Study examines financial risks of water resilience planning in California

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Partnerships between water utilities, irrigation districts and other stakeholders in California will play a critical role in funding new infrastructure under the Water Resilience Portfolio Initiative announced in 2020 by Gov. Gavin Newsom, but a new study warns that benefits might not be evenly distributed without proper structure to the agreements.

California's initiative is a multi-billion dollar effort that encourages different water utilities and irrigation districts to work together to build shared infrastructure to ameliorate the effects of droughts, but a number of questions remain regarding how best to structure these agreements.

In a new research article published March 15 in the journal *Earth's Future*, researchers from the University of North Carolina at Chapel Hill and Cornell University explored partnership agreements in the context of the Friant-Kern Canal, which delivers water to irrigation districts and municipal utilities in the southern Central Valley of California.

"The canal has been sinking due to groundwater over-pumping and a partnership of local water providers has begun to make repairs—projected to cost $500 million—in coordination with state and federal agencies," said Andrew L. Hamilton, a postdoctoral associate in the School Civil and Environmental Engineering at Cornell and the study's primary author. "However, benefits to individual providers are highly uncertain. This setting is more broadly representative of the types of infrastructure investment that California and other regions are considering, as well as the challenge of bringing different parties together to collectively fund these projects."

The team tested thousands of different ways of designing candidate partnerships, to understand the impact of each design (i.e., which water providers are participating, and what share of funding is each responsible for), the type of infrastructure and the climate scenario.

In most cases, performance was very uneven across the different partners—some received significant new water supplies at low cost, while others received negligible benefits relative to their share of project cost. Local performance varied based on a variety of factors, such as the water providers' location, water rights and local factors. This highlights the importance of detailed models that can capture system dynamics at

the level of individual water providers.

These results point to the importance of considering multiple factors so that investment partnerships can be constructed to satisfy all partners. Several points should be of interest to policymakers as they seek to make wise investments that improve California's water resilience:

1. If the future is drier than the past, there may not be sufficient "capturable" water available to make the investment worthwhile. This climate-related risk may be borne more heavily by some partners than others.
2. Investments in one project (e.g., canal expansion) must often be paired with another (e.g., water storage) if the full benefits of the investments are to be realized and evenly distributed across a partnership.
3. Larger partnerships make it more difficult to please everyone, since it becomes more likely that at least one partner performs poorly. This introduces a trade-off, since larger partnerships are typically viewed more favorably by the public and by policymakers.

The future is highly uncertain due to climate change, regulatory change and other stressors. This study's results demonstrate how poorly planned partnerships can lead to significant financial risk for water providers under unfavorable future scenarios. The authors posit that financial resilience should be a key aspect of water supply resilience planning in California and other regions.

More information: Andrew L. Hamilton et al, Resilient California water portfolios require infrastructure investment partnerships that are viable for all partners, *Earth's Future* (2022). DOI: 10.1029/2021EF002573

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