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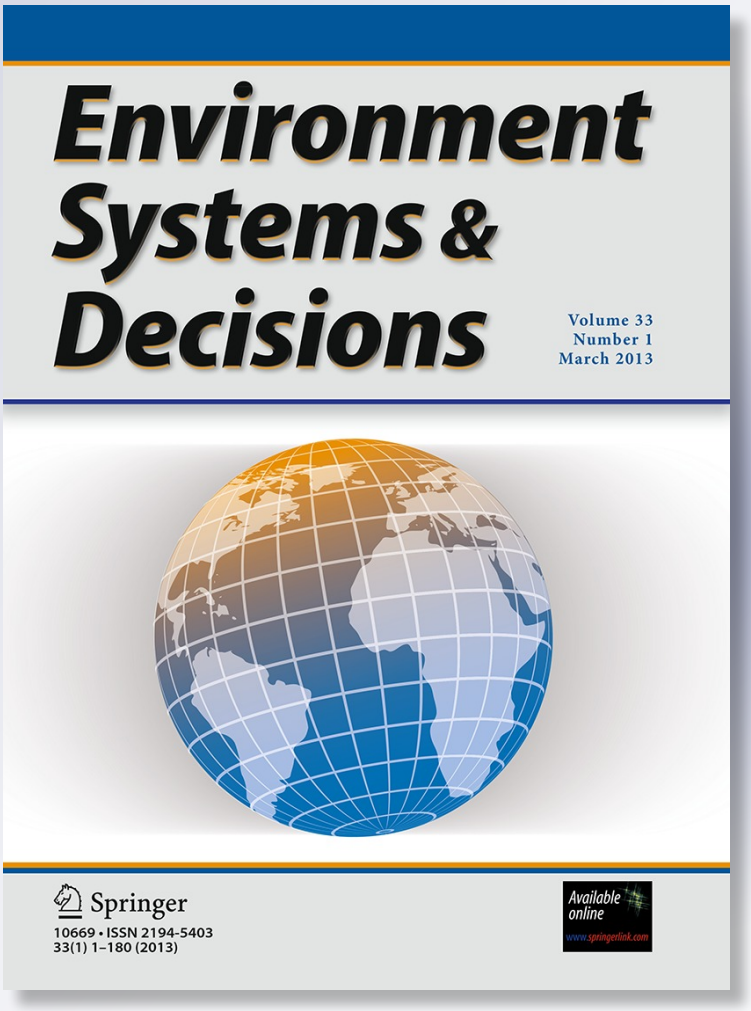

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Abstract In the twenty-first century, the goals of mankind are evolving from rising prosperity to attaining long-range sustainable survival in an acceptable state. Such change will lead to a paradigm shift predicted by Thomas Kuhn. This situation motivates two novel generalized systems, Risk-Constrained Optimization (RCO) and its derivative, Risk-Constrained Optimization/Decision Network (RCO/DN). RCO aims for flexible and robust strategies across large ranges of scenarios and risks. It assumes that for any "serious" (complex and long-range) planning and decision-making problem, externalities are important and uncertainty is radical. Therefore, it rejects the very concept of *the correct* or *the best* strategy, replacing it with a strategy that is *the most acceptable* to decision-maker(s). RCO considers decision-support systems, models, and algorithms to be tools of analysis, rather than methods of selection of *the best*. It replaces the artificial and risky paradigm of *maximization* by a cautious natural and evolutionary paradigm of *catastrophe avoidance*. RCO filters out the worst and riskiest candidate strategies, leaving for judgmental selection a small set of flexible, robust, and reasonably safe strategies. For that purpose, RCO employs enhanced stochastic multiscenario (ESMS) models, transforming them into *optimizing filters*. It is important that this operation is achieved in accordance with a new principle—changing the overall solution by affecting the values of scenario-specific, rather than general, outcome variables. Furthermore, RCO screens decisions and strategies by several *synthetic criteria* in a framework of novel *strategic frontiers*. Thus, RCO embeds ESMS into an *ensemble* of mutually supporting risk management techniques, legitimizing high-level analytical use of a *computer plus optimization model* combination.

Keywords Paradigm of decision-making · Economic rationality · Uncertainty · Risk management · Long-range planning · Scenario planning · Sustainability

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