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Designing Dynamic Adaptive Policy Pathways using Many-Objective Robust Decision Making

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Dealing with climate risks in water management requires confronting a wide variety of deeply uncertain factors, while navigating a many dimensional space of trade-offs amongst objectives. There is an emerging body of literature on supporting this type of decision problem, under the label of decision making under deep uncertainty. Two approaches within this literature are Many-Objective Robust Decision Making, and Dynamic Adaptive Policy Pathways. In recent work, these approaches have been compared. One of the main conclusions of this comparison was that they are highly complementary. Many-Objective Robust Decision Making is a model based decision support approach, while Dynamic Adaptive Policy Pathways is primarily a conceptual framework for the design of flexible strategies that can be adapted over time in response to how the future is actually unfolding. In this research we explore this complementarity in more detail. Specifically, we demonstrate how Many-Objective Robust Decision Making can be used to design adaptation pathways. We demonstrate this combined approach using a water management problem, in the Netherlands. The water level of Lake IJselmeer, the main fresh water resource of the Netherlands, is currently managed through discharge by gravity. Due to climate change, this won't be possible in the future, unless water levels are changed. Changing the water level has undesirable flood risk and spatial planning consequences. The challenge is to find promising adaptation pathways that balance objectives related to fresh water supply, flood risk, and spatial issues, while accounting for uncertain climatic and land use change. We conclude that the combination of Many-Objective Robust Decision Making and Dynamic Adaptive Policy Pathways is particularly suited for dealing with deeply uncertain climate risks.