Tufts CEE Seminar Series Presents

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Seminar Title: Behavioral games and computational models to study governance of shared water resources
Date: Friday March 12, 2021 - 12:00pm - Eastern Time (US & Canada) - Virtual Event

Marco Janssen is a Professor in the School of Sustainability and School of Complex Adaptive Systems at Arizona State University. Janssen is trained in Operations Research and Applied Mathematics. The research interests of Janssen relate to the study of governance of shared resources using computational modeling, behavioral experiments, and case study analysis. His initial research was focused on integrated assessment modeling of climate change. Increasingly Janssen worked with social scientists to study human-environmental systems at different spatial and temporal sciences. As a result, Janssen published in economics, political science, anthropology, sociology, psychology, and interdisciplinary studies of social-ecological systems. Nowadays, his main interest is the study of the conditions of communities to self-govern their shared resources. Recent projects focused on water management in Mexico City, participatory games to stimulate water savings in rural India, comparative case study of lake organizations in Wisconsin, USA, agent-based modeling of hunter-gathers in middle stone age South Africa, and online experiments to study collective action under high uncertainty in a virtual Mars colony.

The seminar will discuss how to study water resources governance using behavioral games and agent-based models. When people share water resources, they have to overcome social dilemmas to create and maintain shared infrastructure and allocate limited water resources. Behavioral science provides insides into ways communities can work together. An example is how behavioral groundwater games are used in rural India to stimulate cooperation to reduce groundwater extraction. In collaboration with NGOs, a game on groundwater extraction was developed where participants decide which kind of crop to plant. This was followed up with a moderated discussion at the community level. No specific solutions were promoted, but in half of the communities, changes were made to reduce groundwater depletion. This approach is currently scaled up in cooperation with extension services. A second project discussed is water governance in Mexico City, which experiences both flooding and limited access to potable water. Independent and uncoordinated decision making about changes to infrastructure and landscapes by actors adapting to a specific spatial or sectorial vulnerability in the water system can mitigate risk locally while transferring risk to another location in the city or portion of the hydrologic system. As part of a bigger initiative, an agent-based model was developed that captures the interplay between neighborhoods and the central water authority, making decisions on investment in new infrastructure and infrastructure maintenance. Neighborhoods can adapt and protest. The objective of the model is to understand how the vulnerability of an urban environment subjected to water-related hazardous events is influenced by a central authority's decision-making process that manages water-related infrastructure. The feedback by the neighborhoods to government decisions are included and provide a way to capture the effectiveness of policies.