

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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Climate Risk Informed Decision Analysis (CRIDA) Mendoza, Guillermo,Jeuken, Ad,Matthews, John H.,Stakhiv, Eugene,Kucharski, John,Gilroy, Kristin,2018-12-31 **Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, Asia, Latin America and the Caribbean** Mishra, Anil,UNESCO,Verbist, Koen,2021-05-04

Review of the Draft Fourth National Climate Assessment National Academies of Sciences, Engineering, and Medicine,Division of Behavioral and Social Sciences and Education,Division on Earth and Life Studies,Board on Environmental Change and Society,Board on Atmospheric Sciences and Climate,Committee to Review the Draft Fourth National Climate Assessment,2018-05-18 Climate change poses many challenges that affect society and the natural world With these challenges however come opportunities to respond By taking steps to adapt to and mitigate climate change the risks to society and the impacts of continued climate change can be lessened The National Climate Assessment coordinated by the U S Global Change Research Program is a mandated report intended to inform response decisions Required to be developed every four years these reports provide the most comprehensive and up to date evaluation of climate change impacts available for the United States making them a unique and important climate change document The draft Fourth National Climate Assessment NCA4 report reviewed here addresses a wide range of topics of high importance to the United States and society more broadly extending from human health and community well being to the built environment to businesses and economies to ecosystems and natural resources This report evaluates the draft NCA4 to determine if it meets the requirements of the federal mandate whether it provides accurate information grounded in the scientific literature and whether it effectively communicates climate science impacts and responses for general audiences including the public decision makers and other stakeholders *Water governance for resilience to climate change* Kjellen, M.,White, M.,Matthews, J.,Mauroner, A.,Timboe, I.,Burchi, S.,Dhot, N.,van Waeyenberge, T.,El Fenni, Y. R.,Lohani, A.,Newton, J.,Imamura, Y.,Miyamoto, M.,Moors, E.,de Oliveira, V. G.,Schmeier, S.,Crespo, C. C.,Gutierrez, M. T.,Welling, R.,Suhardiman, Diana,Hada, R.,Saji, M.,Jimenez, A.,Lymer, B. L.,Saikia, P.,Mathews, R.,Bernardini, F.,Koeppel, S.,Aureli, A.,Resende, T. C.,Avellan, T.,Hahn, A.,Kirschke, S. J.,Perera, D.,Loeffen, A.,Turner, R.,Pories, L.,Aldaco-Manner, L.,Daher, B.,Willemart, S.,Schillinger, J., In UNESCO World Water Assessment Programme WWAP UN Water The United Nations World Water Development Report 2020 water and climate change Paris France UNESCO **The United Nations world water development report 2020** UNESCO World Water Assessment Programme,2020-03-23 The 2020 edition of the WWDR titled Water and Climate Change illustrates the critical linkages between water and climate change in the context of the broader sustainable development agenda Supported by examples from across the world it describes both the challenges and opportunities created by climate change and provides potential responses in terms of adaptation mitigation and improved resilience that can be undertaken by enhancing water resources management attenuating water related risks and improving

access to water supply and sanitation services for all in a sustainable manner It addresses the interrelations between water people environment and economics in a changing climate demonstrating how climate change can be a positive catalyst for improved water management governance and financing to achieve a sustainable and prosperous world for all The report provides a fact based water focused contribution to the knowledge base on climate change It is complementary to existing scientific assessments and designed to support international political frameworks with the goals of helping the water community tackle the challenges of climate change and informing the climate change community about the opportunities that improved water management offers in terms of adaptation and mitigation [Climate Services for Adaptation to Sea-Level Rise](#) Jing Li,Michael Dylan Sparrow,Julie Billy,Roderik Van De Wal,Robert James Nicholls,Goneri Le Cozannet,2022-07-04

Organizations, Uncertainties, And Risk James F. Short, Jr.,Lee Clarke,1992-08-26 Every day individuals groups and organizations make decisions that involve uncertainty and risk and often important consequences for society Increasingly our lives are being defined by large scale organizational decision processes involving governments businesses and other institutions This book examines the nature of decisionmaking by organizations confronted with various risks focusing on choices in which technology and scientific advances play major roles The contributors also look at the regulatory agencies that set and enforce standards of health and safety Within the literature on risk analysis this book is unique in its integration of social theory with wide variety of case examples Theories of rational choice advanced by neoclassical economics and cognitive psychology are critically examined in view of the importance of the context for decisionmaking Specific avenues for the study of the organizational institutional contexts of decisionmaking and the process of socially constructing risk objects are proposed as a means of correcting the weaknesses of these theories The contributors examine the strategies of manufacturing and communications firms neonatal intensive care units of hospitals and a major U S governmental strategies are given how energy choices are made in France and how expert advice and formal public involvement are incorporated into risk related policy decisions in Britain Field studies of regulatory agencies in Britain at both policymaking and enforcement levels are also included **Climate Change 2007: Mitigation of climate change** ,2007 [Climate Sense](#) ,2009 This

book illustrates the role played by nations and organizations in providing the necessary weather and climate data and products and describes the contributions of nations towards the implementation of global observing and information systems research programs and intergovernmental assessments to provide policy makers with a clear representation of the climate system including climate variability and change Publisher s description **Economic Analysis of Climate-Proofing Investment Projects** Benoît Laplante,Cinzia Giuseppina Rosa Losenno,Asian Development Bank,Loreta S. Rufo,2015 A key step in ADB s climate risk management framework is the technical and economic valuation of climate proofing measures to reduce risks resulting from climate change This report describes the conduct of the costbenefit analysis of climate proofing investment projects to present the best possible information on the economic efficiency of alterna *Building Resilience for*

Adaptation to Climate Change in the Agriculture Sector Alexandre Meybeck, 2012 The joint workshop on Building resilience for adaptation to climate change in the agriculture sector was organized by FAO and OECD and was held from 23 to 24 April 2012 at FAO headquarters in Rome P 5 A Policy Decision-making Framework for Devising Optimal Implementation Strategies for Good Agricultural and Environmental Policy Practices, 2001 *Climate Change Communication* Daniel James Scott, Canada. Environment Canada, University of Waterloo, 2000 Proceedings of a conference that provided a foundation to begin addressing matters related to communicating the climate change issue in order to raise awareness confer understanding and motivate action Presentations are organized under the following themes climate change perceptions among scientists influences on public understanding of climate change organizational roles in communicating about climate change national climate change perceptions among the public assessment of media representations of climate change promotion of community action stakeholder framing of climate change communication and the science policy interface lessons for civic engagement from other participatory processes social marketing strategies community based communication strategies climate change education through science fiction climate change curriculum development values and responsibility scenarios as communication tools engaging youth linking climate change knowledge stakeholder engagement in the agricultural sector motivating change developing an international climate change communication network communication of natural variability the role of libraries and climate change from an Inuit perspective The final section includes summaries of conference workshops public forums and poster papers **Decision-making Under Uncertainty** Sara Moore, Erika Zavaleta, Rebecca Shaw, University of California, Santa Cruz, 2012 **West-Northwest, Hastings International and Comparative Law Review Combined Issue**, 2009 **Western Indian Ocean Journal of Marine Science**, 2006 Advancing the Science of Climate Change National Research Council (U.S.). Board on Atmospheric Sciences and Climate, 2010-12-24 What we know about climate change A new era of climate change research Recommendations Part I 1 Introduction Science for understanding and responding to climate change 2 What we know about climate change and its interactions with people and ecosystems 3 A new era of climate change research 4 Integrative themes for climate change research 5 Recommendations for meeting the challenge of climate change research Part II Technical chapters 6 Changes in the climate system 7 Sea level rise and the coastal environment 8 Freshwater resources 9 Ecosystems ecosystem services and biodiversity 10 Agriculture fisheries and food production 11 Public health 12 Cities and the built environment 13 Transportation 14 Energy supply and use 15 Solar radiation management 16 National and human security 17 Designing implementing and evaluating climate policies References Appendixes *Proceedings of the International Forum on Climate Prediction, Agriculture and Development* International Research Institute for Climate Prediction, 2000 **Climate Change Adaptation and Mitigation in the Tourism Sector** United Nations Environment Programme. Sustainable Consumption and Production Branch, 2008 With its close connections to the environment and climate itself

tourism is considered to be a vulnerable and highly climate sensitive economic sector similar to agriculture insurance energy and transportation At the same time tourism is a contributor to Greenhouse Gas GHG emissions including emissions from transport accommodation and activities In 2005 tourism s contribution to GHG emissions was estimated to be approximately 5% According to the Davos Declaration on climate Change and Tourism the sector has to rapidly respond to climate change within the evolving UN framework and progressively reduce its Greenhouse Gas GHG emissions if it is to grow in a sustainable way In response to this challenge this publication is designed to provide a pragmatic platform to strengthen the capacity of professionals to understand and respond effectively to the global challenges of climate change in tourism destinations It is the result of the ongoing cooperation between UNEP UNWTO and WMO in the context of the wider UN response to climate change The publication presents an overview of the current science and policy of climate change followed by self guidance material on mitigation and adaptation exploring tools methods and techniques associated with the management of climate change in tourism It also identifies examples of good practice from which stakeholders might learn in order to develop their own capacities for implementing climate change strategies *Proceedings of the National Academy of Sciences of the United States of America* National Academy of Sciences (U.S.),2005

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