The San Joaquin Valley Region makes up the southern half of California’s Central Valley, a 460-mile basin extending through the heart of the state (Figure 1). The region encompasses the entirety of San Joaquin, Stanislaus, Merced, Kings, and Tulare County and part of Madera, Fresno, and Kern County. The eight counties that compose the region are home to over four million people, more than a tenth of California’s population. Fresno is the largest city within the region and the fifth largest city in the state, with a population of over one million. Merced County is the fastest growing county in the state, and the region as a whole is projected to grow significantly through 2060. Extending southward from the Sacramento-San Joaquin River Delta, the San Joaquin Valley is bounded by the Sierra Nevada to the east, the Tehachapi Mountains to the south, and the Coast Ranges to the west. The San Joaquin River and its tributaries drain the northern half of the valley and flow towards the Delta; the southern half of the valley drains to the closed Tulare Basin, which includes the beds of Tulare, Buena Vista, and Kern lakes. These lakes are dry most of the time as the rivers that historically drained them have been diverted to agriculture. Hot, dry summers and foggy, rainy winters characterize the valley’s climate. Home to one of the world’s most productive agricultural regions, farming dominates land use in the valley. Environmental pressures in the San Joaquin Valley include dry wells and sinking lands due to groundwater overdraft, nitrate contamination of groundwater, local air pollution, and a decline in aquatic, wetland, and terrestrial ecosystems (PPIC, 2. These environmental challenges exacerbate social vulnerability in the valley’s poor, rural communities—the valley includes seven of the 10 counties with the highest rates of child poverty in the state.

Agriculture is one of the most vulnerable sectors under climate change due in part to more frequent and severe drought, as well as tighter water supply. Sustaining agricultural productivity in the San Joaquin Valley will require improved adaptation and mitigation strategies. In many cases, meeting the standards for climate smart agriculture will involve tradeoffs resulting from shifts in cropping patterns, use of limited water supply, and repurposing of fallowed lands. Regulatory and physical constraints on water supply for agriculture, and environmental factors such as warmer temperatures and more variable precipitation, new pests, and reduced chill hours will affect agricultural decisionmaking and implementation. Managing sustainable agroecosystems in the San
Joaquin Valley will require a systems approach that accounts for resource linkages to other economic sectors, such as water for cities and the environment.

Ecosystems in the San Joaquin Valley are highly vulnerable to climate change given existing anthropogenic stressors and the lack of organization of landscape-scale science, funding, and mitigation of adverse impacts within the region. This is particularly the case during prolonged droughts when scarce water supply disproportionately impacts ecosystems. Building resilience in ecosystems through active management, developing physical and biological connectivity, and restoring key biophysical processes will greatly improve ecosystem response to acute extreme climate events and chronic anthropogenic stressors.

Water resources within the San Joaquin Valley region will be severely impacted by climate change. Regional climate trends are likely to reinforce naturally highly variable precipitation regimes, but with prolonged periods of drought and pronounced precipitation events. At higher elevations, more precipitation as rain and less as snow will result in a fundamental shift in the hydrologic regime, with greater surface water flows over shorter periods of time. Increased atmospheric temperature during seasonal shifts will result in a change in the timing of snowmelt and more susceptibility to rain-on-snow events from atmospheric rivers. Paradoxically, water years may be characterized as having less water and more flooding. In all, the increased variability in timing and magnitude of surface water will result in a cascade of downstream effects, including changes in reservoir operations for flood protection, less available surface water during seasonal drought (i.e., summer) when irrigation requirements are highest, and decreased water quality. Water quality will be degraded directly, from increased stream temperatures reducing cold water management options for fisheries or from the increase in concentration of contaminants given diminished flows. Changes in irrigation practices, rising concentrations of salts in soils, and an increase in hydrologically disconnected groundwater basins are likely to continue to indirectly degrade water quality. Groundwater as a source of supply is currently in a perpetual state of overdraft, thus reducing its physical capacity via subsidence and its management capacity to serve conjunctive uses in the future. This imbalance calls for the opportunistic recharge of groundwater during wet years and improved coordinated use of surface and groundwater sources, both of which Sustainable Groundwater Management Act implementation must consider to adequately address this issue. Changes in policy must also improve equity of water distribution in times of water scarcity.

Infrastructure in the San Joaquin Valley, including urban, water, and transportation systems, may face increased stress from higher temperatures and extreme precipitation events, including droughts and floods. Increasing urbanization in the San Joaquin Valley – and uneven land use planning throughout the region – is likely to hinder efficient and cost-effective investments in regional infrastructure. The direct link between the transportation sector and the public health sector point toward exacerbated poor air quality and its direct negative effects on the most vulnerable communities in the San
Joaquin Valley. Mitigation strategies to reduce emissions through improved modes of transportation will also have positive effects on public health and climate adaptation. Identifying other opportunities to reduce public health and economic burdens on already disadvantaged communities should be paramount in climate change.

Public health in the San Joaquin Valley will also be exacerbated by many negative impacts from climate change. Warmer temperatures will facilitate the spread of disease, worsen air quality from extended agricultural fallowing, and challenge food security in disadvantaged communities. At the same time, concentration of pollutants in drinking water, particularly in small community water systems and rural household drinking wells, may increase the incidence of waterborne diseases. Disadvantaged rural communities are likely to experience more intense impacts from extreme events compared to urbanized areas. They are often less equipped to rebound from such events given their rural geography and historic underinvestment, and thus are likely to be disproportionately impacted by economic and environmental stressors under future climate conditions.

ACCESS

For access to the full report, please email Research@sgc.ca.gov

DISCLAIMER

This report summarizes recent climate research, including work sponsored by the California Natural Resources Agency and California Energy Commission. The information presented here does not necessarily represent the views of the coordinating agencies of the State of California.