

AN ABSTRACT OF THE THESIS OF

Julie Elkins Watson for the degree of Master of Science in Water Resources Policy & Management presented on April 25, 2012

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In transboundary water resources policy and management situations, such as the governance of the Columbia River Basin, complex social, ecological, and economic factors seem to be in irreconcilable competition with one another. However, cooperative negotiation provides an outlet for entities and stakeholders to “expand the pie” and develop creative alternatives for integrated, resilient management. To achieve these goals, it is critical that stakeholders have meaningful dialogue that goes beyond positions to identify the underlying values and interests in the basin. Furthermore, parties must develop a shared understanding of the substantive complexities of the social-ecological system. Collaborative learning allows participants to meet both of these objectives at once, and facilitators can spark collaboration through carefully planned interventions. The goal of this study was to test a carefully crafted “facilitative” documentary film as a facilitation tool to promote dialogue, understanding, and creative scenario development amongst parties. The study has three main components: 1) the resilience and learning analysis of the case study (the Columbia River Treaty) policy situation, 2) the creation of a facilitative film featuring interviews with diverse stakeholders in the basin, and 3) the qualitative and quantitative assessment of the effects of the film in the cooperative negotiation process. The film, *A River Loved: A film about the Columbia River and the people invested in its future*, premiered at the Universities Consortium Symposium on Columbia River Governance- an informal forum for dialogue held in Kimberley, British Columbia in October 2011. I measured participants’ reactions to the film and found substantial support for my hypotheses, concluding that interventions such as facilitative documentary film have great potential to transform complex, multi-stakeholder social-ecological policy situations.

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A River Loved: Facilitating Cooperative Negotiation of Transboundary Water Resource
Management in the Columbia River Basin through Documentary Film

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Julie Elkins Watson, Author

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I came to Oregon State University to get an education- to learn a set of skills that I could use to make the world a better place. My experience here helped me on my path towards that goal, but it has also been so much more than that. Every day, I am amazed by my incredible faculty and peers. The passion, creativity, life experiences, and perseverance in the face of adversity that I see around me every day inspire me. Seeing what we can accomplish by combining our efforts, skills, and experiences, I understand now what the academic endeavor should be. At the same time, I have learned a great deal about life and friendship. Thank you so much to all of my peers and faculty in Water Resources, the College of Earth, Ocean, and Atmospheric Sciences (formerly Geosciences), and all across the university!

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Introduction

The Columbia River is a fascinating case study of a complex social-ecological system. A transboundary river at the heart of the Pacific Northwest, it is a very large, very managed, and very valued river central to the region. Throughout the years, the region has grown and changed, and management of the Columbia has profoundly changed the system. Today, environmental managers have reached a threshold in the system- changes in the Columbia River Treaty- that leave the basin ripe for intervention towards more adaptive, resilient management to meet the changing needs and values in the basin.

Over the following pages, I analyze the Columbia River Treaty management decision and propose strategies for productive intervention. I begin with a description of the conceptual framework for my project, followed by a description of my objectives and an overview of the basin and relevant issues. Then, I describe Walker and Salt's (2010) framework for assessing systems and resilience, which I then employ to deconstruct the Columbia River Treaty to examine its components, interactions, cycles, and thresholds. I describe what a more adaptive, resilient Columbia Basin might look like, and then conclude with a discussion of the decision space illuminated by studying the system. One important realization that emerges from this analysis is that the physical decision space boils down to how the river will be operated for water quantity and quality (which are both stocks in the system). This is consistent with Meadows's assertion that "Most individual and institutional decisions are designed to regulate the levels of stocks" (Meadows, 2008, p. 24). To be more resilient, however, it is clear that a more adaptive governance structure is needed—a governing body that can make operational decisions based on a more diverse set of values.

Meadows claims that systems function via the flow of information (Meadows, 2008, p. 14). Furthermore, Innes and Booher promote collaboration- dialogue and flow of information among diverse stakeholders with multiple intelligences- as key to informing policy decisions (Innes & Booher, 2010, pp. 96, 144, 171). Thus, I examine the flow of information amongst stakeholders as an important aspect of the conflict situation. I apply Walker's progress triangle method to examine the procedure, relationships, and substance of the policy decision to identify knowledge and information gaps (Walker, 2010). Based on this analysis, I determine that parties in a basin as large and diverse as the Columbia River Basin

can and need to learn a great deal from one another about the substance of the issues at various scales and locations. Additionally, though parties know the “worn” positions of the other side, there is need for meaningful dialogue and learning about the underlying interests and values of the various parties.

After identifying leverage points and areas of need in the policy decision situation, I propose an intervention strategy, learning through film, based on the idea of collaborative learning. I propose film as a medium through which parties can learn about one another’s interests and values as they gain an enhanced understanding of the Columbia River as a system. I attempted this intervention in October of 2011 at the Universities Consortium Symposium on Columbia River Governance. Through my study, I worked to answer my primary research question: **Can documentary films facilitate cooperative negotiation towards more resilient management of social-ecological systems?**

I examined the success of this approach by answering several sub-questions:

1. Can they (facilitative documentary films) promote dialogue?
2. Can they facilitate understanding/empathy amongst parties?
3. Can they encourage parties to consider new scenarios?

I describe the procedures and methodology I used to make the film and test its effectiveness as a facilitation tool. Then, I describe the results of the study, and I draw conclusions about using film as a facilitation tool to enhance cooperation in complex social-ecological policy situations. In the Columbia River Basin, the film proved to be successful in increasing understanding and dialogue amongst parties. I conclude with a discussion of a proposed second intervention, collaborative systems modeling, which draws on techniques from facilitation, science, and the social sciences to allow participants to craft and fine-tune their understanding of the complex interactions within the system. Through careful analysis of the social-ecological system at multiple scales and through time, both facilitators and stakeholders can learn a great deal about how and where in the system to intervene. Through this analysis, study, and discussion, I show that carefully planned interventions, such as a facilitative documentary film, can be useful in promoting cooperation towards resilient resource management.

Conceptual framework

Transboundary water management- managing water resources that span political boundaries- is one of the great challenges of our time, and it will only become more imperative as population continues to grow and the demand continues to rise for sufficient quantity and quality of water resources. However, transboundary water management goes beyond political boundaries, referring also to the constructed boundaries between cultures and stakeholders who represent a diverse array of values and interests within a river basin. Finding consensus regarding shared values and mutual interests amongst stakeholders is a key component of successful transboundary water conflict transformation, and thus, it is a critical goal of facilitators to foster mutual understanding through the most effective and transformative means possible. The goal of this study is to examine the potential of media, particularly a customized documentary about stakeholder values in the Columbia River Basin, to serve as a facilitative technique in multi-stakeholder water resource collaborative negotiation.

Facilitation of multi-stakeholder water resource management

Water resource management is incredibly complex business. Not only does it involve a wide array of stakeholders with valid goals and values that sometimes compete with one another, it also spans various political and spatiotemporal scales. Thus, facilitation techniques must rise to the challenge through integrative and creative collaborative processes.

Stakeholders tend to fall into three "social solidarities": the hierarchic regulatory solidarity, which wields coercive (e.g. regulatory) power and seeks regulatory solutions, the individualistic market solidarity, which wields persuasive (e.g. monetary) power and favors economic solutions, and the civic egalitarian solidarity, which wields moral (or cognitive) power and favors equitable and ethical sharing of costs and benefits in the river basin (Dore, Robinson, & Smith, 2010). Although these three stakeholder types co-exist in all river basins, one can see how these groups could struggle to find common ground. In fact, according to the International Union for Conservation of Nature and Natural Resources (IUCN), "Most water negotiations often pit parties against each other as if there is no way that all can or will

gain by managing shared water resources effectively." However, mutual gains are possible if the parties commit to cooperative negotiation focusing on achieving each party's interests (Dore, Robinson, & Smith, 2010).

How can diverse parties with divergent orientations towards the issue and varied opinions on the proper course of action find common ground? Cooperative negotiation, or collaboration, provides a decision-making framework that departs from the traditional, competitive model of policy negotiations. Innes and Booher (2010) describe a collaborative process as one wherein "all affected interests jointly engage in face to face dialogue, bringing their various perspectives to the table to deliberate on the problems they face together," adding, "all participants must also be fully informed and able to express their views and be listened to, whether they are powerful or not" (p. 6). The heart of cooperative negotiation is dialogue. Innes and Booher explain, "It is within dialogue where ideas and choices emerge and where confusing and conflicting views and knowledge can be transformed" (p. 119). Departing from the competitive model of debate- points and counterarguments- dialogue helps participants to gain mutual understanding, allowing for authenticity, empathy, and synergistic conversation towards win-win solutions (Innes & Booher, 2010, p. 119).

Agreeing to cooperative negotiation does not mean that stakeholders relinquish their passions; rather, it channels the underlying values and interests into dynamic alternatives that "expand the pie" of possibilities and shared benefits in the basin (Dore, Robinson, & Smith, 2010; Moore, 2003, p. 278). This is best stated in the IUCN's *Negotiate* report: "By going beyond viewing situations or issues as having a constant or fixed value, more can be added to the situation than seems apparent at first... something new or different may be created through understanding the reasons for why something is wanted or desired" (Dore, Robinson, & Smith, 2010). In another report, the IUCN clarifies that "With more on the table to negotiate, parties have more opportunities to find mutually acceptable solutions. Shifting focus to de-link the benefits of the resource from its physical parameters can provide a more flexible framework for negotiations" (Sadoff, Greiber, Smith, & Bergkamp, 2008). Another way of transforming the conflict is through logrolling, a concept identified by Pruitt and Lewis (1977) but explained by C. W. Moore in *The Mediation Process* as "trading items that are valued differently by the parties" (Moore, 2003, pp. 278-79). This

reframing of the conflict allows stakeholders to achieve their objectives through cooperative negotiation based on values rather than positions (Moore, 2003, pp. 278-79). Although stakeholders have different interests and priorities within the basin, the communication and understanding of these interests translates into an understanding of the "basket of benefits" in the river basin that can be shared amongst stakeholders to create positive-sum (rather than zero-sum) solutions benefitting all parties (Sadoff & Grey, 2005; Wolf, 2007). Thus, in order to expand the hypothetical pie, the parties must take time to explore what the basket of benefits consists of in their river basin.

To understand the "basket of benefits" in a basin, stakeholders must share, listen, understand, and respect one another's underlying interests and values. As such, a critical component of successful cooperative negotiation involves fostering mutual understanding and respect amongst stakeholders. The parties need to take time to share and explore the underlying values that shape their interests and the points of leverage that impact those interests (Dore, Robinson, & Smith, 2010). This process is critical because it creates a forum through which "parties can better understand what may have previously been unknown or misunderstood about other parties" (Dore, Robinson, & Smith, 2010).

However, fostering mutual understanding and respect can be challenging, especially when stakeholders who enter the collaboration process claim to "know" the other players and their familiar stances or positions related to the issues. Thus, the facilitator's challenge is to design the process in a way that encourages real listening and rumination, does not favor one way of valuing (or one social solidarity) over others, and gives voices to stakeholders who lack the resources to sit at the table or articulate their views (Dore, Robinson, & Smith, 2010).

Facilitation, values, and media

Based on the previous discussion of multi-stakeholder water resource cooperative negotiation, it becomes apparent that a critical task for facilitators is to help parties share and respect the interests and values that lie beneath positional negotiation. Thankfully, facilitators have a diverse set of direct and indirect options for identifying interests amongst stakeholders in cooperative negotiation. Simply conveying a positive attitude about interest

exploration is a first step. Direct questioning, active listening, clarifying, summarizing, and reframing are just a handful of techniques that can be employed by the facilitator to identify stakeholder interests (Moore, 2003, pp. 257-259). Consequently, many of these techniques are also relevant to conciliation, the process through which the facilitator promotes trust, understanding, respect, and cooperation between parties (Moore, 2003, pp. 166, 173-83). Additional relevant techniques for conciliation involve demonstrating that parties share values to foster mutual understanding and reframing interests to foster legitimacy and respect, which ultimately build empathy between parties (Moore, 2003, pp. 184-85, 190-91). Between identification of interests and the conciliation process, the facilitator can help parties to achieve a mutually beneficial (expanded pie, logrolled, basket of benefits, win-win) approach central to cooperative negotiation.

Interestingly, all of these techniques could be implemented and mediated through film. The facilitative filmmaker can identify interests through questioning, with the camera rolling as a silent yet fully attentive listener. Then, the film editing process can summarize, clarify, reframe, and demonstrate that parties share many of the same underlying interests and values, while editing out positional statements that are destructive to the collaborative process (Moore, 2003, p. 77). Communicated to the viewer (e.g. other stakeholders), then, this type of film could hypothetically foster mutual understanding, empathy, and respect between parties.

Though the term "documentary" is sometimes associated with positional, political advocacy that strives to influence viewer opinions and/or goad political action (e.g. Michael Moore films), this film medium can also be employed for cooperative purposes. For example, Oregon State University graduate student Sarah Sheldrick created a film, "Water before Anything," which focused on the a Task Force for groundwater management in Umatilla County, Oregon. Sheldrick created this film not to favor or promote certain interests, but to illuminate various stakeholders and their values in the basin while documenting the collaborative process. While a film of this nature does inherently promote participatory, cooperative negotiation- one of the responsibilities of a mediator or facilitator- it strives to maintain neutral in respect to the interests and goals of the various parties. In

this way, facilitation through film can parallel many aspects of in-person, real-time facilitation (see: Moore, 2003, pp. 53, 467).

Though many of the techniques in facilitation could be carried out through film, this medium has distinctions and idiosyncrasies from in-person communication that should be explored. Facilitation through documentary has parallels with online dispute resolution (ODR), wherein the electronic communication serves as the "fourth party" in the mediation process. While ODR can be an effective form of mediation, it comes with a set of unique challenges because of the different communication medium (Nadler, 2001). Similarly, using a documentary as a fourth party facilitation tool differs from face-to-face facilitation because parties cannot inject or clarify statements- as they would during a group conversation- while viewing a finalized film. Thus, it is important that a facilitation filmmaker be as conscientious and integrative as possible while producing the film, and it is equally important that parties are given the opportunity after watching to discuss, add to, and clarify statements in the film. This process parallels Moore's variation on the interest-oriented discussion wherein parties speculate about one another's interests, and then each party is given the opportunity to correct or supplement the representation of their interests.

A second "fourth party" facilitation method is the use of Decision Support Systems (DSS). These systems are a form of artificial intelligence that draws from data and various parameters placed on them to calculate the expected outcome of a decision. Modern DSS can incorporate stakeholder input and participation, making them a fourth party in the cooperative negotiation process (Chen, Herr, & Weintraub, 2004). According to Chen, Herr, and Weintraub (2004), "With a DSS, the stakeholders can examine multiple options to find a solution that is scientifically correct and politically acceptable. A DSS guides stakeholders through the decision making process, but does not tell them the 'best solution.'" In their study, the researchers observed that stakeholders interacted with the DSS in different ways, but reported that they appreciated the transparency and usefulness of the DSS to model potential outcomes, which in turn, assisted the stakeholders in self-adjusting their negotiation objectives to better achieve their interests (Chen, Herr, & Weintraub, 2004). Thus, a fourth party DSS can help stakeholders to gain a deeper understanding of the negotiation environment, which in turn helps the stakeholders to reassess positions and

negotiate more effectively towards achieving their underlying interests. In this way, DSS expands the pie so that parties can engage in better-informed cooperative negotiation with an expanded pie of mutual benefits.

Similar to DSS, media also feeds back into the active consumer's appraisal of the negotiation environment. Ball-Rokeach, Rokeach, and Grube (1984) studied how a television program could influence behavior and beliefs, and they developed a "self-education theory of media influence." Rather than being passive recipients of media propaganda, they asserted, individuals actively seek and attend to media that contribute to their understanding and self-knowledge. Furthermore, those who seek media for understanding will then use the information for self-confrontation, a process through which the viewer "appraise(s) his or her own morality and competence, a process that leads to feelings of either self-satisfaction or self-dissatisfaction, culminating in stability of change in belief and behavior" (Ball-Rokeach, Rokeach, & Grube, 1984, pp. 158-60). Ball-Rokeach and her colleagues specifically studied the effect of a television program on viewer values and behavior. Since the media consumers actively engaged with the media, using it for understanding and self-confrontation and ultimately changing values and behavior, audiovisual media can be conceptualized as a Decision Support System in its own right. In fact, while the stakeholder DSS in the Chen, Herr, & Weintraub experiment (2004) helped stakeholders to refine their negotiating positions, the TV program in the Ball-Rokeach et al. study (1984) assisted viewers in refining their personal values. Thus, audiovisual media as a decision support tool have the capacity to facilitate even deeper levels of understanding and appraisal of the values shaping the interests behind the positions in multi-stakeholder facilitation.

Additional research clarifies the channels through which media can influence listeners' attitudes. Petty and Cacioppo (1981) pose that listeners combine what they hear with their preexisting knowledge and beliefs, forming an aggregated opinion on a given topic (p. 211). According to Petty, Briñol, and Priester (2009), media influence can occur either saliently, through the central route, or indirectly, via the peripheral route. In the Elaboration Likelihood Model (ELM), the authors describe the influence of motivation, quality of persuasive argument, and other variables such as distraction and repetition affect whether

or not a listener will experience attitude change. A motivated listener will actively process and make judgments about the information they hear, while an unmotivated listener- say, one who expects a familiar argument- will not think, or elaborate, on what he or she hears unless some peripheral variable creates an emotional appeal, establishes ethos, or otherwise employs propaganda techniques. While listeners may tune out listening to an expert, expecting to either accept or reject the expert opinion, information presented by a non-expert- someone potentially less trustworthy- causes the listener to elaborate. In addition, messages presented by disadvantaged groups, messages coming from a speaker with whom the listener identifies, and messages that are unexpected from a certain source all increase the likelihood that the listener will pay attention and more carefully consider the message (Petty, Briñol, and Priester, 2009, pp. 132-143). Knowing this, a facilitative filmmaker can construct a film using techniques that encourage listeners to truly engage and process the interests and values expressed by the speaker.

In sum, a strategically planned, filmed, and edited documentary film exploring stakeholder interests and values can theoretically facilitate mutual understanding and conciliation between stakeholders. This, in turn, can allow the parties to engage in logrolling under an expanded basket of benefits in the cooperative negotiation process. The film serves as a fourth party, much like online dispute resolution or Decision Support Systems. However, since viewers are active and evaluative consumers of media, a film has the potential to assist stakeholders as they appraise and gain deeper understanding of both their own and others' values. For these reasons, documentary films developed by the "facilitative filmmaker" have seemingly great potential as a facilitative tool in multi-stakeholder water resource cooperative negotiation. To test this hypothesis, I analyzed a policy decision (the Columbia River Treaty discussions) to determine whether film would be an appropriate intervention, crafted a facilitative documentary featuring a diverse set of interests and values, premiered the film to a group of stakeholders, and assessed the film's utility as a facilitation tool via both qualitative and quantitative feedback. My specific objectives for the study are described below.

Objectives

The goal of this study was to test the potential of a documentary film as a facilitation tool. Before intervening with a film, however, I needed to determine whether a facilitative film was an appropriate intervention in my case study area. Thus, my first goal was to analyze the Columbia River Basin and Columbia River Treaty policy decision to identify opportunities for learning. My next goal was to create the film, a process that involved compiling interviews from around the basin. Finally, I needed to test the film as an intervention strategy. By measuring the values and empathy of stakeholders before and after documentary viewing, I hoped to observe whether viewing the film caused a significant difference in these variables. I also assessed whether stakeholders brainstormed new scenarios for the basin (which represents the political space or expanded basket of benefits) after watching the film. My goals for the study can be broken into the following objectives:

1. To analyze the Columbia River Treaty policy situation in terms of systems thinking, resilience, and learning;
2. To identify a strategy for intervention in the Columbia River Treaty dialogue;
3. To interview a broad array of stakeholders representing diverse values;
4. To translate these interests and underlying values into a brief, facilitative documentary film;
5. To show the film and measure its effects on stakeholders' understanding and empathy, dialogue, and scenario development (through pre- and post-viewing surveys);
6. To draw preliminary conclusions about the documentary medium as a facilitative tool in the cooperative negotiation process;
7. To document values and interests in the basin for potential future consideration by policymakers, for water resource managers around the world, and for posterity.

At the start of this process, I suspected that the stakeholders would illuminate a diverse basket of benefits in the Columbia Basin- expanding beyond those needs and benefits identified in the 1964 treaty. Furthermore, I hypothesized that viewing the documentary would increase stakeholders' understanding of one another's interests and values, provoke dialogue, and spark ideas for new ways to share benefits in the Columbia River Basin. I

expected that the film would be generally well received as a helpful facilitation tool in the multi-stakeholder collaboration process.

Case Study: The Columbia River Basin

The Columbia River Basin (figure 1) is the roughly the size of France, spanning 259,500 square miles across seven U.S. states and the Canadian province of British Columbia. Originally the wild and unrestrained home of diverse wildlife, including salmon, and the trading place of Native American tribes, the Columbia River was transformed by colonial influences to fit the transportation, trade, and energy needs of the European settlers. Locks and dams created to harness the river for human needs completely changed the face of the river, transforming it to enable population growth and settlement in the basin (Cosens, 2010).



Figure 1: Map of the Columbia River Basin and major dams (U.S. Army Corps of Engineers, 2003)

With the formation of the International Joint Commission in the 1940s, the U.S. and Canadian governments started discussions concerning flood control and hydropower on the Columbia River. A devastating flood in 1948 hastened the discussions, and formal negotiations for a Columbia River Treaty began in 1961 (Cosens, 2010). The resulting agreement would provide the U.S. with sixty years of purchased flood control via storage in Canada, as well as controlled flow and hydropower benefits. In return, Canada received three U.S. financed dams, \$65 million for the sixty years of flood control, and one-half of the increase in U.S. hydropower revenues (Columbia River Treaty, 1964; Hyde, 2010).

The Columbia River Treaty was admired across the world as the “pinnacle of international cooperation on freshwater resources.” However, three main reasons exist to reexamine the arrangement: 1) purchased flood control stipulated in the treaty ends in 2024, 2) relevant basin stakeholders and legitimate sovereign entities (i.e. tribes and first nations) were not included in the original negotiations, and 3) many contemporary values for the river are not reflected in the 1964 treaty, either due to omission or due to shifting values and perspectives over the last several decades.

The Columbia River system has changed over time, as have stakeholders’ needs and values. Some of these changes occurred alongside the river’s development, and some occurred because of it. Flood control and hydropower benefits, along with irrigated agriculture, fueled development in the region, allowing the non-native population in this area to settle and thrive. Additionally, transportation and recreational value increased with these developments.

At the same time, these large-scale engineering projects completely disrupted the natural flow of the river, which profoundly altered the river ecosystem. In the 1960s, salmon were not included in the management scheme for the Columbia. Today, salmon are often represented as cultural, economic, and environmental beacons of the Pacific Northwest. Yet, the dams on the Columbia have completely shifted the relationship between people and salmonids. Salmon are anadromous: they travel from the ocean upstream to mate and lay their eggs. Dams, as physical barriers, prevent salmon from reaching their traditional breeding grounds. Today, as the United States has recognized salmon as a benefit of the

river worth preserving- in both public opinion and via the Endangered Species Act- some dams have been retrofitted to allow salmon passage (BPA, U.S. Bureau of Reclamation, & USACE, 2010). Still, the dams change the river in many other ways, and the way that the river is managed (higher low flows and lower high flows) makes ecosystem health- for salmon and for a variety of other ecosystem services- a constant struggle and debate in the region.

Additionally, treaty management of the Columbia neglected cultural values of the river. Places of cultural significance, such as Celilo Falls- a traditional Native American fishing and trading area- and cultural sites submerged in the Canadian storage reservoirs, were destroyed or severely altered by the hydropower/flood control projects. Beyond just place, these changes affected traditional practices, foods, even language. The wounds still felt by both indigenous and non-indigenous communities throughout the basin create additional conflict as groups work to preserve what is left, restore what is possible, and seek reparations for what is irrecoverable.

In sum, the management of the river has led to large-scale shifts in the system. Some of these changes occurred because values were different at the time the treaty was written, and others relate to the lack of representative voices at the negotiation table. All these things combined, one can see how the various values and interests in the basin seem to be in competition, thus creating conflict.

At the same time that conflict can manifest through legal or political battles, there is the possibility for conflict transformation through dialogue. The purchased flood control benefit for the United States expires in 2024, at which point flood control switches to a "Called Upon" scenario. Concurrently, September 16, 2024 is the soonest that either the U.S. or Canada can terminate the treaty, pending ten years' prior notice (CRT 1964). Thus, the potential uncertainty in the future of the treaty creates a unique opportunity for the federal, sovereign, and non-sovereign stakeholders to have a discussion about what future management of the Columbia should look like. As 2014 approaches, stakeholders and sovereigns are engaging one another in dialogue to determine the best way to proceed. If handled well, this situation could be an invaluable chance to build peace and cooperative

management in the Columbia River Basin, once again setting an example to the world of what transboundary cooperation can be.

To these ends, the federal entities charged with managing the Columbia River Treaty are conducting what is known as the 2014/2024 review. On the BC side, the BC Ministry of Energy & Mines- not BC Hydro- is conducting the Canadian treaty review process. On the United States side, the goal of this review process is to conduct a technical and political assessment of the treaty and make a recommendation to the State Department by September 2013 regarding continuation, termination, or modification of the treaty. In doing so, the USACE and Bonneville Power Administration (the operating entities for the United States) established a technical review team and sovereign review team consisting of representatives from the 11 federal agencies, 4 states, and 15 tribes (Stephan & Rea, 2011). Following an initial joint technical research project with the BC entities (Phase I studies), the US sovereign review teams are currently examining a set of alternatives- continuation of the status quo with called upon, termination, and modification to include ecosystem function- for future Columbia River Management (Golightly & Bagdovitz, 2011). Stakeholders in the basin are concerned that the third alternative, modification, will not receive adequate attention in light of the fast-approaching 9/2013 deadline.

Some hope that scenarios and discussions that cannot occur in the formal process will take place in the Columbia River Treaty Symposiums. These informal gatherings of professionals, academics, and stakeholders in the basin, have the goal of sparking the discussion about these values and future scenarios for the Columbia. The Symposiums serve as a "parallel track" to the formal process, and they represent a type of Multi-Stakeholder Platform (MSP), which is defined by the IUCN as "a part of governance in which different stakeholders are identified and, usually through representatives, invited and assisted to interact in a deliberative forum" (Dore, Robinson, & Smith, 2010). These MSPs have the objectives of "sharing knowledge and perspectives," "generating and examining options," and "informing and shaping negotiations and decisions" (Dore, Robinson, & Smith, 2010). At the November 2010 Symposium, participants demonstrated a strong desire to develop the "basket of benefits" in the Columbia. Although the Symposium brought forth several values and scenarios, the stakeholders and decision makers have a pressing need for a more

comprehensive understanding and evaluation of the values and points of leverage in the system so that they can better identify areas where benefits can be shared effectively.

Because of its intricate jurisdiction, complex physical environment, and the diverse social and economic values in the basin, the Columbia River and its governance are well suited for examination via complexity theory and techniques from systems and resilience thinking. This type of analysis is timely and relevant to the current treaty review processes. Moreover, as the dialogue intensifies nearing the 2014 treaty decision, careful analysis and strategic intervention have the potential to transform conflict towards more resilient, cooperative management.

Policy decision analysis

Thus far, I have introduced my research question and objectives, described the theoretical progression of ideas that led to my hypotheses regarding film as a facilitation tool, and introduced my case study area, the Columbia River Basin. Before I discuss the process of creating and evaluating the film, I will first provide an analysis of the Columbia River Treaty policy decision that identifies opportunities for enhanced resilience and learning in the system.

I will evaluate the policy situation in the context of resilience theory, drawing on Walker and Salt's (2006) framework for analysis. First, I will describe the framework I plan to use. Then, I will break down the social-ecological system to identify drivers and state variables. I will identify thresholds, discuss briefly what resilient management might look like in the basin, and explore the decision space to determine leverage points in the system.

Then, I will assess opportunities for collaborative learning in the Columbia River Basin. I will apply Walker's Progress Triangle, looking at the situation in terms of process, relationships, and content, and I will conclude with a discussion of the learning opportunities I identify in relation to my film project.

Evaluating the Columbia River Treaty: A framework for assessment

Resilience and adaptive management are buzzwords in environmental management, but what do they mean, and how can we apply these concepts to actual on-the-ground

environmental problems like the Columbia River Treaty policy decision? The following paragraphs describe Walker and Salt's (2006) framework for assessing and improving resiliency. This framework will be applied to assess the Columbia River Treaty in the following section.

The first step towards thinking about socio-ecological issues from a resilience perspective involves gaining a clear understanding of the system (Walker & Salt, 2006, pp. 11, 119). One must take time to identify the variables at play in a system and to assess their interactions. What are the linkages between the various scales and sectors? What are the slow variables involved? While it is easy for humans to notice and react to sharp, marked changes (natural disasters, disease outbreaks, etc.), we often tune out changes that are more gradual. Although change is not inherently bad, these slow changes can reach tipping points with grave consequences (Walker & Salt, 2006, p. 10). Therefore, to manage a system for resilience, we must consider these variables and their influences on the system.

After developing a robust picture of all the variables and interactions in the system, the next challenge is to determine thresholds beyond which the system cannot rebound. According to Walker and Salt (2006, p. 11), "social-ecological systems can exist in more than one kind of stable state. If a system changes too much it crosses a threshold and begins behaving in a different way, with different feedbacks between its component parts and a different structure." This marked change constitutes a "regime shift" in the system (Walker & Salt, 2006, p. 11). Because thresholds could be social or ecological, it is important to consider both types when evaluating for resilience.

Next, one must evaluate the system for cross-scale connections and adaptive cycles. This step is central to the resilience approach, and it is a key difference between systems thinking and resilience thinking. A systems thinker takes a snapshot of the entire system and evaluates the various connections between variables, but a resilience thinker also considers how that system operates through time (Walker & Salt, 2006, p. 11). The temporal aspect of the system- called the adaptive cycle (made famous by C. S. Holling and L. Gunderson's *Panarchy*) - is often characterized by four phases: rapid growth, conservation, release, and reorganization (Gunderson & Holling, 2001). However, a system might be in different phases of this cycle depending on scale and variable of interest. For instance, the economy on the

regional scale might be experiencing rapid growth, while more localized fish and wildlife populations are going through a period of collapse (release). Considering both the temporal variables and the way they interact over time and space is critical in managing a system for resilience (Walker & Salt, 2006, p. 11).

Finally, the greatest challenge is to attempt to operationalize a management framework that takes the four-dimensional (space, time, social, ecological) multi-scale system into account (Walker & Salt, 2006, pp. 11-12). How do policymakers make decisions that are designed to be resilient, or, in other words, designed to account for all variables and potential thresholds in a system including those that the decision makers cannot predict? To be optimally successful, the resulting management framework must be able to adapt to new realizations of thresholds that were not apparent when the management framework was put into place. What is the ability of the actors in the system to manage for resilience (“adaptive capacity”)? Management frameworks should enhance the capacity of actors in a system to either move the threshold or move the system farther from the threshold (Walker & Salt, 2006, pp. 11, 119).

In sum, analysis of a system from the resilience perspective requires one to first think in a systems perspective, and then take that understanding to the next level by incorporating scale and time issues and by determining thresholds. While daunting, this focus on resilient (or adaptive) management has great potential that is worth exploring in greater depth. In the following section, I will evaluate the Columbia River Treaty from a resilience perspective to determine what this point of view offers to the management dialogue. Then, I will conclude by reflecting on resilience as a framework for evaluation and management of complex social-ecological systems.

Systems, resilience, and the Columbia River Treaty

Social-ecological system

The Columbia River system is well suited for exploration from a resilience perspective. Many social (e.g. economics, culture, agriculture, industry, spirituality, development, institutions, recreation) and environmental (physical and ecological) variables are at play on various different scales, from international to regional, state, and local. In the

current Treaty framework, the main actors are the U.S. and B.C. governments, with three operating entities: Bonneville Power Administration and the U. S. Army Corps of Engineers on the U.S. side, and B.C. Hydro on the B.C. side.

The treaty manages for hydropower and flood control on the international/regional scale, but these management decisions have repercussions on the physical and ecological system- completely shifting the hydrograph, altering fish and wildlife habitat, and affecting ecosystem services. Additionally, human systems are affected. The treaty and subsequent hydropower and flood control gains, as well as agriculture and transportation, led to local and regional development, particularly in the floodplain. On the other hand, the treaty negatively affected cultural resources (traditional hunting and fishing grounds as well as burial sites).

Over the last half-century, many slow changes in the system have become evident. The population in the region has grown greatly. However, the industries of importance in the 1940s- logging, aluminum smelting, etc. - have changed significantly. The recognition of tribal rights and autonomy has increased, as has the importance of public participation and dialogue in democratic decision-making processes. Additionally, the value placed on fish and wildlife habitat (particularly salmon) and ecosystem services has changed.

On the physical side, the dams (hydropower and flood control) in the system have shifted the hydrograph, the flow and shape of the river, and the ability of the system to support native vs. non-native species. Climate change is another slow change, the effects of which to the Columbia River Basin and its human and non-human inhabitants are still unclear.

To begin to understand the complex interactions between management and values in the system, it is helpful to utilize a visual depiction of the elements in the system and their interconnections via a situation map (system map, concept map). Figure 2 shows a simplified diagram of the Columbia River Treaty policy situation, focusing specifically on the values and management mechanisms in the social-ecological system.

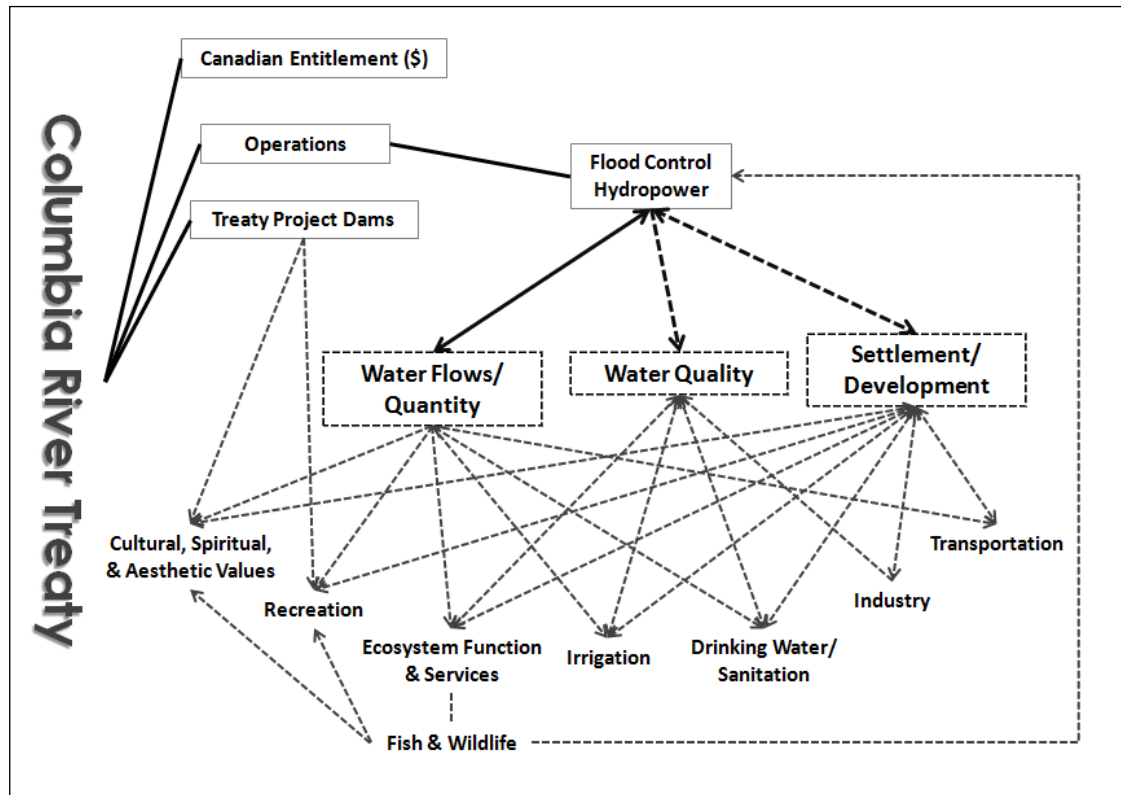


Figure 2: Simplified situation map of the Columbia River Treaty management mechanisms and affected values

All of these changes over time reflect the adaptive cycles described by Gunderson and Holling (2001). Behavior schemas take over and grow to the point of breaking, as with the logging, trapping, and aluminum industries, or with the hatchery fish- which repopulated but eventually weakened the genetic diversity of the salmon stock in the Pacific Northwest. Many of the social, physical, and economic systems are arguably at a point of release as we push ever closer to exceeding the thresholds of the system to respond.

Thresholds

In the physical system, climate change could certainly reach a tipping point beyond which the entire system would change. Increasing temperatures may lead to more water falling as rain than as snow in the mountains, further altering the timing of flows on the river. Whereas historically, the timing of flows synchronized well with energy demands in the region, future flows may be asynchronous with the traditional hydropower management

framework. Without the option of water storage in glaciers and snowpack, managers will have to reframe the way they think about either storage or power. Over the coming decades, they will likely have to do both.

Additionally, if the water temperature in the main stem and side channels heats past a certain point, salmon will be less adapted to thrive in the system, while nonnative species accustomed to warmer water (like the largemouth bass) will be increasingly favored. Some already suspect that in the future, salmon will shift north to the colder waters of Alaska. This will create a dilemma in the region between managing the river based on past conditions- when water was colder and flows more predictably dynamic- or managing based on a climate-altered system as the “new normal.”

Furthermore, the Columbia has traditionally been managed for having “too much” water (i.e. flood control drove the formation of the Columbia River Treaty), but future conditions may require management for just the opposite. If population and irrigation demands increase past a certain point (especially if combined with climate change and decreases in snowmelt), water shortages could become an issue in the Columbia Basin- a system historically managed for surplus (not deficit) water. A decrease in flows would totally change the way managers look at the river.

On the other hand, increased flows push the envelope of how much the entities can manage for flooding in the Basin. Increased water during the spring might be more than the system could handle. If this happened, we could see high cost damages due to flooding of heavily developed areas in the floodplain.

Along a similar thread, many dams are created with an expected useful lifespan. A dam that fails or can no longer perform under the circumstances could cause problems with which the current treaty framework is unprepared to deal. It was for these reasons that the flood provisions in the treaty were set to expire in 2024; the original negotiators assumed that a new framework would need to be put in place.

While the magnitude of the above-mentioned events is fairly high, the probability of them happening is lower. On the other hand, other institutional thresholds that are more probable can also have large (yet not as obviously tragic) effects. Changes in domestic and international geopolitical priorities could quickly trickle down to affect management of the

Columbia. For example, funding decisions, changes in government leadership, or policy changes could affect the operating agencies' ability to perform their duties- or even change what those duties are.

Likewise, at the institutional level, the treaty is not particularly resilient. The management lies with only a few operating entities (subject to the concerns of funding and government change listed above), and the treaty cannot be easily changed to adapt to changing needs and values. For example, in the U.S., Congress would have to pass amendments or a new treaty by a two-thirds vote, and that is incredibly daunting in today's political climate. In figure 3, one can see just how complex the institutional system is, from the Columbia River Treaty management structure to the Treaty Review process. Even the sheer geographical dispersal and scale of stakeholders, combined with the breadth of interests represented in the basin, reflect the institutional complexity of the management decision. Note in the figure that parties are divided by country and by institutional body.

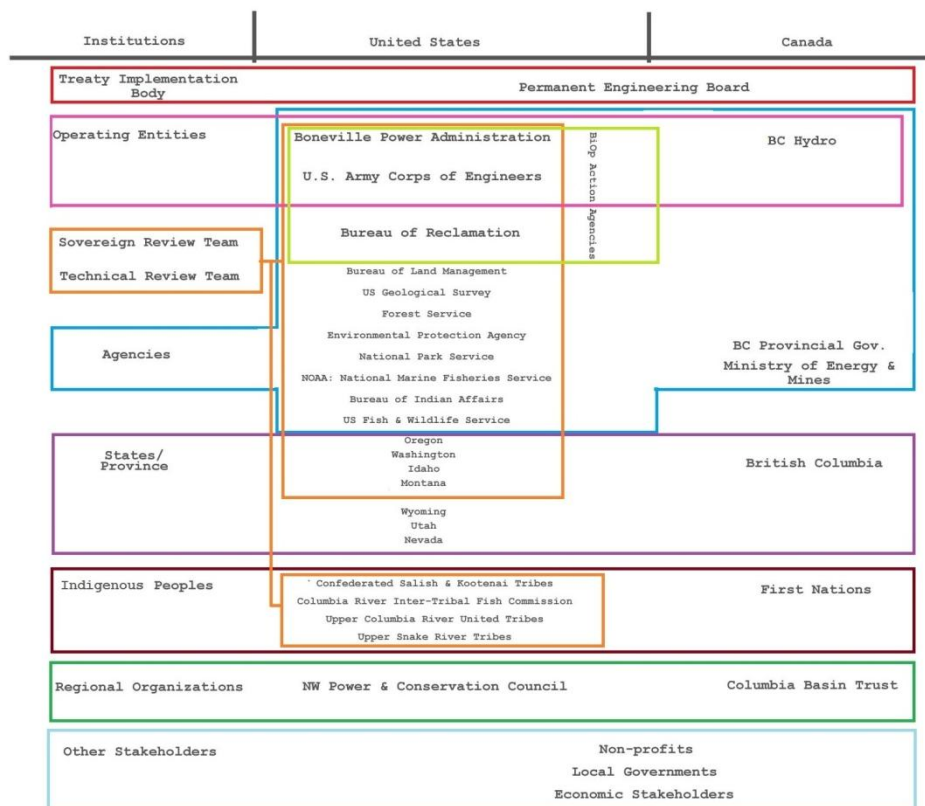


Figure 3. Institutional diagram of entities and stakeholders involved in various aspects of high-level Columbia River management

Both the lower probability, high magnitude and high probability, moderate magnitude risks reflect weaknesses in the system's resilience. As we approach thresholds and reorganization phases in many of our systems, managers in the Columbia Basin are ideally positioned to create a more adaptive, resilient framework to respond to temporal phases and changes over the next many decades.

Resilience framework

Although many have the tendency to think in terms of optimization and efficiency, this framework relies on averages and does not consider changes over time and potential thresholds. It also favors only a limited set of pigeonholed values that are not flexible to adapt to the nuances of societal needs and values shifts over time (Walker & Salt, 2006, pp. 7-8). A more resilient framework would disperse management among more entities (representing more interests) and allow decisions about management to be revisited more frequently. This type of adaptive management framework would greatly increase the basin's ability to respond to both predicted and unforeseen changes and risks. Though it would involve more institutionalization, more time and effort, and more redundancy, the savings in catastrophic regime shifts make the process worthwhile (Walker & Salt, 2006, pp. 7-8). Ultimately, managing for resilience creates a more flexible, adaptive system that better suits the needs of all the users and potential changes the system may encounter.

Decision space

The thought of a policy decision that manages for all the values of the river seems so complex that it is intangible. However, visualizing the system simplifies the decision because it allows for the identification of leverage points. Some variables, when shown in a system diagram, stand out obviously as keystones of influence.

For example, the system's diagram (figure 2) shows the influence of treaty operations on many of the values, separating them by mediating variables (represented in dashed line boxes: settlement/development, water quality, and water flows/quantity). All other variables shown below those mediating variables change as a consequence of one of

the mediating variables changing. Because I framed the system in this way, it became apparent that the mediating variables were really the areas that need to change in order to manage for the various other values. Particularly because water flows affect many other variables and are managed directly (represented in figure 2 with a solid line) via the treaty, managing for water flows would have a profound affect on the other variables.

To find the true leverage point, though, we must trace backwards through the system to find the management decision. When we do this, we find that treaty operations for river flow/quantity is probably the most viable policy leverage point to affect change in the system. This greatly simplifies what a policy change might look like, and it begins to answer a critical question being asked in the basin: can we manage for other values within the framework of the current treaty?

This analysis seems to suggest that ecosystem services and other system values can be managed through the same mechanisms used for management of hydropower and flood control in the past (though the question still remains as to whether the language permits a shift from “maximum hydropower benefit” to a more diverse basket of benefits). However, by diagramming the system and looking for leverage points, the idea of decision space becomes more tangible. Because stakeholders can see the physical currency of the exchange (e.g. water quality, quantity via treaty operations), they can visualize the decision space and have realistic discussions about how to operationalize the various values, thus creating more productive and meaningful negotiations.

Collaborative learning and the Columbia River Treaty

Considering the upcoming changes to flood control in the Columbia River Basin, the possibility of treaty termination, and the array of opportunities to bolster resilience in the social-ecological system, the basin is at a critical turning point in the management of the Columbia River. For better or worse, what happens in the next couple years will have profound effects on the future management of the Columbia River Basin. The basin could move towards a future of resilient, adaptive management that sustainably shares benefits amongst diverse users, or it could continue down the traditional utilitarian path. Because of a societal shift towards more participatory processes (as is evident through the 2014/2024

review), the end result will likely fall somewhere between these two extremes. However, interventions to promote collaborative learning and systems/resilience thinking could be particularly effective during this reevaluation stage to guide decision makers towards more equitable, sustainable solutions.

Evaluating knowledge and information gaps via the “progress triangle”

To decide where and how to intervene, it is prudent to first evaluate the situation and look for problem areas. The “progress triangle” is an effective framework for such analysis. The three points of the triangle represent the three fundamental aspects of a conflict: procedural, relational, and substantive (Walker, 2010). In relation to the Columbia River management situation, each of these aspects illuminates needs and potential areas for collaboration.

Procedurally, as parties are looking at 2014 as a chance for meaningful participation towards a better future, the Columbia River Basin is in a “ripe” position for constructive action. The utilitarian, engineering, government agency-based approach of the past successfully accomplished its goals of producing hydropower and managing flood; however, this approach was unable to adapt to the changing values over the past 45 years. Federal mandates, such as the Endangered Species Act and Biological Opinion reports, have pushed the operating entities from the top-down to meet environmental goals, but attempts to meet these goals within the utilitarian treaty framework are awkward and produce additional conflicts that often lead to litigation (Hyde, 2010).

Today, environmental decision-making and adaptive governance structures that integrate social and ecological systems with public participation are recognized as key for achieving sustainability goals (Berkes & Folke, 1998). Agencies are tasked with involving stakeholders in environmental management, particularly those who have been historically underrepresented or disproportionately affected (Executive Order No. 12898, 1994). As such, the federal agencies (i.e. the USACE and BPA on the U.S. side and the Ministry of Energy on the B.C. side) are attempting to engage stakeholders through a controlled participation process. This process involves a select group of state, agency, and tribal representatives who “listen” to public opinion at listening sessions and hold meetings to

learn about substantive issues in the basin. While this is a big step forward from the paternalistic method of the 1960s, it still excludes or gives little meaningful participation to the public and many regional NGOs. While the leaders of this process seem to be genuine in their interest in consensus and public participation, they are confined by the mandates of their positions.

Stakeholders are also participating unofficially through the transboundary Symposia on Columbia River Governance. These meetings, facilitated by impartial university faculty in the region, serve as a more open forum for collaboration. This parallel track has no official decision-making power, but it can serve as an impetus for collaboration and consensus that can spread to the official track via participants who engage in both the official and unofficial processes.

Relationally, many stakeholders feel they “know” the worn positions of the other side, but there is a considerable gap in understanding the values and interests behind the positions. Sometimes, this “knowledge” is mere speculation (e.g., right now, the U.S. can only guess what the Canadian government wants regarding the treaty). Other times, this knowledge is based on stereotypes and anecdotes rather than meaningful dialogue.

Some parties are advantaged, particularly the agencies and state/provincial actors. Others have unique status, like the tribes and First Nations, but the respect and power given to these actors varies considerably. For instance, these groups were excluded from the original treaty process despite being sovereign stakeholders, but they have considerable sway in exercising rights established in pre-existing treaties. Some parties, like the tribes, have the means and legitimacy to take matters to court if a negotiated settlement does not materialize, but others, such as the citizens impacted by the Canadian treaty reservoir operations, have little power to seek reparations. Thus, building relationships and shared understanding amongst stakeholders is a critical priority.

Substantively, the Columbia River is a wicked problem. The issues are complex, multifaceted, and multi-scale, and the various needs and values in the system are at conflict with one another. For example, jurisdictionally, the Columbia Basin is managed by a dozen federal agencies, two federal governments, provincial and state governments, local districts, and tribal governments, most of which overlap with one another. The hydropower and flood

control needs are most obviously in competition with the ecosystem functions and values. Effects of the current management scheme affect users differently depending on scale and location. Many of these interactions and effects are poorly understood. The science is continually evolving, but the technical and scientific complexity of the issues make them opaque, thus reducing the ability of many important stakeholders to meaningfully engage. At the same time, those with considerable technical expertise become overwhelmed at the prospect of integrating more values (e.g. ecosystem, culture, etc.) into an already complex optimization schema.

However, in the substantive arena, there is great potential for parties to learn from one another to achieve a more holistic understanding of the elements and interactions in the system. The technical, logical knowledge of some parties could be complemented by intuitive, spatial, cultural, or experiential knowledge of other stakeholders. At the same time, shared learning and understanding about the system can help transform relationships amongst parties from competitive to cooperative, which creates the negotiating space necessary to manage the system holistically (Dore, Robinson, & Smith, 2010).

Implications of learning opportunities for facilitation

The Columbia River Treaty policy decision situation is ripe for conflict transformation. From the resilience analysis, it is obvious that the Treaty decision has both the potential for enhancing resilience and the mechanisms (leverage points) that could affect change in the system. However, there remain gaps between participants both relationally and substantively. Conversely, there exists a great opportunity for stakeholders to learn about one another's interests and values while also gaining an enhanced shared understanding of the system. As such, a strategic procedural intervention- such as a facilitative film- has the potential to create drastic positive change towards meaningful participatory dialogue (relationships) and holistic systems and resilience thinking (substance).

Justification

A need for intervention

The analysis of the Columbia River Basin as a social-ecological system and of the Columbia River Treaty policy decision highlight the opportunity for increased resilience and the need for participants to engage in collaborative learning about one another and the system. As the future of the Columbia River Treaty becomes uncertain, there is an increasing need for stakeholders from the three social solidarities (hierarchical regulatory, individualistic market, and civic egalitarian) to engage in cooperative negotiation towards an expanded basket of benefits and mutually acceptable scenario development. Though many of the stakeholders are already forging into developing scenarios for the basin, the critical step of sharing interests should not be shortchanged. On the contrary, even during scenario development, a deeper exploration of the values and interests of different parties has the potential to create more "political space" and can expand the range of possible scenarios for the basin. Therefore, strategic facilitated efforts towards fostering sharing and deeper understanding of stakeholder values would not be amiss.

Intervention for a resilient future: Learning through film

As determined through the policy decision analysis, stakeholders lack true understanding of the values and interests behind the positions of the various parties invested in Columbia River management. Though there are two parallel tracks for stakeholder participation, both have weighed heavily towards traditional technical presentations as the main learning experience. Through the Symposia, stakeholders have more opportunity (than in the official track) to incorporate their values and interests into scenario development, and the rotating location of the symposia allow stakeholders the opportunity to experience the local impacts of the treaty, meet, and interact with local citizens and stakeholders. For example, the October 2011 Symposium in Kimberley, B.C. included a field trip to the Koochanusa Reservoir where participants toured the reservoir on a houseboat, then attended a local stakeholder meeting (hosted by a regional NGO) where they interacted directly with concerned locals affected by the Treaty dams. While this interactive experiential learning experience proved very effective (much of the dialogue after the field trip was markedly

influenced by the experience), it would be impractical to do this at a basin-wide level given the 2014 timeframe.

As a second-best alternative, if one cannot bring the decision-makers to the field, one must bring the field to the decision-makers. Media, such as documentary film, provide an ideal outlet to condense stakeholders' stories and values into a widely available and digestible format. The facilitative filmmaker can identify parties' interests by interviewing a diverse and representative sample of stakeholders, with the camera rolling as a silent yet fully attentive listener. Then, the film editing process can summarize, clarify, reframe, and demonstrate that parties share many of the same underlying interests and values, while editing out positional statements that are destructive to the collaborative process (Moore, 2003, p. 77). Communicated to the viewer (e.g. other stakeholders), then, this type of film could foster mutual understanding, empathy, and respect between parties.

Like a fieldtrip, this method allows the viewer to "travel" to the various ends of the basin, see and hear the voices of the stakeholders, and more importantly, hear their stories, values, and interests uninterrupted. Carefully crafted, this type of film can give voice to historically disadvantaged parties while also allowing the agency heads to show their more human side, thus helping stakeholders to see and understand one another better at the same time that they learn about more complex substantive matters. Additionally, as with a field trip, integrating opportunities to discuss the experience after watching a facilitative film allow parties to ask questions of one another, clarify, or even evaluate what they viewed collaboratively.

Consequently, because of the opportune timing and the already existent Multi-Stakeholder Platform, the Columbia River Basin is an ideal natural laboratory in which to test the ability of strategically planned documentary films to facilitate cooperative negotiation and water conflict transformation. If a facilitative documentary is successful in the Columbia, it has the potential to inspire a more positive, collaborative future for the basin. Furthermore, it could expand the range of possibilities available to facilitators concerned with the constructive engagement of stakeholders in transboundary water resource planning, decision-making, and implementation.

Procedures

Now that I have analyzed the Columbia River Treaty policy decision (Objective 1), determined opportunities for learning in the system (Objective 2), and justified film as an appropriate intervention, I will discuss the procedures I followed to achieve my other research objectives (Objectives 3-7): namely, the creation of a documentary film and testing of that film as a facilitation tool in the Columbia River Basin. To achieve these objectives, I employed a two-pronged approach. The first prong involved compiling materials, data, and filmed interviews into a short documentary film on the interests and values in the Columbia River Basin (film title: *A River Loved: A film about the Columbia River & the people invested in its future*). The thoughtful and strategic development of the film was critical, as the quality of the presentation (like the competence of a facilitator) would determine whether the film had the intended transformative effect. The second prong of the study was the formal experiment, which involved a pre-treatment survey, the film viewing (which is the experimental "treatment"), and a post-treatment survey. I analyzed the pre- and post-viewing surveys quantitatively to determine whether a statistically significant difference was observed as a result of the film viewing. I analyzed some data qualitatively to glean deeper insight into the effects and perceptions of the film. Together, these two prongs allowed me to meet my objectives and answer my research question.

Documentary filmmaking

Filmed interviews

I videotaped semi-structured interviews with stakeholders representing the spectrum of interests in the basin. At first, I put out a call for interviewees and allowed stakeholders to self-volunteer, and then I followed up by reaching out to individuals representing interests that were not represented in the voluntary interviewees. I began this interview process in late spring, but the bulk of my interviews took place in August and September of 2011. Ultimately, I was able to interview 14 stakeholders across Oregon, Washington, Idaho, and British Columbia, including federal agency representatives, academics, tribal and First Nation leaders, and nonprofit organization representatives. I held the interviews in natural settings convenient to the interviewees, and I employed the

facilitative technique of asking directed, open-ended questions (Moore, 2003, pp. 255, 258) to encourage the stakeholders to elaborate on the underlying values that shape their interests. For a list of sample interview questions, see Appendix 1.

The filmmaking process

Throughout the editing process, I strived to remain as neutral and objective as possible, making sure that I did not favor one interest, value set, or social solidarity over others. I worked to present each interviewee's perspective fairly and in the best light by incorporating each speaker's most poignant points, editing out stutters and misspeaks, and using illustrative and/or emotional footage to increase the listener's empathy and respect for the speaker. I focused on highlighting each interviewee's unique ethos, which gave the speaker credibility through history, experience, or commitment. I also incorporated logos, the facts and logical arguments each speaker used to support her or his point. Documentary films can stop here, presenting logic and fact from credible speakers, but ethos and logos alone are insufficient for the purpose of creating empathy amongst parties. Credibility and logic can build respect, but cultivating empathy requires a third element: pathos (Ramage & Bean, 1998, pp. 81-82). I wanted the audience to connect with each speaker at a deeper level, and to do this, I needed to create an emotional appeal. To do this, I blended emotional moments from the interviews (passionate statements, stories, facial expressions, etc.) in with the statements of ethos and logos. As a post-enlightenment society, we tend to tease these elements apart- keeping emotional and spiritual appeals hidden away when debating policy and management issues. However, to transform the situation and lead to sustainable change, I strived to present each speaker as a holistic, multifaceted human being.

Drawing from the Elaboration Likelihood Model, I attempted to frame the interviews in ways that would increase the likelihood that the audience would think more carefully about the various interviewees' interests and values, and subsequently, to increase the potential for the listener to be persuaded to value the speaker's interests more highly (Petty, Briñol, and Priester, 2009, pp. 132-143). During the interviews, I attempted to get stakeholders out of the environment and rhetoric that people would expect from that speaker. When possible, I held the interviews outside. I asked agency representatives-

known for their bureaucratic adherence to technical talks and the official government line- to talk about their families and hobbies. I asked stakeholders to share personal, historical, cultural, and faith-based stories rather than focusing only on the textbook information about the treaty. Beyond adding depth and interest to the film, these unexpectedly human moments would be a breath of fresh air to an audience used to tedious renditions of technical presentations, and in the editing room, I took special care to include as many of these moments as possible.

I used the Apple software Final Cut Studio to integrate the filmed interviews with historic and recent film footage of the Columbia River Basin. I filmed scenery, landmarks, wildlife, and people of the basin during my travels for the interviews. I used this footage to visually connect the audience with the various areas in the basin, to complement what was being said in the segment, and to create transitions between clips. Stock footage used in the film, found on Archive.org, came from the 1949 film The Columbia River: America's greatest power stream. This film, produced by the Bonneville Power Administration, featured the Columbia River songs by Woodie Guthrie and stock footage of fishing at Celilo Falls, the Grand Coulee dam construction, the flooding in Vanport, Oregon, and many other pertinent moments in Columbia River history. This stock footage served to complement the historical accounts of interviewees about the genesis of the Columbia River Treaty.

Finally, I used Creative Commons licensed music from Jamendo.com to complement the footage and interviews in each segment of the film. The music, chosen for its folksy but modern quality, was chosen to appeal to the range of audience members while evoking memories of the classic Guthrie music from the basin's past. In addition, music was used to complement the emotional charge of each section of the film. Slower, more thoughtful music carried listeners through the tougher, more emotional segments, while upbeat music was used to draw users in at the start of the film and leave them with a positive note at the conclusion of the film.

Dissemination

I made *A River Loved* available online and in DVD format for wide distribution. Using the popular video sharing website YouTube and Oregon State University's MediaSpace, I was

able to freely and easily distribute the film to all of the Symposium attendees, agencies, tribes, nonprofits, academics, and others invested in the Columbia River management decision. I gave hard copies of the film to several people who requested copies, and I emailed interviewees and symposium attendees with the link to the film once it was made available online. Many attendees- representing government agencies, regional organizations, tribes, and First Nations- approached me to request access to the film to show their constituents. Through online distribution, the film was able to reach a broad audience quickly, freely, and without the need for hundreds of DVDs, cases, and postage. As of March 2012, the film has over 650 views.

Quasi-experimental research design

Sample

To test the effectiveness of the film, I surveyed Columbia River stakeholders and sovereigns before and after the documentary viewing. The pre-treatment survey was dispersed electronically to attendees of the 2010 Columbia River Symposium in Corvallis, Oregon. This survey was delivered the week before the 2011 Symposium. Eleven people (n=11) filled out the survey, five of whom indicated that they planned to attend the 2011 Symposium.

The group that received the treatment (i.e. viewed the film) and completed the post-treatment survey consisted of the attendees of the 2011 Universities Consortium Columbia River Treaty Symposium in Kimberley, British Columbia. Forty-four symposium attendees (n=44) of approximately 60 people present for the film viewing filled out the post-film paper survey.

I intended to compare the pre-treatment and post-treatment survey results to look for significant differences between the two groups. The pre-treatment survey included a question whereby participants indicated whether they planned to attend the 2011 Symposium. Those who indicated "yes" were designated as the pre-treatment sample, and those who indicated "no" made up the base/control group for comparison. However, because of the low number of participants in the study, particularly in the pre-treatment

survey, I did not have significant statistical power to conduct a difference test analysis between the two groups.

Measures

The study consisted of two anonymous surveys. The pre-treatment survey was distributed online via Oregon State University's Business Solutions Group survey administrator tool. The survey assessed values and interests of stakeholders by asking them to rate the relative importance of different interests in the basin. Additionally, the survey asked participants to select which other variables would change if a given variable's management changed. Through these questions, I hoped to create a simple quantification of systems thinking. I assumed that participants who marked few variables were exhibiting a lower level of systems thinking, while participants displaying higher levels of systems thinking would select many variables that would change in the case of a management shift. Finally, the pre-treatment survey gathered information from participants about their goals for the symposia and collected qualitative feedback about participants' best and worst-case outcome predictions for the basin. A copy of the pre-treatment (pre-symposium film viewing) survey is available in Appendix 2.

The post-treatment (post-film viewing) paper survey consisted of the same stakeholder interest rating and systems thinking questions, but it also asked participants to give specific feedback about the usefulness of the film. For example, the survey asked, "Do you think that watching the documentary helped you to understand other stakeholders' perspectives and values better?" with choices ranging from "I understand others' perspectives less than before," to "I have a totally new understanding of others' perspectives." The survey also included questions such as, "Do you think that watching the film helped others to understand your perspectives and values better?" and "Did you brainstorm any new ideas/alternatives for Columbia River management during the documentary or while reflecting on the documentary?" Each of these questions was crafted to assess whether the film facilitated empathy, respect, and dialogue amongst participants. A copy of the post-treatment (post-film viewing) survey is available in Appendix 3.

Method

The pre-treatment web survey was distributed via email in September of 2011. Then, at the 2011 Columbia River Treaty Symposium in Kimberley, B.C., the documentary film (*A River Loved*) was shown to ~60 symposium participants during a portion of the agenda devoted to student presentations. After the viewing, participants were instructed to enter a common room with round tables and snacks available. On each table, a set of prompt discussion questions and a stack of post-film viewing surveys were available for participants to fill out and drop off at their leisure during the remainder of the Symposium. This post-film procedure was purposefully unstructured so that participants could mingle, chat, and reflect on the film, referring to the prompt questions if desired, without the imposition of rigid laboratory-style protocol. Ultimately, this time for reflection and conversation was part of the whole film-viewing experience, and allowing the post-film reflection and evaluation to happen informally was an important element of the study. Over the next few hours (through the end of the symposium events later that afternoon), participants filled out the surveys anonymously and placed them in a collection box.

Analysis and results

In the pre-symposium survey, I asked participants to describe what they thought would be the results of the Universities Consortium Symposia on Columbia River Governance. Participants could choose one or more items from a list. Nine of ten individuals who answered the question said the outcome of the symposia would be “better understanding of various parties/needs/values in the basin” and “better relationships amongst parties.” Six of ten said the symposia would result in “better-informed policy alternatives.” Interestingly, though no participants believed “the future management plan for the basin” or “a policy recommendation to the sovereign entities” would result from the symposia discussions, three of ten thought that the symposia stakeholder group might be “the beginnings of a river basin organization.” Though the sample that responded to this survey is small, it is encouraging to see that a high percentage of the sample believed that increased understanding and better relationships- facets of conflict transformation- would be likely results of the meetings.

Through the pre-treatment and post-treatment surveys, I created two sample populations that I hoped to compare using a statistical difference test; however, the sample sizes were ultimately too low to conduct a meaningful comparative analysis. Furthermore, the data I planned to compare was Likert scale rating data with relatively small and similar distributions. Between the low sample size and the means and standard deviations of the responses, the statistical power was very low. Ideally, comparative statistics require power of 0.8 or above, and each of my measurements reflected power of less than 0.2. Because of the low statistical power, I may have falsely observed differences between the two groups. Thus, since the power was so low, I chose not to conduct difference analyses.

Despite the limitations of the data for quantitative comparison, I was able to qualitatively describe differences between the two groups. When asked to “rate the following aspects of the Columbia River by how important they are in developing your preferred future management alternatives for the river” on a 1 to 7 scale (with 7 being highest), pre-film viewing participants rated the importance of the various interests and values at an average score of 4.748. The post-film viewing participants rated the same values at an average score of 5.221. Thus, post-film viewing participants qualitatively displayed greater sensitivity to the diversity of interests and values in the basin.

I also observed differences in the systems thinking analysis. For this analysis, I proposed a change in prioritization of a value in Columbia River management, and I asked participants how many other variables in the system would be affected by this change. I assumed that selecting a greater number of “affected” variables would demonstrate more awareness of system interconnectedness. When asked how many other variables would change (with up to 12 choices) if the priority given to agriculture changed in future Columbia River management, pre-film viewing participants selected an average of 3.778 other variables, while post-film viewing participants selected an average of 4.639 other variables. When asked the same question, substituting “environment/ecology” for “agriculture,” pre-film viewing participants selected an average of 4.667 other variables, while post-film viewing participants selected an average of 5.341 other variables. In each case, post-film viewing participants qualitatively demonstrated a greater sensitivity to the Columbia River as a holistic, integrated system than pre-film viewing participants did.

In the post-film viewing survey, I collected qualitative and quantitative feedback about the effectiveness of the film in facilitating understanding, empathy, and scenario development. These results of these questions were encouraging. When asked, “Do you think that watching the documentary helped you to understand other stakeholders’ perspectives and values better?” (n=43), 18 participants (40.91%) said “I understand others’ perspectives *significantly* better” and 22 participants (50%) said, “I understand others’ perspectives *slightly* better.” Three participants (6.82%) said they understood others’ perspectives no less/more than before, and one participant (2.27%) claimed to be more confused after watching the film. Overall, 90.91% of participants claimed to understand others’ perspectives better after watching the film. In addition, when asked, “Do you think that watching the film helped others to understand your perspectives and values better?” (n=41), 92.68% of participants (38 of 41) answered “yes.” Two stated that the film did not make a difference, and one claimed that the film did not convey his/her perspective well.

To address the scenario development question, I asked participants, “Did you brainstorm any new ideas/alternatives for Columbia River management during the documentary or while reflecting on the documentary?” Thirteen participants (30.95% of n=42) said they thought of a new alternative during/after watching the film. Seventeen others (40.48%) stated that they refined or improved an idea or alternative during or after watching the film. Twelve others (28.57%) reported that they did not think of or improve an idea for Columbia River management. Overall, 71.43% of participants who saw the film claimed that they either refined or brainstormed a new idea while watching or reflecting on the film.

To gain qualitative feedback on the film, I asked participants to answer the open-ended question: “What aspects of the film were most meaningful to you? Why?” Below is a selection of quotes pulled from the 32 responses.

- “The visuals depicting the river + surrounding areas really added deeper understanding of the entire system.”
- “[Interviewees’] personal feelings on cooperation and coordination and value of the river.”
- “The entirety of the field of perspectives”

- “The openness of the people interviewed”
- “It is nice to hear from people and learn about their experiences. Makes you appreciate the diversity of perspectives and realize the importance of this issue.”
- “Comprehensive and balanced”
- “The recognition of the balance between power/economic interests and ecological/social interests. Power has been lost in some recent discussions.”
- “The aboriginal perspective. It's important to realize all perspectives & I feel like this one is underrepresented.”
- “The meaning of the river to the people. The spiritual importance of the river held [especially] for First Nations.”
- “Appreciated perspectives on governance: participatory processes.”
- “That the treaty may or may not be ongoing, because there needs to be co-operation from both countries for a healthy water system.”

Many respondents referenced the broad range of parties and parts of the basin represented in the film, claiming that they appreciated hearing perspectives and seeing parts of the basin to which they are not normally exposed. Several others appreciated the attempt at balance, positive framing, and more holistic (less purely informational) take on the issue, though a few individuals suggested that I needed to include more interviews from specific groups (e.g. Canadian perspectives, representatives from every tribe/First Nation, more status quo proponents, etc.). To allow for additional feedback, I left additional space for feedback and comments at the end of the survey. Some comments provided included:

- “I think this film would help and inform people who know anything about the treaty, for example me before I came to the symposium. Also those in the general public, who do not [know] or [n]ever heard about the treaty.”
- “Well done- you have created a positive tone and encapsulated a complex story in an approachable way.”
- “Outstanding product. Should be aired on public TV.”
- “The student presentations were the absolute highlight galvanizing moment of the conference. Thank you!”

Finally, I spoke with many participants throughout the rest of the Symposium, and I made observations about the effects of the film. Many participants (at least five, including agency representatives, regional nonprofits, and tribal representatives) approached me directly to ask when and how they could get access to the film to show to their coworkers and/or constituents. Furthermore, during small-group discussions about Columbia River management, multiple participants referenced things they heard or saw during the film. Thus, the film contributed to dialogue both as an informational/reference tool and as a part of the conversation itself.

Discussion

Study outcomes and implications

Over the previous sections, I discussed the justification for my project, the methods I employed to address my research objectives, and the results of the study. Although I was not able to conduct every analysis that I planned (i.e. the comparative difference tests between pre- and post-film viewing samples), I was able to collect a variety of qualitative feedback to address my research questions. In the table below, I list each of my research objectives and the relevant results.

Table 1: Results and conclusions relevant to each research objective.

| | Objective | Relevant Actions/Results | Conclusions |
|---|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | To analyze the Columbia River Treaty policy situation in terms of systems thinking, resilience, and learning | I conducted a resilience analysis of the Columbia River Treaty situation by examining the complex interactions between elements in the system, by identifying thresholds beyond which the system would behave differently, and by assessing the decision space to | Though the Columbia River Treaty has endured for several decades, its resilience is limited by the concentration of decision-making power. This system is limited in its ability to act and adapt by the political will and priorities of the day. Furthermore, changes in |

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| | | <p>determine leverage points. I employed Walker's progress triangle to assess opportunities for learning in the system.</p> | <p>values and the potential effects of climate change may likely push the system past its thresholds. A more representative, adaptive governance structure could enhance the resilience of the system. Despite appearing infinitely complex, the management decision itself is simple. Water quantity is the leverage point that drives almost every other value in the system.</p> |
| 2 | <p>To identify a strategy for intervention in the Columbia River Treaty dialogue</p> | <p>In the learning assessment, I determined that parties needed to understand at a deeper level the true values and motivations behind one another's positions. Additionally, because of the complexity of the subject matter and the opacity of the technical evaluations of the system, some stakeholders were disenfranchised in the discussions by lack of understanding. I identified a need for a simple, digestible source of information that</p> | <p>Based on these two areas of need- relationship building and content awareness- I identified the Columbia River Treaty policy situation as an ideal case study in which facilitative film could enhance learning. Through film, I could tell the story of the basin and explain the complexity of its management (content) in a simple, engaging way. Film would also create a platform through which stakeholders and entities could share why</p> |

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| | | could bring all participants to the table with a solid understanding of the content of the discussions. | they care so much about their interests, fostering empathy and understanding (relationships) amongst participants. As such, I identified facilitative documentary film as an ideal intervention in the policy dialogue. |
| 3 | To interview a broad array of stakeholders representing diverse values | I interviewed 14 stakeholders representing government agencies, tribes, First Nations, nonprofits, and regional development organizations. Many participants who viewed the film appreciated the diversity of perspectives represented. | If possible, I would have interviewed Canadian government representatives, additional tribal representatives, and more citizens from both sides of the U.S./Canada border. However, for a short, low budget film, the spectrum of interests was sufficient. In fact, the wealth of information and stories provided by each interviewee made it difficult to choose which information to include vs. leave out of the film. Having 20 more hours of interview footage to sort through would have made the editing process exponentially more difficult. |

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| 4 | To translate these interests and underlying values into a brief, facilitative documentary film | I created a 37-minute film using filmed footage and interviews, archival footage, photographs, music, and text. | While amateur, the film captured everything I wanted to include in an accessible format. |
| 5 | To show the film and measure its effects on stakeholders' understanding and empathy, dialogue, and scenario development (through pre- and post-viewing surveys) | The film premiered it at the 2011 Columbia River Symposium. I conducted surveys before (n=11) and after (n=44) the film viewing. Because of the low sample size and Likert data collection, the resulting sample data had insufficient power for quantitative statistical difference testing. | Although I was unable to quantitatively analyze the effects of the film via the quasi-experimental design, I was able to draw qualitative conclusions and observations. See below. |
| 6 | To draw preliminary conclusions about the documentary medium as a facilitative tool in the cooperative negotiation process | Over 90% of participants said, 1) they understood others' perspectives better after viewing the film and 2) they felt others would understand their opinions better after seeing the film. Over 70% of participants brainstormed or refined an idea for Columbia River management while watching or reflecting on the film. Additionally, many participants referenced the | Participants understood one another better after watching the film. They better understood and appreciated unfamiliar perspectives. The film contributed to dialogue regarding Columbia River management, and according to the participants, it led to the development/refining of scenarios. The film proved to be a successful facilitation tool. |

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| | | film in discussions later in the Symposium or asked for a copy of the film to show others. | |
| 7 | To document values and interests in the basin for potential future consideration by policymakers, for water resource managers around the world, and for posterity | I made the film available online on YouTube and Oregon State University's MediaShare for wide distribution, and I sent the link to the film to the attendees of the Symposium. | The film captured the perspectives of the entities and stakeholders at this point in the process while also documenting the history of the Columbia River Treaty. A River Loved has already been shown to Water Resource Governance students at Oregon State University, and it can be used as both a reference and an educational tool for present and future generations of water managers. |

Note that my primary research question (Can documentary films facilitate cooperative negotiation towards more resilient management of social-ecological systems?) was explored through Objective 6, while my sub-questions (Can facilitative documentary films promote dialogue? Can they facilitate understanding/empathy amongst parties? Can they encourage parties to consider new scenarios?) were assessed through Objective 5. Though I was unable to make quantitative statistical comparisons between pre-and post-film viewing groups, strong qualitative evidence suggests that the answer to each of my research questions was a resounding “yes.”

In sum, the film was a successful facilitation tool towards conflict transformation and cooperative negotiation in the Columbia River Basin. As with a field trip, the film created an opportunity for experiential collaborative learning and enhanced dialogue through positive

framing of diverse perspectives. Other documentary films carefully crafted using facilitation techniques have the potential to enhance dialogue towards cooperation, and thus, more resilient management in complex social-ecological systems.

Future efforts in conflict transformation through film would benefit from an experienced documentary crew. I gathered some very basic experience with film through auditing an undergraduate class on documentary filmmaking, but before spring of 2011, I had no experience using any of the equipment or video editing software, and very limited experience using the Mac platform. I faced a steep learning curve, and struggled to surmount many technical difficulties (i.e. disk corruption that made it nearly impossible to finish the film) on my own that someone with more experience with the equipment and software could have better handled. Thus, I recognize that the film could have been of higher quality if I had more experience and training in film, sound, and production or if I had worked with an experienced film crew.

Additionally, future research should include more participants, post-treatment focus group interviews, and perhaps even follow-up surveys or interviews in the weeks or months after the film viewing to observe whether effects of the intervention are lasting. These types of measurements are important for assessing the long-term effects and usefulness of the intervention. Because I did not do additional follow-up measurements, I cannot be sure that the responses to the post-film viewing survey were more than temporary positive vibes in the wake of viewing the film and hearing my request for participants.

Likewise, the way I presented the film was more casual than the scientific endeavor requires. While I had prepared a script of what I would say to the audience before showing the film, I ultimately abandoned the script and spoke conversationally. I was wary of saying anything that would influence the way the participants processed or evaluated the film, but it is possible that something I said influenced the results of the study. In a pure research venture, this type of situation needs to be managed with more precision in order to avoid biasing the results. In applied research, and in this specific project, however, the introduction and framing of the film could be considered part of the larger facilitation technique. The facilitative film does not exist in a vacuum; rather, the way the film is integrated into the process is an important part of its potential utility. Therefore, I do not

recommend that future research should inject a facilitative film like this into a process with no context. Rather, I pose that the facilitative filmmaker should indeed frame the film, but do so with awareness and intention.

Finally, researchers should test other types of interventions to promote collaborative learning and cooperation in social-ecological systems. Beyond film, I describe another potential intervention- collaborative social-ecological systems modeling- below.

Proposed future intervention: Collaborative social-ecological systems modeling

To understand environmental problems from a systems perspective, managers often employ technical modeling practices, which historically occurred behind closed doors (Van den Belt, 2004; Prell et al., 2007). These models meet resistance when the assumptions and processes behind the model are opaque and when the models only consider technical/scientific knowledge about the system (Voinov & Brown Gaddis, 2008). Highly technical models are viewed as a “black box” to the public, thus discouraging civic participation (Van den Belt, 2004). Furthermore, stakeholders with high technical capacity and logical/scientific intelligence are favored in traditional approaches, while stakeholders representing a more diverse array of intelligences and values are disadvantaged (Voinov & Brown Gaddis, 2008).

However, collaborative modeling (also: shared vision planning, participatory modeling, mediated modeling) integrates stakeholders into participatory ecological modeling, which creates an environment of collaborative learning about the system and potential intervention points (Van den Belt, 2004). These approaches allow managers and stakeholders to develop a shared understanding of the system that incorporates the concerns and interests of multiple users (Voinov & Brown Gaddis, 2008).

Though collaborative modeling creates opportunity for meaningful participation of historically disadvantaged groups, this technique falls short in that the modeling process focuses on only on a fragment (e.g. only economics, only ecology) of the system (Prell et al., 2007). A truly holistic collaborative model would integrate social variables (cultural, institutional, etc.) with the environmental and economic variables into one unified model of the social-environmental system (Prell et al., 2007). After all, Jerome Delli Priscoli says:

“Many decisions thought to be purely technical are actually political, that is, they affect the distribution of values throughout society. Most managers in administrative agencies are actually managing the gray area between technical and political... We must seek to put that which we do (our technology) into the service of that which we believe (participatory democracy)” (Delli Priscoli, 2003).

Thus, to achieve sustainability, environmental managers must find techniques to reconcile the technical with the social into one meaningful, holistic stakeholder engagement process.

A participatory modeling process, like the facilitative film, would allow stakeholders to each incorporate their own values and interests into a holistic picture of the system. Stakeholders would participate in an exercise much like situation mapping, where they would draw out the values important to them and all of the factors influencing those variables. Then, the stakeholders would work together to define the causal loops, or quantitative/qualitative relationships between those variables. Finally, each stakeholders' map would be integrated with each of the others (joined at each of the overlapping variables) to create one holistic systems model. Through several iterations, the model could be tweaked and tested until it satisfied all the stakeholders involved. Unlike traditional modeling, the entire process- parameters, assumptions, etc. - would be transparent and open to the model users.

This collaborative systems modeling process could make a large impact, even if the model was never used, as it helped stakeholders to see and define the relationships between all of the complex variables in the system. It would be a true collaborative learning exercised. If used, the model would only enhance this experience. The collaborative model could be used to test scenarios and reach consensus, or it might even be useful as a tool for adaptive management. The new paradigm for adaptive resource governance is iterative, redundant, multi-layered, multi-scale, and most importantly, stakeholder-centric (Dietz, Ostrom, & Stern, 2003; Folke, Hahn, Olsson, & Norberg, 2005). A holistic social-ecological systems model built and used collaboratively could be the keystone to meeting those objectives.

Conclusion

In complex policy and management situations, such as the governance of the Columbia River Basin, complex social, ecological, and economic factors are at play at a variety of scales and phases. To effectively manage the system to meet diverse goals resiliently, it is critical that stakeholders have an understanding of one another's interests and values as well as an understanding of the substantive complexities. Collaborative learning allows participants to meet both of these objectives at once, and facilitators can spark collaboration through carefully planned interventions.

Before intervening, it is important to assess the conflict to determine the proper time, place, people, and manner of intervention to achieve positive results. In this case, the systems and resiliency analysis pinpointed the decision space and relevant leverage points in the Columbia River management system. In addition, the progress triangle provided a sturdy framework for examining the procedural, relational, and substantive aspects of the problem. In the Columbia River Basin, two areas for intervention became evident: developing shared understanding of one another, especially of historically disempowered groups, and developing more nuanced understanding of the complexities of the social-ecological system.

After determining where intervention is needed, one can plan when to intervene and what type of intervention is appropriate. In the Columbia River Basin, I proposed a facilitative documentary film, crafted to allow diverse parties to explain their values and share their knowledge of the system. My vision for this project was to start the conversation about bringing dynamic media into the facilitation of complex transboundary environmental negotiations. I produced a short documentary film illuminating interest and underlying values in the Columbia River Basin, and then I showed the film to a group of stakeholders and assessed the effects of the film viewing. I attempted this intervention at the 2011 Universities Consortium Symposium on Columbia River Governance in Kimberley, British Columbia.

The results of the study are strong evidence that the film illuminated better understanding of interests and values, better dialogue, and new scenario development amongst stakeholders in the basin. Over 90% of respondents said that they understood others' perspectives better after watching the film, and about the same amount claimed they

thought others who watched the film would understand their personal perspective better. Both of these results suggest that the film was successful at building shared understanding amongst parties, which is an important component of conciliation (promoting trust, understanding, respect, and cooperation) in the negotiation situation (Moore, 2003, pp. 166, 173-83). In addition, ~70% of respondents developed or refined an idea for Columbia River management while watching the film, possibly suggesting that many respondents gained an enhanced understanding of the system through watching the film. These results provide strong qualitative support for my hypotheses, allowing me to answer my research questions:

1. Yes, facilitative documentary films can promote dialogue,
2. Yes, they can facilitate understanding/empathy amongst parties,
3. Yes, this type of film can they encourage parties to consider new scenarios, and ultimately,
4. Yes, documentary films can facilitate cooperative negotiation towards more resilient management of social-ecological systems.

These results suggest that documentaries should be considered as a handy tool for facilitators of complex, multi-stakeholder negotiations. Beyond its facilitative role in the current Columbia River Treaty discussions, the documentary allowed stakeholders' voices to be heard and a moment in water resource management history to be documented for posterity and for future water managers studying values and interests in the Columbia or any transboundary river basin. Interventions such as facilitative documentary film can transform complex social-ecological policy situations by fostering collaboration, shared experiences, and shared understanding of the holistic system.

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APPENDICES

Appendix 1: Film interview questions

1. Please tell me a little about yourself and your history in the area.
2. Are you involved with any organizations that are interested in the Columbia River? If so, can you tell me about the organization and what it does?
3. Could you describe the history of the Columbia leading up to the treaty?
4. What have been the effects of the treaty?
5. In your opinion, what does the Columbia River represent?
6. I'd like to talk to you about your needs and values of the river. What does the Columbia River mean to you? Explain to me why those things are so important to you.
7. Is there anything people typically misunderstand about your point of view that you would like to explain or clarify?
8. Could you describe the current situation in the Columbia River Basin related to the treaty?
9. What opportunities do you see coming from the 2014/2024 review?
10. What are your thoughts on the Columbia River Treaty Symposiums so far? What results do you think could come from the Symposiums?
11. If management of the Columbia changes, what variables do you think would have the greatest positive or negative impact on the basin?
12. Picture twenty-five years from now, picking up a newspaper, what is the worst news headline you can think of related to the Columbia River?
13. What would be the best possible news headline about the Columbia (25 years from now)?

Appendix 2: Pre-treatment web survey questions

1. In what state/province do you live?
 - a. British Columbia
 - b. Idaho
 - c. Montana
 - d. Oregon
 - e. Washington
 - f. None of these
2. What description best fits the area in which you live?
 - a. Rural
 - b. Urban
 - c. Suburban
3. Choose the category that best fits any agencies/organizations related to the Columbia River with which you are involved.
 - a. Government agency- federal
 - b. Government agency- state/provincial
 - c. Government agency- local
 - d. Tribe/First Nation government/organization
 - e. Non-governmental organization
 - f. Academic/research institution
 - g. No affiliation
 - h. Other (write-in)
4. Describe briefly (one or two sentences): Why does the future of the Columbia River matter to you? [open ended]
5. Please rate the following aspects of the Columbia River by how important they are in developing your preferred future management alternatives for the river. (1= not important at all, 7= critically important)
 - a. Agriculture
 - b. Culture
 - c. Domestic/household water supply
 - d. Environment/ecology
 - e. Fisheries/fish stocks
 - f. Flood control
 - g. Hydropower
 - h. Industry
 - i. Recreation
 - j. Scenery/aesthetic values
 - k. Spiritual/religious values
 - l. Transportation
 - m. Other (write-in)
6. Choose one of the values/interests you ranked most important above (preferably the value/interest you feel is most important).
7. For the value/interest you selected, please choose from the list below the term that best describes why you believe it is so important.

- a. Economics
 - b. Future generations
 - c. Personal beliefs
 - d. Personal security/livelihood/subsistence
 - e. Regional/national security
 - f. Tradition
 - g. Other (write-in)
8. If the priority given to *agriculture* in future Columbia River management changed, what other variables would be most likely to change? (multi-selection)
- a. Culture
 - b. Domestic/household water supply
 - c. Environment/ecology
 - d. Fisheries/fish stocks
 - e. Flood control
 - f. Hydropower
 - g. Industry
 - h. Recreation
 - i. Scenery/aesthetic values
 - j. Spiritual/religious values
 - k. Transportation
 - l. Other (write-in)
9. If the priority given to *environment/ecology* in future Columbia River management changed, what other variables would be most likely to change? (multi-selection)
- a. Agriculture
 - b. Culture
 - c. Domestic/household water supply
 - d. Fisheries/fish stocks
 - e. Flood control
 - f. Hydropower
 - g. Industry
 - h. Recreation
 - i. Scenery/aesthetic values
 - j. Spiritual/religious values
 - k. Transportation
 - l. Other (write-in)
10. Did you participate in any of the Columbia River Treaty Symposiums? (IF YES)
- a. What do you hope to achieve personally by participating in the Symposium?
Rate how well each of the following statements represents your goals. (1= not at all my goal, 7= my primary objective)
 - i. Learn about other perspectives
 - ii. Share/represent my point of view/interest
 - iii. Build relationships with other parties/stakeholders
 - iv. Gather information to inform my organization's position
 - v. Participate in dialogue about future Columbia River management

- vi. Contribute to developing/evaluating Columbia River management alternatives
 - vii. Influence Columbia River management alternatives
 - viii. Other (write-in)
- b. What results do you think can come from the Symposium?
- i. Better understanding of various parties/needs/values in the basin
 - ii. Better relationships amongst parties
 - iii. Better-informed policy alternatives
 - iv. A policy recommendation to the sovereign entities
 - v. The future management plan for the basin
 - vi. The beginnings of a river basin organization
11. Do you plan to attend the September 2011 Symposium? [y/n]
12. Twenty-five years from now, if you or someone in your family picked up a newspaper and saw COLUMBIA RIVER on the front page, what would be the worst possible headline? (Please keep your response to 10 words or less.) [open ended]
13. What would be the best possible headline about the Columbia River twenty-five years from now? (Please keep your response to 10 words or less.) [open ended]

Appendix 3: Post-treatment paper survey questions

1. Did you submit a response to the original survey of Columbia River stakeholder values sent out via email by Julie in September 2011? [Yes, No, Unsure]
2. In what state/province do you live?
 - a. British Columbia
 - b. Idaho
 - c. Montana
 - d. Oregon
 - e. Washington
 - f. None of these
3. What description best fits the area in which you live? (Choose one.)
 - a. Rural
 - b. Urban
 - c. Suburban
4. Do you think that watching the documentary helped you to understand other stakeholders' perspectives and values better? (**Choose one.**)
 - a. I understand others' perspectives less than before
 - b. I do not understand others' perspectives and less/more than before
 - c. I understand others' perspectives *slightly* better
 - d. I understand others' perspectives *significantly* better
 - e. I have a totally new understanding of others' perspectives
5. Do you think that watching the film helped others to understand your perspectives and values better? (**Choose one.**)
 - a. Yes
 - b. No, the film did not make a difference.
 - c. No, the film did not convey my perspective well.
 - d. No, my values/perspectives were not represented.
6. Did you brainstorm any new ideas/alternatives for Columbia River management during the documentary or while reflecting on the documentary? (**Choose one.**)
 - a. Yes, I thought of a new alternative.
 - b. I refined or improved an idea/alternative
 - c. No
7. What aspects of the film were most meaningful to you? Why?
8. Please rate the following aspects of the Columbia River by how important they are in developing your preferred future management alternatives for the river. (1= not important at all, 7= critically important)
 - a. Agriculture
 - b. Culture
 - c. Domestic/household water supply
 - d. Environment/ecology
 - e. Fisheries/fish stocks
 - f. Flood control
 - g. Hydropower
 - h. Industry

- i. Recreation
 - j. Scenery/aesthetic values
 - k. Spiritual/religious values
 - l. Transportation
 - m. Other (write-in)
9. If the priority given to *agriculture* in future Columbia River management changed, what other variables would be most likely to change? (multi-selection)
- a. Culture
 - b. Domestic/household water supply
 - c. Environment/ecology
 - d. Fisheries/fish stocks
 - e. Flood control
 - f. Hydropower
 - g. Industry
 - h. Recreation
 - i. Scenery/aesthetic values
 - j. Spiritual/religious values
 - k. Transportation
 - l. Other (write-in)
10. If the priority given to *environment/ecology* in future Columbia River management changed, what other variables would be most likely to change? (multi-selection)
- a. Agriculture
 - b. Culture
 - c. Domestic/household water supply
 - d. Fisheries/fish stocks
 - e. Flood control
 - f. Hydropower
 - g. Industry
 - h. Recreation
 - i. Scenery/aesthetic values
 - j. Spiritual/religious values
 - k. Transportation
 - l. Other (write-in)
11. If you would like to share any feedback about the film or clarification of your responses, please do so below

