Water Risk Planning Tools for Decision Support in the Electric Power Sector

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Background/Objectives. Climate impacts on water resources and watersheds occur at the ecosystem, infrastructure, community, and regional scale, and affect a variety of sectors and communities. Communication of predictions and impact models is key to enabling decision-making so planners can take action to reduce the effects of climate. EPRI's research on water risk tools and climate-based assessments seeks to address potential climate impacts on watersheds in a way that can help guide investment, improve management, and meet development or climate adaptation goals.

Approach/Activities. Our research integrates modeling and analysis, elicits stakeholder input through workshops focused on vulnerability and designs, evaluates risk profiles, and identifies and evaluates the effectiveness of site-specific adaptation strategies. Our research occurs in three discrete areas: hydrologic modeling; risk characterization; and watershed-based climate adaptation strategies. The hydrologic modeling provides a framework for selecting, calibrating, and validating hydrologic and water quality models for a specific region, and then determining and piloting the most appropriate climate projections to use to estimate future regional impacts using these models. The second step involves characterizing water risks associated with climate impacts. We identified and summarized these potential risks to operations, regulatory compliance, supply chains, and infrastructure from changing surface water conditions resulting from climate change impacts. These risks may result from reduced water availability, increased flooding and streambank erosion, increased water temperatures, and decreased water quality, among other impacts. The third area of research focuses on identifying, and evaluating cost effectiveness of, climate adaptation strategies that span a gradient of scales, from local (short stream reach) to broad (entire watershed) and focus on watershed management opportunities and nature-based solutions. The opportunities identified can be implemented to realize asset, infrastructure, ecosystem, and/or community protection while simultaneously providing socioeconomic and environmental benefits.

Results/Lessons Learned. Our research provides a framework for translating climate change into changes to surface water conditions, characterizing and quantifying water risks to specific assets/operations, and identifying cost-effective watershed management opportunities that can minimize the impacts of those risks. This framework was applied as pilot analyses in three basins across the United States with a focus on impact to the electric power industry. However, this process can be implemented at a variety of scales, in various regions, and for specified assets to support the business case for identifying projected climate impacts on watersheds, guiding watershed management activities, and designing appropriate climate adaptation strategies to address water risks in developed or developing countries to build climate resiliency.