



Projected Impacts of Climate Change on Irrigated Agriculture in the San Joaquin Valley, California

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The objective of this study is to assess the impact of potential climate change scenarios on the sustainability of irrigated agriculture in California; particularly, potential changes in irrigation water availability, crop water requirements, groundwater pumping, groundwater levels, and soil salinity. We consider three increased greenhouse gas (GHG) emission scenarios and study the potential impacts on the agro-hydro-climatological conditions in the region up to 2100. In particular, the analysis is broken down into four main impact areas: (i) climate responses, (ii) crop responses, (iii) agricultural water and crop management responses, and (iv) hydrologic responses. Climate response includes predictions of precipitation, air temperature, and reference evapotranspiration, based on downscaled output from two General Circulation Models (GCM's) until the year 2100. Precipitation projections are used to estimate future surface water availability. Crop response includes changes in crop water demand due to changing atmospheric conditions. We considered several possible management responses to changes in surface water supplies and crop ET: (i) land fallowing and retirement, (ii) changes in cropping patterns, (iii) ground-water pumping, and (iv) technological adaptation. As a final step, the climate-change induced changes in crop ET, surface water supply, and groundwater pumping were used as input into a hydro-salinity model of the study area to assess resulting impacts on groundwater levels, land subsidence, soil salinity, and crop yields. Impact results are presented for a range of climate change scenarios.