INTEGRATED FLOODPLAIN GOVERNANCE

A Conceptual Approach and Assessment Protocol

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ACRONYMS

IFG   Integrated Floodplain Governance

IFM   Integrated Floodplain Management

Rivers and floodplains are complex adaptive social-ecological systems. In the face of climate change, rapid development, and other interconnected social and environmental problems, managing floodplains for long-term resilience—as modeled by Indigenous approaches—is critical to the well-being of ecosystems and people. Achieving such resilience is stymied by siloed bureaucracies through which the mutual goals of human, ecosystem, and economic health become conflicting mandates. Integrated floodplain management (IFM) represents a holistic paradigm of ecosystem management that is guiding current efforts in Washington State to bring multiple interests together to reduce flood risk, enhance working lands, and restore habitat in floodplains. Beyond integration at the project level, IFM requires certain social, political, and institutional norms and structures to shift to re-align relationships, policies, funding, and other parameters in ways that support integrated initiatives and their multiple benefits.

This work to change the social, political, and institutional contexts that enable or hinder the further integration of floodplain management is the work of integrating the governance of floodplains. While government is commonly defined as the governing body, *governance* can be understood as the manner and action of governing. Put simply, governance is the set of social conditions that enables management actions and related social and ecological outcomes. Understanding how to adapt and design the governance system of floodplains to enable the support of IFM programs is therefore critical to ensuring that these approaches are successful, and that floodplains are resilient.

This report responds to calls for better understanding how to coordinate ecosystem governance in the Puget Sound region (Breslow, Kintner, Dreyer et al., 2019) by developing the concept

of *integrated floodplain governance* (IFG) as a foundation for IFM. IFG focuses on intentionally changing the way that floodplains are governed in order to improve social conditions that support integrated, just, and climate resilient floodplain management. We understand the objective of integrated governance to be: connecting institutions, structures, processes, and relationships for a holistic and coherent approach to addressing complex social-ecological systems issues.

Toward this aim, this report provides language with which to think about these complex problems and the role of governance in addressing them, as well as tools with which to imagine an integrated governance system that supports IFM. Additionally, this report proposes a protocol for identifying, assessing, and promoting the enabling governance conditions required to scale IFM in the Puget Sound region, and offers recommendations for how to assess floodplain governance in a systematic way.

The conceptual frameworks and proposed protocol presented here may be used by practitioners, managers, decision-makers, researchers, and any others looking to better understand governance and identify social, political, and institutional bridges and barriers to implementing integrated ecosystem management projects. The protocol presented in **Section 4** can be tailored to enable an assessment of governance at various levels, from the individual agency or county level to state-wide and beyond. We offer this report as a resource for assessing IFM's progress and tracking paradigm change in the floodplain management system, and as a reference that highlights the importance of governance to ecosystem health and recovery in general.

Importantly, we recognize that the need for solving these issues stems from colonization and industrial destruction of natural systems based

on notions of Western dominance, and that, while aiming to be inclusive of multiple ways of knowing, the view of governance reflected in this report still largely engages technocratic and western philosophies. Indigenous and other governance frameworks embracing different epistemologies, values, practices, and aspirations can contribute transformative insights and essential counter-points to the frameworks and ideas presented here. We therefore strongly recommend pursuing a complementary study that examines the implications of Indigenous and other philosophies for a reimagined system of floodplain governance.

Rivers and floodplains are vital to the well-being of ecosystems and people. They are diverse and dynamic landscapes that provide critical connections between terrestrial and aquatic systems, linking freshwater and marine processes. Floodplains in North America are integral to Native Americans' lives and cultural practices, provide clean water, nurture salmon and other wildlife, and support a variety of activities including restoration, conservation, recreation, and healthy farmland. Floodplains, and the diversity of life and cultural and economic benefits that are derived from them, are ever more threatened by extreme weather and climate change, increasing urbanization, and social and political polarity. Figuring out how to govern and manage these complex-dynamic systems in the face of the enormous, interconnected social and environmental dilemmas we face today requires holistic and integrated approaches to ecosystem governance and management.

Integrated floodplain management (IFM) aims to achieve the synergy required to address these complex issues in historically siloed and con-tradictory bureaucratic management agendas and outcomes. IFM has emerged in part from a recognition that resource management paradigms built on ideals of efficiency, standardization, and control often create inefficiencies and lack the flexibility to meet the needs of today's rapidly changing social-ecological systems (Lebel et al., 2006, pg.1). Instead of siloed approaches to managing the floodplain in which actors compete against one another for finite resources and implement often contradictory projects, IFM proposes that partners from a wide variety of sectors (including working lands, ecosystem restoration, and flood risk management) work together to pursue a holistic approach to floodplain health. Native land managers and other place-based people have long modeled ways to care for ecosystems holistically. To advance IFM as a renewed paradigm of floodplain management,

practitioners and managers recognize that certain social, political, and institutional norms and structures in bureaucratic resource management systems must shift to re-align relationships, policies, funding, and other parameters in ways that support integrated initiatives and their multiple benefits.

In Washington State, the Habitat Strategic Initiative (2021, pg.25) as well as results from our focus groups show that barriers to successful implemen-tation of integrated management actions are often rooted in larger social, political, and institutional contexts. The following have been identified as needed components for integrated management to succeed:

- Enhanced technical skills and increased capacity of managers at various levels;
- Integrated funding sources;
- Appropriate levels of funding for the pre-plan-ning work required to craft integrated management programs;
- Coherence in the regulatory, funding, and permitting processes;
- Coordination of management efforts across interest groups (e.g., working lands, ecosystem restoration, flood risk management);
- Sufficient knowledge, data, and tools to inform decision making;
- Efficient and effective communication strategies, and;
- Streamlined regulatory and permitting processes.

The solutions required to address these challenges often exceed the capacity and ability of any one manager or entity. Further, because floodplains "typically cross social, political, cultural, and other jurisdictional boundaries, it is rare that any single entity, organization, or agency can adequately manage them on their own.

1 INTRODUCTION

Rather, social-ecological systems require governance (as opposed to government)" (Stern, 2018, pg.174). While government is commonly defined as the governing body, governance can be understood as the manner and action of governing. In this report, *governance* is understood as the set of social conditions that enables management actions and related social and ecological outcomes. The shift toward an integrated approach to floodplain management in the Puget Sound region represents a "paradigm change" in not only how management actions are implemented on the ground, but also in how floodplains are governed. In this report we refer to *paradigm change* as the process of transforming the governance of floodplains toward an approach that supports IFM.

Why is a governance-focused analysis useful?
While governance has been cited as one of the most important factors enabling or constraining successful adaptive management of ecosystems, relatively little attention has been placed on identifying appropriate governance designs to address particular social-ecological systems or environmental problems, or on how to frame the evaluation or analysis of environmental governance (Bennet and Satterfield, 2018). As Cosens and Williams (2012) write, "the flaw in implementing adaptive management without integrating the social component is that it makes the same mistake as traditional management by optimizing for a subset of the system, i.e., the ecosystem. Coupled with adaptive management, an appropriate form of governance addresses the entire social-ecological system" (pg.2). In other words, a well-designed and adaptive governance system is critical to the success of IFM.

Responding to calls for improved and coordinated governance of ecosystems in the Puget Sound region, this report develops the concept of *integrated floodplain governance* (IFG) as a foundation for IFM (Breslow, Kintner, Dreyer et al., 2019). Further, this report provides language to think about governance conditions and subsequent impacts and provides tools to enable readers to imagine changing the governance system to support IFM. Finally, we also propose a protocol to identify, assess, and promote the enabling governance conditions required to scale IFM in Washington State generally, and especially in the Puget Sound region, and offer recommendations for next steps in assessing floodplain governance in a systematic way. This report aims to serve as a resource for assessing IFM's progress and tracking paradigm change in the floodplain management system, and as a reference that highlights the importance of governance to ecosystem health and recovery in general.

The goals for this report are to:
1. Develop the concept of governance and its relationship to ecosystem health and recovery, especially in the context of IFM in the Puget Sound region.

2. Improve the understanding and assessment of governance strategies that support and expand IFM in Washington State.

Over the course of 15 months from December 2022 to February 2024 we developed the concept of IFG as it applies to Washington State. Our applied research design cycled through stages of developing conceptual validity by grounding this work in academic literature and ensuring management relevance by engaging and learning from the lived experiences of a 13-person transdisciplinary group of practitioners and experts working across the floodplain management system in Washington State (Table 2.1). Our conceptual frameworks and proposed protocol evolved iteratively throughout the course of the project as we incorporated ideas from the literature and ground-truthed and expanded upon these concepts with feedback and guidance from the working group. Each phase of the project is discussed below.

Table 2.1 Composition of the Working Group

Job Titles
• Program Manager—IFM Organization • Projects and Funding Coordinator—Watershed • Environmental Programs Manager • Floodplain Project Manager • Supervising Ecologist and Project Manager • Floodplains Management Specialist • Hydraulic Engineer • Restoration Ecologist • Natural Resource Scientist • Lead for Floodplains & Estuaries Implementation Strategy • Floodplain Planner • Watersheds Senior Program Manager • Monitoring Data Coordinator and Analyst

Affiliation	Number of Participants
County	4
Tribal Staff	1
State	5
Federal	2
NGO	1

Phase 1. Rooting our work in theory, gaining contextual relevance, and drafting conceptual frameworks

Adaptive governance theory was identified as a starting point for exploring relevant social science concepts and themes. We simultaneously reviewed gray literature produced by Floodplains by Design (FbD) and other organizations working in floodplain management in Washington and sought other learning opportunities to understand the local management context.

Table 2.2 Contextual Relevance

Types of gray literature reviewed	Learning opportunities
• FbD charter and strategy documents • FbD research and monitoring documents • Resource documents provided on FbD's website • Other IFM partnerships' websites and reports	• FbD Lunch and Learns and Culture and Capacity meetings • Introductory conversations with staff from both the public and private FbD partners

As we worked toward a framework describing paradigm change in the floodplain management system, it became clear that there was a need to gain greater clarity on *what that system actually is* (e.g. the social, institutional, political conditions impacting floodplain management). Defining the system became a prerequisite for understanding and tracking paradigm change. Environmental governance literature helped provide a starting point for naming parts of 'the system' that either enable or constrain the successful implementation of IFM (Bennet and Satterfield, 2018).

With an enhanced understanding of what we were trying to achieve, we engaged the working group for the first time to help describe the system of floodplain management in Washington State. In our first meeting with working group participants

we used an online visual tool (Mural.co) and group discussions to engage participants in identifying and mapping existing elements and attributes of the floodplain management system in Washington, conceptualizing desired parts of the system, and discussing challenges, successes, and goals in this work.

In response to introducing draft diagrams and academic conceptualizations of the governance system to the working group, one participant aptly stated, "It's a lot of words, [and] there are a lot of words under the words." While the conversation flowed, and participants ultimately were able to work with the tools presented by the researchers, it was clear that these initially proposed tools and frameworks were too complicated, theoretical, and not appropriate for an applied context. Feedback from the participants boiled down to 1) these tools need to be simplified; 2) there needs to be a way to show the interactions between different attributes of governance and across different levels and scales.

Phase 2: Developing conceptual framing and tools to understand, assess, and promote governance for IFM in Washington
After our first working group meeting, we revised our conceptual frameworks with the goals of communicating: 1) governance is not static, but can be designed and adapted to meet the needs of the social-ecological system; 2) there are certain attributes of environmental governance that might be more salient at different times depending on the needs of the social-ecological system, and; 3) the evaluation of governance must pay attention to the dynamics that exist between and among the scales, levels, and attributes of governance.

Additionally, during this workshop, working group participants organically identified a proposed methodology for assessing governance. It was recommended that a series of focus group discussions be held amongst different 'like' groups of people working in the floodplain management

system to discuss governance-related challenges and opportunities they face in their work. The researchers conducting the focus groups would then be responsible for analyzing results and identifying governance attributes acting as bridges or barriers to IFM. The participants agreed that approaching the assessment in this way, rather than expecting non-social scientists to sort their experience directly into the new terms and categories of governance, would be more useful, less confusing, and would ultimately lead to a better understanding of the state of the governance system for floodplain management in Washington.

Phase 3. Developing a protocol to assess and promote Integrated Floodplain Governance
Toward developing a protocol for assessing and promoting IFG, and in line with the working group's recommendation, we next drafted a protocol based on focus groups to trial in our third working group meeting. The purpose of this step was to design and test a protocol that could potentially be used by IFM organizations to assess change in the enabling governance conditions of IFM. The protocol was developed in line with common practices for conducting focus groups (Katz-Buonincontro, 2022).

We then trialed our proposed protocol with working group members. Splitting the group into two, each trial focus group discussion lasted 90 minutes and took place over Zoom. In line with best practices, we next transcribed, coded, and analyzed the focus group notes and transcriptions. The focus group discussions and the subsequent data analysis process revealed dominant themes and concepts that were then ascribed to attributes through a coding process rooted in grounded-theory (Katz-Buonincontro, 2022). This process helped us identify focal attributes for IFG. Based on our experience of testing the protocol, and on the feedback gathered from working group members, we revised and finalized the protocol, which is presented in **Section 4**.

In this section, we introduce three conceptual frameworks to spur and structure thinking about the complex problems facing floodplains and the role of governance in integrating their management. The first framework (Fig. 3.1) synthesizes a subset of theories that imagine *environmental governance* as good, adaptive, or transformative: aspirational ideas that can be used to understand, imagine, and enact change in governance systems. This framework helps us to envision paradigm change. Next, building on Bennet and Satterfield's (2018) work on environmental governance, we introduce *integrated floodplain governance* (IFG) (Fig 3.2) as an example of the kind of change one can aspire to in the governance system. IFG represents the governance system we are aspiring to develop through the process of paradigm change. Finally, we conceptualize the multiple scales, levels, and dynamics associated with IFG as a tool for describing and navigating its structural complexity (Fig. 3.3).

We introduce these conceptual frameworks to create a vision for aspirational governance transformation and improvement. We follow this section with a proposed protocol intended to serve as a tool to help characterize existing governance systems and to identify areas of improvement. Taken together, we hope that these frameworks and the protocol can serve as a tool to 1) help create an aspirational vision of improved governance for floodplains, and 2) help identify elements and attributes of governance that can or should be changed at various scales and levels.

3.1 Theories of Environmental Governance: Good, Adaptive, and Transformative

In a world increasingly characterized by uncertainty, an urgent question is how to develop or adapt governance systems to better deal with change. *Governance* is defined as "the institutions, structures, and processes that determine who makes decisions, how and for whom decisions are made, whether, how and what actions are taken and by whom and to what effect" (Bennet and Satterfield, 2018 pg.2). *Environmental governance* is concerned with the social contexts (the institutions, structures, processes, and relationships) necessary to maintain, transform, or manage for resilience within a social-ecological system (Bennet and Satterfield, 2018; Chaffin, Gosnell, and Cosens, 2014; Folke et al., 2005). These social contexts subsequently enable or constrain the successful implementation of management actions (Folke et al., 2005). Importantly, governance is not static, and does not just emerge passively from socio-political contexts, but rather can be intentionally designed and adapted with specific attributes and objectives to address a particular social and/or environmental issue (Bennet and Satterfield, 2018, pg.10). The integration of floodplain management involves redesigning the governance system to enable management practices that meet the dynamic and evolving needs of the floodplain.

As we reviewed environmental governance literature, we found the concepts of *good, adaptive,* and *transformative* governance useful in thinking about paradigm change (the process of transforming the governance of floodplains toward an integrated approach).

Figure 3.1

ADAPTIVE GOVERNANCE

Suitable to managing for resilience in a SES. Characterized by attributes such as learning, flexibility, knowledge dissemination and co-production, and collaboration.

GOOD GOVERNANCE

Underpins the cycle of adaptive-transformative governance. Ensures key principles of governance (legitimacy, transparency, and efficiency) are present no matter which stage of change the governance cycle is in.

Transformation of governance system complete, transformative capacity no longer needed.

Recognition that the governance system needs to change.

TRANSFORMATIVE GOVERNANCE

Suitable to transforming the system toward a more desirable SES. Characterized by attributes such as leadership, capacity for learning and experimentation, framing and agenda setting.

ADAPTIVE GOVERNANCE

GOOD GOVERNANCE

TRANSFORMATIVE GOVERNANCE
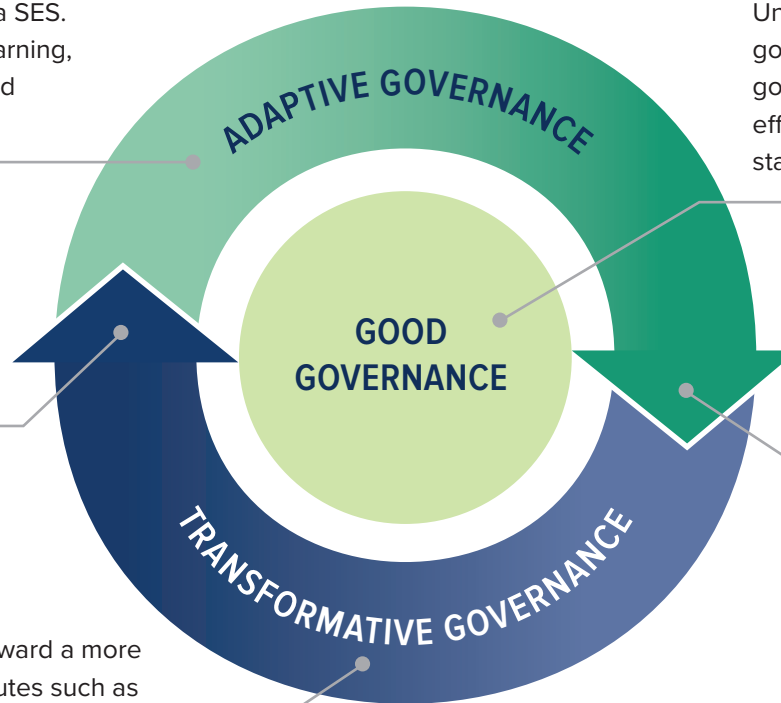
Figure 3.1 Proposed Phases in a Cycle of Governance Suitable for Managing Change in a Social-Ecological System (SES)

Environmental governance literature illuminates that governance systems that are best able to respond to changes in human and environmental systems cycle through adaptive and transformative periods. We envision this rhythm is ideally supported by good governance to ensure key principles (such as legitimacy, transparency, and efficiency) are present no matter which stage of change the governance cycle is in. Theoretically, the cycle of paradigm change recurs continuously as the governance system adapts and transforms to meet changing needs of the social-ecological system. This cycle represents a continuous cycle of paradigm change in governance.

3 CONCEPTUALIZING INTEGRATED FLOODPLAIN GOVERNANCE

Good Governance:
As Lockwood (2010) writes, "Good governance is a prerequisite for effective management" (pg.755). Additionally, good governance is the prerequisite for adaptive and transformative governance. Good governance is ideally what enables the functioning of governments. Characteristics of good governance include legitimacy, transparency, accountability, inclusiveness, fairness, connectivity, direction, performance, and resilience (Graham, Amos, Plumptre, 2003; Lockwood, 2010).

Adaptive Governance:
Adaptive governance has emerged as a leading vision to deal with the challenges and complexity of changing social-ecological systems, and to adapt to these changes as they occur (Armitage and Plummer, 2010). Adaptive governance can be understood as "the social contexts necessary to manage resilience in social-ecological systems" (Folke et al., 2005). It is characterized by processes of learning, knowledge dissemination and co-production, and approaches to management that are flexible, and collaborative (Folke et al., 2005; Olsson et al., 2006; Lebel et al., 2006; Plummer, Armitage, and de Loë, 2013; Chaffin et al., 2014; Koontz 2015; Chaffin et al., 2016).

Transformative Governance:
In contrast to adaptive governance, which aims to manage for resilience within an existing social-ecological system, the goal of transformative governance is to facilitate an alteration of any given social-ecological system to a more desirable state by "transforming the structures and processes that define the system" (Chaffin et al., 2016, pg.400). Importantly, the structures and processes that are transformed can be social or environmental. Transformative governance is not always necessary, but instead should be viewed as temporary, to be implemented when the current governance system is no longer meeting the needs of the social-ecological system. Transformative governance requires major change

in patterns of social behavior that occur at various levels and scales (including personal, institutional, and cultural).

Transformative and adaptive governance share many of the same characteristics, and to some degree can be considered different points on a continuum of governance (Chaffin et al., 2016, pg.407). Chaffin et al. (2016) describes a rhythm of governance that entails implementing adaptive governance when the social-ecological system regime is desirable, transitioning to transformative when the social-ecological system needs to change, and returning to adaptive once the transformation has happened (pg.408). Ideally, underpinning this rhythm of change are the tenets of 'good governance', such as fairness, equity, transparency, and legitimacy.

3.2 Elements, Objectives, and Attributes of Integrated Floodplain Governance

While there has been an abundance of theories and frameworks developed on environmental governance, including common-pool resource governance (Ostrom, 1999), the field remains quite theoretical and can feel nebulous, inaccessible, and hard to apply to real-world contexts. To understand and assess the enabling governance conditions for IFM in Washington, we focused on conceptualizing governance and developing a protocol with which to evaluate it, tailored to the Washington context.

To parse out the concept of governance toward making sense of the complexity of the term, we conceptualize governance as a nested set of categories. Drawing directly from Bennet and Satterfield (2018), we use elements, objectives, and attributes to represent the components of governance important to its design and analysis. *Elements* refer to the analytical units (the institutions, structures, processes, and relationships) associated with governance, *objectives* refer to the overall aims of governance, and *attributes* are

the "considerations associated with the capacity, functioning, and performance of governance" (Bennet and Satterfield, 2018, pg.2). Parsing out these distinct elements, objectives, and attributes further enables the analysis of governance (analogous to the integrated ecosystem assessment approach presented in Levin et al., 2009).

One way to analyze governance is to assess the functioning of desired attributes and their capacity to contribute to the institutional, structural, procedural, and relational elements of environmental governance. Together, the condition and interplay of a range of desirable attributes across various scales and levels of governance can serve as a window into the overall 'health' of the governance system. Depending on the goals and objectives, and other contextual aspects

of a particular floodplain, certain attributes of governance might be more salient (Chaffin et al., 2016; Bennet and Satterfield, 2018).

To work toward a conceptual framework of IFG, we adapted Bennet and Satterfield's (2018) framework for the analysis of environmental governance and tailored it to the context of IFM in Washington. As detailed below, we started with Bennet and Satterfield's list of elements, attributes, and objectives, and, based on analysis of Washington's IFM efforts and feedback from our working group,added "relationships" as an element, "integrated" as an objective, and "collaboration," "coherence," and "trust" as related attributes. A full list of objective and attribute definitions are provided in **Appendix 1**.

Figure 3.2

Aspirations for Integrated Governance

EFFECTIVE
Direction
Coordination
Accountable
Capactiy
Informed
Efficient

INTEGRATED
Collaboration
Coherence
Trust

RESPONSIVE
Learning
Anticipatory
Adaptive
Innovative
Flexible

EQUITABLE
Inclusive
Participation
Fair
Just

ROBUST
Legitimate
Connected
Nested
Polycentric

Elements of Governance

INSTITUTIONS
laws, policies, rules, norms

STRUCTURES
decision-making bodies, formal organizations, informal networks

PROCESSES
decision-making policy creation, negotiation of values, conflict resolution

RELATIONSHIPS
interpersonal, organizations, governments, networks, interest groups

Figure 3.2. Characterizing Proposed Objectives (outer ring) and Desirable Attributes (inner circle) of Integrated Floodplain Governance

We began with Bennet and Satterfield's (2018, pg.8) list of elements, attributes, and objectives, and based on observations of the floodplain management system in Washington, and feedback from the working group, we added "relationships" as an element, "integrated" as an objective, and "collaboration", "coherence", and "trust" as related attributes to more thoroughly describe integrated floodplain governance. Importantly, governance can be intentionally designed and crafted, and, depending on the goal of the social-ecological system and the challenges it is facing, different attributes of governance might be more useful to build or focus on at any given time. Objectives and attributes can and should apply to all elements of governance. The analysis of environmental governance has to do with understanding if the objectives of governance are being met by analyzing the functioning of various attributes across the elements of governance.

Adding "Relationships" as an element of governance

We recommend adding a fourth element, "relationships," to the three elements of governance (institutions, structures, and processes) proposed by Bennet and Satterfield (2018). The role of relationships and the types of relationships necessary for facilitating IFM in Washington is described in compelling detail by Macilroy (2021). Recent academic literature (Bodin, Mancilla Garcia, and Robbins, 2020; Koch et al., 2021) has also highlighted the importance of social relations in the dynamics of environmental governance. Analyzing people and relationships independently from institutions, structures, and processes is "absolutely necessary for detecting goal displacement and drift in how mechanisms of power and privilege operate through formal and informal institutions and inform how organizations implement and enforce goals and objectives" (May, 2022, pg.50). The quality and content of social relationships within the cultural and political contexts in which they take place ultimately determines "how successful any more or less formalized collaborative governance approach is in resolving environmental problems through collective action" (Koch et al., 2021, pg.2).

Drawing on relational approaches to governance which "emphasize connections and relationships as the key to thriving social-ecological systems", and our observations of the floodplain management system in Washington, we suggest that "relationships" (between and amongst people, governments, organizations, networks, and non-humans) is just as important an element of governance to understand and pay attention to as institutions, structures, and processes (Fisher et al., 2022). Additionally, the introduction of relationships as a fourth element of governance emphasizes power relations and dynamics that exist among different governance actors. Relationships are dynamic processes that are impacted by power, privilege, and inequities embedded in institutions, structures, and processes, and can emerge independently of these factors. Further, an emphasis on relationships and relational responsibilities, especially those that exist between humans and non-humans, can help identify opportunities for alternative forms of governance that accommodate Indigenous ways of knowing (Fisher et al., 2022; Whyte, 2013). We found that this piece of governance, the people-working-with-people part, to be important in facilitating IFM in Washington, and therefore necessary to include as its own distinct element of governance.

Table 3.1 Proposed Elements of Integrated Governance

Proposed Elements of Governance	Definition
Institutions	"the formal (e.g., constitutions, laws, policies, tenure systems) and informal rules (e.g., cultural context, social norms, prevailing power structures) that shape human interactions (e.g., in the form of decision-making structures and processes) and that guide, support, or constrain human or management actions" *(Bennet and Satterfield 2018, pg.6)*
Structures	"the formalized bodies or entities (e.g., decision-making arrangements, co management bodies) and organizations (e.g., levels of government, private sector organizations, civil society organizations) as well as informal networks of actors and organizations that embody governance capacities (e.g., efficiency, participation) and perform different functions (e.g., producing rules and decisions, enabling management actions)" *(Bennet and Satterfield 2018, pg.6)*

Processes	"the means for realizing the functions and the performance of governance, include articulation of institutional mandates, negotiation of values, conflict resolution, law making, policy formation, diffusion of information, and application of policy. These processes, then, play an important role in both deci-sion-making and the implementation of those decisions." *(Bennet and Satterfield 2018, pg.6)*
Relationships	"Understanding of how and why actors relate to other actors and which affects these relations have on the dynamics in environmental governance entities is pivotal to effectively deal with the multifaceted nature of environmental problems" *(Koch et al., 2021, pg.2)*. Beyond interpersonal relationships, a focus on relationships between and amongst governments, organiza-tions, networks, and non-humans helps to increase understanding of the mechanisms underlying dynamics of local and regional envi-ronmental governance.

Table 3.1
A synthesis of related literature and our observations of IFM in Washington suggests four major elements of integrated governance. Three (institutions, structures, and processes) are adapted from Bennet and Satterfield's (2018) synthesis of the environmental governance literature. In addition, drawing on ideas of relational approaches to ecosystem management which "emphasize connections and relationships as the key to thriving social-ecological systems", and observations of the floodplain management system in Washington (Macilroy 2021), we suggest that "relationships" (between and amongst people, governments, organizations, networks, and non-humans) are a fourth important element of governance to understand and assess (Fisher, Mackey, Macpherson, et al., 2022).

3.3 Scales and Levels Associated with Integrated Floodplain Governance

A further way to make sense of the complexity of governance is to recognize its multiscalar nature. Here we offer a way to disentangle the multiple scales and levels of governance. Below we present a framework for conceptualizing, naming, and navigating the structural overwhelm of governance.

Environmental problems do not occur in isolation, but tend to be "interconnected, sometimes in unexpected ways," across various scales, including, but not limited to spatial, temporal, and jurisdic-tional (Berkes, 2017, pg.3). Similarly, floodplains, as complex-dynamic systems that stretch across spatial and jurisdictional scales, are affected by various scales of time, formal and informal insti-tutions, knowledge systems, management plans, organizational goals, and network linkages. They require approaches to governance that are multi-level and cross scalar. Analyses that take a holistic perspective of a system, rather than observing one variable at a time, reveal the importance of scale effects, including the inherent uncertainty within the system, nonlinear relations between social and ecological variables that result in surprises, transitions, and emergent properties such as resilience (Berkes, 2017; Plummer and Armitage, 2010). As Cash et al. (2006) write "From a management perspective, evidence is accu-mulating that supports the hypothesis that those systems that more consciously address scale issues and the dynamic linkages across levels are more successful at 1) assessing problems and 2) finding solutions that are more politically and ecological-ly sustainable" (pg.9). Complex systems theory provides a way to think about floodplains and their management as complicated, ever changing, dynamic sets of interactions unfolding across many social and ecological scales and levels. Paying attention to scales and levels, and their dynamic interactions can help illuminate where in the governance system additional attention or effort is needed to enable desired management outcomes.
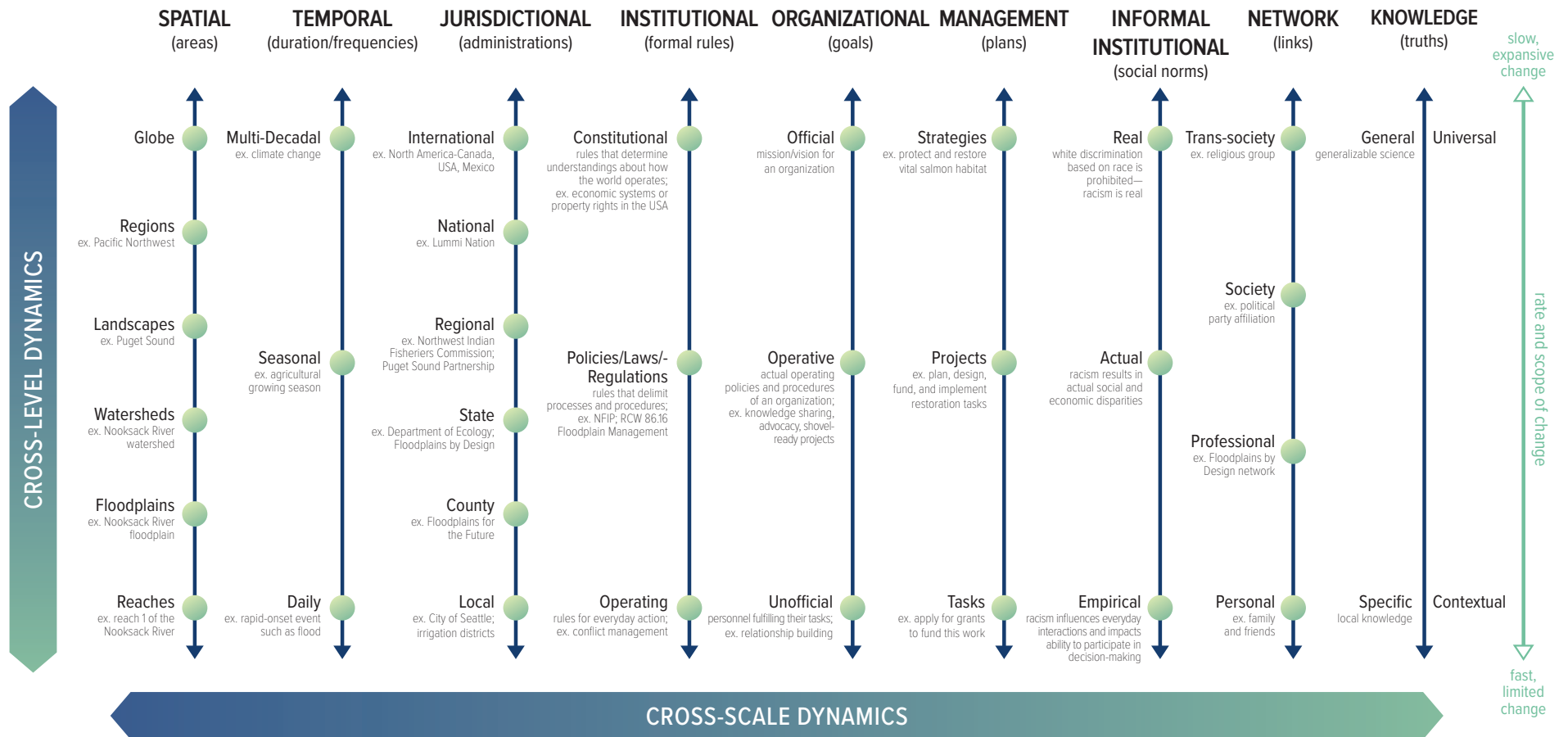
Figure 3.3 Selected Scales, Levels, and Dynamics Associated with Integrated Floodplain Governance

An illustration of the types of scales (dark blue arrows), levels (green dots), and dynamics (blue-green gradient arrows) that contribute to the complexity of floodplain governance, adapted from Cash et al., (2006), and influenced by May (2022). The blue-green gradient arrows illustrate the cross-level and cross-scale dynamics, and the light green arrow shows the rate and scope of change typical at various levels on a given scale. The multi-level, multi-scalar problems that impact any given floodplain requires an approach to governance that more consciously acknowledges the complexity created by these dynamics and strives for identifying and crafting interventions at the appropriate levels and scales.

CONCEPTUALIZING INTEGRATED FLOODPLAIN GOVERNANCE

We recognize the concept and use of the word scale is used often in the ecosystem management world differently, for example, people often might refer to the local or state scale. Here we adopt the terms of Cash et al.: "*scales* are the spatial, temporal, quantitative, or analytical dimensions used to measure and study a phenomenon, and *levels* are the units of analysis that are located at different positions on a scale" (2006, pg.3). We found these terms useful in thinking about the larger dynamics influencing floodplain governance and management. We view a scale as a kind of ruler, with levels representing different points on that ruler. For example, a *spatial* scale might be composed of the following *levels*: globe, regions, landscapes, watersheds, floodplains, and reaches. A jurisdictional *scale* might be composed of international, national, regional, state, county, and locality *levels*. Interactions happen within and across scales which can lead to substantial complexity in dynamics (for example, a river might cross multiple spatial and jurisdictional levels where many different organizations are involved in their management). Cross-scale interactions are those that happen across scales (e.g. spatial and temporal), whereas cross-level interactions are those that occur across levels within a scale (e.g. for a spatial scale, global and regional levels might interact). A common example of a cross-level dynamic is climate change, where a complex mix of local processes are linked to global systematic changes, and vice-versa (Cash et al., 2006).

Some of these scales (spatial, jurisdictional) are more intuitive than others and can easily be understood in the context of a floodplain. For example, a river often exceeds the boundaries of any one jurisdiction, causing a need for multiple levels (state, county, localities) to work together. Floodplains are also impacted by the reality of how work often plays out in organizations. For example, May (2022) writes that organizational goals exist on three levels 1) official goals, which are the stated goals, mission and vision of the organization; 2) operative goals, which are the policies and procedures that exist to distribute resources and create objectives toward achieving goals, and; 3) unofficial goals, which arise from everyday problem solving and role fulfillment informed by an individual's knowledge, capacity, and lived experience (pg.42.).

Floodplains, and the way they are managed, are also impacted by less tangible scales including the different forms of knowledge (e.g., academic, local, Indigenous, and experiential) that practitioners or decision-makers hold and use. Additionally, informal institutions, such as social norms and constructs, can result in structures that impact people's power, agency, and ability to participate in management actions and decision-making processes. For example, regarding the role of race and racism, May (2022) states, "While constitutional institutions and formal organizational goals bar race as a basis for discrimination in present day USA, the persistence of racism is *real* across different levels of institutions, organizations, and relationships, manifesting through *actual* disparities in public health, income, occupational, and opportunities to be heard, seen, and considered in decision-making processes, and *empirical* everyday interactions, relationships, challenges and successes, and collective mobilization for change toward racial equity" (pg.43).

All these scales are pertinent to the social contexts and governance systems that enable or constrain management actions and the resilience of social-ecological systems. For a more detailed description of these levels and scales see **Appendix 2**.

Scale Challenges
Common management challenges occur when the existing mixture of cross-scale and cross-level interactions threaten to undermine the resilience of the social-ecological system (Cash et al., 2006).

These challenges can be broken down into those associated with ignorance, mismatch, and plurality (Cash et al., 2006).

Challenges related to *ignorance* arise when cross-scale dynamics are ignored. Commonly, spatial and temporal scale dynamics are ignored which leads to a variety of management problems such as "national policies that adversely constrain local policies, local actions that aggregate into large-scale problems, and short-term solutions that turn into long-term problems" (Cash et al., 2006, pg.5). *Mismatch* challenges are those in which human institutions do not map onto bio-geophysical scales (spatial and/or temporal) of the resource of concern. This is common for floodplain management in which the authority of a jurisdic-tion does not have the same boundaries as the river or floodplain. Temporal scale mismatches for floodplain management arise when short funding cycles conflict with long-term planning needs. Knowledge scale mismatches happen when the best available knowledge does not align with the scale at which decisions are made (e.g. when the spatial scale of available climate models are not applicable or useful for county level floodplain managers). Finally, *plurality* challenges arise when it is assumed that there is a single or correct solution to scale and level challenges that applies to the whole system for all actors, which results in one-size-fits-all approaches that are ineffective and inequitable and do not consider local context (Cash et al., 2006, pg.5).

As Cash et al., (2006) write, "In a world increas-ingly recognized as multi-level, solutions must be as well" (pg.10). More intentionally conceptualiz-ing the scales, levels, and dynamics of floodplain governance, as illustrated in Figure. 3.3., may help in identifying the location of challenges in the system and tailoring integrated solutions to where they are most needed.

Rate and Scope of Change
We draw on Holling, Gunderson, and Peterson's (2002) adaptive cycle and panarchy model, Ostrom's Institutional Analysis and Development Framework (2005), and May's Complex Adaptive Governance Systems Framework (2022), to conceptualize varying rates of change at different scales and levels. May proposes that higher levels on a scale "exhibit slower speeds and exert greater constraint and authority" while "lower levels change faster and exert less constraint across smaller scales" (2022, pg.41). May goes on to detail that this is because larger and slower components (comprising higher levels on a scale) provide memory and structural resistance to change, which encourages smaller and faster changing components (represented by lower levels on a scale) to return to a stable state after a perturbation (e.g. a flood) in the social-ecolog-ical system. This observation was emphasized by one of our focus group participants who stated: "I would just say my observation is that if you graphed ...lag time for changing policies or governance or grant programs in relation to science or new information, the federal agencies I work with are way slower, and then the state is the next slowest, and then the county is the next slowest" (Participant 4, Group 2).

Considering how the rate of change is related to scale helps conceptualize where particular attributes of governance might need to be emphasized (e.g. where more trust or coherence is needed) to intervene in dysfunctional dynamics. Additionally, thinking about this in conjunction with one's own position on various scales—i.e., the spatial, temporal, organizational, and so on, levels at which we work—helps us envision the change we are empowered to influence, and where we may need help from people operating at different levels or scales to achieve broader goals.

Table 3.2 Select Quotes from Focus Group Discussions Illustrating Scales, Levels, Dynamics, and Challenges

Quote	Scale(s)	Type of challenge
"The glacial pace at which the federal government is able to change, adapt regulations and procedures and that sort of thing is really felt in the world of floodplain management where the science, even though there's still a ton of science questions, has actually leap-frogged the regulations and we see that probably holding us back" (Participant 6, Group 2)	Temporal (duration/frequencies); Jurisdictional (administrations); Institutional (formal rules); Knowledge (truths)	Plurality
"And just this consistent issue with timelines just not matching up. And from the state level trying to work with community—often the timeline for a state or a contract needing to showcase your deliverables can be much faster than the time that it takes to establish relationships with communities and really build trust at that local level... And then the need to really show results and deliver results not aligning with that relationship-building. And that's it, you know, the time that it takes to make really genuine and meaningful connections with community partners... This issue of time, I think when you look at it from different angles and different perspectives that it really is a big one." (Participant 2, Group 2)	Temporal (duration/frequencies); Management (plans); Network (links)	Mismatch
"[I] think about conflict within the IFM groups and the different industries and how we can move past some of that and get folks on the same page and working together when you are encountering different priorities and different ways of thinking. And when that does come up, how do we keep moving forward and keep the work going and try to pursue those multi-benefit opportunities?" (Participant 3, Group 2)	Network (links); Knowledge (truths); Organizational (goals); Management (plans)	Plurality
"A lot of problems that people are noticing in their particular floodplain or whatever is related to stuff that's going on in the county upstream of them, or the country upstream of them. And so that cross boundary governance, the connections across–whether it's watersheds or counties or states or whatever–making sure that people are talking because there's a lag between where you experienced what's happening, and the causes of why that's happening. And I feel like there hasn't been, I don't see, a ton of communication in that way" (Participant 4, Group 2)	Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Network (links); Knowledge (truths)	Mismatch

"But it's also really difficult to spend government money... it's not just regulations, it's not just permitting, but it's almost like the lack of collaboration amongst the regulatory piece of project implementation where you have everyone looking at only how to fulfill their needs... there's this many agencies all which have a defined purpose and all which need a box checked in order to move something forward. And how do you undo that? ...we've created this really complicated structure of regulation that has the rippling impact of needing intensive regulation and so yes, more money absolutely helps to a point but we still have to check 15 boxes. And I don't know that the solution is to work together better or get rid of some of those permits, that's not the option. I think it's how we undo the system we've created for ourselves. (Participant 1, Group 1)	Institutional (formal rules)	Ignorance
"It's essentially either state legislative policy or federal legislative policy that has created all of these individual funding programs and all these individual regulatory programs and they were created for good reason. But now you have this complex web of funding and permitting that is administratively dysfunctional, and there's not a good system... to make it as easy as possible for folks that already have to manage complex partnerships of watershed scale approaches to that complex funding systems where you have 15, 16 grants to get one project done and you have to navigate through however many different regulatory processes. And I do think, you know, in some cases, there's progress. I think Floodplains by Design is an example of progress in that space of allowing a flexible funding source to exist. But every funding program has its own constituency and its own, you know, champions within the legislature. It's even more complex and there is no equivalent of where you can find different parts of funding and do these multi-ben-efit projects, let alone the regulatory and permitting side" (Participant 7, Group 1)	Institutional (formal rules); Jurisdictional (administrations); Management (plans)	Ignorance

4.1 Developing the Protocol

In the previous section, we provided language and frameworks with which to make sense of governance complexity, and to articulate objectives and desired attributes of a particular governance system. In this section, we consider how to evaluate whether progress is being made toward these objectives, how to diagnose barriers and bridges toward a desired system of governance, and how to identify key attributes needing attention and support (i.e., the most responsive attributes). This protocol is based on an acknowledgment of the dynamic nature of governance, and the need to continually assess which objectives and attributes are salient given which phase(s) of governance need emphasis (good, adaptive, transformative). Toward this end, we propose a method, or protocol, described below, for assessing governance that accommodates its dynamic, multidimensional nature through an adaptive, qualitative, and participatory approach that encourages desired attributes such as trust, collaboration, and plurality, directly in its implementation. We discuss results from testing this protocol with our working group in the next section.

We offer this protocol as a potential method to establish baseline governance conditions that support IFM, and track paradigm change in the floodplain management system. The protocol can be thought of as a tool to 'temperature check' how the presence or lack of attributes of environmental governance are promoting (acting as a bridge to) or preventing (acting as a barrier to) IFM. While it is feasible for an organization to adapt this protocol to meet the constraints of existing capacity, we recommended, if appropriate resources are available, that a professional qualitative social scientist (usually an external specialist) conduct the assessment.

This protocol draws on the theory and practice of adaptive management and is based on the premise that policies and programs should ideally be seen as experiments that require constant monitoring, evaluation, and adjustment (Chaffin, Gosnell, and Cosens, 2014). Because floodplains are complex, adaptive, social-ecological systems constantly undergoing dynamic change, they require governance strategies that are also dynamic and adaptive (Bennet and Satterfield, 2018). In line with our understanding that governance can be intentionally designed, monitored, and adapted to meet the needs of changing social-ecological conditions, as the goals and functions of the floodplain fluctuate, the salience of the different attributes of environmental governance will also fluctuate. This dynamism requires a methodology that supports and emphasizes an adaptive approach, and that explores the nuanced and dynamic narratives that often cannot be captured by static indicators or metrics alone.

For example, as IFM has risen in priority in Washington, working group members found trust and collaboration building across organizations and communities increasingly important in facilitating integrated projects *(Integrated Floodplain Governance Focus Group Discussions #1 and #2)*. Importantly, trust and collaboration building must occur at many scales and levels (across agencies and jurisdictions), not just at the management or project level. A governance-focused analysis, using a systematic protocol such as the one we propose here would enable a researcher, manager, practitioner, or decision-maker to locate where in the system trust and collaboration need to be emphasized or improved to facilitate IFM, and to identify effective strategies for building these attributes.

PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

The proposed protocol takes a three-step approach that is aimed at assessing and promoting IFG:

1. Tailoring environmental governance attributes to the local context.

2. Using focus groups to identify attributes of environmental governance acting as bridges and/or barriers to IFM.

3. Promoting attributes of IFG at appropriate scales and levels.

Tailor Selected Attributes to Local Goals

Given that there are no governance panaceas and that each environmental issue has its own unique history, challenges, and opportunities, it is important to ground theory in local contexts (Ostrom, 2007). The list of attributes (see **Appendix 1**) that we have developed are derived from Bennet and Satterfield's (2018) literature synthesis of environmental governance and have been tailored to the context of IFM in Washington State. These attributes are not meant to serve as a blueprint, but rather should be adapted to the social-ecological context in which the assessment is taking place.

Contextual relevance can be achieved through the analysis of: management goals, plans, and responsibilities for the region of interest; reports and publications from various actors/collaboratives involved in the region of interest; and participatory processes that identify local social goals and the major bridges and barriers to accomplishing work. The latter may include public meetings with representative decision-makers and stakeholders, community meetings, focus groups, and in-depth interviews. In addition to improving understanding of a specific governance context, these types of participatory processes can directly strengthen

desired attributes by fostering inclusion, deepening social relationships, and building trust (Breslow, 2016, pg.253).

Use Focus Groups to Identify Bridges and Barriers to IFM
Method:
Toward the goal of understanding the existing governance system for floodplain management and identifying some of the key leverage points for change, we apply our conceptualization of IFG and use attributes of IFG as a unit of analysis. To adapt this conceptualization to the context of IFM in Washington, we first recognized a need to describe the system of floodplain governance, and then to identify the attributes of governance that are currently working either as bridges (supporting efforts to integrate floodplain management efforts), or barriers (hindering efforts to integrate floodplain management), in the system. An effective and efficient method to describe the governance system and to identify attributes is a focus group[1].

A focus group approach facilitates the collection of a large amount of data from multiple perspectives in a relatively short period of time. Thoughtfully convening key people in well-structured conversations can provide insight into how governance related opportunities and challenges impact the implementation of IFM. Next, to identify priority "focal attributes"—i.e. those attributes of environmental governance that are most salient as bridges and/or barriers to implementing IFM in a particular context– resulting from the focus group discussions, we propose using a grounded theory approach to data analysis (Glaser & Strauss, 1967). A grounded-theory approach allows the relationships between various events, pieces of information, and ideas to emerge

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[1] We recommend following standard protocols for conducting focus groups. We found *'How to Interview and Conduct Focus Groups'* written by Jen Katz-Buonincontro (2022) to be particularly thorough and helpful guidance.

PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

(Katz-Buonincontro, 2022, pg.14). In the context of IFM, a grounded theory approach reveals the relationships between different attributes of governance and their impact on the facilitation of IFM. This data can then be used to inform a baseline of enabling governance attributes and conditions that support IFM. Furthermore, a focus group approach enables participants of the group to advance some of the desired attributes for the governance system (like trust and collaboration) by facilitating a space in which they build relationships and mutual understanding.

Frequency:
We recommend completing this process every 1-2 years to track progress and changes and to respond efficiently and effectively to changing floodplain conditions. This is recommended for the following reasons:

1. Creating a habitual 'temperature check' on the governance system enables a culture of learning through frequent monitoring, evaluation, and adaptation of the governance structure in line with an adaptive management approach, ultimately resulting in more appropriate governance design and an avoidance of entrenched, but ultimately unhelpful norms.

2. Aligning this assessment with funding biennia can help ensure resources are distributed to address governance related challenges and opportunities, define strategies that address them, and allocate sufficient resources to implement and conduct the evaluation outlined here.

Participants:
We recommend convening multiple focus groups to represent various parts of the IFM system with different common group characteristics (such as county-level floodplain managers, agricultural community representatives and landowners, and Tribal staff from appropriate departments). The purpose of creating multiple focus groups is to ensure saturation (the point where minimal new information is gained), as different people interact with different parts of the system at different levels and on different scales. A county-level floodplain manager, an employee of a state or federal agency, a landowner, and an employee of a Native nation's natural resources department are all likely to experience the system governing floodplains very differently. Convening focus groups in which participants share a common group characteristic is best practice in that it creates a space in which participants are more likely to feel comfortable sharing their experiences because other group members are likely to have similar experiences (Katz-Buonincontro, 2022). Taking a holistic view of the system and all its parts requires the representation of these different perspectives (and more).

In addition to ensuring that a diversity of perspectives is represented during the focus groups (resulting in more complete data), an inclusive approach serves the dual purpose of building relationships among participants, improving social connections, and creating new pathways for communication and trust building. Attention should be paid to ensuring principles of diversity, equity, and inclusion guide the recruitment for focus groups.

We recommend that purposive (non-random) recruitment of participants is used so that you can ensure common group characteristics for each focus group. The process of recruiting and grouping participants is more an art than a science, and attention should be paid to various practical questions (e.g., availability and interest) and social considerations (e.g., pre-existing conflicts between group members due to previous interactions or power differences).

4 PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

Considerations for determining common group characteristics:

- Level of management interaction with the system (e.g. strategic planning, project level management)

- Jurisdictional scope (e.g., national, state, regional, county, local)

- Geographic scope (e.g., global, regional, landscape, watershed, floodplain, reach)

- Interests (e.g., working lands, ecosystem restoration, flood risk management)

Discussion Questions:

Questions should be tailored to the particular context and challenges that the inquirer aims to address. For the purpose of understanding attributes of governance that act as bridges and/or barriers to the successful implementation of IFM, we recommend developing questions that touch on the various elements of environmental governance, including relationships, institutions, structures, and processes. We have provided an example of the questions used in our focus group discussions next.

Table 4.1 Example Focus Group Questions on Environmental Governance for Integrated Floodplain Management

Type of question	Questions
Introductory	1. What brings you joy in the work that you do? 2. What do you find most vexing in the work that you do?
Transition	3. What do you see as the biggest barrier to further integration of the floodplain management system in Washington? 4. What do you see as the greatest opportunity to further integration of the floodplain management system in Washington?
Key	5. What do you think most critically needs to change in the way that work is being done to further integrate floodplain management in Washington? Who wants to start us off?
Ending	6. Within your job description, what could you feasibly do to promote integrated floodplain management, for example, in your daily tasks, or your annual work plan, or some other scale? What would you need to do this?

4 PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

Transcribing, Coding, and Data Analysis:
We recommend using best practices for transcribing, coding, and data analysis following a grounded theory approach. Using grounded theory as a basis for data analysis is particularly helpful in allowing causal conditions, processes, strategies, and phenomena to be understood (Katz-Buonincontro, 2022, pg.123). Comparing and contrasting data across focus groups will be an important step in understanding which attributes of environmental governance are acting as bridges/barriers across different scales and levels within the floodplain management system and will ultimately help the researcher identify focal attributes. Focal attributes will emerge through the coding process either as the most discussed attributes or those that are discussed as having an outsized impact on the system and its dynamics.

4.2 Results from Testing the Protocol with Working Group Members

To trial our proposed protocol with our working group members, (practitioners and experts working at various scales and levels within the IFM space in Washington State), we split the group into two, based on their position within the floodplain management system. The first group was composed of working group members operating at a 'sub-state' level, and the second group was composed of working group members operating at a state-wide or national level. The meetings were each 90 minutes long and took place over Zoom. The first group met on October 11, 2023, and the second group met on October 17, 2023. The two focus groups were asked the questions included in Table 4.1.

Focus group results illustrated that attributes and their effects on the governance system can rarely be understood by themselves but are often connected with other attributes. Further, it was revealed that bridges and barriers are often opposite sides of the same coin (e.g., the presence or absence of trust). Below we discuss the focal attributes that emerged from the two focus groups as bridges and/or barriers to IFM. We follow this with a discussion of lessons learned from trialing the protocol. A full discussion of these attributes is provided in **Appendix 3**.

Emergent attributes acting as bridges and/or barriers across both focus group discussions:
Bridges: Collaboration, Learning, Trust, Informed

Barriers: Capacity, Coherence, Informed, Collaboration

4 PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

Bridges: Collaboration, Learning, Trust, Informed
In this report we use the concept of bridges to illustrate attributes whose presence help to facilitate or support the integration of floodplain management in Washington State. The attributes that emerged as bridges to IFM in these focus group discussions were: Collaboration, Learning, Trust, and Informed. Below we highlight how these attributes were discussed by focus group members as facilitators of IFM.

Attribute	Definition
Collaboration	In the realm of environmental governance, collaboration refers to a mode of goal development, decision-making, and service delivery that shifts away from top-down government, or sector specific settings, to a setting in which public, private, nonprofit, and community actors are jointly involved in and accountable for decision-making and service delivery to create outcomes that could otherwise not be achieved. This model has resulted from the recognition that social-ecological problems that we now face are sufficiently complex enough that there is a lack of consensus on the exact nature of the problem and what the appropriate solutions are. _References: Breslow, 2021; Folke et al., 2005_

Collaboration was the dominant attribute emerging from the discussion of bridges and barriers across both working groups. In line with our understanding that causes and solutions have common roots, collaboration emerged as a leading bridge when present, and as a leading barrier when not present. The discussion of collaboration as a bridge to IFM was linked with many different supporting and enabling attributes such as: trust, accountability, polycentricity, inclusion, and participation. Focus group participants also highlighted

different avenues for building better collaboration into governance strategies. For example, one participant highlighted how accountability can help build collaboration: _"Being an ally on issues that may not pertain to the entire network or entire collaborative partnership, but you know, when something comes up that is of significance to one stakeholder group that may not have bearing on the overall work, but they have developed this trust, they've developed these great relationships with this collaborative group. And for that, those partners are able to step up and say, "yeah, we need to support you in this". I think being allies across these different interests, even if they're standalone items, is something that really helps build trust and appreciation for next time you need to work on something collaboratively."_ (Participant 7, Group 2). Collaboration was also discussed across multiple different scales including institutional (formal and informal), knowledge, and jurisdictional.

Attribute	Definition
Learning	Institutional and social learning is realized through ongoing monitoring and evaluation, communication, and reflection upon the social and ecological performance of environmental governance practices. Collective memory is enhanced through practices such as documentation and sharing of lessons learned, knowledge co-production, and developing communities of practice and learning networks. _Reference: Bennet and Satterfield, 2018_

Learning was discussed by focus group members as a leading bridge to IFM. There was a sense across both focus groups that learning is happening within the floodplain management system across both social and ecological systems and that as a result IFM approaches are being

legitimized and further enabled. For example Participant 3 (Group 1) stated: *"Not only is there a diversity of perspectives and values being brought to the table and in designing solutions, but I think there's an increase in understanding and learning that's happening across those different perspectives, and hopefully a little more understanding of what those are in sort of an expansion of what's important and what you care about, because you're interacting with people that have those in a very, I guess, direct way. So that's what really gets me excited is when you see people learning, and I'm included in that too. Learning about those different perspectives and that becomes part of how you approach the work going forward."* Learning was often discussed in conjunction with temporal scales. To this effect, one participant gave the following example: *"I think we've started to do some of these things long enough now, even though it hasn't been that long, but I mean, the example that comes to mind is putting large wood in rivers and armored banks where it's appropriate. And that was a science that was pretty uncertain there for a long, long time… I think we're at the point now for that particular example, where you could almost develop a certain set of conditions and criteria and templates like, if this is where we're gonna go do work in the river for a levee repair or whatever it is, it meets these criteria to put a bunch of wood in. I don't have any illusions that every levee repair is going to be like a demolition and setback of the levee or buyouts, you know, of the properties that it protects. We're still a long way from that, but if we're trying to incorporate some eco and habitat features as we go, that's starting to get easier to do."* (Participant 6, Group 2).

Attribute	Definition
Trust	In the context of environmental governance, trust can be considered an individual's willingness to accept vulnerability in the face of uncertainty. Trust makes social life predictable, it creates a sense of community, and it makes it easier for people to work together. Trust will look different at different levels and scales of governance. For example, how governments or institutions go about building trust with the public will look different from how individuals build trust with one another. References: Folke et al., 2005; Stern and Baird, 2015

Trust as an avenue for enabling IFM was discussed in both focus groups at different levels including interpersonal and between governments and individuals. One participant, and member of a county-level government stated, *"Word of mouth is huge. And so you might just have one or two sites, but maybe that farmer is a really important farmer in the community. And the fact that you're working with them and following through on those incentives and doing what you've said and now they're sharing that with their friends. So I think that is really important—word of mouth—and being able to sometimes take those small steps toward trust."* (Participant 5, Group 2). Trust was often discussed as a strong force enabling or constraining collaboration and subsequently IFM. Participants discussed not only how trust helps to facilitate IFM, but also tactics for building trust. The time it takes to build trust (temporal scale) and the fragility of trust were discussed by both groups. One participant stated *"Trust is fragile, I spent a long time building trust and creating space. Something I think about sometimes, too, is that it's not just about creating trust. It's about maintaining it and how do you maintain it. What I've noticed, and one of the projects I've been*

working on for the last five years, is that over those five years, we've created trusting space, so there's more room for mistakes to happen. And there's more room for something to set the whole thing into a spiral... I guess this is a more resilient, trusting space and there's more resilience that's built into it because we've spent time together working through struggles. Everyone feels heard." (Participant 1, Group 1)

Attribute	Definition
Informed	The likelihood of effective outcomes is increased when planning and management decisions are informed by the best available knowledge—this includes integrated knowledge types (scientific, local, and Indigenous) and of multiple systems (social and natural). *Reference: Bennet and Satterfield, 2018*

Informed, as an attribute, was discussed by both groups as a leading way to legitimize and enable IFM: *"Outreach and education and informing folks on exactly what integrated floodplain management is and broadening our scope and reach there. This change is scary. It was scary. Doing things in a new way, even though the current way might not be working for folks, getting them on board, doing it differently, and stepping outside of their comfort zone of how they've operated can be hard. So the more that we can provide knowledge and education and be interfacing with people and really displaying and getting out there what this is, and what we want to do, and how we want to do it, and why these people should be at the table, and how they can help, and how it can benefit them—it's very difficult to take those steps into implementing IFM without doing all of that too and I don't know that we're doing enough of that necessarily."* (Participant 2, Group 1). In particular, the role of this attribute was discussed as a way to build more polycentric

governance structures in which multiple centers of decision-making and action-taking exist to improve integration and collaboration across these different centers. To this end one participant stated: [There is a need for] coordinating some of the monitoring and making sure the results are being shared. *"So that people are aware of the tools that may already exist, that they could then apply to their landscapes and kind of facilitate some of the conversations and specifically address neighboring county issues or the neighboring water. Getting folks to talk even about clusters and little regions and things, you know, thinking about it, literally, as a multiple scale"* (Participant 4, Group 2).

Barriers: **Capacity, Coherence, Informed, Collaboration**
On the other end of the spectrum to bridges, we use barriers to illustrate attributes that, when lacking, can make the integration of floodplain management in Washington State more difficult. The attributes that emerged as barriers to IFM in these focus group discussions were: Capacity, Coherence, Informed, and Collaboration. Below we highlight how these attributes were discussed by focus group members as barriers to IFM.

Attribute	Definition
Capacity	The skills (e.g. in leadership, conflict resolution, climate data analysis), and resources (e.g. people, financial, infrastructure) that enable planning and implementation of management actions. *Reference: Bennet and Satterfield, 2018*

Capacity and its nuanced impact on floodplain management was discussed across various aspects of the governance system. Discussion of capacity included topics such as people not having enough time and/or knowledge, challenges in staff retention, insufficient funding, and too much funding without enough people or time to

manage the funding. Capacity was often discussed in conjunction with the attribute coherence. For example, one participant stated: *"Sometimes funding also creates more complexities in terms of the work and so it adds administrative burden. It adds complexity in terms of dynamics between partners. There isn't any place that I ever go that people don't say if we had more money, we could do more. But I have experienced places where when there is more money it doesn't necessarily solve all the problems that they had identified"* (Participant 3, Group 1). These comments highlighted that even though new initiatives might be pushed for, insufficient coherence in meeting the new objectives across the system given various capacity related concerns (funding, permitting, regulatory) can create barriers to their success.

Attribute	Definition
Coherence	Refers to alignment and consistency of policy and management actions (e.g. projects and planning) across different levels and sectors of governance. It ensures that policies and actions do not work in isolation but are integrated and coordinated to achieve common goals. It is crucial to avoid conflicting policies or unintended consequences that may hinder effective actions. *Reference: Pangalos, C. (2023)*

Coherence was a dominant attribute emerging as a barrier to IFM. Coherence was discussed as a scale problem and focus group participants highlighted that a lack of coherence across different organizational (goals), management (plans), and institutional (formal rules) was a leading barrier to supporting successful implementation of IFM. Working group members emphasized the lack of coherence in the funding and regulatory systems: *"It's essentially either state legislative policy or federal legislative policy that has created all of these individual funding programs and all these individual regulatory programs and they were created for good reason. But now you have this complex web of funding and permitting that is administratively dysfunctional, and there's not a good system, like Participant 1 said, to make it as easy as possible for folks that already have to manage complex partnerships of watershed scale approaches to that complex funding systems where you have 15, 16 grants to get one project done and you have to navigate through however many different regulatory processes"* (Participant 7, Group 1).

Attribute	Definition
Informed	The likelihood of effective outcomes is increased when planning and management decisions are informed by the best available knowledge—this includes integrated knowledge types (scientific, local, and Indigenous) and of multiple systems (social and natural). *Reference: Bennet and Satterfield, 2018*

The attribute informed was discussed as a barrier primarily in relation to scale effects. For example, one participant highlighted that when information is not coherently applied across institutional (formal rules) and jurisdictional (administrations) scales it can create a barrier to IFM: *"The glacial pace at which the federal government is able to change, adapt, regulations and procedures and that sort of thing, I think is really felt in the world of floodplain management where the science–even though there's still a ton of science questions–has actually leap-frogged the regulations, and we see that probably holding us back"* (Participant 6, Group 2). Additionally, participants discussed that the long time scales over which outcomes from various floodplain management initiatives unfold can create uncertainty and hesitation when managers do not have the information necessary to determine if their actions are the "right" ones to

take: *"How can we know what is enough or what is the right approach when often a lot of these very complex efforts and projects take sometimes years to see effects. That can be difficult to evaluate the end result of our actions and how good or how enough they are contributing to restoration"* (Participant 2, Group 2).

Attribute	Definition
Collaboration	In the realm of environmental governance, collaboration refers to a mode of goal development, decision-making, and service delivery that shifts away from top-down government, or sector specific settings, to a setting in which public, private, nonprofit, and community actors are jointly involved in and accountable for decision-making and service delivery to create outcomes that could otherwise not be achieved. This model has resulted from the recognition that social-ecological problems that we now face are sufficiently complex enough that there is a lack of consensus on the exact nature of the problem and what the appropriate solutions are. *References: Breslow, 2021; Folke et al., 2005*

Collaboration as mentioned above was the dominant attribute emerging from the discussion of bridges and barriers across both working groups. When discussed as a barrier, focus group participants highlighted that there is a lack of collaboration beyond the project scale which creates a lack of coherence in the floodplain management system and various scale related challenges. For example: *"A lot of problems that people are noticing in their particular floodplain is related to stuff that's going on in the county, upstream of them, or the country, you know, upstream of them. And so that cross boundary governance, I*

guess the connections across the watersheds or counties or states or whatever, making sure that people are talking because there's a lag between where you experienced what's happening, and the causes of why that's happening. And I feel like there hasn't been, I don't see a ton of communication in that way." (Participant 4, Group 2).

4.3 Lessons Learned and Recommendations

We recognize that many of the bridges and barriers discussed above will be familiar to individuals who are seasoned practitioners and managers working in the floodplain management system. For example, it is no revelation that there was much discussion around lack of capacity as a barrier to IFM. However, discussing the nuance of capacity with these different groups, and analyzing the discussion through the lens of the conceptual frameworks presented above helps us to understand how capacity is functioning across different elements of governance (institutions, structures, processes, relationships). Additionally, this form of analysis can illustrate the various scales and levels at which capacity is acting as either a bridge or barrier, further illuminating the pinch points in the system and potential avenues for action.

In addition to discussing how attributes act as bridges or barriers to IFM, participants shared ideas for how to advance particular attributes. For example, in discussing how to build trust and facilitate collaboration, both groups emphasized the key role of bridging organizations. Bridging organizations "provide a forum for the interaction of… different kinds of knowledge, and the coordination of other tasks that enable co-operation: accessing resources, bringing together different actors, building trust, resolving conflict, and networking" (Berkes, 2008, pg.1). **Floodplains by Design** was mentioned multiple times as an example of a bridging organization supporting IFM efforts across Washington State. Referring to Floodplains

by Design, one participant stated "[it is an] entity that is operating with flexibility at the interface between practitioners and funders and regulatory entities... taking an [integrated] approach in a very intentional way" (Participant 3, Group 1). In addition to bridging organizations, participants noted the importance of centering relationships and people as a way to build trust.

> "I feel like this might sound silly, but having food at meetings and stuff. Doing things in person. Having whoever is coordinating those groups being someone who lives in the community and has relationships already with people who've already been doing stuff there... trust matters more than anything else does. I think there's different ways to configure that depending on what community you're in, but I feel like everyone likes food and drinks. Nice, good coffee and a reasonable time to connect, so not like Saturday mornings when people have kids and sports and stuff. Trying to accommodate people's lives and make it in a venue that's easy to get to." (Participant 4, Group 2).

Emphasizing this point, another participant gave a real-life example of what happens when organizations don't "recognize people's most important values":

> "After some really bad wildfire seasons in 2014/2015 across the state, we tried to build up. . .a post wildfire flood committee in the state. And we were trying to make folks that were affected by wildfires aware of their risk of post wildfire flooding. . . It was a very stark reminder that if you're bringing a message to a group of people, you first have to recognize their most important

> values. These are people that had just gone through a wildfire and we're like, "Okay, here's what you do to prepare for the flood risk". And they're going "we don't have a place to sleep next week"" (Participant 6, Group 2).

Further focus group discussions could be useful to learn from practitioners and experts about best practices for building particular attributes at different scales and levels in the floodplain management system. For example, Macilroy (2021) illuminates the role of relationships in IFM. Future research could follow this model, where one aspect of the governance system is explored in detail to understand best practices (such as how trust is actually playing out in the floodplain world).

Importantly, we recognize that our focus groups were not representative of the entirety of perspectives within the floodplain management system in Washington. Answers to these questions, and the emergent attributes produced from these conversations, will be different depending on who is at the table. Striving for focus groups that are representative of the diversity of perspectives and lived experiences of people who interact with floodplains will be important to understanding governance strategies that work for all. While the above emergent attributes are illustrative of some of the challenges and opportunities for governing floodplains, they are not fully representative of the complexity of these challenges, or how these challenges are experienced differentially across groups and individuals.

We found that trialing this protocol with our working group was a useful exercise in understanding both how the attributes of governance that we propose are acting as bridges and/or barriers to IFM in Washington, and in revealing scale and level challenges impacting governance for IFM. We believe this protocol could serve as

4 PROPOSED PROTOCOL TO ASSESS AND PROMOTE IFG

an appropriate first step in understanding and tracking changes in the governance system to better support IFM. Potential future next steps could include:

1. Holding a wider variety of focus groups to gain more robust insight into key attributes of IFG in Washington.

2. Developing associated indicators and/or metrics for identified attributes of interest (to practitioners and decision-makers) that would measure progress toward that attribute and improve governance strategies overall.

We also believe this protocol could be used at multiple scales and levels to analyze governance for floodplains in Washington State as a whole, and by individual organizations or agencies to better understand the barriers and bridges to further integration within their work. Additionally, this protocol could be tailored to address different governance related issues and questions such as those related to equity or climate resilience.

This report develops the concept of governance, and in particular integrated floodplain governance, as a way to understand and assess aspects of the social system that impact IFM and related social and ecological outcomes. We have introduced a lexicon, conceptual frameworks, and a protocol to understand and assess governance strategies that support IFM and can be tailored to the local context. To expand upon this work we have identified the following opportunities for future research:

Expanding the understanding of the functioning of particular attributes of governance:
Understanding governance for IFM and which attributes of governance are most useful for integrating the system will require further analysis about how these attributes function at different scales and levels, interactions among attributes, and how to increase the capacity and functioning of desired attributes. For example, Stern and Baird (2015) expand our understanding of different types of trust that are useful to enhance the efficacy and resilience of natural resource management institutions: dispositional, rational, affinitive, and systems based (pg.1). Work like this shows the usefulness of studies that explore and expand upon our understanding of these attributes and their functioning within various elements of governance. Another approach is to look at specific partnerships or projects and the role attributes play in these contexts. Recent work by Jennifer Arnold for the Oregon Water Enhancement Board (2023) looks at the role of trust and other governance related factors in different types of effective partnerships. This type of analysis could guide how individuals, organizations, or networks might build desired attributes at appropriate scales and levels.

Understanding how to effectively change governance structures:
Future research could also seek to understand how to begin changing governance structures that are no longer serving the needs of social-ecological systems. As one focus group participant stated:

"Everyone is kind of fed up with the same old, same old, it's not working, we need a big shift, but there's definitely resistance to that in the system. And so, it feels like we're kind of gearing up and... I think that's really inspiring because that's what we need locally too in the work that we're doing. And it is happening, like it's bubbling up everywhere. But it is a change in systems. It's a change in function. It's a change in the way things have always been done and [I] kind of had this moment last week of like we're spending a lot of money to undo what was done in the system. And that's gonna be our legacy in this generation. And maybe the next generation can do things better. But for now, at least when it comes to rivers, we're spending tens of millions of dollars undoing the infrastructure that wrecked the system. And so, it's not, in a lot of ways, it's not restoration, it's reconciliation. We need to undo the wrongs." (Participant 1, Group 1).

One potential research pathway for understanding how to 'undo the wrongs' is looking at how 'critical junctures' like major flooding events can facilitate windows of opportunity for change in governance systems. Focus group participants highlighted the role disasters or extreme events play in facilitating change in the system. "It's kind of sad to say, [but] when there is a big flood, I feel like that's a good opportunity afterwards because people really see what the need is, and you start to come together to find solutions." (Participant 3, Group 2). Institutional Change Theory literature and methodologies like the Zurich Resilience Alliance's Post Event Review Capability Framework could

5 DISCUSSION

facilitate this kind of analysis and provide helpful insight into how to change governance elements toward a more integrated approach to floodplain management.

Understanding the cause-effect relationship between governance elements and social and ecological outcomes:
While this report offers tools for imagining a governance system designed for integrating floodplain management in the region, we recommend a useful next step would be to ground-truth the concepts presented here in an applied case study to understand the cause-effect relationship between governance elements and social and ecological outcomes (Bennet and Satterfield, 2018; Plummer, Baird, Dzyundzyak et al., 2017). For example, the Floodplains and Estuaries Implementation Strategy 2021 Update states, "Decades of conflicts have created challenging conditions for pursuing an integrated management approach, which relies on a foundation of trust and a willingness to collaborate" (Habitat Strategic Initiative, 2021, pg.25). Identifying the impact of trust and collaboration (or the lack thereof) on social and ecological outcomes in the floodplain management system and understanding strategies for building these attributes across elements of governance (institutions, structures, processes, and relationships) could help to replace roadblocks with metaphorical bridges to more integrated, just, and climate resilient social and ecological outcomes. Further, identifying these relationships can help add legitimacy to the need for governance focused analyses and investments. One opportunity for exploring these cause-effect relationships is through a longitudinal case study of a particular IFM program or project.

Further caveats:
Importantly, we recognize that the need for solving these issues stems from colonization and industrial destruction of natural systems based on notions of Western dominance, and that, while aiming to be inclusive of multiple ways of knowing, the view of governance presented here still largely engages technocratic and Western philosophies. Indigenous and other governance frameworks embracing different epistemologies, values, practices, and aspirations can contribute transformative insights and essential counterpoints to the frameworks and ideas presented here. We therefore strongly recommend pursuing a complementary study that examines the implications of Indigenous and other philosophies for a reimagined system of floodplain governance. Technocratic governance paradigms that view nature and humans as separate are in direct conflict with Indigenous views and values and therefore result in different approaches to governing and managing floodplains. Greater attention must be paid to the values and ways of knowing about the world that underpin governance design and the ways in which conflicting epistemological perspectives can act as barriers to truly integrating governance (Fisher et al., 2022).

Finally, we recognize the work presented in this report is just one way to structure thinking about the work of paradigm change and understanding the complexities of floodplain management. Ultimately, our hope is that this report can prompt further discussion and research about the importance of governance and its impacts on floodplains and other social-ecological systems in the region.

Understanding and tracking progress in IFM requires an understanding of the pieces of the governance system that need to be changed to better support it. This report has aimed to:

1. Expand upon the conceptualization of governance and its relationship to ecosystem health and recovery, especially in the context of IFM in the Puget Sound region.

2. Improve the understanding and assessment of governance strategies that support and expand IFM in Washington State.

Through the conceptual frameworks presented in this report we aimed to demonstrate that governance is a real, complex-dynamic system that can be designed and adapted to meet the needs of changing social-ecological systems. The conceptualization of scales and levels aims to serve as a tool for diagnostic inquiry into the dynamic challenges and opportunities faced by floodplain managers in a world that is increasingly multilevel.

By focusing on governance as a real social system that is necessary to achieve environmental change, we can see it more deliberately and in greater detail and begin to address the components that are acting as bridges or barriers toward achieving our management goals and desired social and ecological outcomes. In this report we have provided language and conceptual frameworks with which to envision governance and parse its various elements, objectives, attributes, and scales, in order to more carefully diagnose what needs changing and decide where and how to focus our energies. This is the work of "paradigm change."
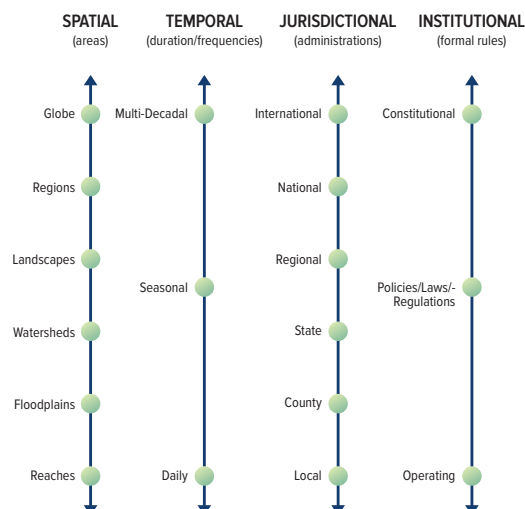
Governance can change based on the needs of the social-ecological system

Governance systems can be intentionally designed based on the goals for the social-ecological system
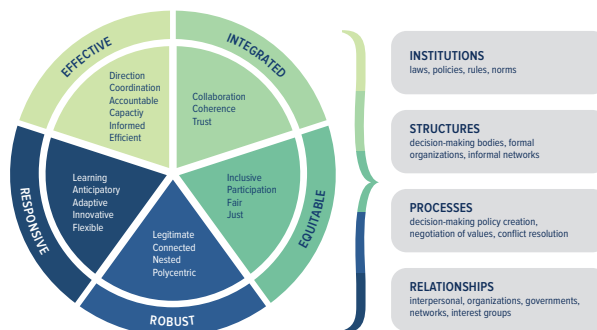
Governance impacts and is impacted by dynamic interactions occurring across many scales and levels

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Governance Objective: Integrated
Integrated governance connects institutions, structures, processes, and relationships (e.g. spatial, temporal, jurisdictional, institutional) for a holistic and coherent approach to addressing complex social-ecological systems issues.

Attribute	Definition
Trust Interpersonal and institutional trust makes it easier for diverse institutions/ actors to work together	In the context of environmental governance, trust can be considered an individual's willingness to accept vulnerability in the face of uncertainty. Trust makes social life predictable, it creates a sense of community, and it makes it easier for people to work together. Trust will look different at different levels and scales of governance. For example, how governments or institutions go about building trust with the public will look different from how individuals build trust with one another. *References: Folke et al., 2005; Stern and Baird, 2015*
Coherence Alignment and consistency of policy and actions across levels and sectors of governance enables effective management actions	Coherence refers to alignment and consistency of policy and management actions (e.g. projects and planning) across different levels and sectors of governance. It ensures that policies and actions do not work in isolation but are integrated and coordinated to achieve common goals. It is crucial to avoid conflicting policies or unintended consequences that may hinder effective actions. *Reference: Pangalos 2023*
Collaboration Collaborative forms of planning and decision-making and service delivery in service of a collective goal(s)	Collaboration in the realm of environmental governance refers to a mode of goal development, decision-making, and service delivery that shifts away from top-down government, or sector specific settings - to a setting in which public, private, nonprofit, and community actors are jointly involved in and accountable for decision-making and service delivery to create outcomes that could otherwise not be achieved. This model has resulted from the recognition that social-ecological problems that we now face are sufficiently complex enough that there is a lack of consensus on the exact nature of the problem and what the appropriate solutions are. *References: Breslow, 2021; Folke et al., 2005*

APPENDIX 1: Proposed Governance Objectives and Attributes Definitions

Governance Objective: Robust

"Robust governance ensures that functioning institutions persist, maintain performance, and cope with perturbations and crises" (Bennet and Satterfield, 2018, pg.7).

Attribute	Definition
Legitimate Institutions (formal and informal rules, policies, laws, social norms), organizations, actors, and programs ensure strong political and local support	Legitimate institutions, organizations, and actors ensure strong political and local support. They are often guided by a collective vision, conferred with formal legitimacy (though law or policy) and are perceived to be legitimate by constituents and actors who are interested in, impacted by, or have the ability to influence the work at hand. *Reference: Bennet and Satterfield, 2018*
Connected Functional social networks across scales, institutions, organizations and individuals enable knowledge and resource sharing, build trust, and help to enable stronger working relationships	Functioning social networks exist to connect institutions, individuals, and organizations across multiple levels and scales. Network members are able to communicate with one another, share resources, solicit feedback, and transfer knowledge. There is attention paid to understanding, valuing, and leveraging partners' respective cultural differences for mutual benefit. Social memory is valued and links past experience to future policies. They are often enabled by bridging organizations and are characterized by positive social relations. *References: Chaffin et al., 2014; Breslow, 2021; Mickel & Goldberg, 2018; Folke et al., 2005*
Nested Levels of decision making authority, responsibilities, and tasks are appropriately assigned and supported to ensure effective use of	In nested governance, decision-making authority, responsibility, and tasks are devolved to the most administratively appropriate level, which enables the proper entity to self organize, make decisions, and take actions. Importantly, this responsibility at lower levels must be matched with adequate support and oversight from higher levels to ensure cohesion. *Reference: Bennet and Satterfield, 2018*
Polycentric Centers of decision-making and action-taking exist in multiple locations, across jurisdictions, and at multiple scales helping to ensure resilience and adaptability in the face of adversity	Multiple centers of semi autonomous decision-making and action-taking exist in multiple locations, across jurisdiction, and at multiple scales that all interact and cohere toward a common goal. This redundancy of purpose and function and institutional diversity helps to buffer against change and avoid institutional collapse when faced with adversity. *Reference: Bennet and Satterfield, 2018*

APPENDIX 1: Proposed Governance Objectives and Attributes Definitions

Governance Objective: Responsive
"Being responsive ensures that environmental governance is adaptable both to changing environmental and social conditions and to diverse contexts." (Bennet and Satterfield, 2018, pg.7).

Attribute	Definition
Learning Institutional and social learning improves management actions and governance practices, builds resilience, and ensures adaptability	Institutional and social learning is realized through ongoing monitoring and evaluation, communication, and reflection upon the social and ecological performance of environmental governance practices. Collective memory is enhanced through practices such as documentation and sharing of lessons learned, knowledge co-production, and developing communities of practice and learning networks. *Reference: Bennet and Satterfield, 2018*
Anticipatory Institutionalized practices for anticipatory analysis and planning helps to build resilience in the face of chronic and acute risks	Institutionalized anticipatory practices such as analysis and planning for the consequences of both chronic (long term shifts in climate patterns, e.g. sustained higher temperatures that may cause sea level rise of chronic heat waves), and acute (event-driven risks caused by extreme weather events such as floods) risks can help to build knowledge and capacity to address disturbances. *Reference: Bennet and Satterfield, 2018*
Adaptive Policies, institutions, and management actions are updated/changed when needed to increase resilience and reduce uncertainties in management outcomes	Adaptive Governance is enabled by institutionalized spaces for dialogue, reflection, and deliberation, and clear processes and steps to ensure that policies, institutions, and management actions are periodically revisited and updated or changed when required. *Reference: Bennet and Satterfield, 2018*
Innovative Innovative forms of governance support experimentation with new ideas. Coupled with an adaptive management approach new ideas enable effective management actions to emerge	A culture of innovation coupled with a higher risk tolerance encourages experimentation with new ideas. The monitoring and documentation of successes and failures associated with these new ideas enables effective management actions to emerge. *Reference: Bennet and Satterfield, 2018*
Flexible Institutions, policies, and laws, ensure solutions are tailored to local needs and realities - governance supports the flexibility required for effective management actions	Flexibility in institutions and policies allows for approaches to environmental management and conservation actions to fit the diverse needs of local realities. Rather than a one-size-fits-all approach, efforts are made to understand the social, cultural, political, economic, and environmental contexts where interventions are being implemented and management actions are adjusted accordingly. Governance design reflects this need for flexibility and adjusts accordingly. *Reference: Bennet and Satterfield, 2018*

APPENDIX 1: Proposed Governance Objectives and Attributes Definitions

Governance Objective: Equitable
"To achieve the objective of being socially equitable, environmental governance should engage decision-making processes and produce socioeconomic outcomes that might be characterized as: inclusive, participatory, fair, and just." (Bennet and Satterfield, 2018, pg.7)

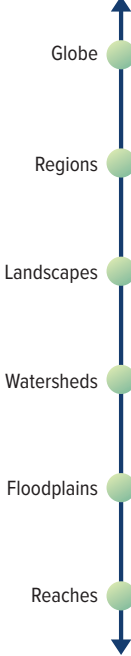| Attribute	Definition
Inclusive Policies, structures, and processes ensures effective management outcomes that meet the needs of a multitude of people	Equitable environmental governance begins with policies and processes that recognize, respect, and are inclusive of the perspectives, knowledge systems, values, cultures, and rights of diverse actors, including the views of groups who are often marginalized and/or vulnerable (e.g. impoverished communities, unhoused people). *Reference: Bennet and Satterfield, 2018*
Participation Inclusive, representative, and equitable processes for engaging diverse groups that are impacted by or are interested in decision-making processes and management actions	Effective participation requires context-specific processes and structures to enable inclusion, representation, and the engagement of diverse groups that are impacted by or interested in collective decision-making processes and management actions. This enables the sharing of power and the creation of representative plans and actions. *Reference: Bennet and Satterfield, 2018*
Fair Distribution of benefits and burdens; responsibilities are shared equitably strengthening social networks, accountability, and legitimacy	Power and benefit sharing mechanisms help to ensure that the benefits and burdens of environmental management actions are distributed in a fair manner and that the rights and responsibilities are shared equitably. *Reference: Bennet and Satterfield, 2018*
Just Laws and policies ensure access to justice to defend against wrongdoing	Equitable governance is ensured through laws and policies that protect local rights, ensure that groups have access to justice to defend against wrongdoing, and facilitate reparations and or compensation for past wrongs. *Reference: Bennet and Satterfield, 2018*

APPENDIX 1: Proposed Governance Objectives and Attributes Definitions
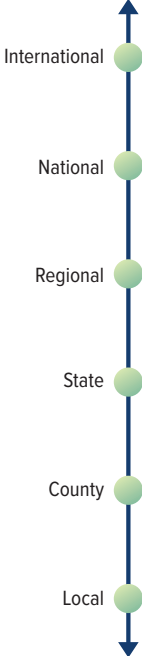
Governance Objective: Effective

"To be effective is to maintain or improve the ability of environmental systems to function and to produce ecosystem services through the persistence of species, habitats or biodiversity" (Bennet and Satterfield, 2018, pg.7).

Attribute	Definition
Direction Clear vision, goals, aims, scope, and boundaries establishes boundaries and benchmarks for success of management actions	Direction is provided through a clear articulation of vision, goals, aims and the establishment of boundaries on action and scope. This helps to establish what effective action entails and what success looks like. *Reference: Bennet and Satterfield, 2018*
Coordination Roles, functions, and mandates are coordinated across the governance system to ensure effective use of resources and time	Roles and functions of different governance organizations (e.g. NOAA, PSP, Native nations, Local governments) are coordinated to ensure management actions are adequate and trade-offs are resolved. Coordination can happen through bridging organizations or networks. *Reference: Bennet and Satterfield, 2018*
Capacity Skills and resources are adequate for the tasks at hand enable effective and efficient management actions	Capacity, meaning skills (e.g. leadership, conflict resolution, climate data analysis), and resources (financial, infrastructure) enables planning and implementation of management actions. *Reference: Bennet and Satterfield, 2018*
Informed Use of best available knowledge (including scientific, local, Indigenous Traditional Knowledge, natural and social) builds resilience and ensures effective management outcomes	The likelihood of effective outcomes is increased when planning and management decisions are informed by the best available knowledge - this includes integrated knowledge types (scientific, local, and Indigenous) and of multiple systems (social and natural). *Reference: Bennet and Satterfield, 2018*
Accountable Institutional, organizational, and interpersonal accountability helps to build trust, strong social networks, and legitimacy	There are clear mechanisms to hold those involved in governance accountable. This helps to ensure that mandated decisions are followed and effective actions are being taken. Transparency in communication about the rationales for decisions and the outcomes of potential future or past actions is important for accountability. *Reference: Bennet and Satterfield, 2018*
Efficient Efficient use of time and resources build legitimacy and accountability	Efficient governance includes ensuring that the time commitments required of involved parties are reasonable, that efficacy guides the choice of management actions and the use of public resources, and that costs and actions are proportional to system productivity. *Reference: Bennet and Satterfield, 2018*
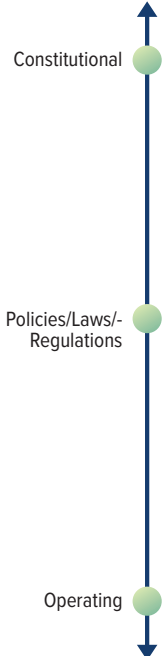
Scale	Definition/Explanation	Levels	Example
Spatial (area)	Environmental, geophysical, and ecological phenomena occur over a continuous range of geographical levels *(Cash et al., 2006, pg.3)*	Globe Regions Landscapes Watersheds Floodplains Reaches	"Complex cellular processes govern the decomposition of plant matter lying across a cleared patch of forest, releasing carbon dioxide into the atmosphere. Once released to the atmosphere, molecules of carbon dioxide rapidly merge into a somewhat uniform global mix of gasses regulating the Earth's greenhouse effect. Global climate change may result from an amplified greenhouse effect. Thus, global systematic changes and phenomena are linked to and regulated by a complex mix of local processes and vice versa" *(Cash et al., 2006, pg.3)*
Temporal (durations, frequencies)	Environmental and social processes happen at a range of different time frames	Multi-Decadal Seasonal Daily	"Phenomena of extremely long duration in global climate dynamics, such as sea temperatures, manifest themselves in changes in relatively short-lived hurricane regimes. Social phenomena also happen over a range of time frames: the 24-hr news cycle, electoral events that happen on the order of multiple years, the lifetime of bureaucratic agencies, or the long time frame of large cultural shifts in religion or in dominant economic paradigms and ideologies" *(Cash et al., 2006, pg.3)*

Scale	Definition/Explanation	Levels	Example
Jurisdictional (administrations)	Clearly bounded and organized political units, with linkages between them created by constitutional and statutory means	International National Regional State County Local	A river might run through multiple different jurisdictional units including Native nations, multiple towns, cities, counties, states, and even countries. Each jurisdictional unit might have their own rules and approaches to managing the river.

APPENDIX 2: Select Scales and Levels Pertinent to IFG

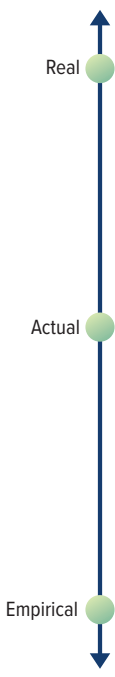| Scale	Definition/Explanation	Levels		Example
Institutional (formal rules)	"Institutions provide rules for action, but are not actors nor the arenas when actions occur" "Formal institutions are codified, documented, explicit rules generally enforced through bureaucratic and hierarchical authority structures, such as laws, legislation, and treaties" *(May, 2022, pg.42)* "In sum, the operational level is what people do, the collective choice level determines what people are allowed to do, and the constitutional level is about who decides" *(May, 2021, pg.3)*	Constitutional Policies/Laws/-Regulations Operating	"Constitutional rules designate authority relations at the highest level, with influence across the broadest scale, and set the parameters for lower level institutions" "Collective choice/policy level rules delimit processes and procedures for decision-making, and the roles of actors involved" Operational rules guide every day, practical activities, decision-making, and problem solving processes for individuals or small collectives" *(May, 2022, pg.42)*	At a constitutional level: These rules determine who decides how floodplains are managed. They are the rules that determine expectations, assumptions, and understandings about how the world looks or operates, "whose knowledge, experiences, and understandings matter; and what skills, forms of wealth, or relationships are important" (May, 2021, pg.4). Property rights in the U.S. is a good example of this. Collective choice/policy level: the National Flood Insurance Program (NFIP) guides the United State's floodplain management programs and sets parameters for what is acceptable and not. It provides the maps and regulatory basis for local floodplain management. Further Washington State floodplain management standards add another level of mandated compliance—constricting what people are allowed to do. Operating: Local governments then operate in a situation in which there is fear around complying with FEMA/NFIP. Make decisions based on the needs for compliance with constitutional and collective choice/policy rules, they also consider mandates of their organization and their specific role within the organization.

APPENDIX 2: Select Scales and Levels Pertinent to IFG

Scale	Definition/Explanation	Levels		Example
Organizational (goals)	Organizations are actors, as well as arenas for action	Official / Operative / Unofficial	Official goals: "the general purposes of the organization as states in charters, mission statements, annual reports, and public statements by key executives and other authoritative pronouncements" Operative goals: "define the actual operating policies of the organization in delineating means and resources and prioritizing objectives in achieving official goals." Unofficial goals: evolve at the fastest rate of change with the preferences, interpretations, capabilities, and power struggles of personnel in everyday problem solving and role fulfillment" *(May, 2022, pg.43)*	Organizations might have large guiding goals like strategic plans, and mission and vision statements. For example, the Department of Ecology's 2023-25 Strategic Plan states that their Vision is "Our innovative partnerships protect and sustain healthy land, air, water, and climate in harmony with a strong economy", and their mission is "To protect, preserve, and enhance Washington's environment for current and future generations." The operative goals for how each division achieves the mission and vision within the Department of Ecology might look different. For example, the floodplain management division will have different operating goals and strategies for achieving their goals than those tasked with implementing the State Solid and Hazardous Waste Plan. Unofficial goals within an organization have to do with the personnel occupying roles at the organization fulfilling their tasks. These goals might be personal (i.e. a person's desire to be promoted, or to build better relationships at work), or related to the task at hand (find opportunities for creating efficiencies in the FbD grant application process).

Scale	Definition/Explanation	Levels	Example
Management (plans)	"Many environmental management plans and "actions," can be grouped into hierarchical sets ranging from tasks through projects and strategies." *(Cash et al., 2006, pg.3)*	Strategies Projects Tasks	There may be a strategy related to a particular watershed that dictates overall plans (e.g. improve salmon habitat, protect communities and infrastructure from flooding, and preserve agricultural lands), but any given project might only be able to accommodate one or two of those desired outcomes. Further, individual tasks to complete any given project may or may not be relevant to the overall project or strategy plan.

Scale	Definition/Explanation	Levels		Example
Informal Institutional (social norms)	"In contrast to formal institutions, which are manifest, easily observable in documented legislation, law, policy, organizational mission statements, workload documents, and contracts, informal institutions are latent, undocumented, implicit, often tacit norms, understandings, and expectations enforced through social relationships" "informal institutions have essential properties that operate continuously, regardless of immediate effect and irrespective of any one person's acknowledgment. We know the underlying causal mechanisms of informal institutions are real from the effects on human behaviors, circumstances, and life chances" *(May, 2022, pg.42)*	Real Actual Empirical	Real: nearly unobservable tendencies that provide weight and meaningful structure to the social world Actual: Events require a more concerted effort to discern and explain Empirical: events are easily observed and measured *(May, 2022, p.43)*	"While constitutional institutions and formal organizational goals bar race as a basis for discrimination in present day USA, the persistence of racism is real across different levels of institutions, organizations, and relationships, manifesting through actual disparities in public health, income, occupational, and opportunities to be heard, seen, and considered in decision-making processes, and empirical everyday interactions, relationships, challenges and successes, and collective mobilization for change toward racial equity. The difficulty in this analysis is that realities are not just stratified, but multiple" *(May, 2022, pg.43)*

Scale	Definition/Explanation	Levels	Example
Network (links)	"Internal structures of networks may not be related to spatial scales. Networks in markets and industries, through claims and religions, or even through processions and voluntary associations may be unrelated to political or geographic space" *(Cash et al., 2006, pg.3)*	Trans-society Society Professional Personal	Networks are not necessarily linked to jurisdictional or spatial scales. Examples of these kinds of networks include those based on religion, profession, kin, shared hobbies or interests.
Knowledge (truths)	"There is often a gap between the highly generalized and gener-alizable understanding produced by formal science and the experien-tially and practice-based understanding embedded in both 'modern' local, and 'traditional' ecological knowledge" *(Cash et al., 2006, pg.3)*	General Universal Specific Contextual	There are different types of knowledge. As Cash et al. (2006) write, "Although knowledge of processes is useful at larger spatial and temporal scales, often it can only be applied by accepting a lower resolution and application of general processes to the local specific cases" (pg.3). One example of this is high resolution climate models not being useful to local decision makers.

Bridges: **Collaboration, Learning, Trust, Informed**

Collaboration: was the dominant attribute emerging from the discussion of bridges and barriers across both working groups. In line with our understanding that causes and solutions have common roots, collaboration (when present) emerged as a leading bridge and a leading barrier (when not present). The discussion of collaboration as a bridge to IFM was linked with many different supporting and enabling attributes. Collaboration was also discussed across multiple different scales. Focus group participants also highlighted different avenues for building better collaboration into governance strategies.

Definition
Collaboration in the realm of environmental governance refers to a mode of goal development, decision-making, and service delivery that shifts away from top-down government, or sector specific settings, to a setting in which public, private, nonprofit, and community actors are jointly involved in and accountable for decision-making and service delivery to create outcomes that could otherwise not be achieved. This model has resulted from the recognition that social-ecological problems that we now face are sufficiently complex enough that there is a lack of consensus on the exact nature of the problem and what the appropriate solutions are. *References: Breslow, 2021; Folke et al., 2005*

Illustrative quotes:

Accountability in collaboration as a way to build trust and further IFM
"Being an ally on issues that may not pertain to the entire network or entire collaborative partnership, but you know, when something comes up that is of significance to one stakeholder group that may not have bearing on the overall work, but they have developed this trust they've developed these great relationships with this collaborative group. And for that, those partners are able to step up and say, "yeah, we need to support you in this". I think being allies across these different interests, even if they're standalone items, is something that really helps build trust and appreciation for next time you know you do need to work on something collaboratively." (Participant 7, Group 2)
Associated attributes: Trust; Accountable
Scale/Levels & Dynamics: Temporal (duration/frequencies); Jurisdictional (administrations); Organizational (goals); Management (plans); Network (links); Knowledge (truths)

Collaboration is enabled through more polycentric governance designs
"I think the most vexing thing for me is dealing with people who are strongly adhered to hierarchy. I don't feel that hierarchy has a place in collaborative work... Rather than having power from above and drawing from below, collaborative work is a power drawing from within and amongst, and there's just a completely different power structure in that and I think that when people are strongly adhering to hierarchy and cannot think of any other type of administrative structure that it has huge impacts on how collaborative work, advances and is integrated within the functioning and I think county governments as a whole have that experience and so that is one of the main barriers to bringing integrated collaborative work into a local or any government structure is that there's not a real collaborative structure in which to advance... there's clearly a need [for hierarchy], but it's sort of applying the right structure to the situation at the time and that flexibility and ability to be comfortable with both and understanding when to use one versus the other would make a lot of sense to me." (Participant 1, Group 1)
Associated attributes: Polycentric
Scale/Levels & Dynamics: Institutional (formal rules); Informal Institutional (social norms); Knowledge (truths)

How a focus on equity, inclusion, participation and trust building facilitated collaboration and is a bridge to IFM approaches
"I think a more intentional focus on equity, and the communities that we work with and incorporating more voices than we necessarily did before will help broaden out the participation that we're getting. So I think I think those three things [including technological advancements and increased focus] together will actually like create a stronger fabric for like governance moving forward and potentially just some really kind of big, big changes" (Participant 4, Group 2)
Associated attributes: Inclusion; Participation; Trust
Scale/Levels & Dynamics: Institutional (formal rules); Institutional (informal rules/social norms); Knowledge (truths)

APPENDIX 3: Focus Group Discussion Results: Bridges and Barriers to IFM

Learning: was discussed by focus group members as a leading bridge to IFM. There was a sense across both focus groups that learning is happening within the floodplain management system across both social and ecological systems and that as a result IFM approaches are being legitimized and further enabled. Learning was often discussed in conjunction with temporal scales.

Definition
Learning: Institutional and social learning is realized through ongoing monitoring and evaluation, communication, and reflection upon the social and ecological performance of environmental governance practices. Collective memory is enhanced through practices such as documentation and sharing of lessons learned, knowledge co-production, and developing communities of practice and learning networks. *References: Bennet and Satterfield, 2018*

Illustrative quotes:

How learning facilitates better collaboration and outcomes
"Not only is there a diversity of perspectives and values being brought to the table and in designing solutions, but I think there's an increase in understanding and learning that's happening across those different perspectives and hopefully a little more understanding of what those are in sort of an expansion of what's important and what you care about because you're interacting with people that have those in a very, I guess, direct way. So that's what really gets me excited is when you see people learning, and I'm sort of included in that too. Learning about those different perspectives and that becomes part of how you approach the work going forward." (Participant 3, Group 1)
Associated attributes: Collaboration; Participation; Inclusion
Scale/Levels & Dynamics: Temporal (duration/frequencies)

Learning over long time scales as a bridge to IFM
"I think we've started to do some of these things long enough now, even though it hasn't been that long, but I mean, the example that comes to mind is putting large wood in rivers and armored banks where it's appropriate. And that was a science that was pretty uncertain there for a long, long time... I think we're at the point now for that particular example, where you could almost develop a certain set of conditions and criteria and templates like, if this is where we're gonna go do work in the river for a levee repair or whatever it is, it meets these criteria to put a bunch of wood in. I don't have any illusions that every levee repair is going to be like a demolition and setback of the levee or buyouts, you know, of the properties that it protects. We're still a long way from that, but if we're trying to incorporate, you know, some eco and habitat features as we go, that's starting to get easier to do." (Participant 6, Group 2)
Associated attributes: Efficient; Informed
Scale/Levels & Dynamics: Temporal (duration/frequencies); Management (plans); Knowledge (truths)

Coordinated learning to address barriers and inefficiencies in the system—that is a bridge
"And so, I do see like a lot of people are really motivated to like, identify those barriers that we're all facing and kind of coming together to make progress toward that even if its slow, you know, there's there are things happening and so I see that as a kind of a optimism that you know, folks are really motivated to work through those issues together." (Participant 5, Group 2)
Associated attributes: Coordination; Participation; Innovation; Collaboration
Scale/Levels & Dynamics: Temporal (duration/frequencies); Management (plans); Network (links); Knowledge (truths)

Learning as a way to increase legitimacy of IFM approaches

"It's in the public's interest to address these broader scale issues in our floodplains to prevent catastrophic damages [like] a pipeline blowing out a highway [and] disconnecting a community, [or] a fiber optic cable going and cutting off a region from internet access. When we're working in a political environment where the memory may not go back far enough, or that area may not have experienced that type of catastrophe, it's not going to be a high priority, [for] a community where new developments are going in, [and] none of those folks have the memory of a flood 15 years ago that cut off their community. I think getting that information out, images [and] descriptions of what happens when we don't manage our floodplains well [is important]." (Participant 4, Group 1)

Associated attributes: Legitimate; Anticipatory

Scale/Levels & Dynamics: Spatial (areas); Temporal (duration/frequencies); Organizational (goals); Management (plans); Network (links); Knowledge (truths)

Trust as an avenue for enabling IFM was discussed in both focus groups at different levels including interpersonal and between governments and individuals. Trust was often discussed as a strong force enabling or constraining collaboration and subsequently IFM. Participants discussed not only how trust helps to facilitate IFM, but also tactics for building trust. The time it takes to build trust (temporal scale) and the fragility of trust were discussed by both groups.

Definition

Trust: In the context of environmental governance, trust can be considered an individual's willingness to accept vulnerability in the face of uncertainty. Trust makes social life predictable, it creates a sense of community, and it makes it easier for people to work together. Trust will look different at different levels and scales of governance. For example, how governments or institutions go about building trust with the public will look different from how individuals build trust with one another. *References: Folke et al., 2005; Stern and Baird, 2015*

Illustrative quotes:

Centering relationships and people builds trust and participation and can enable the cohesion and collaboration needed to support IFM

"I think it really does just go down to that trust building and that accommodating and, you know, recognizing that people have varied lives that require their attention as well and trying to meet them where they're at. And I think that's how you get to see those shared priorities and like, see the humanity in folks that you're working with, and even if you know, even if there is a history of contention or difficult topics being discussed like that." (Participant 2, Group 2)

Associated attributes: Collaboration; Direction; Inclusive; Participation; Flexible

Scale/Levels & Dynamics: Temporal (duration/frequencies); Informal Institutional (social norms); Network (links); Knowledge (truths)

Creating and maintaining resilient trusting space as a bridge to IFM

"Trust is fragile, I spent a long time building trust and creating space. Something I think about sometimes, too, is that it's not just about creating trust. It's about maintaining it and how do you maintain it. What I've noticed, and one of the projects I've been working on for the last five years, is that over those five years, we've created trusting space, so there's more room for mistakes to happen. And there's more room for something to set the whole thing into a spiral. There's just a little bit I guess this is a more resilient, trusting space and there's more resilience that's built into it because we've spent time together working through struggles everyone feels heard." (Participant 1, Group 1)

Associated attributes: Learning; Participation; Collaboration; Accountable

Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Network (links); Knowledge (truths)

How trust and accountability are linked and act as a bridge (especially at the government scale):
"Word of mouth is huge. And so you might just have one or two sites, but maybe that farmer is a really important farmer in the community. And the fact that you're working with them and following through on those incentives and doing what you've said is now they're sharing that with their friends. So I think that is really important word of mouth and being able to sometimes take those small steps toward trust." (Participant 5, Group 2)
Associated attributes: Accountable; Legitimate
Scale/Levels & Dynamics: Network (links); Knowledge (truths)

Trust building and brokerage across different scales and levels to facilitate IFM
"The time it takes to build trust between and among these interests, is the most vexing part and it's not just external interests, can be internal, within county departments as well too, that just have been at odds for years. And I think just being able to take the time to establish the trust and having some of these groups view you, you or members of your program as brokers of that trust and starting to have faith in you. While they may not ever trust that other group, right, maybe farmers and tribes, for example, will never trust each other. But they do trust us, and they know that we're going to have to follow through." (Participant 5, Group 1)
Associated attributes: Accountable; Legitimate
Scale/Levels & Dynamics: Temporal (durations/frequencies); Network (links); Knowledge (truths)

Informed as an attribute was discussed by both groups as a leading way to legitimize and enable IFM. In particular the role of this attribute was discussed as a way to build more polycentric governance structures in which multiple centers of decision-making and action-taking exist and to improve integration and collaboration across these different centers.

Definition

Informed: The likelihood of effective outcomes is increased when planning and management decisions are informed by the best available knowledge—this includes integrated knowledge types (scientific, local, and Indigenous) and of multiple systems (social and natural). *Reference: Bennet and Satterfield, 2018*

Illustrative quotes:
How better information can help inform a polycentric approach to governance and improve integration and collaboration:
"So that people are getting, are aware of the tools that may already exist, that they could then apply to their landscapes and kind of facilitate some of the conversations and specifically address neighboring county issues or the neighboring water. Getting folks to talk even about clusters and little regions and things you know, so for multiple thinking about it literally as a multiple scale" (Participant 4, Group 2)
Associated attributes: Collaboration; Polycentric; Efficient; Connected
Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Network (links); Knowledge (truths)

The role of communication, education and awareness building (informing) legitimizes new ways of working and creates space for innovation
"Outreach and education and informing folks on exactly what integrated floodplain management is and broadening our scope and reach there. This change is scary. It was scary. Doing things in a new way, even though the current way might not be working for folks. Getting them on board, doing it differently. And kind of stepping outside of their comfort zone of how they've operated can be hard. So the more that we can provide knowledge and education and be interfacing with people and you know, really displaying and getting out there what this is and what we want to do and how we want to do it and why these people should be at the table and how they can help and how it can benefit them that aren't we it's very difficult to take those steps into implementing IFM without doing all of that to and I don't know that we're doing enough of that necessarily." (Participant 2, Group 1)
Associated attributes: Legitimacy; Innovation; Trust; Participation; Inclusion
Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Network (links); Knowledge (truths)

Barriers: **Capacity, Coherence, Informed, Collaboration**
Capacity was discussed in its nuance across various aspects of the governance system. Discussion of capacity ranged from people not having enough time and knowledge to there not being enough funding, to there being too much funding and not enough people to manage the funding, to staff retention, to not enough supplies. Capacity was often discussed in conjunction with the attribute coherence. These comments highlighted that even though new initiatives might be pushed for (IFM) if there is no coherence in meeting the new objectives across the system given various capacity related concerns (funding, regulatory), it can create barriers to their success.

Definition
Capacity: meaning skills (e.g. leadership, conflict resolution, climate data analysis), and resources (people, financial, infrastructure) enables planning and implementation of management actions. *Reference: Bennet and Satterfield, 2018*
Illustrative quotes: **Capacity as a barrier in (terms of people's time) when there isn't coherence in planning across scales** "Sometimes funding also creates more complexities in terms of the work and so it adds burden and it adds administrative burden. It adds complexity in terms of dynamics between partners, so that there isn't any place that I ever go that people don't say if we had more money, we could do more. But I have experienced places where when there is more money, it doesn't necessarily solve all the problems that they had identified." (Participant 3, Group 1) Associated attributes: Coordination; Collaboration; Coherence Scale/Levels & Dynamics: Organizational (goals); Management (plans); Institutional (formal rules) **Capacity (in terms of people's time) as a barrier** "I just have a sense that people's time, there's so many demands and pressures on people's time, throughout any given day, that it's hard to sort of, take a breath and have meaningful communication and dialogue." (Participant 3, Group 1) Associated attributes: Participation; Efficient Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Network (links); Knowledge (truths)

Capacity (in terms of supplies and people) as a barrier
"We don't have enough plants for the riparian plantings. We don't have enough people to do the maintenance to keep the plantings from being overtaken by weeds or dying. [We don't have enough] irrigation equipment to keep the plantings alive. That's actually just one small slice, but as an example of like... we're not scaled up. I feel like we we're working on it but so in addition to not having enough money, I feel like we also just don't have enough people, supplies, to actually just do it" (Participant 4, Group 2)
Associated attributes: Coherence
Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans)

Capacity (in terms of people's time) as a barrier
"Everybody is stretched in between different projects, different types of work. And, yeah, I also think about like at the local level of small communities, like floodplain managers, usually responsible for a zillion other things in addition to floodplain management, and there's a lot of turnover in that position as well, so it's like constant training" (Participant 3, Group 2)
Associated attributes: Informed
Scale/Levels & Dynamics: Jurisdictional (administrations); Temporal (duration/frequencies); Organizational (goals); Management (plans); Knowledge (truths)

Capacity (in terms of staff retention) as a barrier to IFM
"Staff retention and the leakage of knowledge" (Participant 4, Group 2)
Associated attributes: Informed; Learning
Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Knowledge (truths)

Capacity as a barrier to IFM and anticipatory and adaptive approaches to floodplain management
"I think it's just so closely related to this issue of capacity where it is difficult to be proactive and to think about everything that needs to be thought about at once. Especially when we're thinking of land use and all of these intersecting needs and priorities. And so there becomes this element of triaging. [Asking] what's the most important thing at this moment? And often, that's a more of a reactive approach. But it's really hard without that added capacity to get to the point where [you can] be proactive and think of these issues before they become significant issues for people or property." (Participant 2, Group 2)
Associated attributes: Anticipatory; Effective; Accountable; Adaptive
Scale/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Knowledge (truths)

Coherence was a dominant attribute emerging as a barrier to IFM. Coherence was discussed as a scale problem and focus group participants highlighted that lack of coherence across different organizational (goals), management (plans), and institutional (formal rules) was a leading barrier to supporting successful implementation of IFM. In particular an emphasis was placed on the lack of coherence that exists in the funding and regulatory systems.

Definition

Coherence refers to alignment and consistency of policy and management actions (e.g. projects and planning) across different levels and sectors of governance. It ensures that policies and actions do not work in isolation but are integrated and coordinated to achieve common goals. It is crucial to avoid conflicting policies or unintended consequences that may hinder effective actions. *Reference: Pangalos, C. (2023)*

Illustrative quotes:

Example of how lack of coherence in direction across different scales created barriers:

"I think the example here that I'm thinking of is like and we're this part of the country that is ahead of the game in floodplain management too, which makes it a little a little harder for the federal organization to keep up. But you know, there's this recognition that something like nature-based solutions and multi benefit floodplain management is the you know, is the future and yet we can't get it to catch up on the regulation side," (Participant 6, Group 2)

Associated attributes: Coordination; Learning; Informed; Direction

Scale/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/ frequencies); Organizational (goals); Management (plans); Knowledge (truths)

Lack of coherence as a barrier across different scales

"But it's also really difficult to spend government money. And I think to Participant 7's point like it's not just regulations, it's not just permitting, but it's almost like the lack of collaboration amongst the regulatory piece of project implementation where you have everyone looking at only how to fulfill their needs and not like, Oh, you have, like there's 16 permits, but like, okay, sure everyone has a mission and they need to see all that happen. And I get that and that's important. But now we've kind of backed ourselves into a system where there's this many agencies all which have a defined purpose and all which need a box checked in order to move something forward. And how do you undo that?... I think it's how we undo the system we've created for ourselves." (Participant 1, Group 1)

Associated attributes: Capacity; Efficient; Coordination; Direction

Scale/Levels & Dynamics: Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans)

Lack of coherence as a barrier across different scales

"It's essentially either state legislative policy or federal legislative policy that has created all of these individual funding programs and all these individual regulatory programs and they were created for good reason. But now you have this complex web of funding and permitting that is administratively dysfunctional, and there's not a good system, like Participant 1 said, to make it as easy as possible for folks that already have to manage complex partnerships of watershed scale approaches to that complex funding systems where you have 15, 16 grants to get one project done and you have to navigate through however many different regulatory processes" (Participant 7, Group 1)

Associated attributes: Efficient; Capacity; Direction

Scale/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/ frequencies); Organizational (goals); Management (plans); Knowledge (truths)

Lack of coherence and coordination as a barrier across scales

"We've been able to put in some great applications for the restoration component, but we're still trying to run the infrastructure piece in tandem and finding the source of money to do that. I mean, it's not going to be cheap to relocate that waterline and that's the preferred alternative, rather than putting a huge setback dike and leaving the waterline in where it is because as we know, from doing levees in the estuary, they're very expensive... And so it's been very challenging. We're grateful for sources of funding, like Floodplains by Design, because it's one of the only ones that will fund the restoration and the infrastructure components together... because we have to move them in tandem. We can't just go jump to restore the site without relocating that infrastructure first. So that's a real world example." (Participant 5, Group 1)

Associated attributes: Capacity; Coordination

Scale/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/ frequencies); Organizational (goals); Management (plans); Knowledge (truths)

> **How coherence interacts with different scales and the need for integration to happen above the project level**
> "One of the things that I noticed was a gap, so there is a lot of focus on trying to get people to collaborate and connect on that like, say watershed level or county kind of level or project level. And then you have multiple projects in neighboring counties or adjacent watersheds... you might have, like people who are collaborating in one WIRA neighboring a different one and they actually don't talk to each other that much or necessarily know exactly what's going on in each other's WIRA." (Participant 4, Group 2)
> **Associated attributes:** Informed; Learning; Coordination
> **Scale/Levels & Dynamics:** Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans); Network (links); Knowledge (truths)
>
> **How attributes can work against one another when there isn't coherence across scales—in this case a focus on** Efficiency at state level created non-inclusive processes, limits participation, and is a barrier to trust building "And just kind of this consistent issue with timelines just not matching up. And from the state level trying to work with a community is often the timeline for a state or a contract, you know, needing to showcase your deliverables can be much faster than the time that it takes to establish relationships with communities and really build trust at that local level... really needing and requiring community buy-in and engagement for a variety of efforts and then the need to really show results and deliver results. Not aligning with that relationship building and that's it you know, the time that it takes to make really genuine and meaningful connections with community partners. So just, yeah, this issue of time, I think when you look at it from different angles and different perspectives that it really is really a big one." (Participant 2, Group 2).
> **Associated attributes:** Efficiency; Inclusion; Participation; Collaboration; Trust
> **Scale/Levels & Dynamics:** Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Knowledge (truths)

Informed was discussed as a barrier primarily in relation to scale effects including how when information is not coherently applied across institutional (formal rules) scales it can create a barrier to IFM.

Definition

Informed: The likelihood of effective outcomes is increased when planning and management decisions are informed by the best available knowledge—this includes integrated knowledge types (scientific, local, and Indigenous) and of multiple systems (social and natural). *Reference: Bennet and Satterfield, 2018*

Illustrative quotes:
How information at one scale when not applied coherently across other scales can result in barriers to IFM
"The glacial pace at which like the federal government is able to change, adapt, you know, regulations and procedures and that sort of thing, I think is really felt in, in the world of floodplain management where I feel like the science even though there's still a ton of science questions has actually leap-frogged, like the regulations and we see that probably holding us back" (Participant 6, Group 2)
Associated attributes: Coherence
Scale/Levels & Dynamics: Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans); Knowledge (truths)

Time scales and uncertainty about best knowledge can create barriers to IFM
"How can we know what is enough or what is the right approach when often a lot of these very complex efforts and projects take you know, sometimes years to see effects, that can be difficult to evaluate the you know, the end result of our actions and how, like, how good or how enough they are you know contributing to restoration" (Participant 2, Group 2)
Associated attributes: Innovation; Efficient; Legitimacy; Adaptive; Anticipatory; Accountability; Direction
Scale/Levels & Dynamics: Temporal (duration/frequencies); Organizational (goals); Management (plans); Knowledge (truths)

APPENDIX 3: Focus Group Discussion Results: Bridges and Barriers to IFM

Collaboration as mentioned above was the dominant attribute emerging from the discussion of bridges and barriers across both working groups. In line with our understanding that causes and solutions have common roots, collaboration (when present) emerged as both a leading bridge and a leading barrier (when not present). When discussed as a barrier, focus group participants highlighted that there is a lack of collaboration beyond the project scale which creates a lack of coherence and various scale related challenges.

Definition

Collaboration: in the realm of environmental governance refers to a mode of goal development, decision-making, and service delivery that shifts away from top-down government, or sector specific settings, to a setting in which public, private, nonprofit, and community actors are jointly involved in and accountable for decision-making and service delivery to create outcomes that could otherwise not be achieved. This model has resulted from the recognition that social-ecological problems that we now face are sufficiently complex enough that there is a lack of consensus on the exact nature of the problem and what the appropriate solutions are. *References: Breslow, 2021; Folke et al., 2005*

Illustrative quotes:
Lack of collaboration across scales creates barriers to IFM and related social and ecological outcomes—need to consider integration at a larger scale (not just the management scale)
"A lot of problems that people are noticing in their particular floodplain is related to stuff that's going on in the county, upstream of them, or the country, you know, upstream of them. And so that cross boundary governance, I guess the connections across the watersheds or counties or states or whatever, making sure that people are talking because there's a lag between where you experienced what's happening, and the causes of why that's happening. And I feel like there hasn't been, I don't see, a ton of communication in that way." (Participant 4, Group 2)
Associated attributes: Informed; Direction; Participation
Scales/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Temporal (duration/frequencies); Organizational (goals); Management (plans); Network (links); Knowledge (truths)

Having increased collaboration and participation without the capacity to support it can also create a barrier to IFM
"The more partners the more different integration that you bring on, so opportunity also has opportunity costs and how we do that without, you know, adding more strings and providing the capacity support that's needed to be able to do that greater integration, I think is the real trick and, and hard thing to figure out" (Participant 7, Group 1)
Associated attributes: Participation; Capacity
Scales/Levels & Dynamics: Institutional (formal rules); Temporal (duration/frequencies); Organizationals (goals); Management (plans); Informal Institutional (informal rules/social norms); Knowledge (truths)

Need for greater emphasis on collaboration and integration beyond the project level—integration of the governance level
"I think sometimes what happens is you have people kind of duplicating efforts and stuff because we just don't even know exactly that like this other group is basically doing this exact same prioritization project or whatever. And this group is doing something similar, and it's kind of not the most efficient use of time and energy and stuff like that. So from my standpoint, I feel like it's not that integrated outside of once you get beyond the kind of project watershed scale." (Participant 4, Group 2)
Associated attributes: Informed; Learning; Participation; Efficient; Coordination; Direction; Coherence
Scales/Levels & Dynamics: Spatial (areas); Jurisdictional (administrations); Institutional (formal rules); Temporal (duration/frequencies); Organizational (goals); Management (plans); Informal Institutional (social norms); Knowledge (truths)