ACTING AND MODELING THE FUTURE OF DAMS:
Knowledge Production Processes in Sustainability Science

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What is the "Future of Dams"?

The "Future of Dams" (FoD) is an interdisciplinary project focused on advancing the way science is used in decision-making around dams in New England.

- 14,000 dams
- Complex systems involving diverse interests and stakeholder groups
- Trade-offs among values (e.g. fisheries, energy production)
- Testing new and existing knowledge production processes (KPPs) around coupled social-ecological systems
- Linking knowledge with action
- Fostering convergence across disciplines, methods, and organizations (Fig. 1)

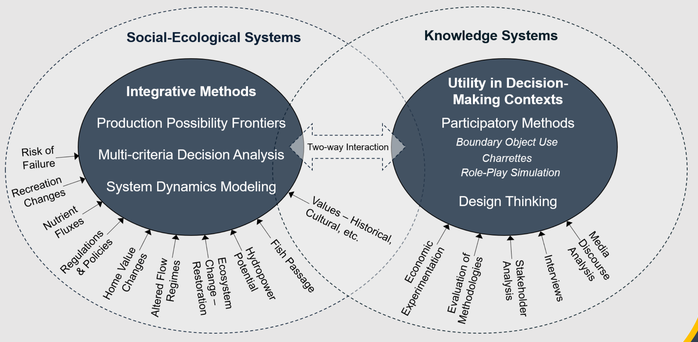

Figure 1. "Future of Dams" project concept map.

Advancing Sustainability Science

- "Innovative interdisciplinary research that is both problem-focused and use inspired to advance the theory and practice of sustainable development."*(1)*

Participatory System Dynamics Simulation

- Converge two types of KPPs rarely discussed together: participatory system dynamics modeling and role-play simulations
- Educate and engage stakeholders
- Support policy decision-making

Acknowledgments

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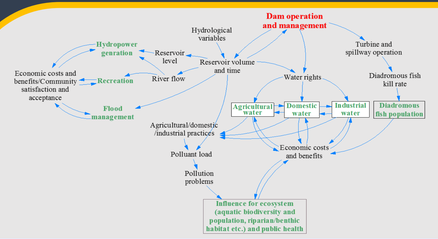
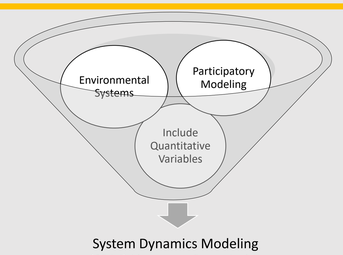
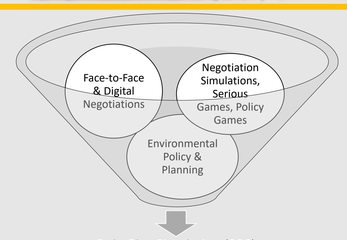
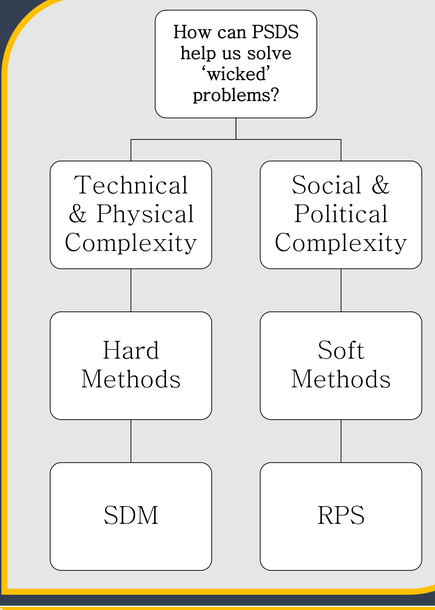
System Dynamics Modeling (SDM) + Role-Play Simulations (RPS) = Participatory System Dynamics Simulation (PSDS)

	System Dynamics Modeling (SDM)	Role-Play Simulations (RPS)
Example		
Literature	 System Dynamics Modeling (SDM) Literature Boundaries	 Role-Play Simulation (RPS) Literature Boundaries
Objectives	**Education & Engagement**: Public engagement and empowerment; Information sharing; Modeling skills **Research**: Evaluate equity impacts **Problem definition**: Develop shared understanding of system issues and relationships **Support policy decision-making**: Foster consensus (model); Make better recommendations	**Education & Engagement**: Science-policy in decision-making; Facilitate communication; Innovations in problem-solving **Research**: Evaluate as learning tool (ex. level of immersion); Change in participants' perspectives **Support policy decision-making**: Consideration of new policy options; Build consensus
Components	Stakeholder assessment: • Interviews/surveys • Map and prioritize issues Facilitated model building and refinement workshop(s): • Qualitative conceptual model • Quantitative models • Develop and rank policy options (ex. sticky dot voting, card sorting)	Stakeholder assessment: • Interviews/surveys • Map and prioritize issues Facilitated role-play design & refinement workshop: • Expert facilitators Switch roles for final decision-scenario workshop: • Assign roles and prepare • Engage in (facilitated) decision-making • Debriefing
Strengths	Builds shared understanding around model; Improves understanding of biophysical interdependence and complexity; Ownership; Leads to creative solutions and policy recommendations; Participants can manipulate data to evaluate impacts of scenarios over time	Improves understanding of social/political interdependence and complexity ex. how science is used in policy-making decisions; Structured process for managing conflict, developing innovative policy solutions, and building consensus; Integrate many and diverse stakeholders/participants; Provides "being there" immersion*(2)*
Weaknesses	Neglects actors' unpredictable and non-rational behavior; Does not incorporate actors' strategic behavior; High time commitment; High level of expertise and data needs are barriers & can lead to modeling errors	Limited stakeholder involvement in design; "Negotiated nonsense"*(3)* Participants' decisions lack scientific basis; Can't analyze outcomes of different decision scenarios over time



Next Steps

- Stakeholder Assessment
  - Semi-structured interviews
- RPS design
  - Context, stakeholders, issues, interests, positions, dam management decision alternatives, constraints, etc.
- PSDS workshop design: integration of SDM and RPS
- Evaluation advancement
  - Both SDM & RPS face similar evaluation challenges
  - Evaluate participatory and environmental outcomes

We Want Your Thoughts! (lift sticky note)

What do dams mean to you?

How do you think science can be better used in decision-making?

References

1. Hart et al., 2015
2. Gordon et al., 2011
3. Mayer, 2009

Credits

Role Play Simulation photo: www.waterfutures.org
System Dynamics Diagram: Weiwei Mo and Cuihong Song
Title photo: Ken James (modified)
Figure 1: Rita Belair and Kevin Gardner

Scan this QR code with your smart phone to access the NEST Future of Dams website (or visit the link below).
https://www.newenglandsustainabilityconsortium.org/dams