and Human Services (HHS), the Secretary of Business, Consumer Services, and Housing, the Secretary of the California Department of Food and Agriculture (CDFA), and three members of the public. (Public Resources Code (PRC) §75121)

4) Requires the SGC to identify and review activities and funding programs of member agencies to improve air and water quality, meet the goals of AB 32 (Pavley, Chapter 488, Statutes of 2006), encourage sustainable land use, and revitalize urban and community centers in a sustainable manner, in addition to helping local and regional bodies develop and plan sustainable communities. (PRC §75125)

5) Establishes the Affordable Housing and Sustainable Communities program to be developed and administered by the SGC to reduce GHG emissions through projects that implement land use, housing, transportation, and agricultural land preservation practices to support infill and compact development and that support related and coordinated policy objectives, as specified. (PRC §75210)

6) Appropriates, continuously, 20 percent of annual proceeds of the GGRF to the SGC for the Affordable Housing and Sustainable Communities program. (HSC §39719)

This bill:

1) States legislative findings and declarations regarding numerous impacts of climate change and the need for adaptation planning, prioritization, and policy development by all state departments and agencies consistent with the Plan in order to address the impacts.

2) Requires the CNRA to:

   a) Update the Plan by July 1, 2017, and every three years thereafter, by coordinating with other state agencies to identify a lead agency or group of agencies to lead state adaptation efforts in each sector, and including:
   b) Vulnerabilities by region and sector, including at minimum, water, energy, transportation, public health, agriculture, emergency services, forestry, biodiversity and habitat, ocean and coastal resources.
   c) Priority actions to reduce sector risks.
   d) Release a draft of the Plan by January 1, 2017, and every three years thereafter; between release of the draft and publication of the final update, hold at least three public hearings in northern, central valley, and southern California.
   e) Report to the Legislature on actions to implement the Plan by applicable agencies.

3) Requires state agencies to address the vulnerabilities identified in the Plan by working to maximize, where applicable and feasible, the following objectives:

   a) Educating the public about the consequences of climate change, as specified.
   b) Ensuring a continued repository of scientific data on climate change and adaptation in the state.
   c) Promoting the use of the Plan to inform planning decisions, ensure that state investments consider climate change impacts, and promote the use of natural systems and natural infrastructure, as defined.
   d) Encouraging regional collaborative planning efforts.

e) Promoting a coordinated, drought-resilient water system and establishing drought preparation and response systems.

f) Building resilient communities by developing urban greening projects.

g) Protecting and enhancing habitat, species strongholds, and wildlife corridors.

h) Promoting actions to address impacts across specified sectors and communities.

4) Requires the SGC to identify and review activities and funding programs of "state agencies," instead of only "member state agencies," by striking "member" in Section 75125 subdivision (a), that may be coordinated for the list of specified goals, including meeting the goals of the strategies and priorities developed in the Plan when identifying and reviewing funding programs of state agencies.

Background

1) *Executive Orders Relating to the Climate Change Adaptation.* Executive Order S-3-05 established GHG emission reduction targets, created the Climate Action Team (CAT), and directed the Secretary of CalEPA to coordinate efforts to meet the targets with the heads of other state agencies. The order required the Secretary to report back to the Governor and Legislature biannually on progress toward meeting the GHG targets, GHG impacts to California, as well as mitigation and adaptation plans.

   Executive Order S-13-08 directed state agencies to plan for climate impacts specifically from sea level rise. It further directed the CNRA, through the CAT, to coordinate the California Climate Adaptation Strategy by June 2009, noting "California must begin now to adapt and build our resiliency to coming climate changes through a thoughtful and sensible approach with local, regional, state and federal government using the best available science."

   Recent Executive Order B-30-15, in addition to setting GHG-related goals, directs the CNRA to update the Plan every three years and include vulnerabilities to climate change by sector and region, as specified, primary risks and priority actions regarding climate change impacts, and identification of lead agencies for each sector, which then report back to the CNRA on their actions taken. The order further directs state agencies to take climate change into account in planning and investment decisions, guided by specified principles, and directs OPR to establish a technical, advisory group to help state agencies in their efforts.

2) *CNRA and the Safeguarding California Implementation Collaborative.* The CNRA, along with the OPR, SGC, and CalEPA, has developed the Safeguarding California Implementation Collaborative (SCIC). The SCIC grew out of the steering committee for the Plan, which was an update to the state's 2009 Climate Adaptation Strategy.

   According to the CNRA, the SCIC is convened monthly in order to understand how the Safeguarding principles are being implemented across the state, integrate climate change considerations across state government, and collaborate with internal and external stakeholders to create sustainable strategies to address climate challenges.

   The SCIC also coordinates complimentary efforts with the CAT and its subgroups and is currently working to complete a Safeguarding California Implementation Tracking Document with information from 25 bodies listed as participants. The Tracking Document will include grants, documents, and outreach efforts carried out by participants. An Implementation Report was anticipated by August 2015.

3) *SGC and Adaptation Funding Considerations.* In their 2014 annual report, the SGC highlighted hundreds of sustainable communities planning and urban greening projects that were completed or underway, as well as $130 million dollars as part of the GGRF-supported programs to reduce GHGs. In the 2015 guidelines for the Affordable Housing and Sustainable Communities Program, the SGC notes as one of the application threshold requirements that "the applicant must demonstrate that where applicable, climate adaptation measures are integrated into their Project."

4) *Legislative Hearings on Climate Adaptation.* This year, the Senate Environmental Quality Committee has conducted two hearings on climate adaptation in California. The first hearing, in February, was focused mainly on state efforts to adapt to climate change impacts with testimony from the Secretaries of CalEPA, CNRA, CDFA, HHS, as well as the Deputy Directors of OPR and the Office of Emergency Services, and testimony from regional and local representatives and the Little Hoover Commission.

   Testimony highlighted that there has been a great deal of preliminary thought on climate change impacts and recommended policy, though there remains a lack of statutory direction that clearly articulates the roles at each level of

government to ensure coordination and prioritization of adaptation and resiliency throughout the state. Uncertainty also remains as to how adaptation and mitigation are integrated in state policies.

In May, a second hearing was conducted in Oakland which focused on regional adaptation efforts and coordination in the Bay Area. Speakers included a member of the Nobel Prize-winning Intergovernmental Panel on Climate Change, as well as the San Francisco Department of Public Health, and representatives from the Climate Readiness Institute, the Bay Conservation and Development Commission, the Association of Bay Area Governments, the Counties of Marin, Sonoma, and Santa Clara, and the City of Berkeley, as well as the Asian Pacific Environmental Network.

Testimony underscored the current and worsening impacts from climate change and the need for coordinating knowledge, tools, and funding so that adaptation is approached efficiently and holistically across government levels and regions. Local leaders called for more alignment of adaptation efforts across the state and regional agencies, as well as more guidance and engagement from the state with regional and local bodies.

Comments

1) *Purpose of Bill.* According to the author, "California has been a leader in taking actions to impact the causes of global climate change. In spite of our efforts, climate change continues to affect our state. It is not enough to try to reverse the course of climate change. We must also become a leader in adapting to climate change. AB 1482 would broaden the state's focus on climate change to include climate adaptation and ensure, by including in state law, California's climate adaptation efforts continue into the future. AB 1482 would specifically require the Natural Resources Agency to oversee and coordinate state agency and department actions to adapt to climate change impacts. It is essential to identify a lead state entity in order to ensure that the state's response to climate change is focused and consistent across agencies to best protect California's residents, resources, and infrastructure from the effects of climate change."

2) *Coordination of Adaptation in California.* CNRA has successfully brought together information from multiple agencies representing various sectors in the Plan. Given these efforts, along with their investment in the creation and coordination of the SCIC and in working with multi-agency groups such as the

CAT and SGC, it seems appropriate for the CNRA to continue its role in coordinating updates to the Safeguarding Plan, as well as the research assessments, by collaborating with leads from numerous sectors.

In considering an organization to lead the state's overall adaptation policy, there are concerns about the task falling to one agency with a sector-specific focus. In order to be the most effective, adaptation efforts should equally involve sectors and regions across the state. If one sector-specific agency is in charge of the state's overall adaptation strategy, there is the potential for prioritizing issues related to that agency's core mandates. Certainly concerns for our state's natural resources are a critical component of addressing climate change, but so are considerations of public health, agriculture, emergency response, air and water quality, etc.

Recent amendments to this bill expand both the coordination among state agencies in leading sector-specific work for the Plan and the range of objectives across sectors to be maximized by agencies in addressing the vulnerabilities identified in the Plan.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: No

According to the Senate Appropriations Committee:

- Unknown ongoing costs in the low millions of dollars to the General Fund for each update of the Plan after 2017.

- Unknown cost pressures in the millions of dollars to the General Fund and various special funds to implement the climate adaptation strategy and the Infrastructure Plan.

SUPPORT: (Verified 8/31/15)

Audubon California (co-source)
Tree People (co-source)
Asian Pacific Environmental Network
California Climate & Agriculture Network
California League of Conservation Voters
California ReLeaf
California State Association of Counties
Center for Climate Change and Health
Climate Resolve

Coastal Environmental Rights Foundation
Defenders of Wildlife
Little Hoover Commission
Local Government Commission
National Parks Conservation Association
The Nature Conservancy
The Trust for Public Land
Wholly H2O

OPPOSITION: (Verified 8/31/15)

None received

ARGUMENTS IN SUPPORT: According to a coalition of supporters, "In 2014, the Natural Resources Agency adopted the Safeguarding California Plan, which begins to lay out a statewide plan for climate adaptation. However, there is no mechanism for enforcing this plan or ensuring that state agency or department actions are consistent with the Safeguarding California Plan.

"AB 1482 would provide statutory authority to the CNRA and the SGC to coordinate the state's climate adaptation policies and programs.

"AB 1482 will ensure that the state's response to climate change is focused and consistent across agencies in order to best protect California's citizens, wildlife, and infrastructure from the effects of climate change."

ASSEMBLY FLOOR: 63-12, 6/2/15
AYES: Achadjian, Alejo, Baker, Bloom, Bonilla, Bonta, Brown, Burke, Calderon, Campos, Chau, Chiu, Chu, Cooley, Cooper, Dababneh, Dahle, Daly, Dodd, Eggman, Frazier, Cristina Garcia, Eduardo Garcia, Gatto, Gipson, Gomez, Gonzalez, Gordon, Gray, Hadley, Roger Hernández, Holden, Irwin, Jones-Sawyer, Lackey, Levine, Linder, Lopez, Low, Maienschein, Mayes, McCarty, Medina, Mullin, Nazarian, Obernolte, O'Donnell, Olsen, Perea, Quirk, Rendon, Rodriguez, Salas, Santiago, Steinorth, Mark Stone, Thurmond, Ting, Weber, Wilk, Williams, Wood, Atkins
NOES: Travis Allen, Bigelow, Brough, Beth Gaines, Harper, Jones, Kim, Mathis, Melendez, Patterson, Wagner, Waldron
NO VOTE RECORDED: Chang, Chávez, Gallagher, Grove, Ridley-Thomas

Prepared by: Laurie Harris / E.Q. / (916) 651-4108
9/1/15 21:30:26

****** END ******

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