Improving Seasonal Forecasting to Support Operational Decision-Making and Policy within Bureau of Reclamation Service Areas in the Upper Colorado and Rio Grande Basins.

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In semi-arid and snow-melt dominated watersheds of the American Southwest, such as the Colorado River or Rio Grande, water managers and policy makers are reliant on seasonal streamflow forecasts, termed water supply forecasts (WSFs) for operational decision-making. These forecasts, issued several months ahead of the main runoff season when agriculture and municipalities have the greatest water demands, provide a fundamental basis for planning reservoir management, water resource allocations, and conservation efforts. All of these planning steps involve inter-agency communication and policy discussion, elevating WSFs to being a policy-relevant tool.

Recent studies have documented the influence of increasing temperature on streamflow across the American West. At the same time, some basins are reporting decreasing skill in WSFs over the recent decades, in part linked to the changing hydrological cycle with warming. Here we show that incorporating seasonal temperature forecasts from operational global climate prediction models into WSFs adds prediction skill for watersheds in the headwaters of the Colorado River and Rio Grande basins. Such predictions can increase the resilience of streamflow forecasting and water management systems in the face of continuing warming as well as decadal-scale temperature variability and thus help to mitigate the impacts of climate non-stationarity on streamflow predictability. The science performed by this project team to improve WSFs has direct implications for decision-making and policy within the Bureau of Reclamation and its partners in the Colorado and Rio Grande basins, including decisions related to allocations for irrigators, wildlife refuges, endangered species, and Native American tribes.