

Climate risk-informed decision analysis (CRIDA): ‘top-down’ vs ‘bottom-up’ decision making for planning water resources infrastructure

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ABSTRACT

Climate risk-informed decision analysis (CRIDA) is a guidebook that lays out an evaluation framework and decision procedures to deal with climate uncertainties that are consistent with traditional agency water resources planning frameworks. CRIDA guidelines complement existing institutional guidance on recognizing circumstances when more complex risk-based climate analysis may be needed, above those required by standard planning procedures. The procedures are based on the concept of ‘decision-scaling’ judgments to qualitatively assess levels of future risk and analytical uncertainty stemming from climate change-related uncertainties, and as a guide for choosing specific analytical approaches and appropriate levels of analysis. CRIDA addresses how much detail is appropriate for a given problem setting, depending on infrastructure type and function, whether it is new design or rehabilitation of existing infrastructure, modular design or long-life infrastructure. CRIDA was structured to resolve the contentious issue of deciding under what circumstances a ‘top-down’ climate scenario-driven analysis ought to be conducted versus a more traditional ‘bottom-up’ vulnerability assessment, based on conventional agency project feasibility procedures. The procedures for such vulnerability assessments and planning procedures are well-represented in classical approaches, such as those included in the 1983 U.S. Water Resources Council’s ‘Principles and Guidelines’. These commonly used procedures promote normative evaluation protocols and decision rules that generate alternative solutions which minimize risk-cost outcomes.

Key words: ‘Bottom-up’ water resources planning frameworks, Decision-scaling, Non-stationary climate analysis, Risk-based decision analysis

INTRODUCTION

For millennia, water resources management has been strongly linked to the economic, social and environmental development of civilizations and, later, nations. Harnessing water resources has transformed variable and often destructive hydrologic flood extremes into reliable, socially desired benefits (municipal water supply, irrigation, hydropower, navigation and environmental flows) and has ameliorated the ruinous effects of droughts. As needs have grown and interventions have increased, water resources managers worldwide have designed more complex water management systems and made more elaborate trade-offs among social, economic and environmental goals. To address these complexities, a wide array of technical, analytical and governance procedures for water management have evolved to keep pace with growing societal demands and the intricacies of public decision-making. However, large uncertainties associated with climate change have added to those planning and management complexities by challenging the foundations of hydrologic and hydraulic analyses associated with the assumptions of a stationary climate (Milly *et al.*, 2008).

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Climate Uncertainties And Risk Informed Decision Making

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