

Re-Imagining the Decision-Making Landscape by Acting and Modeling the Future of Dams

Role-Play Simulations and System Dynamics for Sustainability Solutions around Dams in New England

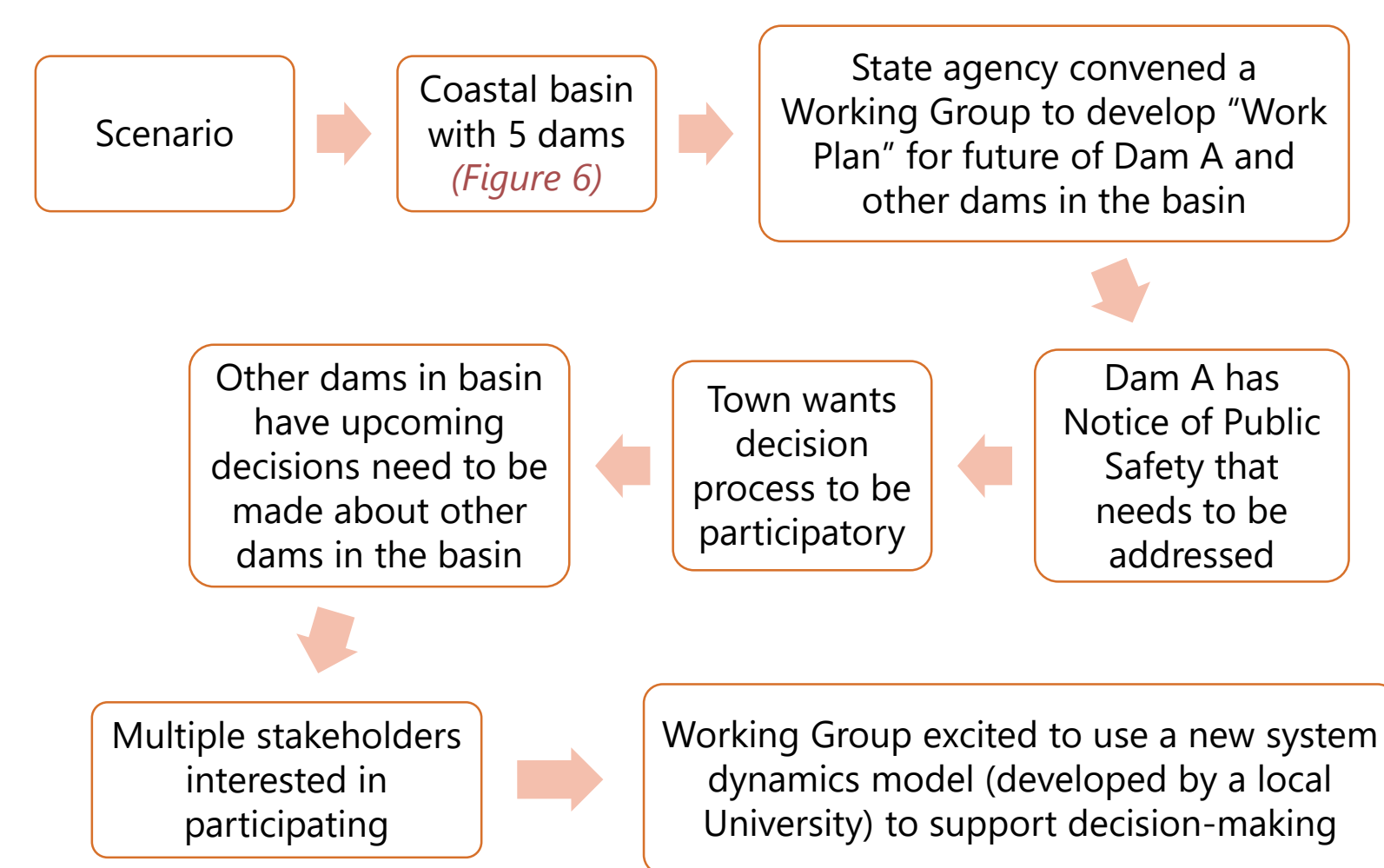
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1. INTRODUCTION

- Over 14,000 dams in New England - management decisions are complex and contentious
- Traditional "hard-bargaining" approaches to water negotiations have limited capacity to address complex sustainability issues
- Consensus building and other collaborative decision-making approaches can help communities find sustainable and innovative solutions to aging dams
- We design and test a new approach that integrates role-play negotiation simulations with system dynamics modeling (Figure 1)

3. HYPOTHETICAL ROLE-PLAY SCENARIO



- Group negotiates 3 decisions:
 - Decision 1: Which dams should be included in the "Work Plan" and what alternatives should be considered for those dams?
 - Decision 2: Who leads implementation of the alternatives proposed in the "Work Plan"?
 - Decision 3: Who pays to implement alternatives in the "Work Plan"?
- 7 roles (plus a facilitator) based on actual stakeholder types (Figure 7)

2. METHODS

- Study site: New Hampshire & Rhode Island (Figure 2)
- Conduct literature review of participatory modeling & role-plays
- Conduct and analyze 36 stakeholder interviews to develop a Stakeholder Assessment (SA) to identify stakeholders, issues and interests (Figure 4), and decision context
- Use SA, literature review, and expert knowledge to design role-play scenario instruments:
 - Confidential "role/character" instructions
 - General "shared context" instructions
- Use existing data, literature review, and expert knowledge to design system dynamics model and make it publicly available via a web user interface
- Conduct 2 workshops in each state
 - 1st set of workshops: gather feedback from stakeholders on model, user interface, and role-play; stakeholders play their actual role (January 2019)
 - 2nd set of workshops: apply stakeholder feedback to improve model, user-interface, and role-play; stakeholders play roles different from their real-life roles (May 2019)
- Evaluation: surveys, concept maps (Figure 5), interviews, debriefing sessions, feedback sheets (Figure 3)

4. RESULTS

- 1st set of workshops completed Jan. 2019
- Total # participants from first set of workshops: 39 (14 in RI and 25 in NH)
- Participant feedback (Figure 9) from 1st set of workshops were used to improve model, web interface (Figure 8), and role-play
- Total of 42 pre-intervention surveys and 37 pre-intervention concept maps (Figure 5)
- Analysis to follow completion of 2nd set of workshops

5. NEXT STEPS

- Complete second set of workshops in NH and RI (late May 2019)
- Conduct post-workshop interviews
- Analyze surveys, concept maps, interviews, and debriefings for normative, relational, and cognitive learning
- Make role-play and model package available as "off-the-shelf" tool for anyone to access

FIGURES

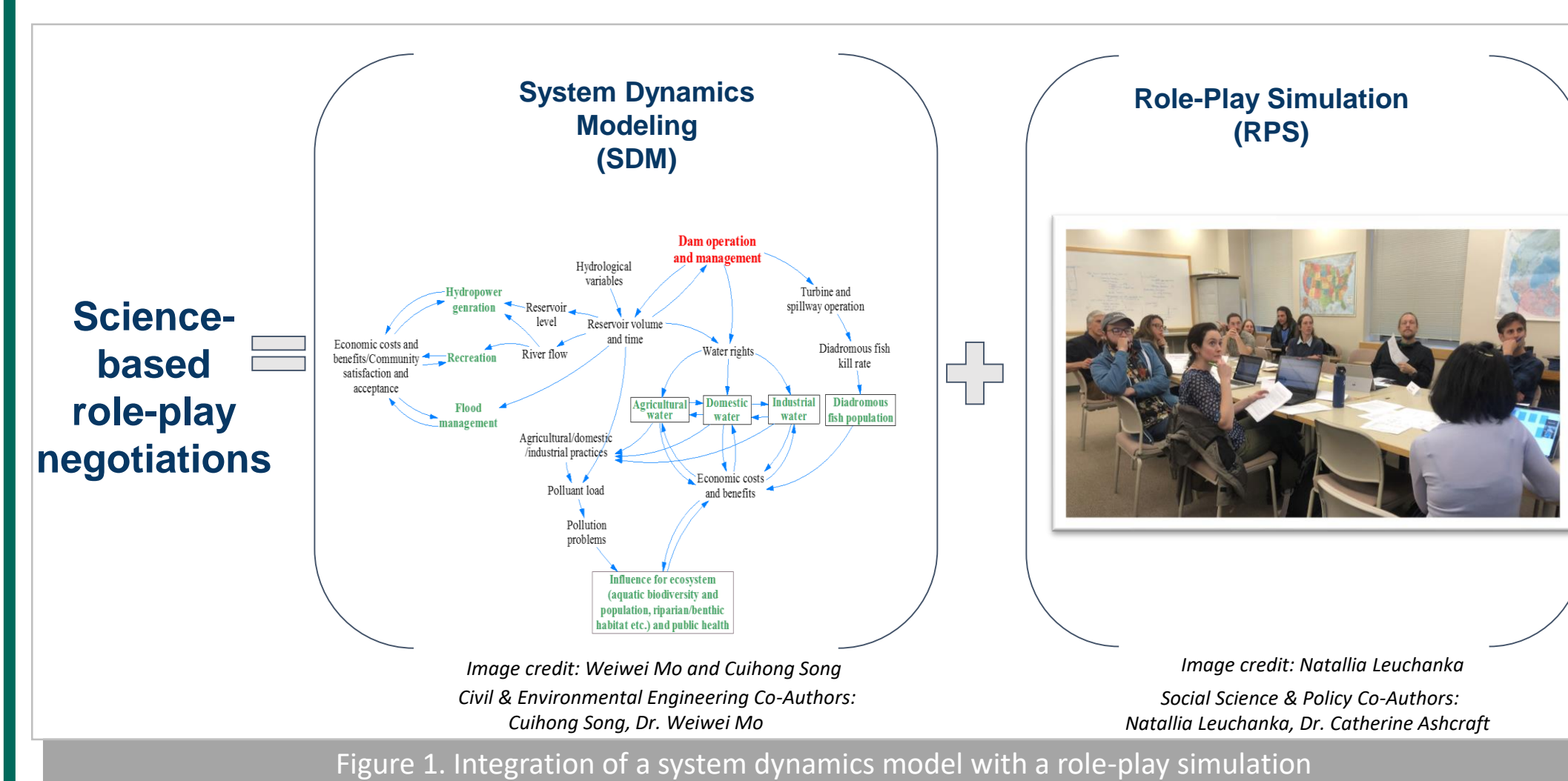


Figure 1. Integration of a system dynamics model with a role-play simulation

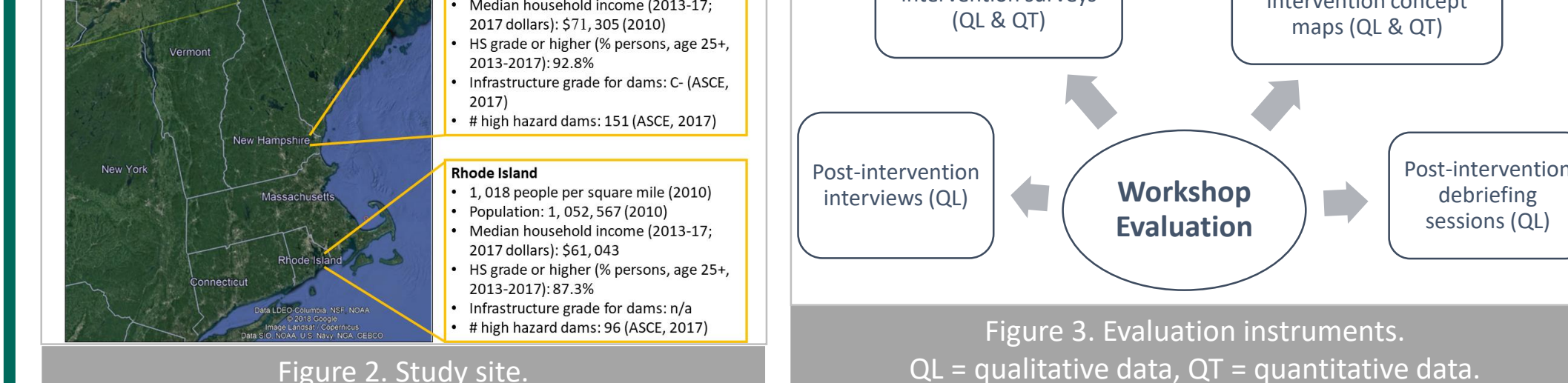


Figure 2. Study site.

Stakeholder Group	Addressing priority interest	Collaboration	Cost	Performance and safety	Flood control	Electricity generation	Hydroelectricity	Hydroelectricity	Hydroelectricity	Hydroelectricity	Safety	Water quality	Wildlife habitat	Property Values & Economic Development	User of Resources/Decision
Local community group representing environmental interests	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State government representing safety interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State government representing ecosystem health interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State government representing fish and wildlife interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Federal government representing fish and wildlife interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State and municipal government representing historic interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Private sector/business representing hydroelectric interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
National NGO representing ecosystem health interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local/regional NGO representing ecosystem health interests	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal government	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Engineering consulting firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Figure 4. Priority interests identified by interviewees (preliminary analysis).

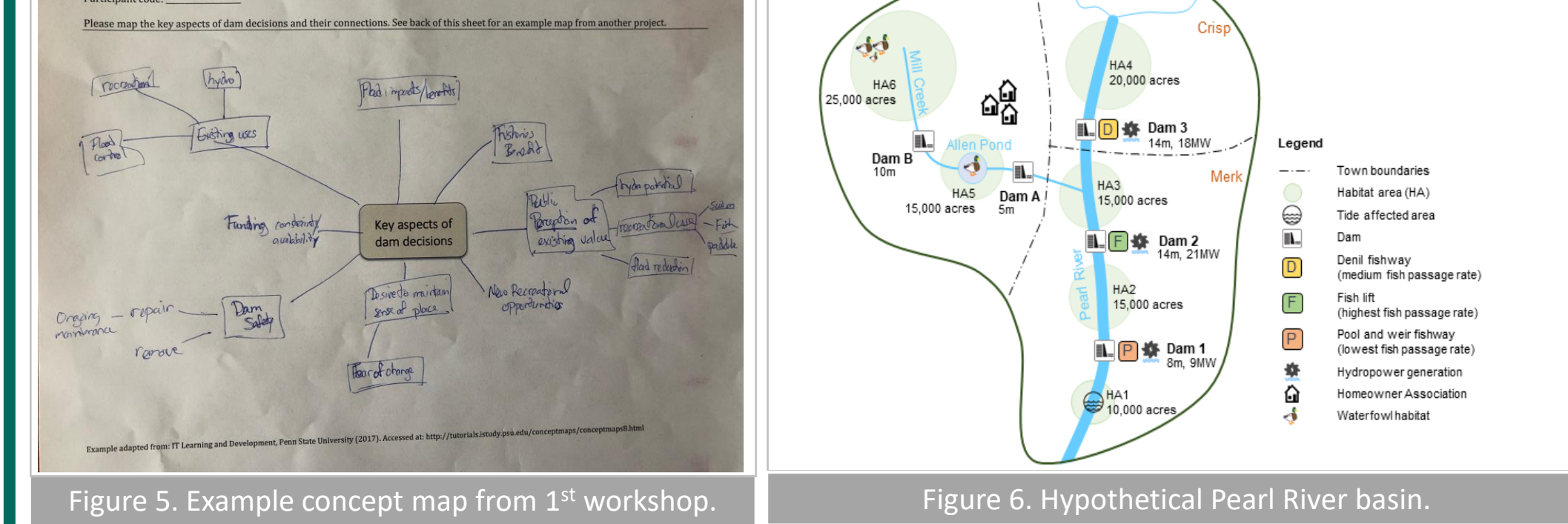


Figure 5. Example concept map from 1st workshop.

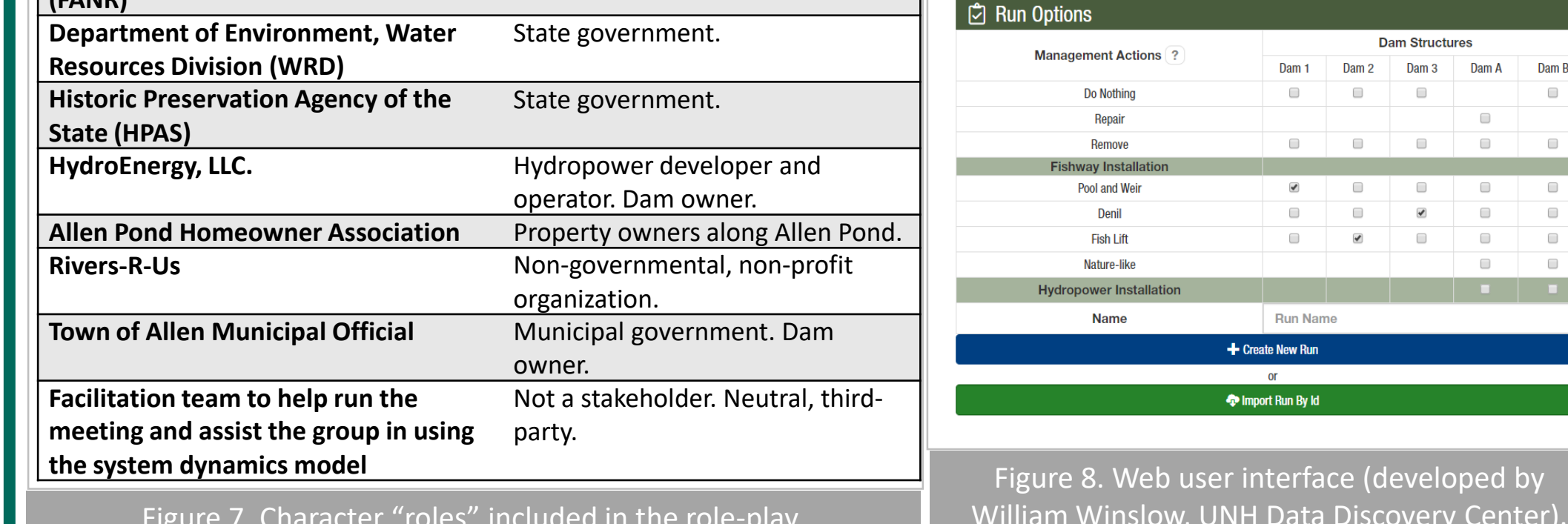


Figure 6. Hypothetical Pearl River basin.

Who is attending today's meeting?	Type of stakeholder
Federal Agency of Natural Resources (FANR)	Federal government.
Department of Environment, Water Resources Division (WRD)	State government.
Historic Preservation Agency of the State (HPAS)	State government.
HydroEnergy, LLC.	Hydropower developer and operator. Dam owner.
Allen Pond Homeowner Association	Property owners along Allen Pond.
Rivers-R-U	Non-governmental, non-profit organization.
Town of Allen Municipal Official	Municipal government. Dam owner.
Facilitation team to help run the meeting and assist the group in using the system dynamics model	Not a stakeholder. Neutral, third-party.

Figure 7. Character "roles" included in the role-play.

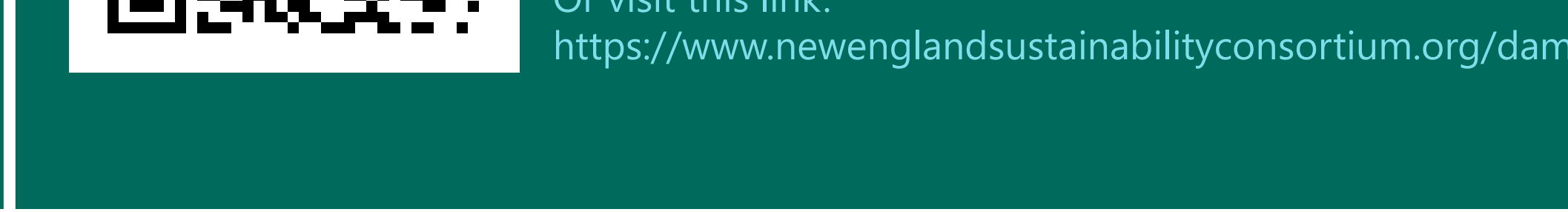


Figure 8. Web user interface (developed by William Winslow, UNH Data Discovery Center).

"Bringing together the players in such an exercise can inform players and non-players (interested citizens) and broaden their views. In [town], such an activity would have been useful at one of our early information gatherings... Even the use of averaged data would work in this situation. Using computers could quickly show trade-offs and the relative importance of specific factors." - NH Workshop #1 Participant & Municipal Elected Official

Figure 9. Quote from workshop participant.



Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Say "Hi" to us!

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