NCHRP 15-61 [Active]

Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure

Project Data	
Funds:	**$750,000**
Staff Responsibility:	**Edward T. Harrigan**
Research Agency:	**Kilgore Consulting and Management**
Principal Investigator:	**Roger Kilgore**
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BACKGROUND

Transportation hydraulic engineers are being asked to account for global climate change within hydrologic and hydraulic (H&H) design practice. Current H&H design procedures stipulate use of historical data that are assumed to represent a stationary process. Climate change introduces non-stationary risks such as sea level and temperature rise, and changes in timing and distribution of precipitation, snowpack, and snowmelt. Failure to account for such non-stationary risks may compromise the operational characteristics of existing and future transportation infrastructure. Climate change scientists employ outputs from a cascade of models to develop regional scenarios representing these non-stationary phenomena that are not associated with specific probabilities. Existing guidance for H&H design does not provide methods to incorporate such information. Collaborative efforts and a common set of terms and definitions between climate change scientists, hydrologists, hydraulic engineers, and coastal engineers are essential to harmonize climate change inputs and H&H design practice. Incorporating the results of climate models may have large cost implications for future infrastructure. For example, overestimates of the magnitude of peak flows can result in costly oversizing of drainage infrastructure, while underestimates might leave infrastructure vulnerable and the resultant flooding impacts on surrounding lands and structures inadequately addressed. It is often questioned if the magnitude of change in hydrologic and hydraulic inputs due to climate change are within the range of uncertainties accounted for in the current state of practice and how the uncertainties vary for the design of various hydraulic features ranging from stormwater management facilities to bridges, given that they are typically evaluated for varying extreme events. Furthermore, accounting for climate change in hydraulic design is complicated by additional non-stationary processes arising from urbanization and other land cover changes. Research is needed to provide hydraulic engineers with practical tools to (1) account for the effects of climate change in hydraulic design where appropriate and (2) justify when such changes are not warranted for a project of a particular type or scale.

OBJECTIVE

The objective of this research is to develop a design guide of national scope to provide hydraulic engineers with the tools needed to amend practice to account for climate change.

STATUS: Awaiting the revised final report.