



# Modeling and analytics to address national and global scale challenges

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This issue of *Environment Systems & Decisions* features original research papers with a common theme. These papers develop and implement methods from a variety of analytics and modeling disciplines to tackle real and serious problems faced by national and global communities and populations. Several of the papers, for example, discuss climate change, flooding, and disease. Several others balance multiple decision factors toward sustainable system operations, including relationships among economic and environmental objectives. Methodological tools such as optimization, decision analysis, input–output modeling, risk analysis, and multivariate statistics are described to facilitate informed, sustainable decision making, and management of manmade and natural resources. These papers demonstrate that through applied analytics, we can mitigate risks, promote sustainability, and increase the wellbeing of humans and society at multiple scales.

Groundstroem and Juhola (2019) develop and demonstrate a supply chain model to examine the effects of climate change on the Nordic countries. They conclude that there are vulnerabilities at certain nodes to cross-border impacts within the national energy systems. Abdulkareem et al. (2019) describe a study relevant for water resource planners in which they model runoff dynamics with respect to land use and land cover changes. They find that deforestation plays a major role in managing water infrastructure. Next, Nguyen et al. (2019) describe the implementation of an input–output model characterizing the dynamics of key economic sectors in Viet Nam. They develop a linear

optimization model for minimizing greenhouse gas emissions and describe the impacts to various economic sectors. Vasios et al. (2019) develop a multicriteria model for site selection, balancing economic and environmental considerations. The authors demonstrate the method with a case study of a thermal power plant in Greece. Vybornova and Gala (2019) describe the need to rapidly deploy laboratory facilities in the field during an infectious disease outbreak. They outline a decision aid and operating procedures considering equipment, personnel, and other logistics considerations. Elboshy et al. (2019) discuss the importance of adaptive capacity and social vulnerability in responding to urban flood risks. The authors build a model with these factors to improve the understanding of the risks faced by urban populations. Finally, Koengkan et al. (2019) explore causal relationships among economic growth, energy consumption, and the degradation of the environment in several Andean nations. Using econometric models, they discover a number of bidirectional relationships among economic and environmental variables.

A future special issue of the Springer journal *Environment Systems and Decisions* will include papers derived from the 16th Annual Conference on Systems Engineering Research (CSER 2018), with latest advances in systems engineering theory and methodology.

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