

**STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGULAR MEETING OF DECEMBER 6-7, 2018
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ITEM NUMBER: 6

SUBJECT: Central Coast Region Response to Climate Change

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ACTION: Discussion/Informational

SUMMARY/INTRODUCTION

Climate change is affecting water quality and presents unique challenges for California's Water Boards. The Water Boards must anticipate changes and identify risks to water quality associated with climate change, then adapt their programs to manage these changes. Driven by clear policy direction from the Governor and the State Water Board, Regional Boards are developing frameworks, work plans, strategies, and resolutions describing their specific responses to climate change. At the February 2018 Board Meeting ([Item 19](#)), Central Coast Water Board staff discussed climate change as a major stressor on regional water resources. At Water Quality Coordinating Committee (WQCC) sessions in both 2017 and 2018, Board members learned of existing and anticipated impacts to California's watersheds resulting from climate change, as well as actions taken by state and local agencies to deal with these impacts. As an outgrowth of these session, Board Members requested follow-up discussion focused on regional activities to address climate change.

The purpose of this agenda item is to provide information regarding the Central Coast Water Board's initial efforts in response to climate change, and to initiate a regional discussion with the Board regarding future planning and actions for state and local agencies, including the Central Coast Water Board. To further this discussion, staff invited regional stakeholders to provide presentations to the Board and participate in a panel discussion on topics such as sea level rise, the Central Coast Climate Collaborative, and local planning projects. The resulting forum is intended to provide additional focus to an array of activities undertaken in the region to address climate change.

DISCUSSION

Policy Direction Requiring Regional Board Actions

In March 2017, the State Board adopted [Resolution 2017-0012](#), a "Comprehensive Response to Climate Change." This Resolution describes specific actions Regional Boards will take in

response to climate change. Most actions require collaboration with the State Board's Division of Water Quality and other State agency organizations and include:

- Updating plans, permits, and policies, and coordinating with other agencies
- Reducing methane emissions from landfills
- Collecting recycled water data
- Enhancing ecosystem resilience to the impacts of climate change, including but not limited to actions that protect headwaters, facilitate restoration, enhance carbon sequestration, build and enhance healthy soils, and reduce vulnerability to and impacts from fires
- Minimizing impacts associated with ocean acidification, hypoxia, increasing temperature and nutrients
- Developing new and underutilized water resources, expanding surface water and groundwater storage where appropriate, and adding operational flexibility to build and enhance resilience to impacts of climate change
- Reducing vulnerability of water and wastewater infrastructure to flooding, storm surge, and sea level rise

This staff report discusses the Central Coast Water Board staff's work to address these and other actions. To frame that discussion, the following section provides an overview of the effects of climate change in the Central Coast and describes examples of local projects that illustrate how climate change mitigation and adaptation objectives can be achieved through physical actions on the landscape

EFFECTS OF CLIMATE CHANGE IN THE CENTRAL COAST REGION

Water Quality Effects

As in most parts of California, the effects of climate change in the Central Coast Region include temperature increases, sea level rise, and a highly variable precipitation described as a "whip lash"¹ pattern characterized by long periods of drought followed by wet winters with extreme storm events. The human response to the effects of climate change are expected to induce additional effects (e.g., less rainfall leading to more groundwater pumping). Some of the Central Coast effects of climate change can be reasonably predicted, such as increased groundwater dependence, absent other mitigation strategies, resulting in decreased groundwater quality and availability. However, current and future research are necessary to understand how other changes will manifest in the Central Coast, to better define the extent of their effects on surface and groundwater quality, and to evaluate the effectiveness of mitigation actions. As part of this ongoing research effort, the recently completed Regional Report in California's Fourth Climate Change Assessment² identifies key water quality related effects in the Central Coast Region (Table 1).

¹ Swain, et al. 2018, Increasing precipitation volatility in twenty-first century California

² Office of Planning and Research, Scripps Institution of Oceanography, California Energy Commission, California Public Utilities Commission). 2018. California's Fourth Climate Change Assessment.

Table 1: Water Quality Related Impacts of Climate Change on the Central Coast

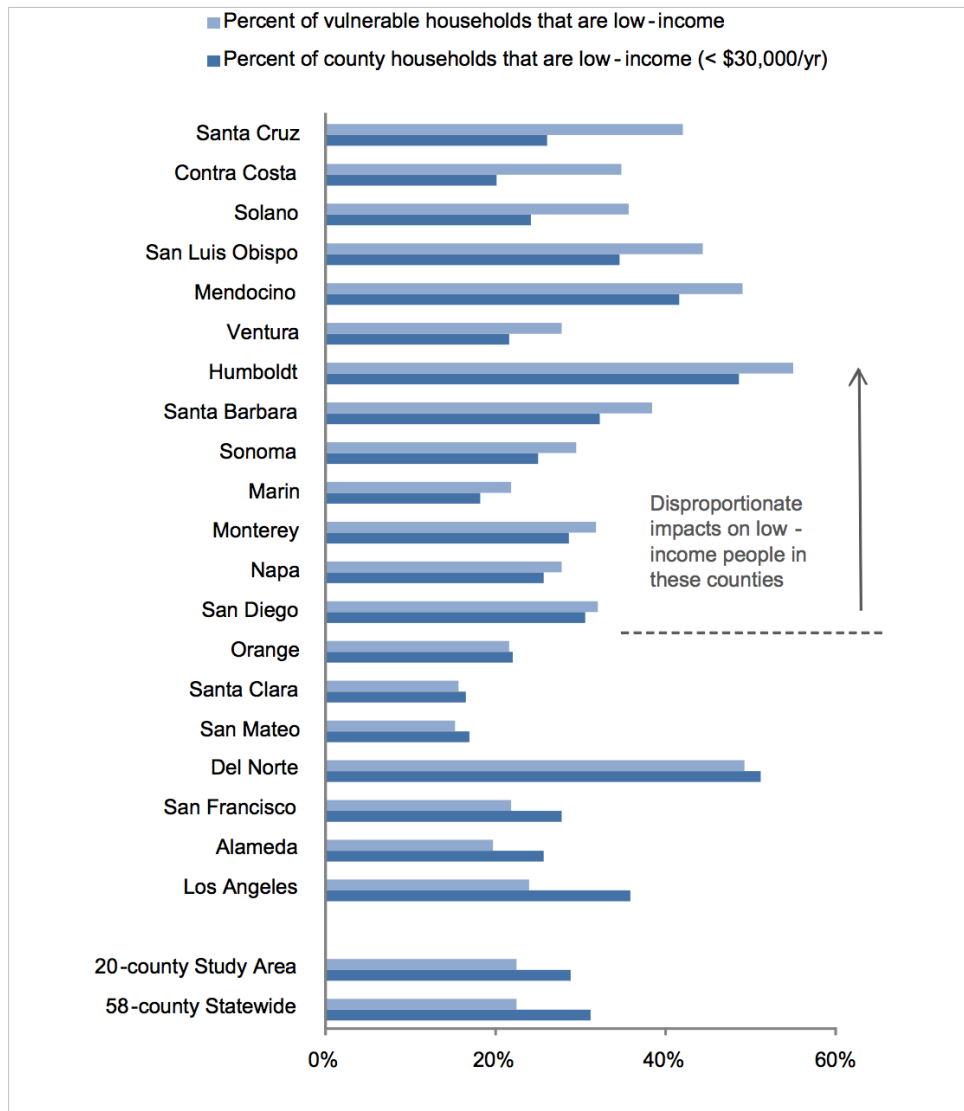
<p>Maximum and minimum temperatures for the Central Coast will continue to increase through the next century, with greater increases in the inland region. Precipitation is expected to increase slightly, but precipitation variability will increase substantially.</p>
<p>Periodic El Niño events dominate coastal hazards across the Central Coast while atmospheric rivers, expected to increase, are the dominant drivers of locally-extreme rainfall events.</p>
<p>Water supply shortages, already common during drought, will be exacerbated. Higher temperatures may result in increases in water demand for agriculture and landscaping. Reduced surface water will lead to increases in groundwater extractions that may result in increased saltwater intrusion. Lower surface flows will lead to higher pollutant concentrations and will impact aquatic species.</p>
<p>The aquatic life of streams and rivers are threatened by projected extreme swings from drought to floods and exacerbated by fire and post-fire mass erosion that buries habitat in sediments. Climate impacts can threaten the survival of already endangered Steelhead and Coho salmon, and further reduce the diversity and abundance of sensitive aquatic insects.</p>
<p>Recently observed and projected acceleration in sea level rise (SLR) poses a significant threat to the region's coastal communities and infrastructure. Future flooding is also a serious concern. A recent study suggests that approximately 12,000 residents and \$2.4 Billion in property could be exposed to flooding due to SLR and storms in Santa Barbara County by the end of the century. A similar level of exposure is predicted for Monterey County.</p>
<p>Estuarine systems will be affected by accelerated SLR, warming of water and air, ocean acidification, and changes in runoff. Some Central Coast marshes may drown or become shallow mudflats, leading to a loss of the ecosystem services that marshes provide, including carbon sequestration.</p>
<p>Many beaches will narrow considerably. As many as two-thirds will be completely lost over the next century, along with the ecosystems supported by those beaches. The landward erosion of beaches will be driven by accelerating SLR combined with a lack of ample sediment, effectively drowning the beaches between the rising ocean and the backing cliffs and/or urban hardscape.</p>
<p>Frequent and sometimes large wildfires will continue to be a major disturbance and post-fire recovery time may be lengthened. The 2017-2018 Thomas Fire and debris flow led to tragic loss of life and huge social cost, and may be representative of future devastating fires and post-fire effects from climate change</p>
<p>Impacts to the region's public health include increases in heat-related illnesses for agricultural workers, harmful particulate matter from wildfires, and an increase in ground-level ozone. Infectious/Vector-borne diseases include an increase in Valley Fever and Pacific Coast tick fever, and an increase in harmful algal blooms will have detrimental effects on animals and people exposed to toxins released from the algae.</p>
<p>Agricultural production is highly sensitive to climate change, including amounts, forms, and distribution of precipitation, changes in temperatures, and increased frequency and intensity of climate extremes. The Salinas Valley is identified as one of the most vulnerable agricultural regions under climate change.</p>

Impacts to Disadvantaged Communities Vulnerable to Sea Level Rise

The adverse impacts of climate change will likely disproportionately affect those who are socially and economically disadvantaged, including the urban and rural poor, the elderly, children, traditional societies, agricultural workers and rural populations. Disadvantaged

communities in the Central Coast Region are vulnerable to the effects of climate change described in Table 1. Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties have higher percentages of disadvantaged populations that are vulnerable to flood-related, sea level rise risk, relative to other California coastal counties. Low-income households in the region are disproportionately exposed to rising sea level (see Figure 1: the top bar shows the percentage within the population at risk of a 100-yr flood with a 1.4-meter sea-level rise. A county for which the top bar is longer indicates that there is a disproportionate vulnerability on low-income households).

Figure 1: Percentage of low-income households among the population vulnerable to a 100-year flood with a 1.4-meter sea-level rise compared with the county total³



³ Heberger, et al. (Pacific Institute) 2018, The Impacts of Sea-Level Rise on the California Coast

Climate Change Mitigation

Mitigation, in the context of climate change, refers to actions taken to reduce the concentrations of greenhouse gases in the atmosphere. The Water Board regulates facilities that generate greenhouse gases, like landfills, wastewater treatment plants, and compost facilities. Water Boards can also mitigate greenhouse gas emissions associated with water and wastewater conveyance and treatment by requiring recycled water and stormwater capture projects. Carbon storage (sequestration) is another example of mitigation over which Water Boards have influence, as when we require or support through grant funding wetland and habitat restoration, or when we require green infrastructure for managing urban runoff.

Climate Change Adaptation

Climate change adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage they can cause. Addressing the operational vulnerability of Water Board permitted infrastructure is an example of a direct adaptation response by Water Boards. The Water Board's response to climate change will likely be directed toward adaptation, through permit requirements, given the Board's role in regulating facilities and activities impacted by the effects of climate change.

Most Water Board grant projects inherently provide resiliency to the impacts of climate change because they seek to reduce pollutant loading, restore degraded habitat, and improve environmental quality. For example, grants for irrigation efficiency, treatment wetlands, creek restoration, and green infrastructure projects all build resiliency to climate change. Similarly, the State Water Board's Supplemental Environmental Project (SEP) Policy explicitly supports projects that address reducing greenhouse gas emissions and building resilience to climate change impacts on ecosystems or infrastructure, provided these projects meet additional criteria in the SEP Policy. Table 2 describes several projects implemented by other State agencies, resource conservation districts, and non-governmental organizations (NGOs) in the Central Coast where climate change mitigation and adaptation objectives can be achieved through physical actions on the landscape. The following section discusses the Central Coast Water Board's response to climate change.

Table 2: Central Coast Climate Change Projects Supported by Other State Agencies

Salinas River State Beach Dune Restoration Project: will plant native species and restore the adaptive capacity of vulnerable sections of the dunes, protect adjacent resources from the impacts of sea level rise, enhance public coastal access, and provide education and outreach to the local community (Central Coast Wetlands Group)
Highway 1 realignment and wetland restoration at Piedras Blancas (complete); at Moss Landing, in planning process (Cal Trans)
Elkhorn Slough Tidal Marsh Restoration to restore wetlands that sequester greenhouse gases (Elkhorn Slough Foundation)
Wetland Climate Action Project using wetlands to mitigate climate change impacts (Watsonville Wetlands Watch)
Accelerate adoption of on-farm conservation practices in the coastal Pajaro Valley to improve climate change resiliency in agriculture while piloting the development of tools that will assist growers in understanding the risks of climate change to their operations (Resource Conservation District of Santa Cruz County)

Develop and implement practices to enhance rangeland resiliency to climate change while reducing greenhouse gas emissions and sequestering carbon at a ranch scale (Coastal San Luis Resource Conservation District)

CENTRAL COAST WATER BOARD'S RESPONSE TO CLIMATE CHANGE

Over the past several months, Central Coast Water Board staff assessed the status of its response to climate change. As part of this effort, staff surveyed Water Board program managers, compiled and reviewed current climate change-related information and literature, engaged with experts and stakeholders in the region, increased coordination with Water Board counterparts, and raised overall staff awareness through prepared documents and presentations at meetings (e.g., ocean acidification/hypoxia; healthy soils, climate resilience and water).

Program managers identified climate change-related program activity, including likely impacts, current program responses, mitigation and adaptation opportunities, possible modifications to permits and regulations, and key stakeholders to engage in addressing climate change. The following summarizes this program-specific activity.

Anticipated Climate Change Impacts and Water Board Programs' Role in Responding

The effects of climate change will be felt broadly throughout the Central Coast by regulated parties in every Water Board program. As environmental variables, most climate-related effects are not entirely new, but rather represent an intensification of observed trends that programs are already addressing. In the following examples, Central Coast Water Board program managers identified the impacts to those we regulate along with opportunities in our regulatory and facilitative roles to assist adaptation and preparedness:

- Sea level rise will force changes to WWTP design and location, necessitating new permits (or permit amendments) with requirements focused on impact assessment and planning.
- Prolonged droughts will increase demand on groundwater and water portfolio diversification, forcing increased water recycling or desalination facilities for our Central Coast communities. Our role will be to: 1) facilitate changes to water management strategies and the associated permits, 2) shape state and local policy to accelerate adaptation, 3) provide assistance in gaining grant and loan funding appropriations, and 4) aid in developing the collective political will to implement these expensive and long-term projects and actions. Water recycling is critical to long-term sustainability and provides water supply portfolio diversification as a counterstrategy to climate change and prolonged drought.
 - Note: As part of this Meeting, the Board will consider an item to update requirements for the Monterey One Water regional wastewater treatment plant. This project implements substantial recycling of wastewater, stormwater, impaired surface waters including agricultural return flows, and food industry processing water, to recharge groundwater and provide additional water supply to homes, agriculture, and other businesses.
 - Central Coast Water Board staff is currently working with at least six recycling/water supply portfolio diversification efforts in the region.
- More frequent large storms resulting in flooding and stream erosion, will require staff in multiple programs to respond by issuing orders (e.g., emergency 401 Certifications), processing more applications for flood control, bank stabilization, and coastal armoring projects, and investigating impacts to Beneficial Uses. On the proactive side, following

these emergency events, we will facilitate efforts to implement more protective strategies such as larger creek setbacks to decrease catastrophic results from debris flows, and planned retreat plans at SLR inundation locations.

- In addition to the threat of inundation of key infrastructure, sea level rise may increase groundwater elevations near coastlines potentially remobilizing contaminants and increasing seawater intrusion.
- Inland, increased fluctuations in groundwater levels from increasing variability and extremes in drought and wet cycles will affect remediation strategies at clean-up sites.
- Wildfires and floods generating large amounts of debris brought to landfills will reduce capacity for municipal solid waste, thereby more rapidly exhausting landfill capacity and lifespan.
- Potential effects of climate change to the irrigated lands program, include: temperature-driven challenges to farming in more arid areas of the State may displace growers to the Central Coast; increases in crop type and cultivar changes may present new water quality issues from increased use of herbicides to address new weed invasions/expanded ranges for existing weeds, and from increased use of insecticides and fungicides, to address new diseases and pests and invasions/expanded ranges of existing diseases and pests; increase/decrease in irrigation tailwater or tile drain flows and increase/decrease in nutrient loading, depending on weather and crop yields; increase in soil, surface water and groundwater salinity levels; increased pollutant concentrations in groundwater if recharge is reduced.

All of these examples of climate change impacts and response strategies consumes staff resources from already-assigned program tasks. Adaptation responses by Water Board staff demands that we de-prioritize other work and potentially address it later or not at all.

Current Water Board Program Response Efforts

Accounting for environmental variability in regulating water quality is integral to how Water Board programs operate. Along with sea level rise, climate change's predominant effects in the Central Coast region are expected to result from increasing variability and intensity in climate-related processes (e.g., temperature, precipitation). Water Board programs are currently supporting climate change *adaptation* in very diverse ways, including:

- Promoting and facilitating groundwater recharge through recycled wastewater projects to improve diversification of water supply portfolios
 - Aiding in grant and loan funding acquisition
- Evaluating proposals for desalination facilities and prioritizing recycled water permitting projects
- Requiring implementation of new or improved water quality and land use management practices, irrigation efficiency and management, nutrient management, and modernization in irrigated agriculture
- Requiring low impact development standards in post-construction stormwater management in new and redevelopment projects in urban areas
- Requiring planned retreat in shoreline stabilization projects; using reference sites as the basis for mitigation success criteria; and requiring vegetation removal for flood control to be based on quantifiable flood control goals and gains
- Considering climate change-related changes (e.g., fluctuating groundwater levels) during review of Underground Injection Control projects and aquifer exemption applications
- Examining strategies such as leachate beneficial re-use on-site at landfills rather than hauling to wastewater facilities, and encouraging use of biosolids, compost, or other organic materials to establish and maintain vegetative cover on landfill slopes

- Assessing which active and closed Site Cleanup Program and UST Program sites will be affected by greater groundwater dependency and pumping (for water supply) and sea level rise and whether groundwater elevation increases could affect site pollution
- Promoting installation of new or re-starting non-operational soil vapor extraction systems to increase contaminant mass removal to take advantage of declining groundwater levels under drought conditions
- Incorporating climate change criteria in grant project selection

Central Coast Water Board program staff are also contributing to climate change *mitigation* in the following ways:

- Encouraging water recycling where it results in reduced greenhouse gas emissions associated with water and wastewater treatment
- Requiring monitoring and mitigation of fugitive gas (i.e., methane) if not adequately addressed through Air District or County program, under some circumstances.
- Recommending “no-purge” water sampling methodologies to reduce the carbon footprint of groundwater sampling programs
- Selection of groundwater remediation/cleanup alternatives using criteria that include climate change mitigation consideration.
- Supporting grant funded projects that include climate resilience objectives

Modifications to Water Board Permits or Other Regulatory Orders

Water Board programs that implement orders have opportunities to modify those orders as necessary. In coordination with program staff at State and Regional Water Boards, the following modifications are in development:

- Address the operational vulnerability of Water Board permitted infrastructure through requirements for vulnerability assessment
- Incentivize Green Infrastructure/Stormwater Capture in MS4 Stormwater Permits
- Evaluation of the need for new effluent limits to address changes in ocean chemistry (e.g., acidification, hypoxia) related to climate change
- Adjust flood frequency projection for higher intensity precipitation events and consider increasing setbacks for Class II and III streams for life and property protection.

Water Board Actions to Address Climate Change Beyond Programs

In addition to the on-going work within Central Coast Water Board programs described above, staff are pursuing the following activities that address impacts of climate change:

Engaging Stakeholders:

Central Coast Water Board staff facilitate or participate in engagement with climate change stakeholders through IRWM meetings, Stormwater Resource Plan technical advisory committees, and regional climate collaboratives (e.g., Central Coast Climate Collaborative (4C)). One outcome of this engagement is our hosting the Central Coast Regional Climate Symposium on December 10th. The symposium will offer an overview of California’s Fourth Climate Change Assessment Central Coast Regional Report and offer sessions on Water, Agriculture, Ecosystems, Oceans/Coast, Energy Systems, Financing and Funding, Accelerating adaptation, and Climate tools and resources.

Coordinating with State and Regional Boards:

Program staff regularly coordinates with our State and Regional Board counterparts in several ways, including: participation in State-wide Water Board Program roundtables and quarterly climate change coordination teleconferences; and involvement in the Emergency Response

Technical Work Group. Staff also participates in projects of the Strategy to Optimize Resource Management of Stormwater (STORMS), which directly addresses the effects of climate change (e.g., Project 1a. Promote Stormwater Capture and Use). The State Water Board also participates in a multi-agency collaborative effort on Healthy Soils (https://www.cdfa.ca.gov/healthysoils/agency_efforts.html), a strategy with both mitigative and adaptive components towards climate change.

Implementing the Human Right to Water:

Consistent with the Human Right to Water law, the State Water Board has taken on additional responsibilities and functions, including working with drinking water systems that may be vulnerable to acute water shortages due to drought, the addition of the Office of Sustainable Water Solutions, and adoption of statewide water conservation regulations. In the Central Coast region, small water systems and domestic wells are especially vulnerable to drought due to shallow water sources, local hydrogeologic conditions, and surrounding land uses. Central Coast Water Board program staff address drinking water vulnerabilities by coordinating with the Division of Drinking Water, county environmental health agencies and non-governmental organizations to implement replacement water and domestic well testing programs.

REGIONAL STAKEHOLDER RESPONSES TO CLIMATE CHANGE

Local Agency Response

The regional stakeholder response to climate change initially had a strong mitigation orientation, owing to requirements for Climate Action Plans in AB 32 – the California Global Warming Solutions Act of 2006. The dominant strategy today however is adaptation, as local agencies respond to legislation, an abundance of State guidance, and funding opportunities to assess climate change vulnerability, plan adaptation, and most recently, begin hazard mitigation planning.

Some local agency stakeholders are compelled by State agency requirements to address climate change. For example, the California Coastal Commission requires coastal communities to prepare climate change vulnerability assessments when Local Coastal Plans are updated. Vulnerability assessments are intended to be comprehensive, science-based assessments of the vulnerabilities of communities' resources, structures, and infrastructure, as well as the potential for future damages to the community associated with various coastal hazards, including sea level rise. They are used by communities to identify thresholds of impacts that can guide long-term land use and planning goals, policies, and programs, including capital improvements and implementation measures related to community-wide physical development.

Requirements like those of the Coastal Commission and AB 32 have resulted in most activity in response to climate change occurring among stakeholders in more densely populated portions of the region. There is substantially less activity around responding to climate change's anticipated effects on the working and natural landscapes that dominate the Central Coast region. A pair of exceptions are water management stakeholders addressing climate change through required updates to IRWM plans and through development of Stormwater Resource Plans. These planning frameworks hold potential for addressing water quality impacts of climate change by prioritizing multi-benefit water projects and helping to diversify water supply portfolios for suppliers throughout the region, including working landscapes.

Groundwater Sustainability Agencies (GSAs) formed under the 2014 Sustainable Groundwater Management Act (SGMA). However, SGMA has no explicit incentives to manage groundwater with proactive long-term strategies that account for future droughts including the extreme

droughts projected under climate change. According to research presented in California's Fourth Climate Change Assessment,⁴ most drought mitigation strategies focus on general supply reliability, with fewer examples specifically focused on reducing drought vulnerability, and very few examples of managing groundwater to account for the extreme droughts projected under climate change. Under current conditions GSAs are already facing challenges in designing strategies that use groundwater without causing "undesirable results."⁵ The challenge will be greater under projected climate change scenarios associated with prolonged droughts and an increased groundwater dependence.

Regional Collaborations in Response to Climate Change

Climate change necessitates a collective response, both in efforts to mitigate it through reducing greenhouse gas emissions and storing carbon, and in living with its effects through adaptation. The Central Coast Water Board staff's engagement with stakeholders is critical in ensuring our actions to address climate change are part of this larger collective response.

Planning processes such as LCPs, IRWM, and GSA formation provide important opportunities to focus the collective effort of multiple interests and stakeholders to address climate change impacts to water resources. Additionally, State agencies, including the Ocean Protection Council, the Office of Emergency Services, the California Energy Commission, the State Coastal Conservancy, the Office of Planning and Research, and the Department of Water Resources assist collaborative efforts through workshops, funding programs, technical assistance and guidance.

The Central Coast is also home to regional collaboratives, including the Central Coast Climate Collaborative (4C), and the Monterey Bay Regional Climate Action Compact. Both serve as networks of government agencies, educational institutions, private businesses, non-profit, and non-governmental organizations committed to working collaboratively to address the causes and effects of climate change. With multiple existing and emerging "sub-regional" or county-level collaboratives, there is a need to identify the optimal governance/funding structure to ensure these different efforts can efficiently support and complement one another without causing confusion or undue competition.

NEXT STEPS FOR CENTRAL COAST WATER BOARD RESPONSE TO CLIMATE CHANGE

Central Coast Water Board staff is alert to the effects of climate change and is addressing them in its current work. Moving forward, staff will continue this work through program activities and, as resources allow, in areas outside of programs that offer opportunities to leverage resources and achieve protections for water quality. Staff plans to prioritize program activities and develop a work plan to address climate change organized around three strategies:

⁴ Langridge, Ruth, Stephen Sepaniak, Amanda Fencl, Linda-Esteli Méndez (University of California, Santa Cruz). 2018. Adapting to Climate Change and Drought in Selected California Groundwater Basins: Local Achievements and Challenges, California's Fourth Climate Change Assessment. Publication number: CCCA4-EXT-2018-006

⁵ Undesirable results are defined in SGMA as one or more of the following effects caused by groundwater conditions occurring throughout the basin: chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply; chronic lowering of groundwater levels indicating a significant and unreasonable reduction of groundwater storage; significant and unreasonable seawater intrusion; significant and unreasonable degraded water quality; significant and unreasonable land subsidence that substantially interferes with surface land uses; surface water depletions that have significant and unreasonable adverse impacts on beneficial uses of surface water (SGMA Section 10727.2b).

1. *Facilitate increased wastewater recycling, increase recharge groundwater, and reduce pollutant loading through direct regulatory authority and associated influence and assistance by:*
 - Modifying orders to require necessary planning and assessment efforts to address anticipated effects of climate change and respond to them.
 - Assisting recycled water and water supply diversification efforts for Central Coast communities.
2. *Collaborate with climate change stakeholders:*
 - Strategically engage with stakeholders to identify additional opportunities and further evolve the Water Board role in implementing adaptation and mitigation strategies such as advancing climate-safe infrastructure, identifying and helping implement regional resilience needs and priorities, and developing contingencies for agency response to large wildfires and floods.
3. *Improve understanding of the effects of climate change, and the effectiveness of mitigation and adaptation strategies, on beneficial uses in the region:*
 - Use best available science to fill gaps in understanding as to how climate change will affect ecosystems, watershed processes, and beneficial uses. Improve capacity to evaluate groundwater-surface water connections including effects on base flows for aquatic life and the effects of pumping on groundwater-dependent ecosystems. Track research in key areas, including:
 - University of California, Santa Cruz research and related Salinas case study on impacts to disadvantaged communities that will identify current data gaps and develop critical data, models, vulnerability analyses, and scenarios that managers need to adapt to climate change and alleviate community vulnerability.
 - Ocean acidification and hypoxia hotspots along the Central Coast and effects of anthropogenic nutrient inputs (research by Southern California Coastal Water Research Project, SCCWRP).

CONCLUSION

Central Coast Water Board staff address climate change impacts through a number of existing strategies and actions, the majority of which are implemented through each of the Board's various water quality programs. This agenda item provides a collective accounting and assessment of these efforts.

Going forward, this collection of strategies and actions, both current and future, will be consolidated in the climate change response work plan, including short- and long-term goals and associated schedules for achieving these specific goals. Staff will also provide periodic updates to the Board on our collective progress at implementing the climate change response work plan. As part of these updates, staff will evaluate our performance, cover changes in strategy and direction, and report on the effectiveness of our efforts relative to the condition of the region's watersheds and groundwater basins.

CLIMATE CHANGE GUEST SPEAKER PANEL DISCUSSION

As part of this agenda item, staff has arranged for several guest speakers to provide presentations and participate in a panel discussion. The climate change panelists represent State and Local agencies at the forefront of the Central Coast Region's response to climate change and will be covering the topics described in Table 3.

Table 3: Central Coast Climate Change Panel

<p>Topic: Sea Level Rise Panelist: Executive staff, Ocean Protection Council</p>
<p>Discussion: State agencies continue to support climate change adaptation by providing resources and delivering the best available science to resource managers, regulators, and local communities. A chief example, the Ocean Protection Council's Sea-Level Rise Guidance, summarizes the best available sea-level rise science and modeling and includes updated sea-level rise projections. It also lays out preferred approaches for sea-level rise planning and adaptation that prioritize protection of vulnerable communities, coastal habitats and public access. State and local decision makers can use the document to identify projections and potential impacts and develop strategies to mitigate hazards and increase resiliency based on factors such as location, lifespan of a given project, sea-level rise exposure and risk tolerance. OPC Executive staff will discuss OPC's 2018 update to the Guidance (http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A OPC SLR Guidance-rd3.pdf) and discuss the agency's current work on climate change.</p>
<p>Topic: Collaboration – The Key Ingredient to an Effective Response to Climate Change Panelist: Chris Read, Sustainability Program Manager, City of San Luis Obispo – Steering Committee member, Central Coast Climate Collaborative (4C) (https://www.centralcoastclimate.org/)</p>
<p>Discussion: Local agencies throughout the Central Coast have completed extensive planning exercises to identify vulnerability to impacts of climate change and to plan adaptation. Focus is now shifting to public safety, Hazard Mitigation Plans, and Safety Elements of General Plans. The Central Coast Climate Collaborative (4C) provides a structure for sharing information and resources to improve efficiency for local agencies and to link with climate change stakeholders. Chris Read will describe 4C's collaborative structure, how it was created, how it functions, and opportunities and challenges that lay ahead.</p>
<p>Topic: Integrated Water Resource Management in Face of Climate Change Panelists: Mladen Bandov, Water Resources Engineer, County of San Luis Obispo</p>
<p>Discussion: Integrated Regional Water Management Plans, Stormwater Resource Plans, Groundwater Sustainability Plans, and Local Coastal Plans provide opportunities to address water quality effects of climate change. The stakeholder-driven processes that generate these plans are guided by legislation and a range of criteria in State fund solicitation packages. A project manager from San Luis Obispo County who leads such planning projects will discuss how water quality protection is addressed in the resulting plans and where additional opportunities and challenges occur.</p>