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CLIMATE CHANGE AND WATER SUPPLY PLANNING IN COLORADO

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ABSTRACT: To assess the potential impacts of climate change on water supplies, water providers and water resource managers need information that integrates results from global circulation models with essential characteristics of local hydrology and water management institutions. Two recent studies in Colorado, one conducted at a local watershed scale and another conducted at a river basin scale, illustrate this integrated approach. Studies of the Boulder Creek and upper Colorado River basins utilized temperature and precipitation change forecasted by climate models and calibrated physical hydrology models to generate natural flow sequences reflecting climate change. These flow sequences also were conditioned to reflect variability observed in both historical and paleo-hydrologic records. Flow sequences were then used as inputs to water rights and water management models to evaluate climate-change effects on water right yields, water supply reliability, and reservoir operations. General findings from the studies were that: 1) climate change would lead, in the central Rocky Mountain area, to overall warming but that precipitation change is less certain; 2) that spring runoff would be advanced by up to a month; 3) that summer irrigation requirements would increase; 4) that reservoir storage would be more stressed; and 5) that municipal supply reliability criteria would be violated more frequently. In the municipal case, planning recommendations included improved water system modeling to increase understanding of system response to changing conditions, measures for enhanced demand management and greater operational flexibility, and adoption of reliability criteria and drought recognition/response plans that recognize the variable and nonstationary nature of surface supplies. The studies also suggested that caution be exercised when selecting a small number of climate projections to characterize future conditions, as end results are strongly driven by the uncertainty in climate projections.

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