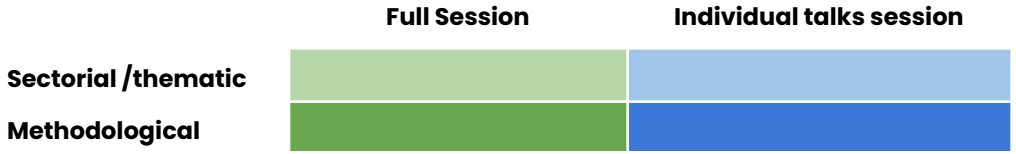
DMDU Annual Meeting 2024

Preliminary Agenda 19th to 21st of November



19th				
Room A	Room B	Room C	Room D	
Registration and coffee				08:30 to 09:00
Welcome speech				09:00 to 09:15
Keynote: Carly Jerla				09:15 to 10:00
Coffee Break				10:00 to 10:30
Bringing DMDU into Colorado River Basin Planning: Collaboration, Engagement and Technology	Modeling Robust Decarbonization Pathways for Louisiana: A Planning and Implementation Case Study	Addressing the decision challenges of ecosystem transformation	Reserved for DMDU special interest groups	10:30 to 12:00
Lunch and poster session				12:00 to 13:15
Using Robust Decision Making to Design Long Term Strategies: Case Studies in Latin America and the Caribbean	Integrating Improved Migration Demographic Projections into Energy System Planning Models: Introducing Necessary Complexity, and the Challenges of Visual Representation of the Outcomes for Decision Making	DMDU in Health Applications	Reserved for DMDU special interest groups	13:15 to 14:45
Coffee Break				14:45 to 15:15

Structured Decision-Making to Support Practical Application of Decision-Making Under Deep Uncertainty Techniques	Modeling and Simulation	How to build an Adaptation Modelling Framework to enhance decision-makers ability to address climate-related challenges?	Reserved for DMDU special interest groups	15:15 to 16:45
Conference Dinner				

20th				
Registration and coffee				08:30 to 09:00
Keynote				09:00 to 09:45
Coffee Break				09:45 to 10:15
Methodological Innovations to Meet Decision Making Challenges	Communication, Involvement & Decision Support	Informing Transportation Planning with Lessons Learned From Other DMDU Applications	Reserved for DMDU special interest groups	10:15 to 11:45
Coffee Break				11:45 to 12:15
Water: Supply, Distribution and Drought	Natural Resources Management & Agriculture	Diverse Disciplinary Modelling Techniques for Climate Adaptation Policy	Reserved for DMDU special interest groups	12:15 to 13:15
Lunch				13:15 to 14:15
Defence	Economics & Finance	Water: Flooding	Reserved for DMDU special interest groups	14:15 to 15:15
Short break				15:15 to 15:45
Why aren't Adaptation Pathways more broadly used in the United States (discussion forum)?	Energy: Infrastructure	Transport & Logistics	Reserved for DMDU special interest groups	15:45 to 16:45
Dinner				

21th				
Registration and coffee				08:30 to 09:00
Advances and challenges of applying DMDU methods in Latin America	Closing the Gap: Can DMDU Paradigms help in Advancing current AI Developments to Artificial General Intelligence.	Enhancing Integrated Assessment Models with DMDU for Effective Climate Action	How to Influence Ideas in Real Time: DMDU Wikipedia Editathon	09:00 to 10:30
short break				10:30 to 11:00
Adaptation	Urban Planning	Public health	Reserved for DMDU special interest groups	11:00 to 12:00
Lunch and poster session				12:00 to 13:00
Waiting for the Paradigm to Shift: DMDU in Formal Academic Presentations	Energy: Decarbonization	Water: Planning	Reserved for DMDU special interest groups	13:00 to 14:00
short break				14:00 to 14:15
Plenary or Pannel				14:15 to 15:15
Closing				15:15 to 15:30

Full sessions descriptions

Title	Abstract	Authors
Addressing the decision challenges of ecosystem transformation	Ecosystem transformation is the irreversible conversion of one type of ecosystem to a different one (e.g., forest to shrubland or grassland; coastal marsh to open water), with major consequences for biodiversity (e.g., species extinctions) and ecosystem services (e.g., water quality, forage, wave buffering). As ecosystem conversion becomes more widespread under global change, ecological managers have multiple response options, including accepting the conversions and consequences, actively intervening to resist conversion, and directing the changes toward new ecosystems with desirable or acceptable properties. Ecological processes play out across a broad range of time scales (days to decades) and are laden with path dependencies, particularly owing to short-term climate extremes and disturbance events. Any given ecosystem may have multiple potential future realizations, owing to both natural processes and management interventions, and future ecosystems may comprise novel assemblages of species. DMDU is clearly of high relevance to natural-resource management under environmental change, but systematic applications to date have been few. This Discussion Forum will foster dialogue between the DMDU and ecological research and management communities, sharing information about objectives, thresholds, and key uncertainties in ecosystem management and identifying DMDU approaches and tools that can be applied to ecological management. We will recruit ecosystem managers from the Denver area (e.g., colleagues in government agencies and NGOs) as well as DMDU researchers who have started to work on ecosystem management or whose work has relevance to the topic (e.g., researchers associated with the NatCap project at Stanford). We welcome suggestions of DMDU members we could approach.	Stephen T. Jackson; Richard H. Moss
Advances and challenges of applying DMDU methods in Latin America	Latin America faces significant challenges in achieving the Sustainable Development Goals (SDGs). Some of the reasons for this include deficient coordination and staff training, lack of leadership, scarce financial support, administrative constraints, misalignment between institutional and societal needs, and insufficient assessment tools to monitor and evaluate progress. Addressing these sustainability challenges necessitates cutting-edge, evidence-based decision-making approaches. Decision-Making Under Deep Uncertainty (DMDU) is a promising method gaining attention among scholars. DMDU approaches can illuminate the decision-rule systems underpinning current stakeholder decision-making processes. They help stakeholders to develop robust and adaptive plans and navigate deep uncertainty conditions so that sustainable long-term policies can stay on track. However, integrating DMDU into sustainable development policies in Latin America requires navigating multiple and conflicting stakeholders' epistemologies, methodologies, and objectives while also coordinating and monitoring scarce resource allocation and activities at both national and international levels.	Conceição de Maria Alves; Yosune Miquelajauregui; Matias Paredes-Vergara; Edmundo Molina Pérez; Sara Diane Turner

Title	Abstract	Authors
	To contribute to filling these gaps, this session will address these challenges by presenting works on regional examples of how DMDU can enhance stakeholders' capacities for achieving SDGs in critical areas for the region. We aim to explore the challenges, scope, limitations, and opportunities of the DMDU approach across Latin America by studying how to bridge the gap between modelers and decision-makers.	
Bringing DMDU into Colorado River Basin Planning: Collaboration, Engagement and Technology	This 90-minute session will describe efforts by researchers and practitioners in the Colorado River Basin to develop and apply DMDU methods in a high-profile planning process. Different aspects of the work will be described in five sections that span one hour, followed by 30 minutes of facilitated Q&A. The Colorado River is a critical resource for seven U.S. states and two Mexican states, providing water for communities, agriculture, industry, environment, recreation, tribal cultures, and hydropower. The ability of the river to support these resources is threatened by declining supply, overuse, and storage declines in the two largest U.S. reservoirs – Lake Powell and Lake Mead. The U.S. Bureau of Reclamation (Reclamation) is leading a formal planning process to identify new operating guidelines for Lake Powell and Lake Mead that must put the basin on a sustainable path for decades into the future, but this prospect is complicated by deep uncertainty arising from wide-ranging climate change projections and the need to balance resource priorities in a complex stakeholder landscape. To address the challenges of deep uncertainty, Reclamation is incorporating Many Objective Robust Decision Making into the process of identifying and evaluating candidate operating guidelines. The technical analysis underpinning this process is done in partnership with stakeholders and must be transparent to the public. Considering this high standard for engagement and stakeholders' lack of familiarity with DMDU concepts, an intensive and accessible approach to education and communication was needed. Through a series of linked talks, this session describes Reclamation's collaboration with researchers and private industry to develop the Post-2026 Operations Exploration Tool, an interactive web-based application that allows users to create and compare operational strategies through the lenses of performance tradeoffs, robustness, and vulnerability. As of June, six months after launch, approximately 450 users had submitted over 400 unique strategies. The tool will continue to support the planning process beyond 2024. 1. Supporting Difficult Decisions in the Colorado River Basin (10 min) Rebecca Smith – Basin background and overview of the planning process and the web tool 2. Research, Discovery, and Methods (15 min) Nathan Bonham, Joseph Kasprzyk, Edith Zagona –	Rebecca Smith; Edith Zagona; Joseph Kasprzyk; Season Martin; Carly Jerla; James Prairie; Alan Butler; Nathan Bonham; HB Zeff; Natalie Daniels

Title	Abstract	Authors
	describes the R&D that underpins the technical analysis and tools; explains robust optimization, etc. 3. Exploring Uncertainties and Crafting Models (10 min) HB Zeff – describes the approach to defining the wide range of futures and how models were developed to simulate any policy across many futures with many of types of decisions 4. Stakeholder Engagement: Education and the Post-2026 Operations Exploration Web Tool (20 min) Rebecca Smith, Season Martin, Natalie Daniels – describes engagement process leading up to the release of the tool, its scope, provides a demo, and summarizes stakeholders' use of the tool 5. DMDU in Ongoing and Future Work (5 min) Rebecca Smith – describes additional engagement and products associated with DMDU in planning process 6. Facilitated Q&A (30 min) Facilitator TBD	
Closing the Gap: Can DMDU Paradigms help in Advancing current AI Developments to Artificial General Intelligence.	The rapid evolution of Artificial Intelligence (AI) in recent years, particularly through advancements in deep learning, has sparked both optimism and concern about the potential emergence of Artificial General Intelligence (AGI). With high-profile projects from OpenAI and xAI fueling speculation, the discourse around AGI has intensified, Yet, the question remains: are current AI advancements paving the way for true AGI? Deep learning, the powerhouse behind many AI innovations, has demonstrated remarkable capabilities and versatility. However, its dependence on large data sets, substantial computational power, and tendency to generate models that merely reflect training data reveals significant limitations. This method's predictive nature struggles with new, unencountered scenarios. This limitation underscores a fundamental challenge: transitioning from AI systems that excel in prediction to systems capable of decision-making under uncertainty—a hallmark of human intelligence and a requisite for AGI. In this context, Decision Making under Deep Uncertainty (DMDU) paradigms emerge as a crucial framework. Unlike traditional AI approaches that seek optimized solutions prone to failure under novel conditions, DMDU emphasizes robust decision-making that remains effective across various potential futures. This session will explore how DMDU paradigms can bridge the gap between current AI technologies and the development of AGI, fostering systems that can adapt and make informed decisions in the face of the unknown.	Swaptik Chowdhury, Nihar Chhatiawala

Title	Abstract	Authors
Diverse Disciplinary Modelling Techniques for Climate Adaptation Policy	This session highlights the work of the Environmental Decision-Making lab at Purdue University. We will explore how various modeling techniques and research fields contribute to gathering insights for climate adaptation policy. Techniques include a game-theoretic voluntary buyout using agent-based modeling, scenario generators using knowledge-guided surrogate modeling, dynamic adaptation for lake eutrophication, and accessibility modeling to identify critical essential service facilities. These diverse techniques, adapted from established research fields, aim to enhance policymaking for climate adaptation, offering promising insights into the uncertainties associated with climate change. The outcomes of these projects can assist policymakers in safeguarding communities, natural resources, and providing services for all amidst a changing climate. The talks for this session are listed below: Game-theoretic Voluntary Buyout Analysis in Coastal Louisiana via Agent-based Modeling Dynamic Adaptation Method for Lake Eutrophication Policymaking Confronting Uncertain Natural Inflows Scenario Generators to Enable Adaptive Planning Processes Under Deep Uncertainty Identifying Critical Essential Service Facilities Using Accessibility Measures	Pragathi Jha, Aaron Dewar, Mohammad Ahmadi, Utkuhan Genc
DMDU in Health Applications	This session focuses on applications of RDM methods to address uncertainty in complex health policy questions. Individual Talks: 1.) Economic evaluation of antimicrobial resistance interventions using RDM (Aluzaite) Antimicrobial Resistance (AMR) is a complex One Health and One World problem and a leading cause of death globally, rapidly escalating in its severity. There are substantial gaps in knowledge on AMR evolution, transmission, and setting-specific data to inform context-specific analyses. This talk will explore the use of RDM methods in economic evaluation of AMR interventions using a case study, with discussion of key considerations and trade-offs. 2.) Surrogate modeling applications in RDM (Stevens) This talk will discuss advances in leveraging statistical surrogates of mechanistic models to expand the scope of RDM analyses in public health decision-making. Through an exemplar Multiobjective RDM analysis to inform introduction of pandemic non-pharmaceutical interventions, we demonstrate that a surrogate model	Anna Hotton; Kristina Aluzaite; Abby Stevens; Jonathan Ozik; Pedro Nascimento de Lima

Title	Abstract	Authors
	approach replicates the results with an order of magnitude fewer function evaluations than a direct policy search method. We will discuss expansion of this framework to more complex policy spaces and more sophisticated RDM approaches. 3.) Applications of RDM for robust strategies in HIV prevention (Hotton) This talk will describe findings from a decision-framing workshop conducted to evaluate a statewide HIV elimination initiative. We used the XLRM framework to elicit feedback about uncertainties, intervention levers and barriers, and outcome metrics. Findings will be translated into an agent-based model to generate large numbers of scenarios to be evaluated using RDM to identify robust strategies for HIV prevention.	
Enhancing Integrated Assessment Models with DMDU for Effective Climate Action	Decision Making under Deep Uncertainty (DMDU) techniques have the potential to improve how Integrated Assessment Models (IAMs) support global climate mitigation and adaptation efforts. IAMs play a crucial role by providing quantitative evaluations of climate strategies on a macro-regional scale over multiple decades. These models assist stakeholders in navigating future alternative actions and understanding their economic, environmental, and ethical implications. Despite continuous improvements in IAMs, significant misalignments remain between the models and the decision-making needs that have emerged in the latest COP debates, spanning topics like equity, loss and damages, circularity, hard-to-abate sectors and fossil fuels phase-out. The mismatch between models and policy-making stems from critical blind spots in current IAMs, for which DMDU can be particularly beneficial. Experts from the IAM, multi-sector dynamics, and DMDU communities are welcome to share their insights and research on related IAM challenges and the potential for advancement. Topics include improving upon current narrative-based approaches used to map out socio-economic and emission uncertainties, uncovering the role of hidden assumptions in ranking climate strategies, tackling the complexity of global-local interactions in simulating climate-economic dynamics, and increasing the reliability of IAM-based climate planning. More broadly, any innovative insight striving to bridge the gap between integrated assessment model land and more effective and scalable climate solutions is relevant for this session. List of speakers: - Jacob Wessel - Wangjinyu Shi - Sara Giarola - Jan Kwakkel/Giacomo Marangoni	Giacomo Marangoni; Jazmin Zatarain Salazar; Jan Kwakkel

Title	Abstract	Authors
How to build an Adaptation Modelling Framework to enhance decision-makers ability to address climate-related challenges?	Easier access to advanced hazard and impact models is crucial to empower decision-makers to evaluate relevant scenarios and improve adaptation planning under deep uncertainty. The key question is "How can we enhance climate change adaptation modeling and create more user-friendly, interactive assessment tools for climate risk and adaptation?" This session will present and seek input to the development of a Generic Adaptation Modelling Framework, which aims to make assessments of climate risk and adaptation more interactive and accessible, contributing to the resilience of communities globally. The framework is primarily being developed to leverage the ECMWF Destination Earth Digital Twin for Climate Adaptation (https://destination-earth.eu/use-cases/adaptation-modelling-framework) but shall be relevant to all adaptation modelling applications including the ones who are not using ECMWF resources. We are curious to learn from the adaptation research community what processes and functionalities such a framework needs to include. In this interactive session, we will briefly present the first draft for a Generic Adaptation Modelling Framework and showcase the starting point for its development through two demonstrators that develop interactive technical solutions to support policy decisions on adaptation to flood risk (FloodAdapt) and heat stress with a focus on public health management (HeatStressAdapt). We then move on to an interactive session discussing, drawing, and sketching missing elements of the framework and redesigning misleading elements. This is the opportunity for adaptation practitioners and researchers to actively shape a blueprint for adaptation modelling tools and to scope out opportunities for collaboration.	Gundula Winter; Nieves Peñar
How to Influence Ideas in Real Time: DMDU Wikipedia Editathon	AI informs every search result, everything that anyone looks up on the internet. And AI increasingly relies on data from Wikipedia. Look up any term, any name, any information at all, and the first result will usually be piped in from Wikipedia. So if information is incorrect or missing from WIkipedia, it will be lost and unreachable to the general public or even fellow researchers who start searches online. But where does Wikipedia get its information from? Volunteers, just like you. And if volunteers are not interested in the subject, it will be missing from Wikipedia. Right now, there is not even an article for DMDU in Wikipedia, let alone DMDU concepts and modeling and use. But that could change in an instant--only you need to help out! This session will show you the ins and outs of Wikipedia so that you can be confident in your real-time edits for DMDU, climate change, modeling, and all of your other passions.	Deena Larsen

Title	Abstract	Authors
Informing Transportation Planning with Lessons Learned From Other DMDU Applications	Successful application of Decision Making under Deep Uncertainty (DMDU) in transportation planning is important in effective use of transportation fund to improve safety, reduce congestion and provide accessible transportation system for all road users. DMDU in transportation planning will improve the ability of our state, regional and local partners to facilitate transportation project deliveries and proactively prepare for and take advantage disruptive modes and new mobility technologies. Transportation planning agencies have just started to embark on the journey of employing DMDU in their long-range transportation planning. DMDU Annual Meeting provides a perfect opportunity for regional transportation planning agencies to learn from those have already used DMDU to support their decision making. The objectives for this panel session are 1) to learn from practitioners from other fields the success stories, challenges, obstacles, and lessons learned while they have been applying DMDU in their decision-making support, and 2) to seek advice from these expert practitioners on how to best advance DMDU in transportation planning. Panel members include: • Rebecca Smith, Bureau of Reclamation • Jordan Fischbach, Water Institute of the Gulf • Julie Rozenberg, World Bank • Dave Groves, World Bank • Marty Milkovits, Central Transportation Planning Staff, Boston Region MPO	Sarah Sun; Robert Lempert

Title	Abstract	Authors
Integrating Improved Migration Demographic Projections into Energy System Planning Models: Introducing Necessary Complexity, and the Challenges of Visual Representation of the Outcomes for Decisionmaking	For the purposes of focusing on technical aspects of the energy system such as interconnection and regulatory process, demographic projections in energy systems models have been simplified and often do not feature dynamically in energy system scenario planning. The risk of this simplification is providing inappropriate confidence to decisionmakers relating to the needs of the future energy system and how to invest to meet them. This uncertainty is again multiplied in the consideration of scenarios for climate change adaptation, in which we are considering a variety of dynamic renewable resources as well as end users and potential social change. If, for example, our models inform decisions to invest in energy infrastructure where people will no longer be living due to inhabitability, those limited investment resources do not bring benefit. Integrating improved demographic information increases complexity and additional layers of data, leading to increased uncertainty. Population projection data bears considerable complexity due to many inputs and assumptions, and integrating more complex projections into already complex energy system models magnifies the uncertainty. The Joint Institute for Strategic Energy Analysis at NREL initiated in 2023 a project related to developing approaches for better representation of complex variables, like population demographics and projections, in NREL energy system models, which are used by Federal, State, Local, and Tribal decisionmakers to inform investment decisions. This session will draw from NREL and project partners to articulate the state of the art in demographic data in energy system models (Mikaela Schlesinger), the view from the field of applied demography of energy system models (Samson Olowalaju) as well as describe emerging approaches to conveying those complexities in a meaningful, visual way for decisionmakers (Kristi Potter and either a partner utility or state government partner).	Dr. Elizabeth Doris, Director, Joint Institute for Strategic Energy Analysis, National Renewable Energy Laboratory Dr. Samson Olowalaju, University of Texas @ San Antonio; Alice Jackson, Xcel Energy;Laura Vimmerstedt, Senior Analytic Researcher;Mikaela Schlesinger, Graduate Researcher, JISEA, NREL
Methodological Innovations to Meet Decision Making Challenges	Decision makers are increasingly faced with complex, high-stakes challenges that are characterized by deep uncertainty. While many advancements have been made across DMDU methodological approaches, we still often fall short in meeting decision making needs and informing real world actions. This session, "Methodological Innovations to Meet Decision Making Challenges," is dedicated to exploring the latest advances to mitigate these challenges and better inform decision-making processes. The session will feature a series of presentations and discussions on state-of-the-art techniques and tools that enhance the ability to inform robust decisions in the face of profound uncertainty. Topics will include but are not limited to: stochastic methods to facilitate the exploration of extremes, artificial intelligence methods to represent learning in	Antonia Hadjimichael; Patrick M. Reed; Joseph R. Kasprzyk

Title	Abstract	Authors
	adaptive processes, and novel scenario discovery techniques that can capture complex dynamics and translate them to planning scenarios. Invited speakers will share new research and insights, presenting case studies and theoretical advancements. Speakers: Julius Schlumberger – innovations in adaptive pathways for multiple risks Madeline Pernat – mapping of system conditions for combined robustness and vulnerability analysis Lillian Lau – bridging reinforcement learning and explainable AI robust infrastructure pathways	
Modeling Robust Decarbonization Pathways for Louisiana: A Planning and Implementation Case Study	The US state of Louisiana, with annual GHG emissions of approximately 220 million metric tons, faces a different decarbonization path than other US states. Two thirds of Louisiana's emissions are from industry, such as petroleum refining and ammonia production. The previous governor initiated a climate action planning process in 2020, resulting in the 2022 Louisiana Climate Action Plan; further federal action through the Inflation Reduction Act (IRA) has changed the financing landscape for large scale climate action. However, the political context has changed with a new governor in Louisiana as of January 2024. This session will feature the planning and technical team supporting Louisiana through a new planning grant, the Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant program (CPRG). Their study investigates the key factors influencing the state's decarbonization pathways. Exploratory modeling and scenario discovery methods are utilized to reveal insights crucial for effective policy implementation. The SISEPUEDE modeling framework, adapted to the specific context of Louisiana, serves as the scenario generator. SISEPUEDE is a flexible and scalable framework for dynamic multi-sector emissions and cost-benefit modeling. It considers critical emission sectors for Louisiana: AFOLU (agriculture and livestock, forestry, and land use, with a particular focus on wetland restoration and coastal resilience), Industrial Processes (including refining, petrochemicals, and other manufacturing), Energy (electricity generation, industrial energy use, transportation, and carbon capture and sequestration), and Waste Management. Louisiana-specific modeling profiles are generated by integrating regional datasets, scientific literature, and local expertise. A comprehensive set of decarbonization policies, aligned with Louisiana's priorities for their Comprehensive Actions to Reduce Emissions (CARE) Plan, is defined. This policy set is then stress-tested against a range of scenarios that explore diverse socio-economic, technological, and environmental conditions relevant to the state. The resulting database is analyzed using scenario discovery methods to reveal the primary drivers influencing decarbonization vulnerability and potential for success in Louisiana. This analysis will highlight specific challenges (e.g., reliance on fossil fuels, vulnerability to climate impacts) as well as opportunities (e.g.,	Edmundo Molina Pérez, PhD; James Syme, PhD; Allison DeJong, AICP; Patrick Kane, PhD; Nastaran Tebyanian, PhD

Title	Abstract	Authors
	potential for renewable energy, carbon sequestration in geological formations). The findings will inform the development and implementation of more robust, context-specific decarbonization strategies for Louisiana's CARE Plan.	
Structured Decision-Making to Support Practical Application of Decision-Making Under Deep Uncertainty Techniques	Abstract: Most Decision-Making Under Deep Uncertainty (DMDU) techniques focus on quantitative methods for projecting and considering decision outcomes in the face of uncertainty, with relatively less structure applied to integrating the decision-maker, stake- and rights-holders, and other impacted entities into decision and objective framing. This lack of structure can lead to a gap between decision analysis and practical application, and conceptual advancements in DMDU techniques failing to be understood or applied in contexts for which they can provide valuable planning or resource management support. In this session, we present Structured Decision-Making (SDM), a framework for making objectives-orientated decisions; explore its usage under conditions of deep uncertainty; and demonstrate how it can facilitate integration of DMDU techniques into practical applications. SDM has been applied across a variety of decision classes, including simple optimization problems; multi-objective decisions, including those involving multiple stakeholders; risk-based and value-of-information decisions; portfolio management; and dynamic problems, including those incorporating active and passive Adaptive Management. This session will introduce the SDM conceptual framework, provide examples of prior application of SDM in DMDU contexts, and explore integration of SDM with techniques for addressing uncertainty. A framework for integrating SDM with Robust Decision-Making techniques will also be presented and explored in the context of barrier island management. The session will conclude a panel discussion and audience Q&A. Talks: Introduction to SDM SDM in the Federal Government SDM and RDM Discussion	Soupy Dalyander; Patrick Kane; Nastaran Tebyanian; Max Post van der Burg

Using Robust Decision Making to Design Long Term Strategies: Case Studies in Latin America and the Caribbean	We would like to present case studies on how RDM has been adopted and adapted to specific circunstances in LAC. At least three case studies could be presented: RDM applied in the electricity Sector in the Dominican Republic; RDM applied in Guatemala with large stakeholder engagement; RDM applied to design the LTS in the Dominican Republic with Resilience aspects included. We may be able to present preliminary results of an analysis in Jamaica. Below the abstracts per talk. Economic evaluation of decarbonizing the electricity sector in the Dominican Republic: The study provides an economic evaluation of transitioning the Dominican Republic's electricity sector from coal to predominantly renewable energy sources, such as solar and wind, supported by battery storage. Employing a robust decision-making methodology, the research generates and utilizes a simulation database to explore 1,000 future scenarios (6,000 model runs), assessing four main strategies: baseline, reference, natural gas, and renewable. Updating the National Low Emission Development Strategy through a participatory process: Guatemala is currently updating its National Low-Emissions Development Strategy (ENDBE, for its acronym in Spanish), originally published in 2019 and led by MARN, MINFIN, and SEGEPLAN. Resumed in 2023, this update aims to achieve carbon neutrality by 2050 through a highly participatory and consensual process among stakeholders. Two blocks of national workshops involving over 70 national entities have been conducted using the RDM methodology, part of DMDU. These workshops fostered effective dialogue while communicating preliminary results to involved parties. Long-Term Strategic Planning for Low Carbon and Resilient Development in the Dominican Republic: In the Dominican Republic, a comprehensive Robust Decision Making (RDM) study is underway to assess the resilience of the national economy against environmental shocks and climate change. Utilizing the OSeMOSYS techno-economic model and extensive stakeholder engagement, this analysis simulates hundreds of future scenarios across diverse sectors, including agriculture, forestry, energy, transportation, waste management, and industrial processes. The objective is to integrate resilience into the national Long-Term Strategy (LTS) for climate change mitigation, emphasizing the role of technologies, policies, and practices in enhancing climate resilience while simultaneously reducing greenhouse gas emissions. By evaluating these factors, the RDM framework enables the Ministry of Economic Planning to build consensus among stakeholders. This collaborative approach aims to align the country's climate actions with its economic growth trajectory, ensuring that the Dominican Republic can effectively respond to and recover from future climatic and economic challenges while maintaining business continuity.	Prof. Jairo Quiros-Tortos; Dr. Jessica Roccard, MSc. Luis Victor-Gallardo, MSc. Mariana Rodriguez-Arce; Susana Solorzano, Lucia Rodiguez, Alejandra Soto, Ignacio Alfaro [and many other colleagues from DR, Guatemala, IADB, WBG]

Title	Abstract	Authors
Waiting for the Paradigm to Shift: DMDU in Formal Academic Presentations	The DMDU community has grown at an astonishing pace since the first meeting of what would become the DMDU Society in 2013. There are now several global centers of DMDU excellence as well as many more individuals and teams of DMDU analysts working across the globe. The field has grown on the strength of its useful applications to practical policy problems across the spectrum of interests. This has increased the standing of DMDU as a community of practice and increasingly brings new students, academics, and analysts into the fold. However, it has been the experience of many that when exposing DMDU work to academic audiences or to communities of analysts trained in and familiar with the application of more traditional or otherwise limited sets of analytical concepts and tools that the reception of such work may be cool, confused, or even hostile. This is unexpected when coming from the more nurturing DMDU community. To some degree, this is to be expected. It is one of the tenets of the Society and the larger DMDU community to be disruptive in setting a new standard for the analysis and consideration of policy in complex and deeply uncertain settings. Nonetheless, the result might be confusion on the part of the early-career DMDU analyst and at times the hostility might be great enough to cause personal and emotional distress sufficient to affect professional momentum. This panel will discuss the practical, intellectual, social, and psychological dynamics involved in presenting DMDU work into academic or analytical settings that are characterized by certain expected standards and modes of analysis. The field of economics provides notable examples of rejection, but similar obstacles can arise in other fields as well. Sometimes such unspoken norms involve utilizing a set of widely accepted models (such as CGE models that nonetheless may not be the best suited to DMDU analysis.) At others it may be paradigmatic chauvinism on the part of academic disciplines with widely accepted toolkits or implicit assumptions underlying the field that are rarely subject to examination. But at yet other times, there may be failure in accepting DMDU analytical modes and findings simply because the recipients have long been trained to perceive other expected messages and forms. For all these instances, but in this latter case especially, it is worth discussing what the DMDU practitioner could do to better convey her message and anticipate what could perhaps go wrong. The panel will share anecdotes as well as practical solutions but will invite the same extensively from the audience.	George DeMartino; Nidhi Kalra; Jan Kwakkel; Rob Lempert; Steven Popper; Julie Rozenberg

Title	Abstract	Authors
Why aren't Adaptation Pathways more broadly used in the United States?	Adaptation Pathways, in their various forms, are essential DMDU tools. Adaptation Pathways are used successfully for decision-support across multiple sectors in Europe, including water resource planning, linear infrastructure planning and coastal defences. The Netherlands and the United Kingdom lead the way in the deployment of Adaptation Pathways in Europe. In addition, there are excellent examples of the application of Adaptation Pathways in other parts of the world, notably New Zealand. Given their widespread use in other regions, why aren't Adaptation Pathways more broadly used in the United States? Are there US-specific legal or policy constraints, perhaps? Or maybe there is not yet a critical mass of US-based Adaptation Pathways practitioners to scale from case-by-case examples to system-wide adoption? Other factors may be at play. The session will pose these questions and provide a forum to seek solutions to the broader deployment of Adaptation Pathways in the United States.	Dr. Robert Kay

Individual talks sessions

Session	Title	Authors
Adaptation	Tools for Decision-Making Under Deep Uncertainty for Local Adaptation Planning: Which, When and How	Patrick Curran; Charlotte Brown; Anita Wreford; Tom Logan
	Funding rules that promote equity in climate adaptation outcomes	Adam B. Pollack; Sara Santamaria-Aguilar; Pravin Maduwantha; Casey Helgeson; Thomas Wahl; Klaus Keller
	How, how much and how fast to adapt? Entangling drivers of coastal flood exposure to inform coastal adaptation	Gundula Winter; Marjolijn Haasnoot; Richard Dawson; Matthias Garschagen
	Practical Tools for Actionable Climate Science: Simplifying Complex Data for Inclusive Decision-Making	Sebastian Malter, Mark Maimone, Amara Regehr
Communication, Involvement & Decision Support	Next-Gen Planning: Simplifying DMDU outputs for policy-making	Tatiana Merino-Benítez; Luis A. Bojórquez-Tapia; Yosune Miquelajauregui; Eduardo Batllori-Sampedro
	Probabilistic decision modeling using S2S forecasts: The importance of calibration and reliability in developing decision support systems	Brian Zimmerman
	Decision-Making Behavioral and Neural Dynamics Using of Decision-Making Under Uncertainty	Edmundo Molina-Perez; Pedro Cortes; Isaac Molina
	Looking Back to Look Forward: Demonstrating Collaborative, Multi-scenario, History-Based Decision Support for Global Systemic Risk	Robert Lempert; Dan Hoyer; Steven Popper; Zora Kovacic

Session	Title	Authors
Defence	The Rapid Exploratory Modelling Toolset – A tool for collaboratively building exploratory Defence models	Darren Rockett; Mark Williams; Drew Clayton
	Exploring information-sharing inertia as barriers to the adaptation of military organizational structures	Yvonne Lont; Tina Comes; Jan Kwakkel
	Uncertainty as an Intelligence Asset	Yakov Ben-Haim
	An Adaptive DMDU Support Framework for Lunar Exploration	C. Ahrens; R. Lolachi; A. Lynch
Economics & Finance	Climate Financing Strategies for Divergent Climate Adaptation Futures	June Choi; Marina Andrijevic; Adriano Vinca; Edward Byers
	Vision, Strategic Concepts, Assumptions, Robust Pathways' (VSCARP): A Non-Quantitative Method to Support DMDU Discussions among Diverse Groups	Steven W. Popper
	Using DMDU Techniques to Stress Test State Budgets: A Colorado Case Study	Kate Watkins, PhD
	Using Robust Decision Making to explore critical factors in the financing of greenhouse gas removal technologies needed to reach net zero	Geoff Darch; Mark Workman; Edoardo Taricco
Energy: Decarbonization	Challenges for decarbonization in Mexico within a framework of vulnerability and regional inequality	Carolina Cruz-Nuñez; Yosune Miquelajauregui-Graf; José Luis Bojorquez-Tapia; Edmundo Molina-Pérez
	Experiences and Insights from Comprehensive Decarbonization Policy Evaluation in Developing Nations	Edmundo Molina-Perez; James Syme; Nidhi Kalra
	Technology milestones improve an early warning system for off-track deep decarbonization strategies	Jinyu Shiwang; Wei Peng; Xinyuan Huang; Gokul Iyer; Vivek Srikrishnan; Klaus Keller
	Navigating Deeply Uncertain and Dynamic Futures for Deploying National Direct Air Capture Systems	Vanessa Schweizer (University of Waterloo, Canada), Kasra Motlaghzadeh (University of Waterloo, Canada)

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Energy: Infrastructure	Empowering Grid Planners to Embrace Uncertainty: A Modular Framework for DMDU in the Face of Climate Change	Liyang Wang; Roderick Go; Jan Kwakkel; David Anthoff; Andrew Jones
	Identification of infrastructure pressure points in a decarbonized grid across climatic-technological scenarios	Katerina Tang; M. Vivienne Liu; C. Lindsay Anderson; Vivek Srikrishnan
	Protecting the Bulk Electric System from Geomagnetically Induced Currents: A Robust Decision Making Approach	Kurt Klein
	Robust Solutions for the Siting of Renewable Energies	Jonas Schwaab 1; Maarten van Strien 1; Peter Bebi 2 ; Kaisa Miettinen 3; Adrienne Grêt-Regamey 1
Modeling and Simulation Methods	DMDU Inception - One Year On	Richard Bendall-Jones; Alan Mosca
	Achieving More Robust Policy Outcomes in DMDU by Distinguishing Simulation and Estimation	Leonard A. Smith; Arthur C. Petersen
	Distinguishing Between Deep Uncertainty and Ambiguity for Decision Making	Ghazal Shabestanipour; Catherine Knox; Jonathan Lamontage; Shafiqul Islam
	On decision rules as voters in contexts of deep uncertainty	Steven O. Kimbrough
Public health	Navigating coupled systems and deep uncertainty: an educational game for adaptive pandemic management	Hadjisotiriou, Sophie; Geertje Bekebrede; Hinrichs-Krapels, Saba; Olde Rikkert, Marcel; Rouwette, Etiënne; Marchau, Vincent
	Guiding Dynamic Adaptive Decision Making: a quasi-experimental study in healthcare	Anke Aarninkhof-Kamphuis MSc.; Dr. Hans Voordijk; Prof. dr. Geert Dewulf
	DMDU in Pharma Early to Late stage development: telling a new story of business & science uncertainty	Raul Mora
	Investing with Foresight: A Participatory Agent-Based Model to Evaluate Migration and Education Investments under Climate Uncertainty in Senegal	Nicolas Choquette-Levy; Andrew Reid Bell; Fabien Cottier; Alex de Sherbinin

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Natural Resources Management & Agriculture	Adapting livestock to climate change: A DMDU-based approach for effective actions.	Issa M. Awal; Michiel Schaeffer; Florent Baarsch
	Implementing DAPP for Climate Adaptation in Indian Wheat Production: Strategies for Resilience and Food Security	David R. Johnson; Maria Filipa Seara e Pereira
	Multi-scenario multi-objective robust optimization for handling windthrow in forest planning: A case study of Korsnäs forests facing extreme windstorms in the next three decades	Babooshka Shavazipour (a*); Kyle Eyvindson (b,c); Dmitry Podkopaev (d)
	Multiobjective robust optimization framework for forest harvest scheduling under uncertain road accessibility	Babooshka Shavazipour; Karin Westlund; Lovisa Engberg Sundström
Transport & Logistics	Advancing Multi-Objective Robust Decision Making in the Rare Earth Elements Supply Chain: Bridging Modeling and Decision Making	Mosaab M. Hamed; Hasan Huseyin Turan; Sondoss El Sawah; Oguz Sahin; Daniel D Prior
	DMDU for implementing autonomous vessels in maritime transportation through simulation and roadmap construction	Takuya Nakashima
	Integrating Multi-Methodological Approaches for Robust Transportation Planning in Minas Gerais: Addressing Socio-Economic and Climate Change Impacts	Diogo Oscar Borges Prosdocimi; Leandro Rodrigues e Silva; Maíra Vitoriano Rodrigues de Freitas; Thiago Henrique de Oliveira Faustino
	Leveraging Intercity Bus Services for Regional Socio-Economic Development: A Robust Decision Making Approach	Diogo Oscar Borges Prosdocimi; Thiago Henrique de Oliveira Faustino; Italo Spinelli da Cruz; Guilherme Silva Cardoso

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Urban Planning	Taming Uncertainty in Representation: How DMDU Methods Could Improve Legislative ReDistricting	James Syme
	IDENTIFYING CLIMATE-RESILIENT, ROBUST COOLING STRATEGIES ALIGNED WITH LONG-TERM CLIMATE GOALS FOR LOS ANGELES	Hye Min Park; Flannery Dolan; Kelly Klima; Sophia Charan
	Multi-modeling and DMDU for integrated urban planning: The case study of Hamburg, Germany's modular urban digital twin development	Rico H Herzog
	How well do simple heuristics perform in designing urban stormwater systems under deep uncertainty?	Siqi Ke; Julian Gutierrez; Vikrant Vaze; Klaus Keller
Water: Flooding	Co-adapting drought indicators and management actions in glacier-fed river basins	Keani Willebrand
	Navigating Epistemic Uncertainty in the Management of Flash Droughts	Gabriela C. Gesualdo; Antonia Hadjimichael
	Resilience Planning Under Uncertain Futures: introducing a new Reclamation Guidebook, Workbook & Resource and Tools List	Karen MacClune, Deena Larsen, Dagmar Llewellyn
	Exploring the integration of climate change, climate uncertainty and the influence of governance and institutional factors in Ontario municipal stormwater and flood management infrastructure planning, policy and practice.	Yena Bassone-Quashie

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Water: Planning	Austin Water's Use of MoRDM for its long-range water plans	Helen Gerlach; Michelle Miro; Marissa Flores-Gonzalez; Robert Lempert
	How safe is safe? Exploring the (lack of) safety factor standards for water supply planning	Taylor Winchell
	Bridging top-down and bottom-up system risk informed climate scenarios for California water resources planning	Andrew Schwarz; Romain Maendly
	Use of Hydroclimate Storylines to Simplify the Decision-Space in Water Management Planning	Dagmar Llewellyn, Lucas Barrett
Water: Supply, Distribution and Drought	Encouraging Stakeholder Dialogue on A Wide Range of Future Hydrologic Possibilities through Ensemble Development and Narrative-Based Visual Dashboards.	Season Martin; Natalie Daniels; Lydia Bleifuss
	Compelled by Narrative: How Old Stories Frustrate New Thinking. The Case of Metropolitan Water District of Southern California.	Henry Graumlich
	Modeling distributional equity in household water affordability using DMDU	Jenny Skerker; Ben Rachunok; Aniket Verma; Aliyah Hamilton; Christian Klassert; Baptiste Francois; Casey Brown; Sarah Fletcher
	Learning Capacity-Building and Flexibility to Tackle Deep Uncertainty: Case Study from Urban Water Distribution Under Drought in Mexico	Ariel Goldin; Jazmin Zatarain; Neelke Doorn; Edmundo Molina Perez; Steven Popper