

# **RE<sup>3</sup> Workshop**

## Renewable Energy & Energy Efficiency

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*Critical Watersheds: How climate disturbances will impact the energy-water nexus*

Integrated Disturbance Science (IDS) is the science behind understanding, quantifying, and developing predictive solutions for climate-driven disturbances and the impacts to society. Disturbances include gradual changes in climate (e.g., rising vapor pressure deficit), extreme events (e.g., hot droughts), and disruptive events (e.g., wildfire). These disturbances will increasingly impact ecosystem services including the energy-water nexus. The Critical Watersheds project is enhancing understanding of integrated disturbances with a focus on impacts to the energy-water nexus. The project is applying coupled ecosystem-hydrologic systems ranging in spatial and temporal scales from sub-meter analyses of intense storms over a few hours to the entire Colorado River Basin through to the end of the 21st century. We have developed new ecohydrological capabilities to understand key processes and feedbacks between climate, ecosystems, and hydrology. These capabilities include variable-resolution representations of landscapes, coupled ecosystem-hydrology modeling, and dynamic vegetation changes in response to drought and wildfire. In partnership with other national laboratories, the project is also developing a framework to couple the impacts of climate change, variability, and climate-driven disturbances on streamflows with a water operations model that forecasts water supplies for energy (coal-fired power plants, oil and gas, and hydroelectric), agriculture, and municipal use.