

## Advancing Integrated Process-Based Modeling of Complex Socio-Environmental Systems

**Award Year:**

2019

**Principal Investigator:**

Yusuke Kuwayama, Resources for the Future

Jesus Gomez-Velez, Vanderbilt University

**Associated Program:**

[Pursuit Program](#) [1]

*Note: This project is part of a larger initiative, in partnership with Resources for the Future, focused on advancing the field of coupled socio-environmental analysis by emphasizing the deeper integration and reconciliation of natural science and economic systems models.*

Sustainable management of freshwater is a growing challenge. Humans use both groundwater and surface water, which are often connected and raises several additional complexities. These include lagged environmental impacts, feedbacks at multiple temporal scales, deep uncertainty due to the combination of large and non-stationary hydrologic processes with endogenous human decision-making, and thresholds—due ecological, social, or policy factors.

To address these challenges and derive general principles and heuristic approaches for management of these connected groundwater-surface water systems, our team is integrating models across ecology, economics, and hydrology. Our approach is to integrate multiple process-based sub-models (also called theoretical, mechanistic, parsimonious, strategic, or equation-based models), allowing for flexible evaluation of a variety of alternative management strategies across a range of parameter values, and at varying spatial and temporal scales. We will explore several testbed systems including seasonally dewatered creeks or rivers in California and basin-scale management in California's Central Valley.

**Participants:**

Jaime Ashander, Resources for the Future

Tyler Treakle, Resources for the Future

Ellen Bruno, UC Berkeley

Anne-Sophie Crépin, The Beijer Institute of Ecological Economics

Helen Dahlke, University of California, Davis

David Finnoff, University of Wyoming  
Alan Hastings, University of California  
Kailin Kroetz, Arizona State University  
Julianne Quinn, University of Virginia  
Cameron Speir, National Oceanic and Atmospheric Administration  
Cleo Woelfle-Erskine, University of Washington  
Millie Chapman, University of California Berkeley  
Laurel Larsen, University of California Berkeley

---

**Source URL:**

<https://www.sesync.org/project/propose-a-pursuit/advancing-integrated-process-based-modeling-of-complex-socio-environmental>

**Links**

[1] <https://www.sesync.org/opportunities/research-thematic-pursuits/pursuit-program>