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Climate change adaptation in regulated water utilities

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Climate change uncertainty is a major challenge to drinking water providers worldwide. In addition, many of the regulatory frameworks that define investment decisions where not developed taking into account the challenges brought by climate change. In particular, coping with a non-stationary climate with more frequent and deeper droughts could require adjustments to regulations as well as new investments to ensure levels of service are maintained. In a context of a developing country facing important uncertainties about future water availability and variability, deciding how much investment is appropriate to maintain that level of service is a key question that needs to be addressed. This decision needs to balance the potential for high regret stranded assets and the political and socioeconomic consequences of not meeting water demands. In recent years the City of Santiago in Chile, has seen extreme events that have caused important service interruptions. These events have brought to the spotlight of the public opinion the need to address the challenges that climate change may bring, demanding immediate and expensive investments without sufficient planning for possibly more efficient solutions. This work presents a comparative analysis of the implementation of alternative measures to cope with droughts. We alternatively analyze the effects of solutions that affect the level of water supply such as building new infrastructure and buying additional water rights or water lease options. These measures are analyzed using a PYWR water resources simulation model of the operation of the water utility under different climate change scenarios using a multi objective evolutionary algorithm to generate efficient portfolios of mixed interventions (infrastructure and policies). This generates a family of solutions from which a set of superior ones with respect to different objectives are selected. The objectives considered are total and maximum deficit, investment and operation cost of adaptation measure, uncultivated agricultural area, duration and frequency of system failure, and river runoff, to accommodate environmental concerns. This allowed proposing efficient intervention packages that consider a range of stakeholder and industry concerns.