

Decision-Scaling Analysis of California's SGMA Legislation

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Objectives: Water related supply issues due to climate change are a worsening issue for water users and irrigation districts across the world, most notably in drought-susceptible areas such as California's Central Valley region. The objective of this study is to take into consideration climate-informed predictions for future rainfall in the Central Valley to outline the various options and water-related concerns that land holders and agricultural irrigation districts will have to face in the future. This type of decision-scaling analysis will provide an economic approach in dealing with the lasting effects of climate change well into the future. This approach is not a physical model in which a groundwater system is designed, rather a the creation of potential first-order human changes to the groundwater system that could be easily monitored and credited in the already existing groundwater system.

Methods: To create predicted streamflow data, the region's historical data will be altered under a number of conditions to resemble climate change and SGMA legislation that affects groundwater supplies, including altering the rainfall time series so that runoff (coming from the Sierra Nevada snowpack) will arrive at different times of the year at faster rates and in greater concentration. This, and other climate-informed prediction patterns, will be investigated and related to the general outcomes of each decision analyzed in the study.

Results: The results of this study demonstrate that in response to the simulated climate change conditions, net groundwater change responds by decreasing. Alternatively, comparing SGMA legislation with and without the effects of climate change demonstrates predicted decreases of groundwater availability with climate change considered.

Conclusions: The results of this study effectively demonstrate that climate-informed net groundwater changes will translate to worse effects for irrigation districts and farmers in the area. Additionally, the SGMA legislation, which reduces pumping, combined with climate change predicts adverse effects for farmers and irrigation districts. Further research is needed to resolve the extent of these effects.

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