



Western Washington University

From the Selected Works of Troy D. Abel

Summer September 8, 2022

Sound Natural Resource Governance for Washington's Estuarine Recovery?

Troy D. Abel, *Western Washington University*

Raechel Youngberg, *Western Washington University*

Jann Eberharter, *Western Washington University*

Mark Stephan, *Washington State University*



This work is licensed under a [Creative Commons CC_BY-NC-ND International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



Available at: https://works.bepress.com/troy_abel/34/

Sound Natural Resource Governance for Washington's Estuarine Recovery?

Dr. Troy D. Abel, Raechel Youngberg, Jann Eberharter, and Dr. Mark Stephan.

Department of Urban & Environmental Planning & Policy, Western Washington
University.



MAKE WAVES.

This report was developed under Assistance Agreement No. KC-529-20 between Kitsap County and Western Washington University. The funding originated from the Washington Department of Ecology Agreement No. WQNEP-2019-KiCoCD-00005 and the Natural Estuary Partnership (NEP) of the U.S. Environmental Protection Agency (EPA). It has not been formally reviewed by EPA or the Department of Ecology. The views expressed in this document are solely those of Dr. Troy D. Abel, Raechel Youngberg, Jann Eberharter, and Dr. Mark Stephan and do not necessarily reflect those of the EPA, Department of Ecology, or Kitsap County. EPA does not endorse any products or commercial services mentioned in this publication.



The authors would like to acknowledge Kitsap County, students in Dr. Troy D. Abel's Natural Resource Policy and Environmental Law courses, participants in the Environmental Politics and Policy panel at the November 11-13, 2021 meetings of the Pacific Northwest Political Science Association, Western Washington University's (WWU) Department of Urban and Environmental Planning and Policy, WWU's Office of Research and Sponsored Programs, and geographer Jonah White.

TABLE OF CONTENTS

<i>Executive Summary</i>	<i>ES1</i>
Little evidence of estuarine goals met or productive experiences. But promising views of recovery possibilities	ES1
Fragmented governing arenas and rules impede estuarine recovery in Washington State	ES1
We gave collaborative natural resource governance for the Puget Sound a failing grade.....	ES1
CPR Long Overdue for WA's Estuarine governance	ES2
<i>Assessing Puget Sound Governance</i>	<i>1</i>
Assessing Governance.....	3
Collaborative, Comprehensive, but Piecemeal.....	7
Fragmented Governance, Science and Habitat.....	8
Figure 4. Seven Salish Blankets?.....	9
Figure 5. High Resolution Change Detection (HRCD) Map. Source: WDFW.....	10
<i>Appendix A. Final Research Questions</i>	<i>A1</i>
<i>Appendix B. The Science of Biogeography</i>	<i>B1</i>
Single Large or Several Small.....	B2
<i>Appendix C. Ecogovernance Science</i>	<i>C1</i>
Table C1. Design Principles from long-lasting and successful CPR governance.....	C2
Polycentric Research	C2
Rule and Action Situations Nesting in an Action Arena	C3
Figure C2. Action Arena Focal Level adopted from Ostrom 2005.....	C3
Figure C3. Flow Diagram of Nested Collective-Choice and Operational Action Situations Forming a Governing Action Arena	C4
No Panacea Policy or Governance Approach.....	C5
Diverse Institutional Arrangements and Rules	C7
<i>Appendix D. Methods, Protocols, and Standards</i>	<i>D1</i>
Technology for Participatory Action Research	D1
Human Subjects Protocols	D3
Professional Ethical Standards	D5
<i>Appendix E. Social and Ecogovernance System Diagrams</i>	<i>E1</i>
Figure E1. Picket-Fence Federalism Depiction of Natural Resource Governance Arenas or Policy Subsystems Impacting the Puget Sound.....	E1
Figure E3. Focal Action Situations for Chico Creek Restoration	E2
Figure E2. Focal Action Situations for Puget Sound Recovery Governance.....	E2
Glossary for Figures E2 and E3	E3
<i>APPENDIX F. Endnotes</i>	<i>F1</i>

EXECUTIVE SUMMARY

Focus group participants reported little evidence of estuarine goals met but promising views of recovery possibilities.



Only 40 percent of focus group participants reported positive examples of estuarine recovery, just 34 percent described productive experiences of recovery, but 83 percent supported the priorities of recovery programs.

Other social science research on Puget Sound governance efforts also found worrisome patterns. Washington State persistently struggled in study after study to achieve the recognized benefits of collaboration in Puget Sound recovery governing arrangements corroborating our findings.

Fragmented governing arenas and rules impede estuarine recovery in Washington State.



The four arenas or policy subsystems designed to govern restoration, growth, transportation, and forestry remain siloed. They lacked coordination found in robust environmental governance.

Comparable scholarly reviews of regional Ecosystem-Based Management programs also found little efficacy. Without coordinated interactions among governing arenas, an action agenda of problems remained a comprehensively piecemeal strategy.

We gave collaborative natural resource governance for the Puget Sound a failing grade.



After considering (1) our focus group results; (2) how only 11 of 42 Vital Signs with data achieved recovery goals; and (3) net ecological losses in land cover since 2007, we assigned a failing grade to WA's estuarine governance.

Similar assessments are found in the Puget Sound Partnership's *State of the Sound* report in 2021, the Northwest Indian Fisheries Commission *State of Our Watersheds* report in 2020, and from the Joint Legislative Review Committee audit of the Puget Sound Partnership in 2016.

CPR Long Overdue for WA's Estuarine governance

Puget Sound recovery efforts were past due for a Common Pool Resource (CPR) diagnosis. Most of our focus group participants reported negative recovery experiences. Many expressed concerns about fragmentation among the four key governing arenas. Practitioners mostly work separately to coordinate ecosystem recovery, manage growth, direct transportation projects, and oversee forestry. But the voluntary and collaborative approaches to Ecosystem-Based Management (EBM) for Puget Sound violated three key design principles of CPR theory. First, Puget Sound salmon recovery and restoration uniformly relied on a collaborative governing strategy instead of developing diverse institutional rules. Second, fragmentation among four governing arenas impacting Puget Sound health thwarted effective coordination. Third, Puget Sound Partnership's (PSPs) land cover and development indicators provided unreliable and invalid measures of habitat loss versus gains.

Salmon are the main resource unit declining in the Puget Sound system. In the fishery action arena, state and tribal officials co-manage salmon fishing. Jointly, they develop harvesting rules followed by fisherfolk. Co-managers also can sanction those violating appropriation rules. But land cover, forests, and riparian habitat management are mostly disconnected from salmon recovery. So, two legislative fixes were offered that required salmon recovery to be integrated with growth management and riparian habitat development. Both failed. Moreover, forestry rules may also need to begin accounting for timber harvest impacts on in-stream flows.

We conclude with three policy prescriptions based on our research from the last year. *First, Puget Sound stakeholders should recognize the value of hybrid policy strategies rather than relying solely on collaborative EBM for recovery efforts.* Instead of debates over choosing only regulation versus only collaboration, both could be deployed to achieve complementary natural resource policy strategies. For example, one bill considered by the Washington legislature aimed to integrate salmon recovery into growth management practice. Similarly, another bill aimed to increase tree cover in riparian areas. Puget Sound cities and counties supported both HB 1117 and 1838. But they were defeated. Washington localities should again support similar proposals in the next session.

Second, local stakeholders need not wait on legislative action. Salmon recovery and Net Ecological Gain could be incorporated into current planning practices and comprehensive plan updates. For example, traditional engineering approaches in urban design need to integrate ecological thinking in professional practice. Impact mitigation should transform to net positive impacts. Instead of spatial minimization, urban design should strive for spatial amplification. Eco-efficiency standards for buildings would be replaced with eco-productive criteria.

Third, recovery and restoration practitioners should utilize the [High-Resolution Change Detection \(HRCDD\)](#) tool to assess both land cover development and restorations to better assess ecological gains and losses at multiple scales. Recent advances in remote sensing offer superior resolutions of the human development footprint and its trends. Washington's Department of Fish and Wildlife (WDFW) developed the HRCDD to improve land cover change detection from aerial imagery. Its images typically rely on 30-meter resolutions. But 1-meter resolution provides better land cover change detection for tree-canopy loss, impervious, and semi-pervious surface increases. All three are considered permanent or semi-permanent changes impacting fish and wildlife in Washington.



ASSESSING PUGET SOUND GOVERNANCE

How would you assess efforts to recover the Puget Sound? What were the most positive efforts you experienced? What were your most challenging experiences? What policies, plans, or processes impacted your experiences the most? How can you and your team, organization, and agency improve recovery efforts for the Puget Sound? These are just some of the questions a Western Washington University (WWU) research team asked in 2021. With support from Kitsap County, we completed a natural resource governance assessment for Puget Sound recovery efforts.

But given our teaching backgrounds, we also began asking the following questions at conferences, in classrooms, and with colleagues. If you could grade the recovery of Washington's Puget Sound estuary, how would you score our multi-decade effort? On a 100-point scale, what number would you pick? An A grade needs above 90 points. Maybe you would assign a B grade between 80 and 89 points? An average or C grade needs between a 70 to 79? But would your grade be even lower?

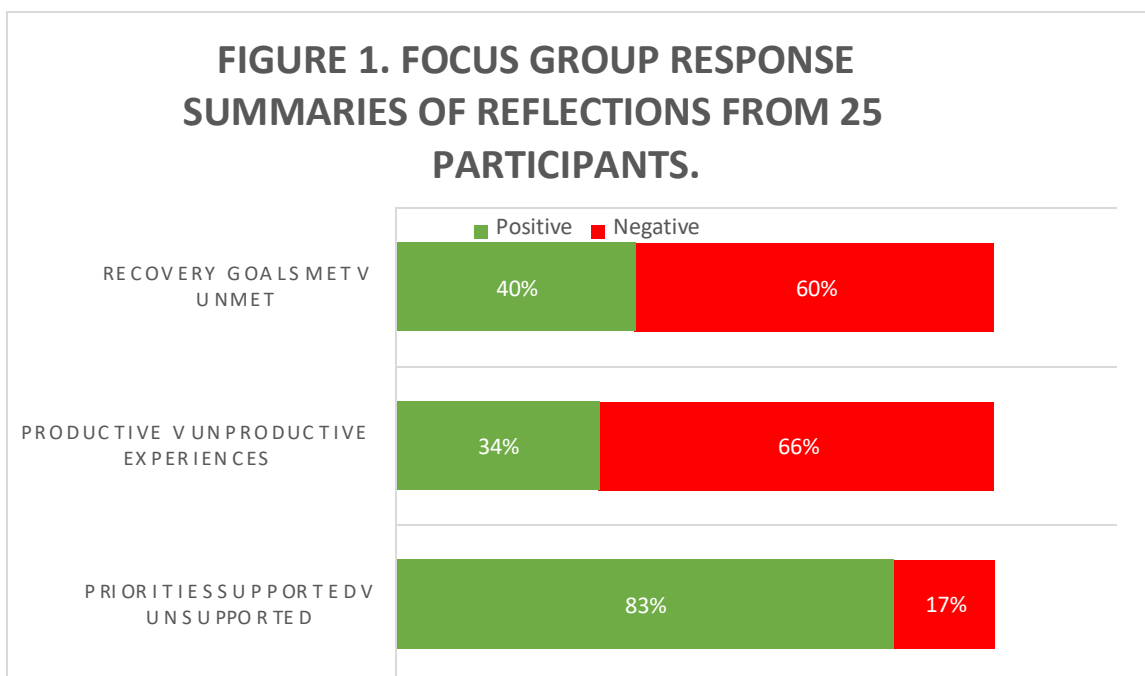
If you used the Puget Sound Partnership's (PSP) 52 *Vital Signs* or indicators as a grading rubric, the score would fall 14 points below a passing D grade of 60 percent. *Vital Signs* measure ecosystem health and guide progress assessments for Puget Sound recovery goals. In the 2021 *State of the Sound* assessment, only 11 of 52 indicators showed signs of progress toward recovery goals.¹ Even if you exclude the 10 indicators with insufficient or missing data, an 11/42 equals just 26 percent. A passing grade required 25 or more indicators meeting their recovery goals. Thus, natural resource governance for the Puget Sound earned a failing grade. Our review of related research led to similar assessments.

Across six focus groups and 22 participants, most respondents described unmet goals in their recovery and restoration experiences. Since some respondents recounted multiple experiences, our totals exceed the number of participants. While 14 reflections (40 percent) described recovery successes, 21 recollections focused on experiences (60 percent) where goals were unmet. We opened each of the six

focus groups asking participants to identify their most memorable recovery or restoration experiences. We also asked for reflections on productive or unproductive experiences. Respondents shared 21 (66 percent) frustrating experiences versus 11 (34 percent) positive episodes. However, most respondents expressed support for their program’s priorities. See our methodology below in Appendix D.

On the positive side, a local habitat-focused professional² stated “it's pretty inspiring to hear about the Hood Canal and the chum recovery there. They actually saw populations rebound.” Likewise, a local planning professional recounted the following. “I would say the one recovery effort [that] jumps in my mind was the derelict boat removal program both statewide and at the county. But it was already a statewide program. And the way that the State set it up was they created state law that allowed any local government to be an authorized entity to remove derelict boats and they provided grant funding.”

On the negative side, a local planning-focused participant said “The most negative experiences, is that things are like any kind of salmon recovery project that we rely on funding is going to be five years out, if not more. There's a lot of process. . . so I get very disheartened...about doing anything, or even putting in for grants to support our effort.” Similarly, a local watershed-focused official observed, “So the [Puget Sound] Partnership when it created its process, it's an overlay with no regulatory [leverage] and not much money. And it's far too technocratic . . . they don't have any other tools to really move the needle.”



A state habitat official added, “the biggest take home that I've gotten over this last six years is that the natural resource agencies are not going to achieve recovery on their own. And they're not going to achieve recovery with just the nonprofits and the local governments. It is going to take a collective effort by Washingtonians to achieve recovery in Puget Sound.” This official later said, “a lot of times it’s an us versus them thing. It's like we need to build a culture of these are our resources collectively as Washingtonians; they're not the government's resources.”

A local infrastructure specialist remarked, “I think that a lot of effort over the years to establish adequate and consistent funding. . .hasn't worked because of our political and governance challenges.” A local water professional agreed and added, “There's been a lot of planning work that's demonstrated what's needed and how much money is needed. And we haven't been able to muster the resources to meet that need.”

Our focus group responses corroborated many of the worrisome assessments we reviewed in relevant reports. For example, the Washington Legislature’s Joint Legislative Audit and Review Committee (JLARC) concluded in 2017 that the PSP’s recovery effort was hindered by 3 structural issues: (1) short statutory timeframes; (2) incomplete action and funding inventories; and (3) monitoring data disconnects with actions. JLARC also concluded that the “Puget Sound will not be recovered by 2020” as intended.³ We too focused on structural challenges.

Assessing Governance

Our assessment relied on the following definition of environmental governance as a major waypoint. “The set of regulatory processes, mechanisms, and organizations through which political actors influence environmental actions and outcomes. Governance is not the same as government” according to Lemos and Agrawal.⁴ They added how governance also “encompasses actors such as communities, businesses, and [Non-Governmental Organizations] NGOs.” Systems thinking and analysis also grounded our governance research.⁵

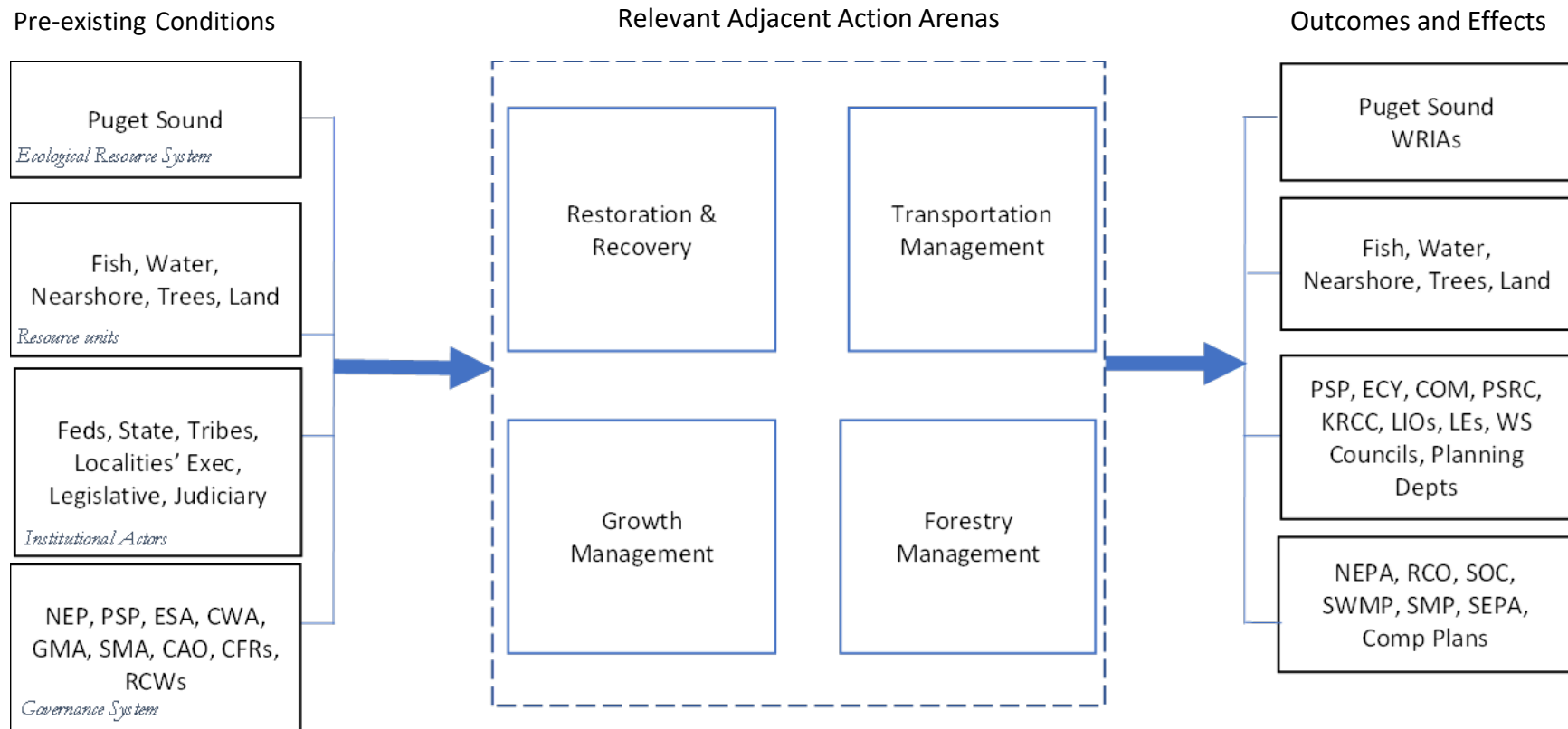
Kitsap County Planning and Environmental Program staff also tasked us with the development of governance map for natural resources under federal and state laws. One of the most applicable system diagrams appears below (Figure 2).⁶ This system’s approach for governance draws primarily on the work of Nobel Prize winner Elinor Ostrom. A political scientist by training, she and many collaborators developed frameworks for the analysis of natural resource actors embedded within institutional arrangements.⁷

Called the Institutional Analysis and Development (IAD) framework, it guided most of the Ostrom or “Bloomington School” of Common Pool Resource (CPR) scholarship.⁸ At the center of this framework and most of its applications, individual choices are not tragedies occurring in a vacuum. Actors operate within action arenas. Ostrom described these institutional settings as “the social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight.”⁹ Based on our interviews, four key “adjacent” action arenas structure actor interactions leading to collective choices impacting Puget Sound Recovery.

First, federal, state, and local professionals populate an estuarine **Restoration and Recovery** action arena. This institutional arrangement grew out of the Environmental Protection Agency’s (EPA’s) National Estuary Partnership (NEP) and a new state agency reorganized with a 2007 law.¹⁰ The Washington State legislature tasked the Puget Sound Partnership (PSP) with restoring the region’s 36-thousand square kilometer estuarine ecosystem by 2020. But the PSP was hampered with a collaborative and non-regulatory mandate.

Second, many of our respondents referred to a **Growth Management** action arena. Shaped by a series of state statutes beginning in 1990, state and county planners try to guide fast-growing Washington cities and counties away from sprawl.¹¹ Guided by a Growth Management Act (GMA), planning practitioners in the Washington State Department of Commerce, dozens of counties, and hundreds of incorporated municipalities interact to manage land development. Some of the 13 management goals range from affordable housing to development permitting, environmental protection, and shoreline management.

Figure 2. The Puget Sound Social-Ecological Governance Subsystem. Adapted from Cole, Daniel, Graham Epstein, and Michael McGinnis. 2019. "The Utility of Combining the IAD and SES Frameworks." *International Journal of the Commons* 13 (1): 244–75. <https://doi.org/10.18352/ijc.864>.



Ecological resource system: The biophysical system where resource units are extracted and through which the levels of focal resources are regenerated by natural dynamic processes. **Resource units:** Characteristics of the units extracted from a resource system, which can then be consumed or used as an input in production or exchanged for other goods or services. **Institutional Actors:** Participants representing key governing agencies, organizations, and departments involved in governing a resource system. **Governance system:** The prevailing set of processes/institutions through which the rules shaping the behavior of the users are set and revised. **Focal Action Arenas:** the pattern of interactions among resource users and the particular resources upon which their livelihood relies. IAD and SES are shorthand for the Institutional Analysis and Development and Social-Ecological Systems frameworks respectively.

Research participants also identified **Transportation Management** as a third critical action arena. Federally designated Metropolitan Planning Organizations (MPOs) receive and allocate transportation funding generated by a national gas tax. The Puget Sound Regional Council (PSRC) acts as the region's MPO.¹² PSRC actors include representatives from the region's 71 cities and towns, port authorities, and King, Kitsap, Pierce, and Snohomish counties. They plan for regional economic development, growth, and transportation projects. With a 20-year horizon, the PSRC tries to manage sprawl with urban growth area designations.

Fourth, we added a **Forest Management** action arena because of this sector's potential impact on salmon recovery. In the mid-1990s, the listing of five Pacific salmon species under the Endangered Species Act (ESA) prompted a significant shift in Washington State forestry laws and rules.¹³ In 1999, the Washington Forest Practices Act became law ([chapter 76.09 RCW](#)) with support from private forest landowners and federal, state, tribal, and county governments. In 2006, Washington State qualified for an incidental take permit from the US Fish and Wildlife Service (FWS). By developing a Habitat Conservation Plan (HCP) for over 9 million forestland acres, a taking of an endangered species was no longer strictly prohibited.¹⁴

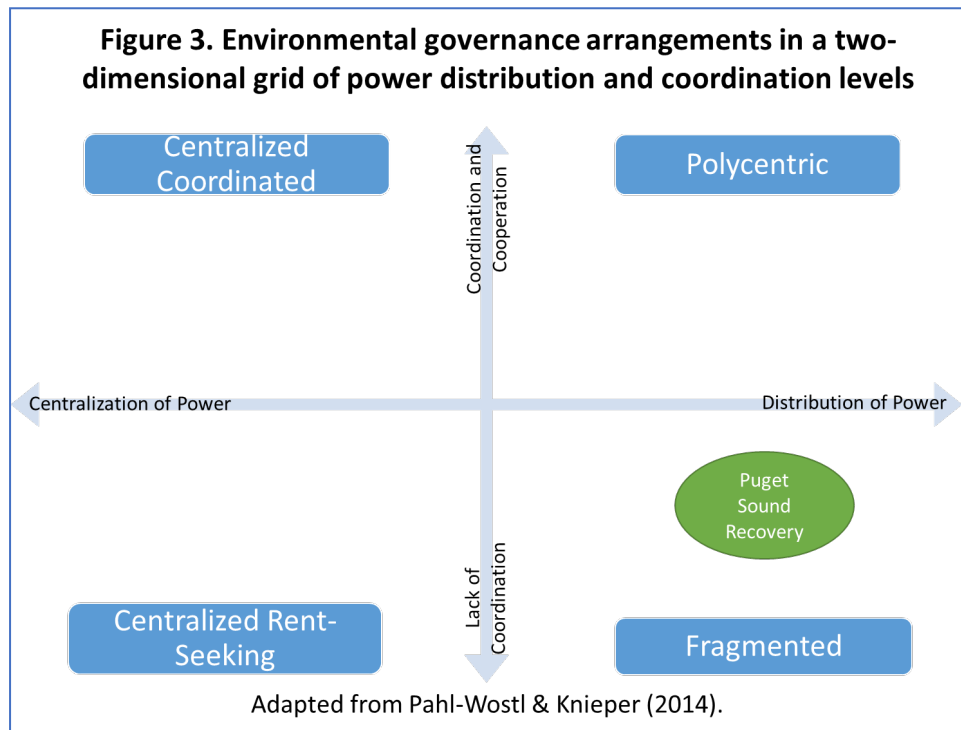
All four of these collective action arenas can be established and reshaped by group interactions. These institutional settings also can be influenced by four clusters of exogenous factors: (1) the Puget Sound ecological resource system; (2) the quantity and quality of resource units like fish, nearshore, watersheds, trees, and land; (3) institutional actors in federal, state, tribal, and local governments; and (4) the governance system or constellation of policies and rules.¹⁵ For example, the legislature attempted to improve the governing arrangements in two legislative proposals. Both failed.¹⁶

First, one unsuccessful house bill would have required GMA comprehensive plans for cities and counties to include salmon recovery. Thus, the habitat and restoration action arena remain separated from growth management. According to the *Times* Lynda V. Mapes, real estate and agricultural interests helped kill the integrative bill. Tribes also divided over the legislation. Second, another bill increasing tree cover in riparian areas also was defeated. One staffer for the Association of Counties quipped "If salmon recovery is truly a goal of Washington state, the idea that various levels of government all the way to the local government should coordinate their salmon recovery plans is a good idea."¹⁷

A growing body of research supports such prescriptions about coordination. One of the more referenced studies in our literature review studied 27 river basins around the world. Those with the widest distribution of power and high levels of coordination achieved better environmental outcomes. Figure 3 below depicts variation from concentrated to distributed power on the x-axis. High coordination to none forms the y-axis. Researchers then differentiated four ideal governing arrangements: polycentric, fragmented, centralized rent-seeking, and centralized coordinated.¹⁸

First and best, polycentric action arenas or regimes occurred with the greatest degree of coordination and broadly distributed power. This research corroborated other studies associating polycentric environmental governance with better ecological outcomes.¹⁹ Second, coordinated but centralized regimes combine concentrated power with high levels of coordination. Third, rent-seeking environmental governance pairs low levels of coordination with concentrated power. Finally, fragmented environmental governance lacked coordination while power remained broadly distributed.

The governance arrangements for Puget Sound recovery seem to exemplify the fragmented category as displayed in Figure 3 below. As one of our respondents put it, “The apparatus, the institutional calcification of laws and political jurisdictions, prevent us from making significant headway. We work within all of the different jurisdictions and they all have their own unique critical areas, the ordinance and their own permit requirements or fees.” They added “we make restoration as hard, if not harder than development. We treat restoration projects as adverse impacts, to the environment, which is, it's just maddening. And I think it's because we designed a system to permit damage. We did not design a system to permit restorative ecological processes.”



Several assessments of collaboration in the Puget Sound’s salmon recovery, forestry, and growth management action arenas found issues with coordination. One research team found that integrating watershed groups produced lower integration scores than counties, public utilities, and tribal organizations.²⁰ Yet, watershed groups were designed to play an integrating role in recovery and restoration coordination. These analysts also documented the marginalization of business groups in the network and scale mismatches between social and ecological systems. Likewise, another network analysis found low rates of collaboration between professionals from different scientific traditions.²¹

Another research duo identified a deficit of collaboration among local organizations across the Puget Sound.²² But in a recent book chapter, one scholar provided an explicit assessment of the Puget Sound’s polycentric governance performance.²³ They concluded that while the Puget Sound’s polycentric governing arrangements exhibited high levels of representation and adaptability, they found mixed results for efficacy and network building and poor outcomes for accountability and efficiency. Our results and several assessments converged on how Puget Sound recovery governance persistently struggled to achieve the recognized benefits of collaboration.

Collaborative, Comprehensive, but Piecemeal

In a widely read environmental case textbook, two authors described a struggling NEP program for the Chesapeake Bay. They reported one leading recovery scientist who described “the bay program as comprehensively piecemeal: it is a laundry list of items to attack . . . but there is no interaction among the various components.”²⁴ The researcher then added “that more progress might have been made had the bay program focused more narrowly on agriculture, the single biggest source of nutrients, rather than trying to be holistic.” Elsewhere, the book’s authors offered this broader assessment. “There is little evidence to suggest that voluntary (or self-regulatory) programs—which contain no binding performance standards, independent certification, or sanctions—are effective.”²⁵ After more than 30 years, university researchers gave the overall health of the Chesapeake Bay in 2020 a C grade.²⁶

To paraphrase one leading scholar of the field, evidence of even modest CPR progress should not be interpreted to suggest that regulatory rules have no role to play in addressing ecosystem recovery. This would be as great an error as suggesting only regulatory rules can resolve CPR dilemmas.²⁷ Instead, natural resource governance should “employ a variety of decision rules to change incentives, increase information, monitor use, and induce compliance” according to Dietz, Ostrom, and Stern.²⁸ Solely relying on collaboration has been insufficient.

Yet, the voluntary, collaborative, and regulation-free design of the National Estuary Program strategy persisted in Puget Sound governance. Over 30 years ago, Congress included the Puget Sound in a new and non-regulatory initiative managed by the Environmental Protection Agency in 1987.²⁹ Named the National Estuary Program (NEP), an Environmental Protection Agency (EPA) document in 2007 called the effort an “effective, efficient, and adaptable coastal ecosystem-based program.”³⁰ Collaborative Ecosystem Based Management (EBM) for environmental governance became a panacea in the 1990s.

Grumbine defined EBM as an integration of “scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term.”³¹ On the one hand, collaborative EBM emerged as an antidote to the environmental regulation of the 1970s. This old regulation became widely viewed as “heavily bureaucratic, prescriptive, fragmented in purpose and adversarial in nature.”³² Others simply summarized seventies-style regulation as command-and-control.³³ On the other hand, EBM also countered policies limited to discrete environmental elements like water, species, or forests.

Several scholars touted Ecosystem-Based Management (EBM) approaches.³⁴ Others including two of this report’s authors offered more cautious assessments.³⁵ Report after report, in year after year, provided warning signs for Puget Sound recovery.³⁶ A decade ago, the Northwest Indian Fisheries Commission (NWIC) and salmon co-manager with Washington State reported the following in 2012. “Ongoing loss and damage of salmon habitat across western Washington is fueling the loss of salmon populations and threatening tribal cultures and treaty-reserved fishing rights.”³⁷

Thus, leading tribal spokesperson Billy Frank Jr. prescribed the following in that 2012 publication. “We need to take approaches that go beyond volunteerism and begin to take more regulatory and enforcement measures.” Several focus group participants’ recollections supported this governance assessment when describing programs that met goals. “I envy the days of the 60s and 70s, when it was kind of the lock it up mentality. You could protect things.” Others pointed to the cleanup of Lake Washington in the era and the Clean Water Act’s (CWA) control of point-source pollution. These appraisals

were supported by one of the first systematic assessments of multiple Ecosystem-Based Management initiatives.

In the book *Natural Experiments*, the late Judith Layzer offered one of the few comparative assessments of EBM in the US. She concluded that projects relying on stakeholder collaboration, rather than through conventional regulation, are less likely to result in environmental improvement. This is because voluntary EBM pursues consensus to avoid controversy and minimize short-term costs rather than imposing performance standards. In one of her assessments, Layzer concluded the following. “Efforts to appease conflicting interests by meeting all demands simultaneously yielded minimally protective plans and halting implementation.”³⁸ But Layzer’s work stood out for a unique design in natural resource governance analysis. She combined traditional social science variables and analysis with biophysical measures.

Governance, Science and Habitat Marred by Fragmentation

Conversely, academics study either ecological systems or social systems instead of their interactions.³⁹ Disciplinary divisions or silos are partly to blame. For example, policy practitioners are prepared with degrees in social science disciplines. Environmental scientists pursue biophysical and geophysical majors.⁴⁰ “Examples of disciplinary myopia are not hard to find” wrote one scholar. “Solutions that emphasize governance and process typically derive from political scientists. Solutions that play up the importance of culture and traditional knowledge stem from social anthropologists and so on.”⁴¹

For instance, most empirical and theoretical environmental politics and governance studies to date largely focus on exploring the outputs of governance activity as opposed to examining actual changes in environmental outcomes.⁴² In a unique assessment of the social sciences in Puget Sound recovery research, analysts found a significant deficit.⁴³ Another study found 80 percent of Puget Sound recovery researchers were natural scientists. Moreover, while collaboration scores were high among social and interdisciplinary scientists, they were the lowest between natural and social scientists.⁴⁴ Meaningfully incorporating outcomes remains a central scholarly challenge in environmental policy and governance scholarship. Such couplings must be examined to allow for clearer tests of our theoretical expectations.⁴⁵

Therefore, we sought to incorporate an environmental outcome metric in our governance assessment. There were 30 to choose from in four categories: (1) thriving species and food web; (2) protected and restored habitat; (3) abundant water; and (4) healthy water quality. Because our primary client was Kitsap County’s Planning and Environmental Programs Division, we chose the habitat category and its land cover and development category.⁴⁶ For our final section of this report, we selected two studies of land cover change reflecting advances in remote sensing.

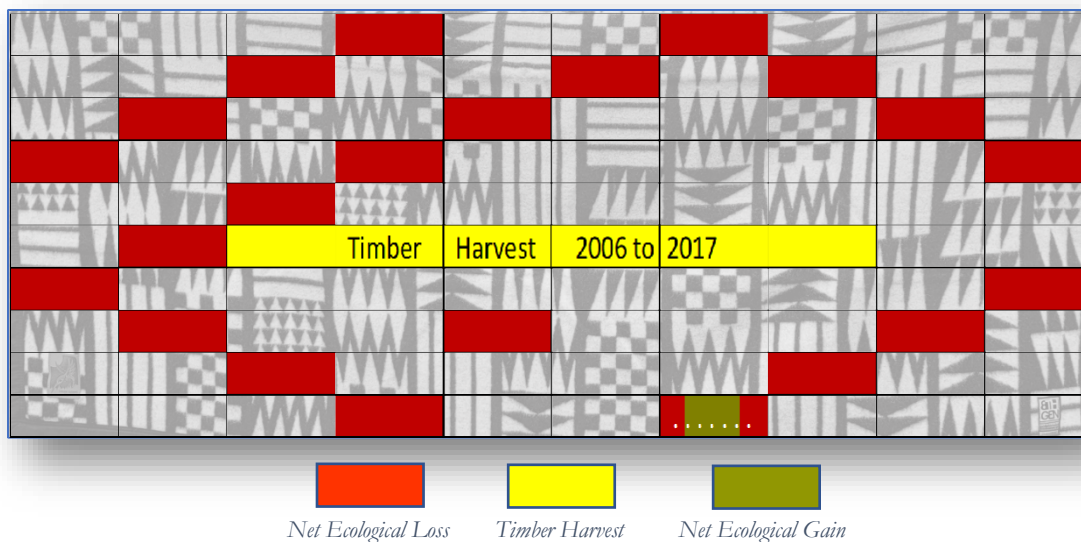
First, In the 2021 *State of the Sound* report, Puget Sound Partnership officials called for the development of a Net Ecological Gain standard. During the last decade, urban design scholars developed a theory of “Positive Development” to inform net ecological gain frameworks.⁴⁷ But in our literature review of published Puget Sound studies, we found a 2013 analysis providing context for what net ecological gain entails. Researchers analyzed the 17,700 km² land area of the Central Puget Sound counties of King, Kitsap, Pierce, and Snohomish. After comparing land cover changes, they estimated that between 1986-2007 urban development increased from 8 to 19% of the region.⁴⁸ Analysts also found lowland deciduous and mixed forests decreased from 21 to 13% while grass and agriculture decreased from 11 to 8%. This totaled a 22% loss of undeveloped land cover over two decades.

Or, visualize the land area of Central Puget Sound in a 10 x 10 table with 100 cells. Each one would represent approximately 177 km². Thus, we shaded 22 cells red in Figure 4. below to represent land cover loss in the Central Puget Sound. Also, we propose using this visualization as a kind of baseline condition of land cover pre-dating the Puget Sound Partnership (PSP) and other salmon recovery efforts. This baseline may offer a useful conceptualization to consider progress on both Net Ecological Loss versus Net Ecological Gain.

In the 2020 *State of the Sound* report, PSP officials advocated for moving from a no-net ecological loss to a Net Ecological Gain standard. The latter is needed because habitat degradation continues to outpace restoration. Recently, Washington Department of Fish and Wildlife (WDFW) landscape ecologists developed a [High Resolution Change Detection \(HRCDD\)](#) dataset for the 35,000 km² Puget Sound watershed.⁴⁹ According to online HRCDD documentation, “forty to 80% of (non-forestry) documented changes are too small to detect using 30-meter resolution data. HRCDD data ensures these small changes to the landscape are captured.”⁵⁰ Past 30-meter resolution remote-sensing datasets were too coarse.

To provide context to the visualization, consider this borrowed analogy. In a book about the personalities and history of the theory of island biogeography, David Quammen began *The Song of the Dodo* with a parable about a Persian blanket.⁵¹ For our region, imagine instead the Coast Salish pattern wool blanket designed by Nooksack Tribal member Louie Gong in Figure 4 below as a background for the grid. When you overlay the blanket with our 10 by 10 grid described above, imagine the 22 cells representing land cover loss between 1986-2007. Following the *State of the Sound* color scheme, we shaded them red to represent net ecological losses.

Figure 4. Six Salish Blankets



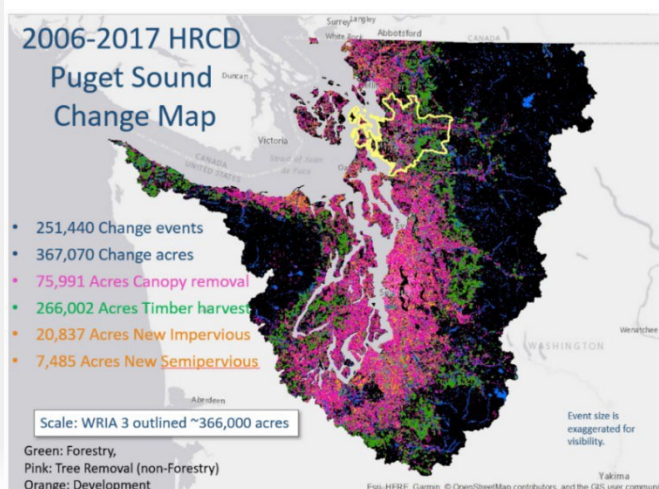
Now imagine aligning those 22 cells into a series of cuts. First, slice four diagonals just inside each corner. Those slashes represent 16% of land cover lost. Now you have five fragments. Imagine another five percent diagonal cut in the upper left of the largest of those five pieces. Now you have six fragments of the original rug after a 21% land cover loss. Now, punch a perforation in the largest piece. This final cut sums with the others to a 22% land cover lost over two decades. Are these six fragments as valuable as the original?

When you apply this metaphor to land cover and development over time across the Puget Sound watershed, you begin thinking like a biogeographer. It's the spatial study of organism abundance and diversity on the earth's surface, and their present and past distribution. One of biogeography's implications follows. "An ecosystem is a tapestry of species and relationships. Chop away a section, isolate that section, and there arises the problem of unraveling" according to Quammen.⁵² However, the HRCD analysis may reveal some good news for the Puget Sound ecosystem. Between 2006 and 2017, 90% of the Puget Sound watershed's land cover was unchanged. Growth management and other forces slowed development's advance.

In Figure 5 below, analysts visualized a quarter of a million land cover change events over a decade. Timber harvest between 2006-2017 represented most of the change with 266,002 acres cut. That equaled 1,076 km² or six more of our 100 panels in the visualization above. But emerging research led by a WWU hydrologist led us to shade them yellow in our "Six Salish Blankets" visualization.⁵³ Utilizing computer simulations, researchers projected that commercial forestry in the Nooksack basin may reduce summer stream flows in the river by up to 25% compared to a no-harvest scenario. Clear cuts at high elevations could be promoting faster and significant snowmelt. Also, younger trees transpire water vapor faster than older trees. Thus, timber harvest may represent more bad than good or even neutral news.

In more bad news, new impervious and semi-pervious development accounted for 28,322 acres or 114.6 km² lost. Non-timber harvest canopy removal amounted to another 307.5 km² of development activity (75,991 acres). In sum, that totals 422.1 km² of land cover change. Instead of holding to no net loss, just over two panels in the baseline visualization above were lost to development between 2006 and 2017. As noted by HRCD analysts, that scale equaled the size of Watershed Resource Inventory (WRIA) 3. This totaled approximately 366,00 acres encompassing the Lower Skagit and Samish watershed. Finally, there also may be some ugly news for the net ecological gain standard.

Figure 5. High Resolution Change Detection (HRCD) Map. Source: WDFW.



Since 2007, land restoration acres for the entire Puget Sound equaled 31,059 acres or 125.7 km² according to the [Puget Sound Acquisition and Restoration Dashboard](#). That's not even one panel of net ecological gain of our Salish blanket visualization in Figure 4 above for Central Puget Sound. Yet, this investment exceeded a quarter-billion dollars (\$254 million). Moreover, those positive changes were too minuscule for visualizing on the HRCD map. Land cover restoration amounted to an undetectable sound in the system.

Therefore, Washington's estuarine governance may first benefit from integrating new salmon recovery rules into our region's growth, transportation, and forestry governance arenas. Second, local jurisdictions should develop objectives for net ecological gain into comprehensive planning practice. Third, incorporating HRCD analysis into the Puget Sound's land cover and development Vital Sign could provide better information for tracking ecological losses and gains.

APPENDIX A. FINAL RESEARCH QUESTIONS

Our research questions draw on a large scholarly literature developed by political scientists with an environmental focus. First, the research program of Nobel Prize winning scholar Elinor Ostrom guided our approach to natural resource governance assessment. Sometimes called the “Bloomington School” of political economy, Ostrom developed a Common Pool Resource (CPR) theory and frameworks for institutional analysis. She held a long tenure at Indiana University in Bloomington Indiana.⁵⁴ Our study first responded to her call for bridging the contemporary divide between biophysical and social science research.

Second, we also followed her advice for natural resource policy analysts “to study and record the unintended effects of particular policy interventions.”⁵⁵ Like in medicine, some combinations of remedies produce adverse outcomes. Diagnosing those ineffective combinations will help us move beyond oversimplistic and failing CPR blueprints. So, we engaged salmon recovery and habitat restoration practitioners involved in protecting and improving the Puget Sound ecosystem with the following questions.

1. What recovery efforts do you recall where goals were met or unmet? We also asked respondents to focus on what is known, what the data shows, and what needs to be known. This was the observational round of our focus groups.
2. Then in a reflection round, we asked respondents to describe what made those recovery experiences positive or negative? We also asked what part of those recovery experiences excited or frustrated them? Finally, we asked respondents what caused them the most concern or intrigued them the most about their recovery experiences.
3. In the third interpretation round, participants responded to questions about what made the difference between achieving or not achieving recovery goals? We also asked when did their understanding improve the most or when did confusion results?
4. In a fourth and final decisions round, we asked focus group participants what actions are needed to support recovery success? Also, they were asked what is needed to solve problems you identified and support policy learning?

Our final focus on policy learning drew from another social science framework often applied to natural resource dilemmas. Advocacy Coalition Framework (ACF) scholars focus both on policy subsystems and the beliefs of policy specialists within those arenas. In particular, ACF predicts that positive policy change results when different coalitions of specialists learn from improved science and knowledge. Problems that were once intractable become solvable.⁵⁶ But the focus remains on studying the activities of actors in policy subsystems. Conversely, collective challenges dominated by divergence among coalitions particularly about policy beliefs are likely to remain intractable.⁵⁷

For example, the most recent application of the ACF about the Puget Sound focused on coalition structures. Lipsky and Ryan identified five coalition groupings in a case study of Whidbey Island: No Government Intervention, Property Rights, Private Land Stewardship, Protect Undeveloped Areas, and

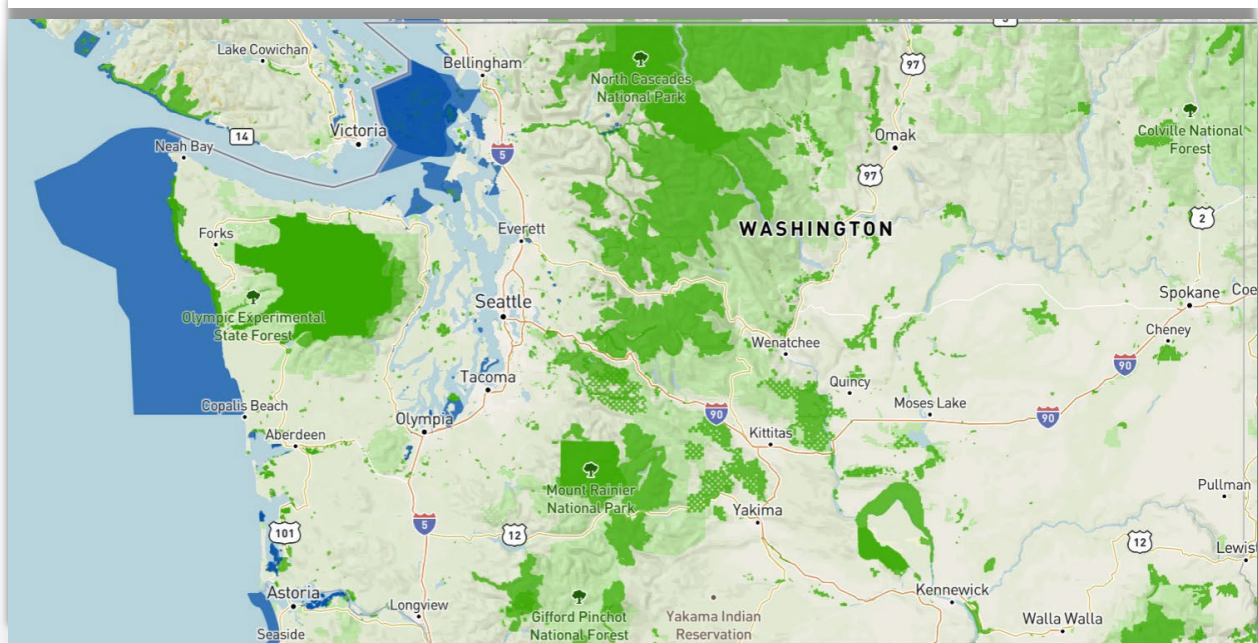
Large-Scale Restoration.⁵⁸ The delineation of distinctive coalition groupings mirrored the multiple policy subsystem arrangements CPR scholars recently developed.⁵⁹ So, we added the following questions.

5. How are recovery and restoration-related policy subsystems or action arenas structured?

6. How do adjacent action arenas foster coordination or fragmentation?

For the next two appendices, we provide backgrounds on the biophysical and social theories guiding our study. Island biogeography provided our first theoretical foundation covered in Appendix B. This spatial ecological science examines where animals and plants are present or absent. Seeded with a seminal 1967 publication, this ecological theory rests on two fundamental principles.⁶⁰ First, larger islands support more species than smaller ones. Second, remote islands support fewer species than less remote islands. Moreover, they also established how habitat can be insulated by not only distance between islands, but anything that divides a landscape such as mountains, climate, and human development. Scholars also connected this environmental science to earlier works on nature preserves and the concern that many were just too small to support many species. For example, the map below displays Washington State's "islands" of protected areas.⁶¹

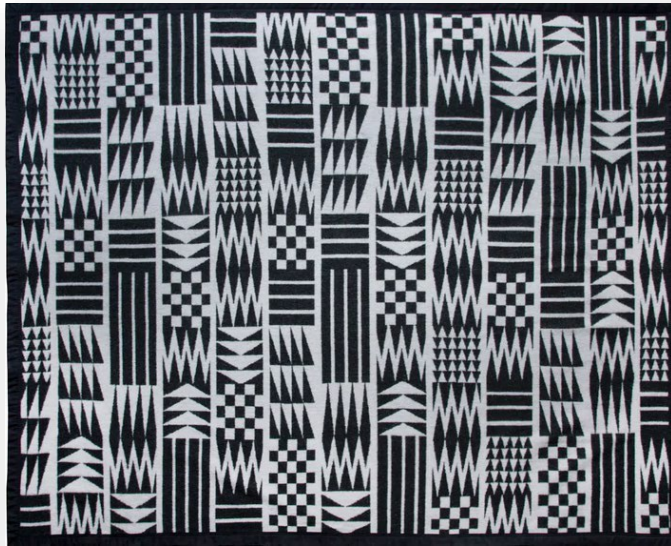
Figure A1. Adapted from the International Union of Concerned Scientist's (IUCN) Protected Planets map.



Second, we turn to Institutional Rational Choice (IRC) theory and its Institutional Analysis and Development (IAD) framework in Appendix C. This perspective moves beyond rational choice theory's limited view of human actors as norm-free, institution free, uncooperative, and selfishly intent on maximizing one's self-interest. Instead, IRC theory and its IAD framework sees political actors embedded in, and constrained by, institutions. Appendices D, E, and F then describe our methods, conceptual diagrams, and scholarly endnotes respectively.

APPENDIX B. THE SCIENCE OF BIOGEOGRAPHY

To think like a biogeographer, imagine unpacking your Salish wool blanket gift we just purchased. It's the

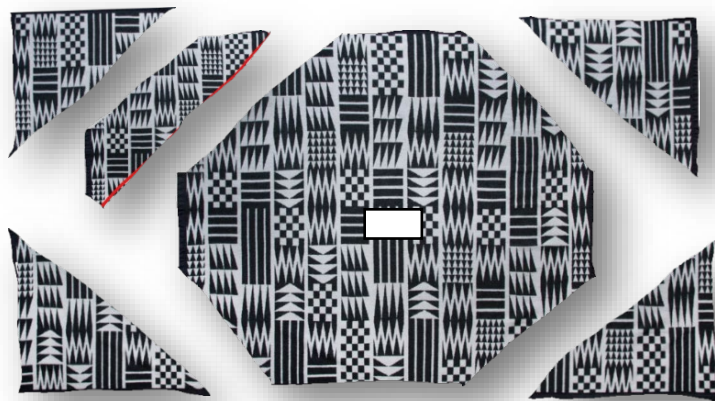


design pictured below. It's a Louie Gong (Nooksack) design. He called the blanket "collaboration with the ancestors."⁶² Gong followed Coast Salish weaving traditions to create the design. The blanket is a complex tapestry of woolen threads giving it a three-dimensional structure.

Now imagine taking a dull knife and cutting off the upper-left corner. Now you have a smaller fragment and a misshapen but smaller original. Slice away the upper-right corner resulting in three fragments. Then, slice away the lower-right and left. Now you have five fragments. Take another slice of the upper-left of the largest piece. Six

fragments remain. Finally, punch out a square representing one of 100 equally sized panels encompassing the entire blanket.

In the vocabulary of island biogeography, you now have six smaller islands instead of one large island. Biogeographers would expect declines in species biodiversity after a single large island fragmented into six. But what would these six pieces amount to? You have nearly the same area of blanket. Do we have six Salish blankets? No. If you really sliced that blanket up, you would be left with ragged and frayed fragments, each one almost worthless and commencing to come apart.



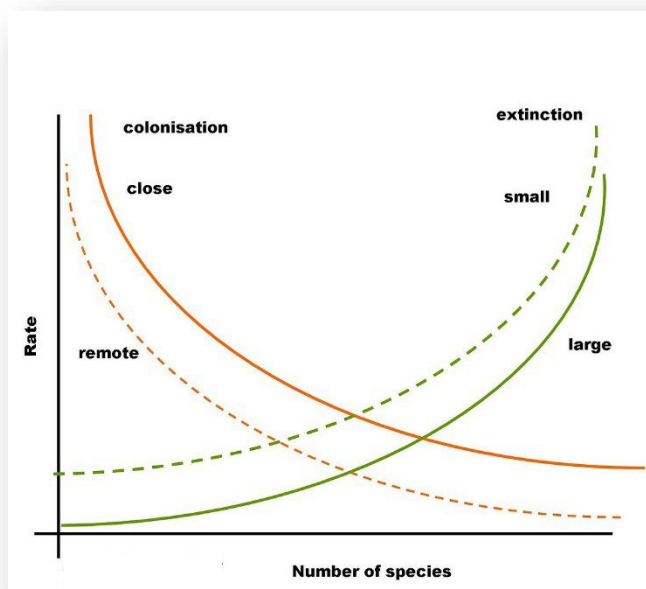
Now, apply that same logic outside to the Puget Sound ecosystem. Island biogeography provides us with a useful metaphor to understand the ecological challenges we face recovering and

restoring our estuarine system. As Quammen summarized, "An ecosystem is a tapestry of species and relationships. Chop away a section, isolate that section, and there arises the problem of unraveling."⁶³ In Washington State for instance, we already lost 90 percent of old growth forest, 70 percent of estuarine wetlands, and 50-90 percent of riparian habitat according to Washington Department of Fish and Wildlife.⁶⁴

Single Large or Several Small

Quammen also described how the conservation implications of island biogeography fueled a heated debate over a seemingly simple question. Should conservation area designations strive for Single Large Or Several Small (SLOSS)? For example, Diamond (1975) drew on island biogeography to develop a set of design principles for the management of an ecologically sound park system. These included: (1) larger protected areas will hold more species than smaller ones; (2) a protected area closer to others will support more species than an isolated one; (3) a round park will hold more species than a long narrow area; and (4) corridors between conservation areas might mitigate the island problem.⁶⁵

Conversely, other researchers would counter that “the theory of island biogeography is completely neutral with respect to SLOSS . . .”⁶⁶ Others were more critical and contested the island theory as trivial or worse, as fiction, not fact.⁶⁷ Similar to economics, the core of island biogeography theory rests on an equilibrium condition. In the graph below, the horizontal or x-axis represents the number of species from 0 to P, where P equals the number of species on the nearest mainland. Then, curves for the rates of species colonization (immigration) or extinction for remote, close, small, and large islands are plotted on the vertical or y-axis. Like supply and demand curves, their intersection or S represents the equilibrium condition.⁶⁸



Islands that are close to the mainland are more likely to see species immigration or colonization than remote or far islands.⁶⁹ Small islands also support fewer species while being more vulnerable to random extinction events like fires, hurricanes, or flooding. Thus, islands that are small (S) and more remote or far (F) from the mainland experience higher rates of extinction and lower colonization levels resulting in the lowest number of species (S_{SF}). Large (L) islands near (N) mainlands experience lower extinction rates and higher colonization levels leading to higher numbers of species (S_{LN}).

Large and far (S_{LF}) or small and near (S_{SN}) to mainlands will have intermediate numbers of species. Therefore, the number of species relationship and island biogeography can be summarized as:

$$S_{LN} > S_{LF} \sim S_{SN} > S_{SF}$$

Subsequent research extended and confirmed as well as challenged and modified the original theory.⁷⁰ The theory has neither been universally accepted nor universally rejected. Nonetheless, island biogeography theory remains elementary to our understanding of endangered species conservation. But another SLOSS question arose in social science.

APPENDIX C. ECOGOVERNANCE SCIENCE

A Nobel Prize winner for economics shaped much of our lens for assessing natural resource governance across the Puget Sound. Elinor Ostrom shared the prize in 2009 because of her decades of work on Common Pool Resource (CPR) management. Early in the sixties, Ostrom's CPR research program started by entering a contentious debate over public management. Many scholars advocated consolidating urban governance into one large governance structure. A single large government could reduce the inefficiency and chaos of several small governments.

Ostrom specifically studied water service delivery in California and found polycentric governance, or multiple centers of governance among several smaller jurisdictions, was often more effective in public service delivery than unitary governance through a single large structure. Ostrom and her public choice colleagues would become influential voices in the field of public administration for two more decades. They pushed the debate beyond just a dichotomous choice between Single Large versus Several Small (SLOSS) governance. CPR researchers began to illuminate a third path large and small or SLASS.

In the nineties, Ostrom also became a significant voice challenging the conventional prescriptions offered to resolve the tragedy of the commons.⁷¹ Garrett Hardin provided an influential analogy about the social dynamics of an open pasture neither owned nor regulated. This and other commons faced inevitable collapse because the individual rationality of users was collectively irrational.⁷² Farmers received a clear and concentrated payoff to add more and more grazers to the system. This rational impulse to expand each farmer's herd was collectively irrational as more and more sheep ate the pasture into oblivion. Hardin's prescriptions for the "tragedy of the commons" were dichotomous. Either privatize with farmers managing several small and privatized commons or regulate with single large governments.

Ostrom and others have shown that CPR and their users are not doomed to tragedy. Instead, CPR governance can succeed with more of the right resource conditions, resource user attributes, and a combination of institutional features. The latter became eight design principles listed below in Table C1. CPR management succeeded when more were met than less. First, clearly define the boundaries of resources and user groups. Second, devise allocation rules congruent with ecological conditions and fair distributions of benefits and costs. Third, make collective choice venues where rules are produced or modified accessible to users affected by harvesting and protection regulations.

Fourth, devise mechanisms of accountability for users and the monitors auditing user behavior and biophysical conditions. Fifth, establish and enforce graduated sanctions with officials accountable to users violating rules-in-use. Sixth, develop accessible, local, and low-cost venues for users and officials. Seventh, establish user rights to devise their own governing institutions without challenge from external authorities. Finally, an eighth principle calls for nested enterprises. In subsequent work in the two-thousands (2000s), Ostrom and others reasoned that successful regional CPR management systems should allocate authority supportive of adaptive governance at multiple scales from local to regional.⁷³ SLOSS was another futile debate.

Table C1. Design Principles from long-lasting and successful CPR governance.⁷⁴

1. Clearly defined system and use boundaries.
2. Allocation rules linked to local conditions.
3. Accessible collective-choice venues.
4. Accountability between resource users and monitors.
5. Enforceable and graduate sanctions for violators of rules-in-use.
6. Low cost and local venues for conflict resolution.
7. User can devise their own governing institutions.
8. Nested Enterprises.

Those nested enterprises also need to be organized so they can accomplish these key activities: allocation of user rights, provision of resources and collective-choice venues, monitoring users and units, rule enforcement and sanctioning, dispute resolution, and networked or “nested” governance. Some CPR scholars refer to nested governance as polycentricity.⁷⁵ Polycentric governance “systems are the organization of small-, medium-, and large-scale democratic units that each may exercise considerable independence to make and enforce rules within a circumscribed scope of authority for a specific geographical area” according to Ostrom.⁷⁶

Polycentric Research

One of our authors helped describe how like the SLOSS parallels in biophysical and social science, polycentricity’s first definitions emerged independently from each tradition.⁷⁷ In its first use, the term emerged from Polanyi’s study of decentralized decision-making processes in the biological and chemical sciences. But according to McGinnis and Ostrom, Polanyi imagined a self-organizing dynamic to his version of polycentrism. He overlooked “the pivotal role of public entrepreneurs in making connections between units of governance systems or the critical importance of explicit coordination among distinct actors within that system.”⁷⁸

Instead, Vincent Ostrom, Tiebout, and Warren offered this definition.

“Polycentric” connotes many centers of decision-making which are formally independent of each other To the extent that they take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts, the various political jurisdictions in a metropolitan area may function in a coherent manner with consistent and predictable patterns of interacting behavior.⁷⁹

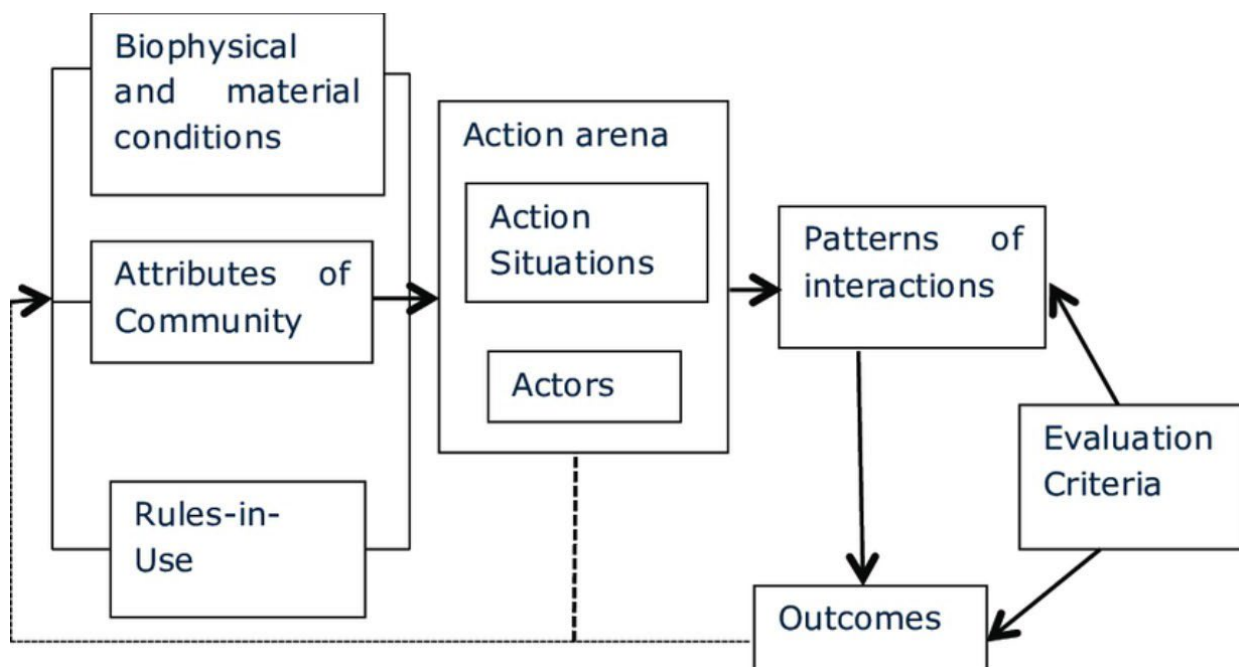
But this 1961 description raised more questions than it answered. First, where and what are the centers of decision-making in a governance system? Second, how do those decision centers take each other into account competitively, contractually, or cooperatively? Third, how do decision centers function coherently?

While numerous publications addressing those questions appeared, one influenced most of our answers applied here.⁸⁰ Ostrom's *Understanding Institutional Diversity* provided a comprehensive explication of an Institutional Analysis and Development (IAD) framework. At the center of this framework and most of its applications, individual choices are not tragedies occurring in a vacuum, but choices within action arenas we describe next.

Smaller Rule and Action Situations Nested in Larger Action Arenas

Ostrom described these institutional places as “the social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight.”⁸¹ These collective action arenas can be reshaped by group interactions while also being influenced by three exogenous factors: (1) the biophysical world; (2) the community individuals are embedded within; and (3) institutional rules incentivizing or constraining certain actions.⁸² Figure C2 below depicts the simplest IAD focal level for analyzing action arenas. Later versions would divide biophysical conditions between a resource system and its resource units.

Figure C2. Action Arena Focal Level adopted from Ostrom 2005.



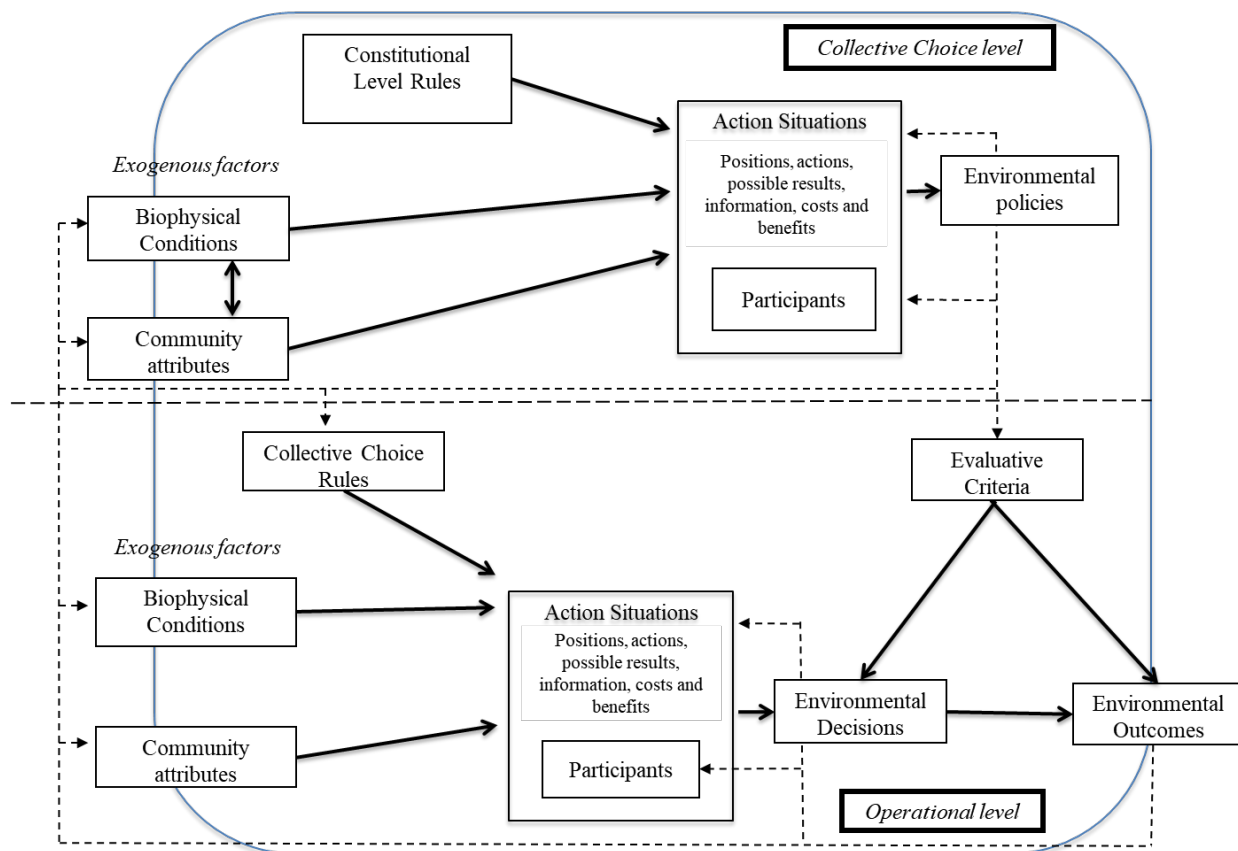
However, this diagram portrays just one level of potential analysis. Long ago, Kiser and Ostrom offered their first exposition on multi-level institutional governing arrangements.⁸³ Figure C1 above typically represents the smallest and lowest “operational level” where actors pursue day-to-day activities impacting biophysical conditions. Embedded within a larger action arena, these spaces are commonly referred to as “action situations” as seen in Figure C3 below.⁸⁴

The operational level contains action situations influenced by similar exogenous factors such as biophysical conditions, community attributes, and a key third factor—collective choice rules. The latter shapes many of the interactions in an operational action situation with an intent to steer operational decisions that change environmental conditions. On this larger and higher “collective

choice” level, actors in collective action situations produce rules to guide interactions and outcomes for the operational level. So, rule connections between smaller situations and larger arenas are a critical feature of nestedness.

In *Understanding Institutional Diversity*, Ostrom expressed her view of nested sets of rules and action situations. She explained “rules are nested in another set of rules that define how the first set of rules can be changed.”⁸⁵ For the three institutional levels, there are also three levels of rules. Operational situations and rules are nested within collective-choice rules nested within constitutional-choice rules. Ostrom also described how constitutional and collective-choice decisions activities involve prescribing, invoking, monitoring, applying, and enforcing rules. Operational action situations are where actors engage in provision, production, distribution, appropriation, assignment, or consumption of resource units.

Figure C3. Flow Diagram of Nested Collective-Choice and Operational Action Situations Forming a Governing Action Arena.



In this bi-level action arena, you could picture Kitsap County operational situations embedded within Washington State rules. Both are embedded within constitutional level rules from the federal level. Such diagrams begin to answer those questions of what the critical governing enterprises or decision centers are, where they reside, and how they relate to one another. With connecting rules, local

organizations become nested within larger state and federal agencies. Without connecting rules, you lose nestedness. Governance exhibits more division or fragmentation.

For example, one leading environmental lawyer described the “bureaucratic wall” dividing land use and water governance in Washington State. While state institutions once governed land use, it devolved to local jurisdictions. “The rift is wide, with both sides reluctant to venture beyond their usual jurisdictions and uncomprehending of the other side’s goals and practices” according to Jean Melious.⁸⁶ Put differently, imagine Figure C3 above doubled. One policy subsystem dominates water governance and the other land use with few interconnections. This “severance” between water and land use matters plagues most western states. In their law review, Tarlock and Wetering used an island biogeography metaphor. They described Western U.S. cities as archipelagos or urban islands.⁸⁷

But briefly in 2016, the Washington State Supreme Court ruled in the *Hirst* decision that local land use planning and state water law need to function as a “single harmonious body of law.”⁸⁸ Growth and water management enterprises now were required to be nested. But in the 2017 legislative session, a Republican led Senate used its parliamentary power to uphold Washington’s \$3.8 Billion capital budget. They demanded a legislative Hirst fix. Democrats relented and according to Melious, the state legislature passed and governor signed a law out of political expediency. It also represented a “politically-motivated erasure of the undeniable interconnection between land use and water resource protection is a step in the wrong direction.”⁸⁹

So now consider a quadrupled Figure C3. We did in Figure 2 above. A restoration and recovery action arena remained severed from three other governing systems for growth, transportation, and forest management. This fragmentation probably spurred cities and counties to support HB 1117. This bill required the addition of net ecological gains for salmon habitat to be added as a goal for the land use element of comprehensive planning through the Growth Management Act (GMA). Likewise, HB 1838 proposed requiring landowners to establish, maintain, and protect the riparian management zone (RMZ) for their property adjacent to salmon and steelhead bearing bodies of water. This new regulation also would be added to GMA planning for local jurisdictions.

Therefore, another governing severance between land use planning and salmon recovery persisted when HB 1117 and 1838 failed. Based on our institutional analysis, we found Puget Sound governance for salmon recovery and habitat restoration violating CPR’s eighth design principle. This finding received support in all six of our focus groups. But our institutional research also illuminated another governing challenge. Natural resource governance for the Puget Sound exemplified panacea thinking.

No Panacea Policy or Governance Approach

Ostrom also identified five threats to robust CPR governance including: (1) rapid exogenous change; (2) translation failures; (3) blueprint thinking and easy access to external funds; (4) corruption and rent seeking; and a (5) lack of supportive large-scale institutions. While evidence for all five probably exist in the Puget Sound case of natural resource governance, blueprint thinking stood out in our research. In a 2007 special of a journal featuring nine articles, Ostrom described blueprints or universal solutions as panaceas.⁹⁰

The National Estuary Partnership (NEP) and its Puget Sound variant emerged when collaborative ecosystem management became a new environmental policy panacea in the nineties.⁹¹ It was a third era or wave of policy developments beginning in 1970. Following key perspectives from policy design scholarship, we delineate three patterns of interactions: coercion, competition, and collaboration.⁹² These became the dominant government tools for three eras or waves of environmental history.

The first decade, or “epoch,” of regulatory policy in the 1970s involved the establishment of environmental policy as a national priority in the U.S. and a series of “command-and-control” regulations.⁹³ Some of the main features included a focus on human health and margin-of-safety analysis, technology forcing standards to control end-of-the-pipe pollution and centralized federalism. Over the 1980s and a second epoch, many new environmental strategies many emphasized either economic or risk-centered approaches.⁹⁴ A third era involved collaborative environmental governance with a diversity of public, private, and nongovernmental actors cooperating instead of coercing or competing.⁹⁵

In this section, we turn our attention briefly to behavioral assumptions behind these environmental policy epochs. Schneider and Ingram described how deterrence theory dominated the first two eras. It presumes that individuals or businesses are utility maximizers and avoid policy-relevant behavior like habitat restoration or salmon recovery.⁹⁶ Therefore, industry and individuals mainly need negative or positive incentives to act for the collective good.

Deterrence theory dominated the debates over environmental policy formulation in the sixties and seventies. In fact, one environmental policy historian in 2000 documented an evolution of policy designs by decade beginning with the 1970s.⁹⁷ The first wave of deterrence based environmental policy designs were often described as the “command-and-control” generation.⁹⁸ Technology forcing requirements and penalties for pollution levels beyond margin-of-safety standards epitomized the deterrence assumption. Thus, coercive policy tools represented the first panacea.

However, these initial environmental policy designs became widely viewed as “heavily bureaucratic, prescriptive, fragmented in purpose, and adversarial in nature.”⁹⁹ (Durant, Fiorino and O’Leary 2004, p. 1). This dissatisfaction spurred advocacy for efficiency-based reforms in a second wave of environmental policy. Market-like mechanisms spurring competition became the second panacea. (Mazmanian and Kraft 1999). Positive incentives for deterrence were needed.

Economic mechanisms in environmental policy relied primarily on a price system assigned to activities detrimental to ecosystems. In short, the polluter pays. Common tools included pollution taxes, subsidies for pollution abatement and transferable emissions permits. Cap-and-trade represented one of the most popular economic policies.¹⁰⁰ But it was a hybrid policy combining coercion and competition.

First, regulators established a limit or cap on total pollution emissions with declining annual levels for facilities in a region. Then, pollution permits were distributed through an auction and then transferable in a trading system. The approach, advocates hoped, would foster competition among polluters who can “over-reduce” emissions and sell their permits to other facilities. In practice, pollution trading in the US received mostly accolades for more efficient outcomes in the mitigation of acid-rain and leaded gas pollution.¹⁰¹ In contrast to solely relying on negative charges, sanctions, or use of force by coercive policy tools, market-based and competitive mechanisms offered a positive payoff.

Both coercive and competitive environmental policy tools rest on deterrence theory. These prescriptions derived from one of the most influential depictions of ecological tragedies. “Freedom in a commons brings ruin to all” claimed Garrett Hardin.¹⁰² Hardin’s prescriptions derived from deterrence theory were also dichotomous. Either regulate or privatize. The commons world was painted black and white.¹⁰³ But, a rich body of work including the scholarship of Elinor Ostrom challenged these policy panaceas. As two reviewers of Ostrom’s work put it, “in a period when individualistic economic thinking was popular, Ostrom offered a vision of cooperative behaviour that did not rely upon reverting to a centralized state.”¹⁰⁴ Thus, Ostrom provided an empirical and theoretical backdrop for a cooperative turn in the third wave of US environmental modes of coordination in the nineties.

According to Durant, “reacting to the shortcomings of existing regulatory tools and sole reliance on market-based tools, another group of reformers began espousing an even more flexible and collaborative approach to environmental governance.”¹⁰⁵ Cooperative approaches (see Glasbergen 1998 for an international view) proliferated in natural resource management, watershed governance, and industrial pollution reduction efforts (Harrison 1998).¹⁰⁶ Environmental policy progress became less about more regulation versus more competition. That was a false debate.¹⁰⁷ Instead, the third wave of environmental policy elevated collaborative environmental governance as the new panacea.

Proponents hailed collaborative environmental governance over regulatory and adversarial approaches.¹⁰⁸ A WWU political scientist cautiously described good, bad, and ugly environmental collaborations in Washington State’s watershed protection efforts.¹⁰⁹ Others argued that collaborative environmental management was a passing fad at best, and at worst, collaboration may create perceptions of progress without real changes.¹¹⁰ For example, one scholar titled his examination of the National Estuary Program as “Collaborative Environmental Institutions: All Talk and No Action?”¹¹¹ Instead, many including Ostrom called for collaboration, regulation, and market-mechanisms.

Diverse Institutional Arrangements and Rules

Polycentric environmental governance involves not just multi-level action arenas (local, regional, national), but also: (1) institutional variety and (2) rule diversity. The former combines markets, hierarchies and collaborative arrangements. In the latter, policy tools include regulatory standards, market procedures, and cooperative procedures. In two of the authors prior work, they noted that competitive and participatory strategies do not need to replace regulation. They can supplement coercive tools.

“One way to think of the future of environmental [governance], then, is the value of hybrid policies, using a combination of complementary policy strategies rather than relying exclusively on regulation, or replacing regulation with one or more of the alternatives.”¹¹² Likewise, Ostrom argued that it was as important to protect institutional diversity as biodiversity. Institutional monocropping should be avoided she argued in a 2011 article.¹¹³ Instead of seeking optimal institutional arrangements for all jurisdictions, we need diverse governing institutions to support adaptation. Consistent with the theoretical expectations of CPR theory and its polycentric variants, effective environmental governance requires not only higher levels of coordination across many decisions centers, but institutional and rule diversity as well. Thus, we view polycentricity as an integral component of an IAD framework characterized by (1) multi-level nesting; (2) policy diversity; and (3) interjurisdictional coordination.

APPENDIX D. METHODS, PROTOCOLS, AND STANDARDS

We also complemented our institutional and biogeographic analysis with focus group interviews in a mixed-methods case study. In 2020, a special issue of a leading natural resource conservation journal devoted seven articles to evaluating collaborative governance. In an overview of the most common assessment methods, researchers grouped evaluative approaches into four categories: (1) Social-ecological network analysis; (2) institutional diagnosis; (3) scenario planning; and (4) action research.¹¹⁴ None of the Puget Sound governance assessments we identified so far used the latter. Besides a social science deficit, Puget Sound governance research also lacks methodological diversity. Thus, we developed a case study approach and deployed a form of Participatory Action Research (PAR).

Practitioners defined PAR as a kind of collective and self-reflective inquiry involving both the researcher and those stakeholders normally considered subjects in traditional research. “Thus, it is a highly collaborative, reflective, experiential, and participatory mode of research in which all individuals involved in the study, researcher and subjects alike, are deliberate and contributing actors in the research enterprise” according to one team.¹¹⁵ Others described it as research with subjects rather than on them or for them.¹¹⁶ PAR also offers an alternative to the two primary scientific approaches in conservation science.

First, a moralist/educational method assumes humans will change their values about natural resources and related behavior once they become aware of the consequences of their actions and others. Second, a technocratic or authoritarian view holds that enlightened scientists can guide politicians to the best policies.¹¹⁷ Conversely, PAR recognizes how research functions not only to produce knowledge and educate, but also as processes supporting the mobilization of action.¹¹⁸ Indeed, we sought to do more than just contribute to research and education. We hope to learn about, engage with, and continue to support needed transitions to improve natural resource governance and recovery in the Puget Sound.

Technology for Participatory Action Research

We applied a facilitation focus group technique known as the Technology of Participation (ToP). Developed by the Institute of Cultural Affairs, ToP methods “enable groups to: (1) engage in thoughtful and productive conversations; (2) develop common ground for working together; and (3) build effective short- and long-range plans for change.”¹¹⁹ Overlapping with the more general focus group technique of qualitative research, ToP also developed specialized facilitation techniques for online engagement. Because of in-person coronavirus restrictions, online focus group engagements were necessary throughout our project.

For primary data collection, we relied solely on the focused conversation method of facilitation from ToP approaches. To focus the conversation, facilitators opened by sharing a specific focus for the group by stating both a rational and experiential aim. For example, we established the rational aim with the following question. *How can participants and their team, organization, and agency foster success for Puget Sound Recovery?* We would follow by identifying our experiential aim with a statement like the following. *We hope to empower Puget Sound recovery stakeholders with the sharing of experiences, insights, and creativity while learning how to positively transform existing governing arrangements for our shared marine and watershed ecosystems.*

Then, facilitators guided focus group participants through a series of four prompts based on the ways humans process and judge information: (1) Observations, (2) Reflections, (3) Interpretations, and (4) Decisions.¹²⁰ First, a facilitator asked *observational* questions to elicit what participants know about the topic, what the data shows, and what may be left unknown. Second, participants respond to *reflective* questions about their initial reactions to the data, both positive and negative. Facilitators also asked about past experiences and associations around an inquiry topic. Table D1 below summarizes are data collection questions.

Table D1. Focus Group Interview Questions

<i>Rational Aim</i>	How can a participating individual and their team, organization, and agency foster success for Puget Sound Recovery?	
<i>Experiential Aim</i>	We hope to facilitate Puget Sound recovery stakeholders with the sharing of their experiences, insights and creativity while learning how to positively transform existing governing arrangements for our shared marine and watershed ecosystems.	
<i>Observation Prompts:</i> <i>O</i>	What were the most positive experiences you or your organization had in a Puget Sound Recovery effort? Conversely, what were the most negative experiences you and your organization had in a recovery effort for the Puget Sound? What were some of the events that led up to these experiences? What other background data is important?	What
<i>Reflective Prompts:</i> <i>R</i>	What caused the positive/negative experiences? What surprised you? What intrigued you? What caused you the most concern? What personally made this experience rewarding/difficult?	Gut
<i>Interpretive Prompts:</i> <i>I</i>	What made the difference between negative and positive experiences? Which of these is most important for you? Why? Which of these need to be dealt with first? Why? What opportunities are there for turning negative situations into positive ones?	So What
<i>Decisional Prompts:</i> <i>D</i>	Who else should we be contacting? What actions can others take for success? What actions can we take to solve these problems? What are the first steps needed to improve Puget Sound recovery efforts?	Now What

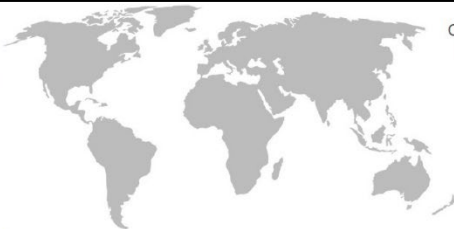
The first two rounds often are summarized as the “what” and “gut” rounds. Third, *interpretive* questions then direct respondents to consider the meaning of the data and experiences generated by the first two prompts. “So what” often characterizes these interpretive questions. Fourth, *decisional* questions focus participants on how they or their organization can respond with specific actions. These final queries are the “now what” questions. Thus, ORID guides participants through a “what, gut, so what, now what” inquiry.

Appendix E. Human Subjects Protocols

Because of ethical standards and federal regulations for data collected from human subjects, we sought and obtained research approvals from WWU's Office of Research and Sponsored Programs and our compliance professional. Below, you'll find our human subjects training certificates.

		Completion Date 08-Oct-2020 Expiration Date 07-Oct-2025 Record ID 38787410
This is to certify that:		
Mark Stephan		
Has completed the following CITI Program course:		Not valid for renewal of certification through CME.
Basic/Refresher Course - Human Subjects Research (Curriculum Group)		
Social/Behavioral Research Course (Course Learner Group)		
2 - Refresher Course (Stage)		
Under requirements set by:		
Washington State University		
		
Verify at www.citiprogram.org/verify/?w356fe987-f0df-4f5d-b338-ddf52d54d2db-38787410		

		Completion Date 09-Jun-2020 Expiration Date 08-Jun-2025 Record ID 14882738
This is to certify that:		
Troy Abel		
Has completed the following CITI Program course:		Not valid for renewal of certification through CME.
Social & Behavioral Research - Basic/Refresher (Curriculum Group)		
Social & Behavioral Research - Basic/Refresher (Course Learner Group)		
1 - Basic Course (Stage)		
Under requirements set by:		
Western Washington University		
		
Verify at www.citiprogram.org/verify/?wd8683930-7cc8-4df4-85e7-840f5821e977-14882738		



Completion Date 02-Apr-2021
Expiration Date 01-Apr-2026
Record ID 40950038

This is to certify that:

Rachel Youngberg

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Social & Behavioral Research - Basic/Refresher

(Curriculum Group)

Social & Behavioral Research - Basic/Refresher

(Course Learner Group)

1 - Basic Course

(Stage)

Under requirements set by:

Western Washington University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w652f852c-6359-462b-b3c8-93bfd144439d-40950038



Office of Research & Sponsored Programs

Old Main 530 - MS #9038
516 High Street, Bellingham, Washington 98225
(360) 650-3220 - Fax (360) 650-6811
www.wvu.edu/compliance

To: Troy Abel
From: Stephanie Richey
Subject: Human Subjects Application
Date: 7/21/2021
Action Taken: Exemption Granted
Principal Investigator: Troy Abel
Faculty Advisor: NA
Project Title: The Sound of Natural Resource Governance (SONAR): Assessing Washington's Estuarine Recovery Efforts
Protocol Number: 4401EX21
Funding: Kitsap County, #KC-411-19-A, "Natural Resources Governance Framework Assessment," January 2021 to March 2022

The Western Washington University (WWU) Institutional Review Board (IRB) designee determined that your project meets the requirements outlined in §45 CFR 46 and WWU institutional procedures to receive the following exemption determination:

Exempt Category 2

This determination means that your research is valid indefinitely, as long as the nature of the research activity remains the same. You may begin recruitment and data collection. After 6 years, according to the University's retention schedule, this exemption file will be deleted. After this point, you will no longer be able to make modifications to this protocol.

This exemption is given under the following conditions:

1. COVID-19 Note: Prior to initiating any face-to-face research activities on- or off-campus, researchers are responsible for following the guidelines for research outlined and approved in your Department Reopening Plan.
2. The research will be conducted only according to the protocol.
3. The research will be conducted in accordance with the ethical principles of Justice, Beneficence, and Respect for Persons, as described in the Belmont Report, as well as with federal regulations and University policy and procedure.
4. PIs, Faculty Advisors, PI Proxies, and any individual interacting or intervening with human subjects or their identifiable data must be appropriately trained in human research subject protections (CITI Basic Social/Behavioral Research – Basic/Refresher course), research methods, and responsible conduct of research **prior** to initiating research activity.

Active Minds Changing Lives

Appendix F. Professional Ethical Standards

As members of the American Political Science Association, Professors Abel and Stephan adhere to this organization's Statement on Professional Ethics. "Professors, guided by a deep conviction of the worth and dignity of the advancement of knowledge, recognize the special responsibilities placed upon them. Their primary responsibility to their subject is to seek and to state the truth as they see it."¹²¹ We also embraced the ethical standards and requirements to protect any human subjects our research involves. Thus, we ensured that our research subjects experienced no physical, mental, emotional, social, or psychological harm because of their participation in our study. We also recognized that participation in our research must be voluntary and a participant's responses in our focus groups, interviews, and surveys will be kept confidential.

There are several ethical principles related to human subjects that undergird scholarly research – three of which are central to Western Washington University and to other scholarly institutions. *Justice* is critical because of the underlining commitment to fairness in working with human subjects – with their recruitment to a study and their treatment in a study. *Beneficence* is multi-faceted and includes a commitment to doing research that keeps risks low and benefits high for subjects as much as possible. *Respect for Persons* is foundational – as researchers we have an obligation to recognize the whole person, including their autonomy and capacity to make their own decisions when it comes to research.

As analysts, we also grounded our approach in the principles of policy analysis. Our lead investigator often compares policy analysis to financial auditing practice. For example, a Certified Public Accountants (CPA) job could be described as measuring the distance between what management said they did and what happened. Likewise, policy analysts measure the distance between what politicians or policies aim to achieve with the results. In this case, the distance between objectives and ends remained quite far.

APPENDIX G. SOCIAL AND ECOGOVERNANCE SYSTEM DIAGRAMS

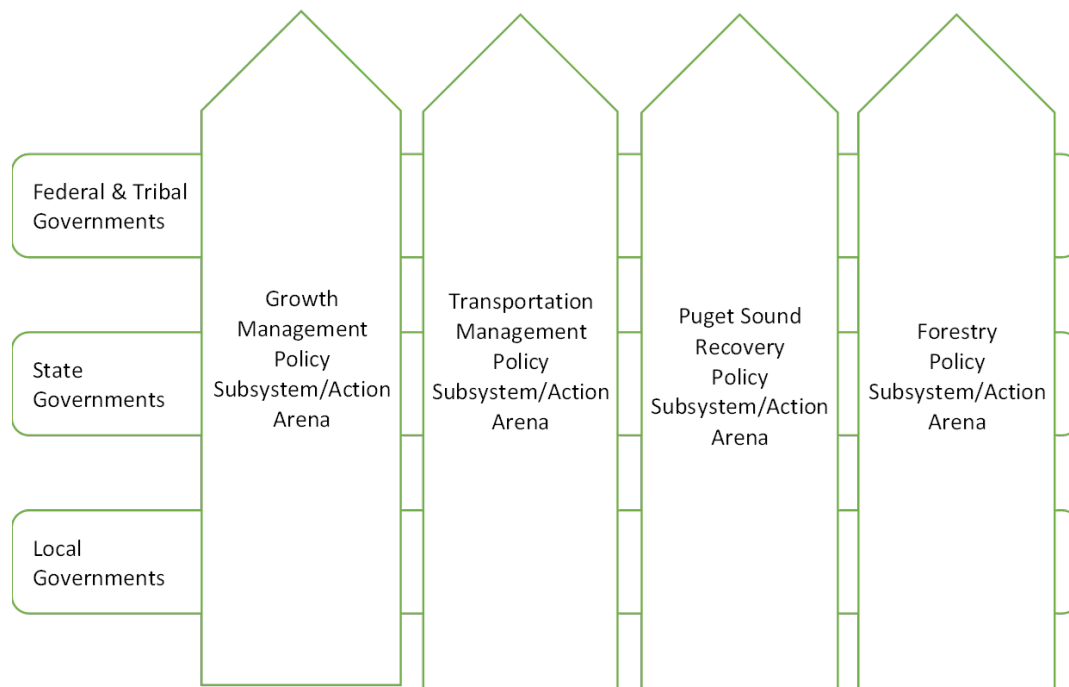


Figure G1. Picket-Fence Federalism Depiction of Natural Resource Governance Arenas or Policy Subsystems Impacting the Puget Sound

The figures in this appendix represent our three primary diagrams guiding our governance framework visualization so far. First, figure G1 represents picket-fence federalism. This frequent depiction comes from an Intergovernmental Relations (IGR) research tradition. A metaphor first attributed to Terry Stanford in the 1967 book *Storm over the States*, it was deployed to describe the new vertical administrative patterns produced by the significant number of federal grants distributed to states.

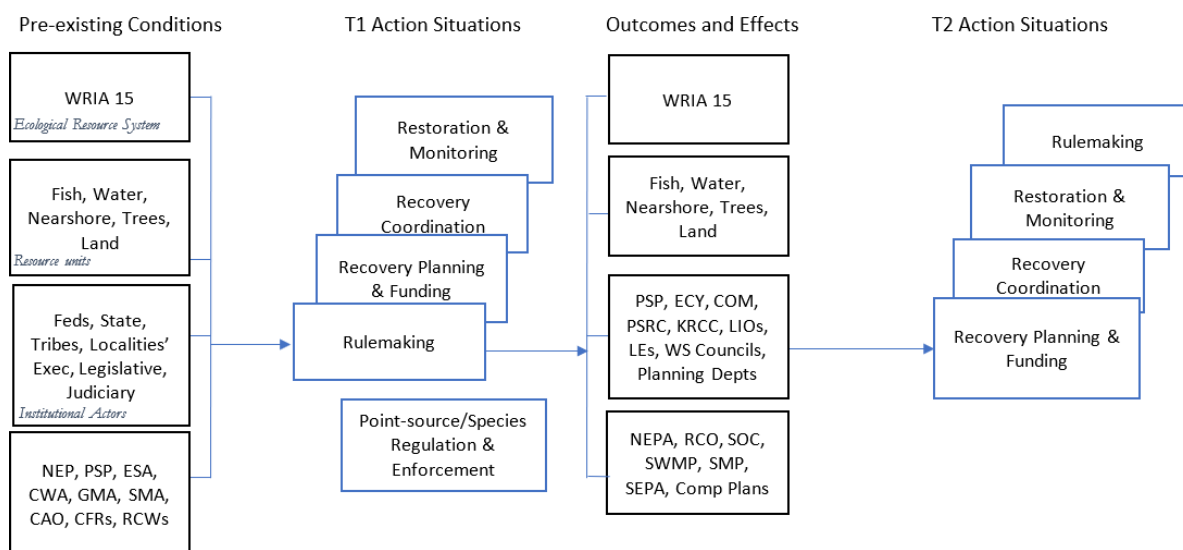
The lines of authority, the concerns and interests, the flow of money, and the direction of programs run straight down like a number of pickets stuck into the ground. There is, as in a picket fence, a connecting cross slat, but that does little to support anything. In this metaphor it stands for the governments. It holds the pickets in line; it does not bring them together. The picket-like programs are not connected at the bottom.¹²²

In 1961, 45 federal grants totaling approximately \$7 billion supported state programs. By 2008, more than 600 federal grants to states totaled \$461 Billion. In the 1970s and 1980s, federal grants-in-aid provided about one-fourth of all state and local revenues annually. These patterns gave rise to the terms “fiscal federalism” and “picket-fence federalism.”¹²³ Scholars presented these concepts to summarize the political, administrative, and financial ties among policy actors across all three levels of U.S. government. But in a more critical summation, two political scientists referred to the pickets as “largely self-governing guilds.” Analysts from the now defunct U.S. Advisory Commission on Intergovernmental Relations (ACIR) called these patterns “vertical functional autocracies.”¹²⁴

Second, Figure G2 depicts a longitudinal depiction (like a movie) of evolving Actions Situations for the Puget Sound Action Arena such as rulemaking, planning & funding, coordination, and restoration and

monitoring.¹²⁵ Those action situations are embedded within and influenced by four exogenous elements: (1) ecological resource systems; (2) resource units; (3) institutional actors; and (4) governance systems. Third, Figure G3 displays a funding cycle for the Chico Creek restoration project. Both figures E2 and E3 include acronyms for key actors and rules critical for estuarine recovery in the Central Puget Sound.

Figure G2. Focal Action Situations for Puget Sound Recovery Governance



Ecological resource system: The biophysical system where resource units are extracted and through which the levels of focal resources are regenerated by natural dynamic processes.

Resource units: Characteristics of the units extracted from a resource system, which can then be consumed or used as an input in production or exchanged for other goods or services.

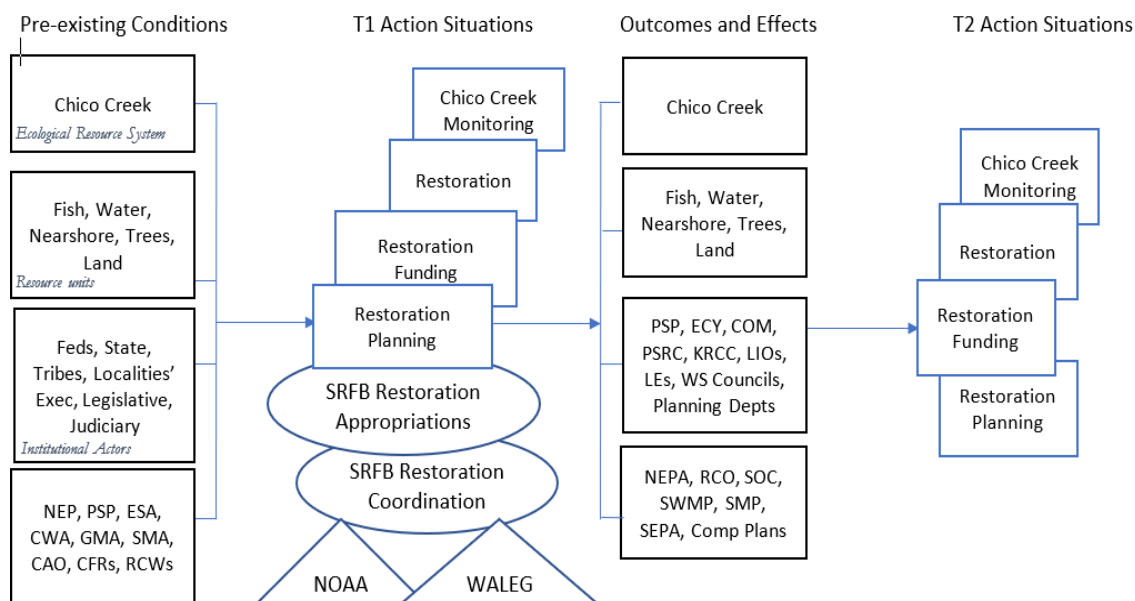
Institutional Actors: Participants representing key governing agencies, organizations, and departments involved in governing a resource system

Governance systems: The prevailing set of processes/institutions through which the rules shaping the behavior of the users are set and revised.

Focal Action Situations: the pattern of interactions among resource users and the particular resources upon which their livelihood relies.

IAD and SES are shorthand for the Institutional Analysis and Development and Social-Ecological Systems frameworks respectively.

Figure E3. Focal Action Situations for Chico Creek Restoration



Glossary for Figures G2 and G3.

CAO = Critical Areas Ordinance
COM = WA Dept. of Commerce
CFRs = Code of Federal Regulations or administrative law
CWA = Clean Water Act
ECB = Ecosystem Restoration Board
ECY = Washington Department of Ecology
EPA = Environmental Protection Agency
ESA = Endangered Species Act
GMA = Growth Management Act
HCCC = Hood Canal Coordinating Council
KRCC = Kitsap Regional Coordinating Council
LEs = Lead Entities
LIOs = Local Integrating Organizations
NEP = National Estuarine Program
NEPA = National Environmental Policy Act
NOAA = National Oceanic and Administration
NWIFC = Northwest Indian Fisheries Commission
PSP = Puget Sound Partnership
PSRC = Puget Sound Regional Council
RCO = Washington State Recreation and Conservation Office
RCWs = Revised Codes of Washington also administrative law
SEPA = State Environmental Policy Act
SMA = Shoreline Management Act
SMP = Shoreline Master Program
SRFB = Governor's Salmon Recovery Funding Board
SOC = Species of Concern
SWMP = Stormwater Master Plan
USFWS = United States Fish and Wildlife Service
WALEG = Washington Legislature
WDFW = Washington Department of Fish and Wildlife
WSPER = West Sound Partners for Ecosystem Recovery

APPENDIX F. ENDNOTES

- ¹ Puget Sound Partnership (PSP). 2021. "[State of the Sound](https://stateofthesound.wa.gov/)." Olympia, WA: Puget Sound Partnership. <https://stateofthesound.wa.gov/>.
- ² Following human subjects protocols, we deidentify our participants.
- ³ Joint Legislative Review Committee (JLARC). 2017. "[Puget Sound Partnership 2016](#)." Olympia, WA: Washington State Legislature.
- ⁴ Lemos, Maria Carmen, and Arun Agrawal. 2006. "[Environmental Governance](#)." *Annual Review of Environment and Resources* 31 (1): 297–325, p. 298. We consider estuarine governance a variant of natural resource governance. Both are types of environmental governance.
- ⁵ Ison, Ray, and Ed Straw. 2020. *The Hidden Power of Systems Thinking: Governance in a Climate Emergency*. New York: Routledge.
- ⁶ Adapted from Cole, Daniel, Graham Epstein, and Michael McGinnis. 2019. "[The Utility of Combining the IAD and SES Frameworks](#)." *International Journal of the Commons* 13 (1): 244–75.
- ⁷ See among many others Ostrom, Elinor. 2010. "[Beyond Markets and States: Polycentric Governance of Complex Economic Systems](#)." *American Economic Review* 100 (3): 641–72; Ostrom, Elinor, Joanna Burger, Christopher B. Field, Richard B. Norgaard, and David Policansky. 1999. "[Revisiting the Commons: Local Lessons, Global Challenges](#)." *Science* 284 (5412): 278–82; and Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge ; New York: Cambridge University Press.
- ⁸ Aligica, Paul Dragos, and Peter J. Boettke. 2009. *Challenging Institutional Analysis and Development: The Bloomington School*. New York, N.Y.: Routledge.
- ⁹ Ostrom, Elinor. 2011. "[Background on the Institutional Analysis and Development Framework](#)." *Policy Studies Journal* 39 (1): 7–27. Later in her career, she was convinced to begin using "action situations." But in our view, action arenas better conveys a meso-scale perspective while the former is useful at a micro-scale.
- ¹⁰ Washington State Legislature. 2007. [Puget Sound Partnership. Revised Code of Washington \(RCW\)](#).
- ¹¹ Laschever, Eric S. 1998. "An Overview of Washington's Growth Management Act." *Pacific Rim Law & Policy Journal* 7 (3): 657–78.
- ¹² Drewel, Robert. 2011. "Integrated Planning for a Sustainable Future in Puget Sound." In *Regional Planning for a Sustainable America: How Creative Programs Are Promoting Prosperity and Saving the Environment*, edited by Carleton K. Montgomery, 404. Piscataway, NJ: Rutgers University Press.
- ¹³ Cashore, Benjamin, and Michael Howlett. 2007. "[Punctuating Which Equilibrium? Understanding Thermostatic Policy Dynamics in Pacific Northwest Forestry](#)." *American Journal of Political Science* 51 (3): 532–51.
- ¹⁴ See <https://www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-habitat-conservation-plan>.
- ¹⁵ Ostrom, Elinor, Michael Cox, and Edella Schlager. 2014. "An Assessment of the Institutional Analysis and Development Framework and Introduction of the Social-Ecological Systems Framework." In *Theories of the Policy Process*, edited by Paul A. Sabatier and Christopher Weible, Third. Boulder, CO: Westview Press. In an earlier edition of *Theories of the Policy Process*, Ostrom placed the IAD and its CPR iterations under the umbrella of Institutional Rational Choice (IRC). It's a synthesis of two distinctive political science traditions. See Ostrom, Elinor. 1991. "[Rational Choice Theory and Institutional Analysis: Toward Complementarity](#)." *American Political Science Review* 85 (1): 237–43; Ostrom, Elinor. 1998. "[A Behavioral Approach to the Rational Choice Theory of Collective Action](#)." *American Political Science Review* 92 (1): 1–22 and Ostrom, Elinor. 2007. "Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework." In *Theories of the Policy Process*, edited by Paul A. Sabatier, Second, 21–64. Boulder, CO: Westview Press.
- ¹⁶ Mapes, Lynda V. 2022. "[WA Legislature Stalls on Efforts to Preserve Salmon Habitat](#)." *The Seattle Times*, March 7, 2022, sec. Local Politics.
- ¹⁷ Mapes, Lynda V. 2022. "[WA Legislature Stalls on Efforts to Preserve Salmon Habitat](#)." *The Seattle Times*, March 7, 2022, sec. Local Politics.
- ¹⁸ See Huntjens, Patrick, Louis Lebel, Claudia Pahl-Wostl, Jeff Camkin, Roland Schulze, and Nicole Kranz. 2012. "[Institutional Design Propositions for the Governance of Adaptation to Climate Change in the Water Sector](#)." *Global Environmental Change* 22 (1): 67–81 and Pahl-Wostl, Claudia, and Christian Knieper. 2014. "[The Capacity of Water Governance to Deal with the Climate Change Adaptation Challenge: Using Fuzzy Set Qualitative Comparative Analysis to Distinguish between Polycentric, Fragmented and Centralized Regimes](#)." *Global Environmental Change* 29

(November): 139–54.

¹⁹ Newig, Jens, and Oliver Fritsch. 2009. "[Environmental Governance: Participatory, Multi-Level – and Effective?](#)" *Environmental Policy and Governance* 19 (3): 197–214.

²⁰ Sayles, Jesse S., and Jacopo A. Baggio. 2017. "[Who Collaborates and Why: Assessment and Diagnostic of Governance Network Integration for Salmon Restoration in Puget Sound, USA.](#)" *Journal of Environmental Management* 186 (January): 64–78.

²¹ Hoelting, Kristin, Beth Moore, Richard Pollnac, and Patrick Christie. 2014. "[Collaboration within the Puget Sound Marine and Nearshore Science Network.](#)" *Coastal Management* 42 (4): 332–54.

²² Thomas, Craig W., and Tyler Scott. 2013. "[Analysis of Organizations Engaged in Puget Sound Ecosystem Recovery.](#)" Seattle, WA: Evans School of Public Affairs, University of Washington.

²³ Koontz, Tomas M. 2019. "Cooperation in Polycentric Governance Systems." In *Governing Complexity: Analyzing and Applying Polycentricity*, edited by Andreas Thiel, Dustin Garrick, and William A. Blomquist, 115–32. Cambridge, UK; New York, NY: Cambridge University Press.

²⁴ Layzer, Judith A., and Sara R. Rinfret. 2019. *The Environmental Case: Translating Values Into Policy*. Fifth. Washington, D.C.: SAGE Publications, p. 122.

²⁵ Layzer, Judith A., and Sara R. Rinfret. 2019. *The Environmental Case: Translating Values Into Policy*. Fifth. Washington, D.C.: SAGE Publications, p. 96

²⁶ Lai, Stephanie. 2021. "Chesapeake Bay Getting Healthier, Scientists Say." *Washington Post, The*, June 23, 2021.

²⁷ Schlager, Edella. 2004. "Common-Pool Resource Theory." In *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*, edited by Robert F. Durant, Daniel J. Fiorino, and Rosemary O'Leary, first edition, 145–75. Cambridge MA: MIT Press.

²⁸ Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. "[The Struggle to Govern the Commons.](#)" *Science* 302 (5652): 1907–12.

²⁹ United States Environmental Protection Agency (EPA). 1988. "Estuary Program Primer: National Estuary Program." Washington, D.C.: Office of Marine and Estuarine Protections.

³⁰ United States Environmental Protection Agency (EPA). 2007. "[National Estuary Program Information Booklet.](#)" Washington, D.C.: Office of Marine and Estuarine Protections.

³¹ Grumbine, R. Edward. 1994. "What Is Ecosystem Management?" *Conservation Biology* 8 (1): 27–38, p. 31.

³² Durant, Robert F., Daniel J. Fiorino, and Rosemary O'Leary, eds. 2004. *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*. Cambridge: MIT Press, p. 1.

³³ Helfand, Gloria E., and Peter Berck, eds. 2003. *The Theory and Practice of Command and Control in Environmental Policy*. First. Burlington, VT: Ashgate.

³⁴ Bodin, Ö., 2017. Collaborative environmental governance: achieving collective action in social-ecological systems. *Science*, 357(6352); Sabatier, Paul A., Will Focht, Mark Lubell, Zev Trachtenberg, Arnold Vedlitz, and Marty Matlock. 2005. *Swimming Upstream: Collaborative Approaches to Watershed Management*. Cambridge, MA: MIT Press; Singleton, Sara G. 1998. *Constructing Cooperation: The Evolution of Institutions of Comanagement*. Ann Arbor, MI: University of Michigan Press; and Weber, Edward P. 2003. *Bringing Society Back in: Grassroots Ecosystem Management, Accountability, and Sustainable Communities*. Cambridge, MA: MIT Press.

³⁵ See among others: Abel, Troy D., and Mark Stephan. 2000. "[The Limits of Civic Environmentalism.](#)" *American Behavioral Scientist* 44 (4): 614–28; Gerlak, Andrea K., Tanya Heikkila, and Mark Lubell. 2012. "The Promise and Performance of Collaborative Governance." In *The Oxford Handbook of U.S. Environmental Policy*, edited by Michael E. Kraft and Sheldon Kamieniecki, 764. Oxford; New York: Oxford University Press; Layzer, Judith A. 2008. *Natural Experiments: Ecosystem-Based Management and the Environment*. Cambridge, Mass.: MIT Press; Singleton, S. 2002. "[Collaborative Environmental Planning in the American West: The Good, the Bad and the Ugly.](#)" *Environmental Politics* 11 (3): 54–75.

³⁶ Northwest Indian Fisheries Commission (NWIFC). 2011. "Treaty Rights at Risk: Ongoing Habitat Loss, the Decline of the Salmon Resources, and Recommendations for Change." Olympia, WA. National Marine Fisheries Service (NMFS). 2011. "2011 Implementation Status Assessment Final Report: A Qualitative Assessment of Implementation of the Puget Sound Chinook Salmon Recovery Plan." Arlington, VA: Lighthouse Natural Resource Consulting, Inc. United States Government Accountability Office (GAO). 2018. "Puget Sound Restoration: Additional Actions Could Improve Assessments of Progress." GAO-18-453. Washington, D.C.: Government Accountability Office. <https://www.gao.gov/products/GAO-18-453>.

- ³⁷ Northwest Indian Fisheries Commission (NWIFC). 2012. [“2012 State of Our Watersheds Report.”](#) Olympia, WA: Northwest Indian Fisheries Commission.
- ³⁸ Layzer, Judith A. 2008. *Natural Experiments: Ecosystem-Based Management and the Environment*. American and Comparative Environmental Policy. Cambridge, Mass.: MIT Press, p. 6.
- ³⁹ See among others Berkes, Fikret, Carl Folke, and Johan Colding. 2000. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. New York, NY: Cambridge University Press and Heberlein, Thomas A. 1988. [“Improving Interdisciplinary Research: Integrating the Social and Natural Sciences.”](#) *Society & Natural Resources* 1 (1): 5–16.
- ⁴⁰ Schlosberg, David, and Thomas D. Sisk. 2000. [“The Environmental Science/Policy Interface: Crossing Disciplinary Boundaries with a Team-Teaching Approach.”](#) *PS: Political Science and Politics* 33 (1): 75–79.
- ⁴¹ Perrings, Charles. 2007. [“Future Challenges.”](#) *Proceedings of the National Academy of Sciences* 104 (39): 15179–80.
- ⁴² See among others Koontz, Tomas M., and Craig W. Thomas. 2006. [“What Do We Know and Need to Know about the Environmental Outcomes of Collaborative Management?”](#) *Public Administration Review* 66 (s1): 111–21 and Thomas, Craig W., and Tomas M. Koontz. 2011. [“Research Designs for Evaluating the Impact of Community-Based Management on Natural Resource Conservation.”](#) *Journal of Natural Resources Policy Research* 3 (2): 97–111.
- ⁴³ Wellman, Katharine F., Kelly Biedenweg, and Kathleen Wolf. 2014. [“Social Sciences in Puget Sound Recovery.”](#) *Coastal Management* 42 (4): 298–307.
- ⁴⁴ Hoelting, Kristin, Beth Moore, Richard Pollnac, and Patrick Christie. 2014. [“Collaboration within the Puget Sound Marine and Nearshore Science Network.”](#) *Coastal Management* 42 (4): 332–54.
- ⁴⁵ See among others Newig, Jens, and Oliver Fritsch. 2009. [“Environmental Governance: Participatory, Multi-Level – and Effective?”](#) *Environmental Policy and Governance* 19 (3): 197–214; Niles, Meredith T., and Mark Lubell. 2012. [“Integrative Frontiers in Environmental Policy Theory and Research.”](#) *Policy Studies Journal* 40 (s1): 41–64; and Rogers, Ellen, and Edward P. Weber. 2010. [“Thinking Harder About Outcomes for Collaborative Governance Arrangements.”](#) *The American Review of Public Administration* 40 (5): 546–67.
- ⁴⁶ However, we also recognize our obligations to stakeholders beyond just our contract client. As members of the American Political Science Association, Professors Abel and Stephan adhere to this organization’s Statement on Professional Ethics. “Professors, guided by a deep conviction of the worth and dignity of the advancement of knowledge, recognize the special responsibilities placed upon them. Their primary responsibility to their subject is to seek and to state the truth as they see it.” See American Political Science Association (APSA). 2012. [“A Guide to Professional Ethics in Political Science.”](#) Washington, D.C.: The American Political Science Association.
- ⁴⁷ See among others Birkeland, Janis, and Stephen Knight-Lenihan. 2016. [“Biodiversity Offsetting and Net Positive Design.”](#) *Journal of Urban Design* 21 (1): 50–66, Birkeland, Janis. 2008. [Positive Development: From Vicious Circles to Virtuous Cycles through Built Environment Design](#). London: Routledge, and Gou, Zhonghua, and Xiaohuan Xie. 2017. [“Evolving Green Building: Triple Bottom Line or Regenerative Design?”](#) *Journal of Cleaner Production* 153 (June): 600–607.
- ⁴⁸ Hepinstall-Cymerman, Jeffrey, Stephan Coe, and Lucy R. Hutyrá. 2013. [“Urban Growth Patterns and Growth Management Boundaries in the Central Puget Sound, Washington, 1986–2007.”](#) *Urban Ecosystems* 16 (1): 109–29.
- ⁴⁹ Pierce, Kenneth B. 2015. [“Accuracy Optimization for High Resolution Object-Based Change Detection: An Example Mapping Regional Urbanization with 1-m Aerial Imagery.”](#) *Remote Sensing* 7 (10): 12654–79.
- ⁵⁰ Washington Department of Fish and Wildlife (WDFW). n.d. [“Change Detection Data.”](#) High Resolution Change Detection. Accessed February 28, 2022.
- ⁵¹ See the 36 Persian throw rugs opening of Quammen, David. 2014. *The Song of the Dodo: Island Biogeography in an Age of Extinctions*. New York: Scribner, pp. 9–13.
- ⁵² Quammen, David. 2014. *The Song of the Dodo: Island Biogeography in an Age of Extinctions*. New York: Scribner, p. 11.
- ⁵³ Kempe, Ysabelle. 2022. [“Logging Forests Takes This Toll on Already-Strained Nooksack River, New Research Suggests.”](#) *Bellingham Herald*, March 24, 2022.
- ⁵⁴ Cole, Daniel H., and Michael D. McGinnis, eds. 2014. *Elinor Ostrom and the Bloomington School of Political Economy: Volume 1, Polycentricity in Public Administration and Political Science*. Vol. 1. 4 vols. Lanham, MD: Lexington Books.
- ⁵⁵ Ostrom, Elinor. 2007. [“A Diagnostic Approach for Going beyond Panaceas.”](#) *Proceedings of the National Academy of Sciences* 104 (39): 15181–87.

- ⁵⁶ Sabatier, Paul A., and Hank Jenkins-Smith. 1999. "The Advocacy Coalition Framework: An Assessment." In *Theories of the Policy Process*, 117–68. Boulder, Colo.: Westview Press.
- ⁵⁷ Clemons, Randy S., and Mark K. McBeth. 2020. *Public Policy Praxis: A Case Approach for Understanding Policy and Analysis*. New York, NY: Routledge, p. 200.
- ⁵⁸ Lipsky, Rachel S., and Clare M. Ryan. 2011. "[Nearshore Restoration in Puget Sound: Understanding Stakeholder Values and Potential Coalitions](#)." *Coastal Management* 39 (6): 577–97.
- ⁵⁹ See following for recent Network of Adjacent Action Situation (NAAS) developments. Kimmich, Christian, Melf-Hinrich Ehlers, Elke Kellner, Christoph Oberlack, Andreas Thiel, and Sergio Villamayor-Tomas. 2020. "[Networks of Action Situations in Social-Ecological Systems Research](#)." *Sustainability Science* 15 (4): 1009–10; Möck, Malte, Colette S. Vogeler, Nils C. Bandelow, and Boris Schröder. 2022. "[Layering Action Situations to Integrate Spatial Scales, Resource Linkages, and Change over Time: The Case of Groundwater Management in Agricultural Hubs in Germany](#)." *Policy Studies Journal* 50 (1): 111–42; and Bertacchini, Enrico, and Peter Gould. 2021. "[Collective Action Dilemmas at Cultural Heritage Sites: An Application of the IAD-NAAS Framework](#)." *International Journal of the Commons* 15 (1): 276–90.
- ⁶⁰ MacArthur, Robert H. 1967. *The Theory of Island Biogeography*. Princeton, N.J.: Princeton University Press,
- ⁶¹ We created the map using the "[Protected Planet](#)" website for the International Union for Conservation of Nature (IUCN).
- ⁶² <https://eighthgeneration.com/collections/blankets/products/salish-pattern-blanket>
- ⁶³ Quammen, David. 2014. *The Song of the Dodo: Island Biogeography in an Age of Extinctions*. New York: Scribner.
- ⁶⁴ Washington Department of Fish and Wildlife (WDFW). 2005. "Washington's Comprehensive Wildlife Conservation Strategy." Olympia, WA.
- ⁶⁵ Diamond, Jared M. 1975. "[The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Reserves](#)." *Biological Conservation* 7 (2): 129–46.
- ⁶⁶ Simberloff, Daniel, and Lawrence G. Abele. 1982. "Refuge Design and Island Biogeographic Theory: Effects of Fragmentation." *The American Naturalist* 120 (1): 41–50, p. 41.
- ⁶⁷ See respectively Williamson, Mark. 1989. "The MacArthur and Wilson Theory Today: True But Trivial." *Journal of Biogeography* 16 (1): 3–4 and Gilbert, F. S. 1980. "[The Equilibrium Theory of Island Biogeography: Fact or Fiction?](#)" *Journal of Biogeography* 7 (3): 209–35.
- ⁶⁸ [This image](#) by Unknown Author is licensed under [CC BY-SA](#).
- ⁶⁹ This summation was adapted from MacDonald, Glen. 2003. *Biogeography: Introduction to Space, Time, and Life*. New York: John Wiley & Sons, pp. 431-436
- ⁷⁰ For a review, see Laurance, William F. 2009. "Understanding Habitat Fragmentation in the Real World." In *The Theory of Island Biogeography Revisited*, edited by Jonathan B. Losos and Robert E. Ricklefs. Princeton, NJ: Princeton University Press.
- ⁷¹ Ostrom, Elinor, Joanna Burger, Christopher B. Field, Richard B. Norgaard, and David Policansky. 1999. "[Revisiting the Commons: Local Lessons, Global Challenges](#)." *Science* 284 (5412): 278–82.
- ⁷² Hardin, Garrett. 1968. "[The Tragedy of the Commons](#)." *Science* 162 (3859): 1243–48.
- ⁷³ Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. "[The Struggle to Govern the Commons](#)." *Science* 302 (5652): 1907–12.
- ⁷⁴ Adapted from Anderies, John, and Marco Janssen. 2016. [Sustaining the Commons](#). Tempe, AZ: Arizona State University.
- ⁷⁵ Carlisle, Keith, and Rebecca L. Gruby. 2017. "[Polycentric Systems of Governance: A Theoretical Model for the Commons](#)." *Policy Studies Journal* 47 (4): 927–52.
- ⁷⁶ Ostrom, Elinor. 2001. "Vulnerability and Polycentric Governance Systems." *Newsletter of the International Human Dimensions Program on Global Environmental Change* 3 (2).
- ⁷⁷ Stephan, Mark, Graham Marshall, and Michael McGinnis. 2019. "An Introduction to Polycentricity and Governance." In *Governing Complexity: Analyzing and Applying Polycentricity*, edited by Andreas Thiel, William A. Blomquist, and Dustin E. Garrick, 21–44. Cambridge, UK; New York, NY: Cambridge University Press.
- ⁷⁸ McGinnis, Michael D., and Elinor Ostrom. 2012. "[Reflections on Vincent Ostrom, Public Administration, and Polycentricity](#)." *Public Administration Review* 72 (1): 15–25.
- ⁷⁹ Ostrom, Vincent, Charles M. Tiebout, and Robert Warren. 1961. "[The Organization of Government in Metropolitan Areas: A Theoretical Inquiry](#)." *American Political Science Review* 55 (4): 831–42, p. 831.

⁸⁰ See the following book for a full range of answers. McGinnis, Michael Dean, ed. 1999. *Polycentricity and Local Public Economies: Readings from the Workshop in Political Theory and Policy Analysis*. Ann Arbor, MI: University of Michigan Press. Cole, Daniel H., and Michael D. McGinnis, eds. 2015. *Elinor Ostrom and the Bloomington School of Political Economy: Polycentricity in Public Administration and Political Science*. Vol. 1. Lanham, MD: Lexington Books. Cole, Daniel H., and Michael D. McGinnis, eds. 2015. *Elinor Ostrom and the Bloomington School of Political Economy: Resource Governance*. Vol. 2. Lanham, MD: Lexington Books. Cole, Daniel H., and Michael D. McGinnis, eds. 2017. *Elinor Ostrom and the Bloomington School of Political Economy: A Framework for Policy Analysis*. Vol. 3. Lanham, MD: Lexington Books. Cole, Daniel H., and Michael D. McGinnis, eds. 2018. *Elinor Ostrom and the Bloomington School of Political Economy: Policy Applications and Extensions*. Vol. 4. Lanham, MD: Lexington Books.

⁸¹ Ostrom, Elinor. 2011. "[Background on the Institutional Analysis and Development Framework](#)." *Policy Studies Journal* 39 (1): 7–27.

⁸² Ostrom, Elinor, Michael Cox, and Edella Schlager. 2014. "An Assessment of the Institutional Analysis and Development Framework and Introduction of the Social-Ecological Systems Framework." In *Theories of the Policy Process*, edited by Paul A. Sabatier and Christopher Weible, Third. Boulder, CO: Westview Press. In an earlier edition of *Theories of the Policy Process*, Ostrom placed the IAD and its CPR iterations under the umbrella of Institutional Rational Choice. It's a synthesis of two distinctive political science traditions. See Ostrom, Elinor. 1991. "[Rational Choice Theory and Institutional Analysis: Toward Complementarity](#)." *American Political Science Review* 85 (1): 237–43; Ostrom, Elinor. 1998. "[A Behavioral Approach to the Rational Choice Theory of Collective Action](#)." *American Political Science Review* 92 (1): 1–22; and Ostrom, Elinor. 2007. "Institutional Rational Choice: An Assessment of the Institutional Analysis and Development Framework." In *Theories of the Policy Process*, edited by Paul A. Sabatier, Second, 21–64. Boulder, CO: Westview Press.

⁸³ Kiser, Larry L., and Elinor Ostrom. 1982. "The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches." In *Strategies of Political Inquiry*, edited by Elinor Ostrom, 179–222. Beverly Hills, CA: Sage.

⁸⁴ Adapted from Real-Dato, José. 2009. "[Mechanisms of Policy Change: A Proposal for a Synthetic Explanatory Framework](#)." *Journal of Comparative Policy Analysis: Research and Practice* 11 (1): 117–43. However, they depicted the bi-level action situations as a policy subsystem. We instead refer to the governance action arena because it contains policies, actors, exogenous factors, outputs, and outcomes.

⁸⁵ Ostrom, Elinor. 2005. *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press.

⁸⁶ Melious, Jean O. 2018. "Laissez-Faire Water Appropriation Meets Land Use Planning in Washington's Hirst Decision." *Gonzaga University Law Review* 53 (1): 117–58.

⁸⁷ Tarlock, A., and Sarah Van de Wetering. 1999. "Growth Management and Western Water Law--From Urban Oases to Archipelagos." *Hastings Environmental Law Journal* 5 (2): 163.

⁸⁸ Whatcom County v. Western Washington Growth Management Hearings Board. 2016, Wash. 2d 186 648. Supreme Court of the State of Washington.

⁸⁹ Melious, Jean. 2018. "[The Controversy Over Permit-Exempt Wells in Washington](#)." *Seattle Journal of Environmental Law* 8 (1), p. 166.

⁹⁰ Ostrom, Elinor. 2007. "[A Diagnostic Approach for Going beyond Panaceas](#)." *Proceedings of the National Academy of Sciences* 104 (39): 15181–87.

⁹¹ Lubell, Mark, Mark Schneider, John T. Scholz, and Mihriye Mete. 2002. "[Watershed Partnerships and the Emergence of Collective Action Institutions](#)." *American Journal of Political Science* 46 (1): 148–63.

⁹² For reviews, see Salamon, Lester M., ed. 1989. *Beyond Privatization: The Tools of Government Action*. Washington, D.C.: The Urban Institute and Elliott, Odus V., and Lester M. Salamon, eds. 2002. *The Tools of Government: A Guide to the New Governance*. Oxford University Press, USA.

⁹³ See among many Mazmanian, Daniel A., and Michael E. Kraft. 2009. "The Three Epochs of the Environmental Movement." In *Toward Sustainable Communities: Transition and Transformations in Environmental Policy*, edited by Daniel A. Mazmanian and Michael E. Kraft, 3–32. Cambridge, MA: MIT Press; Marcus, Alfred. 1980. "Environmental Protection Agency." In *The Politics of Regulation*, 267–303. New York: Basic Books; Melnick, R. Shep. 1983. *Regulation and the Courts: The Case of the Clean Air Act*. Washington, D.C.: Brookings Institution Press; Reagan, Michael D. 1987. *Regulation: The Politics of Policy*. Boston: Little, Brown.

⁹⁴ See among others Morgenstern, Richard D. 1997. *Economic Analyses at EPA: Assessing Regulatory Impact*. Washington, DC: Resources for the Future; Smith, V. Kerry Vincent Kerry. 1984. *Environmental Policy under Reagan's Executive Order: The Role of Benefit-Cost Analysis*. Chapel Hill: University of North Carolina Press; Ruckelshaus,

- William D. 1985. "Risk, Science, and Democracy." *Issues in Science and Technology* 1 (3): 19–38; and Russell, Milton, and Michael Gruber. 1987. "[Risk Assessment in Environmental Policy-Making](#)." *Science* 236 (4799): 286–90.
- ⁹⁵ Gunningham, Neil. 2009. "[The New Collaborative Environmental Governance: The Localization of Regulation](#)." *Journal of Law and Society* 36 (1): 145–66.
- ⁹⁶ Schneider, Anne, and Helen Ingram. 1990. "[Behavioral Assumptions of Policy Tools](#)." *The Journal of Politics* 52 (2): 510–29.
- ⁹⁷ Kraft, Michael E. 2000. "[U.S. Environmental Policy and Politics: From the 1960s to the 1990s](#)." *Journal of Policy History* 12 (1): 17–42.
- ⁹⁸ Helfand, Gloria E., and Peter Berck, eds. 2003. *The Theory and Practice of Command and Control in Environmental Policy*. First. Burlington, VT: Ashgate.
- ⁹⁹ Durant, Robert F., Rosemary O'Leary, and Daniel J. Fiorino. 2004. "Introduction." In *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*, edited by Robert F. Durant, Daniel J. Fiorino, and Rosemary O'Leary, First, 1–27. Cambridge, MA: MIT Press, p. 1.
- ¹⁰⁰ Tietenberg, Tom. 2002. "The Tradable Permits Approach to Protecting the Commons: What Have We Learned?" In *The Drama of the Commons*, edited by Elinor Ostrom, Thomas Dietz, Nives Dolsak, Paul C. Stern, Susan Stonich, and Elke U. Weber, 197–232. Washington, D.C.: National Academies Press.
- ¹⁰¹ See among others Ellerman, A. Denny, Paul L. Joskow, Richard Schmalensee, and Juan-Pablo Montero. 2000. *Markets for Clean Air: The U.S. Acid Rain Program - A. Denny Ellerman, Paul L. Joskow, Richard Schmalensee, Elizabeth M. Bailey, Juan-Pablo Montero - Google Books*. Cambridge, UK: Cambridge University Press; Hahn, Robert H., and Gordon L. Hester. 1989. "[Marketable Permits: Lessons for Theory and Practice](#)." *Ecology Law Quarterly* 16 (2): 361–406; and Keohane, Nathaniel O. 2007. "Cost Savings from Allowance Trading in the 1990 Clean Air Act: Estimates from a Choice-Based Model." In *Moving to Markets in Environmental Regulation: Lessons from Twenty Years of Experience*, edited by Jody Freeman and Charles D. Kolstad, 488. Oxford, UK: Oxford University Press.
- ¹⁰² Hardin, Garrett. 1968. "[The Tragedy of the Commons](#)." *Science* 162 (3859): 1243–48.
- ¹⁰³ Wiens, John. 2007. "[The Dangers of Black-and-White Conservation](#)." *Conservation Biology* 21 (5): 1371–72.
- ¹⁰⁴ Forsyth, Tim, and Craig Johnson. 2014. "[Elinor Ostrom's Legacy: Governing the Commons and the Rational Choice Controversy](#)." *Development and Change* 45 (5): 1093–1110.
- ¹⁰⁵ Durant, Robert F. 2017. "Introduction." In *Environmental Governance Reconsidered: Challenges, Choices, and Opportunities*, edited by Robert F. Durant, Daniel J. Fiorino, and Rosemary O'Leary, Second, 1–26. Cambridge, MA: MIT Press, p. 21.
- ¹⁰⁶ See respectively Conley, Alexander, and Margaret A. Moote. 2003. "[Evaluating Collaborative Natural Resource Management](#)." *Society & Natural Resources* 16 (5): 371–86; Sabatier, Paul A., Will Focht, Mark Lubell, Zev Trachtenberg, Arnold Vedlitz, and Marty Matlock. 2005. *Swimming Upstream: Collaborative Approaches to Watershed Management*. Cambridge, MA: MIT Press; and Harrison, Kathryn. 1998. "[Talking with the Donkey: Cooperative Approaches to Environmental Protection](#)." *Journal of Industrial Ecology* 2 (3): 51–72.
- ¹⁰⁷ Fiorino, Daniel J. 2006. *The New Environmental Regulation*. Cambridge, Mass.: MIT Press.
- ¹⁰⁸ See for example John, DeWitt. 1994. *Civic Environmentalism: Alternatives to Regulation in States and Communities*. Washington, D.C.: CQ Press; Healey, Patsy. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*. UBC Press; and Bodin, Örjan. 2017. "[Collaborative Environmental Governance: Achieving Collective Action in Social-Ecological Systems](#)." *Science* 357 (6352).
- ¹⁰⁹ Singleton, S. 2002. "[Collaborative Environmental Planning in the American West: The Good, the Bad and the Ugly](#)." *Environmental Politics* 11 (3): 54–75.
- ¹¹⁰ Douglas S. Kenney. 2000. *Arguing about Consensus: Examining the Case against Western Watershed Initiatives and Other Collaborative Groups Active in Natural Resources Management*. Boulder, Colo.: Natural Resources Law Center, University of Colorado School of Law.
- ¹¹¹ Lubell, Mark. 2004. "[Collaborative Environmental Institutions: All Talk and No Action?](#)" *Journal of Policy Analysis and Management* 23 (3): 549–73.
- ¹¹² Kraft, Michael E., Mark Stephan, and Troy D. Abel. 2011. *Coming Clean: Information Disclosure and Environmental Performance*. Cambridge, MA: MIT Press, p. 197.
- ¹¹³ Ostrom, Elinor. 2012. "[Why Do We Need to Protect Institutional Diversity?](#)" *European Political Science* 11 (1): 128–47.

- ¹¹⁴ Clement, Sarah, Angela Guerrero Gonzalez, and Carina Wyborn. 2020. "[Understanding Effectiveness in Its Broader Context: Assessing Case Study Methodologies for Evaluating Collaborative Conservation Governance](#)." *Society & Natural Resources* 33 (4): 462–83.
- ¹¹⁵ Lune, Howard, and Bruce L. Berg. 2016. *Qualitative Research Methods for the Social Sciences*. Pearson Education, p. 127.
- ¹¹⁶ McIntyre, Alice. 2008. *Participatory Action Research*. Los Angeles, CA: Sage Publications.
- ¹¹⁷ Castellonet, Christian, and Carl F. Jordan. 2004. *Participatory Action Research in Natural Resource Management: A Critique of the Method Based on Five Years' Experience in the Transamazonica Region of Brazil*. New York: Routledge.
- ¹¹⁸ Gaventa, John. 1991. "Towards a Knowledge Democracy: Viewpoints on Participatory Research in North America." In *Action and Knowledge: Breaking the Monopoly with Participatory Action Research*, edited by Orlando Fals-Borda and Muhammad Anisur Rahman, 121–31. New York: Apex Press.
- ¹¹⁹ Oyler, Marilyn, and Gordon Harper. 2007. "The Technology of Participation." In *The Change Handbook: Group Methods for Shaping the Future*, 732. San Francisco, CA: Berrett-Koehler.
- ¹²⁰ See among others Nelson, Jo. 2001. *The Art of Focused Conversation for Schools: Over 100 Ways to Guide Clear Thinking and Promote Learning*. Gabriola Island, B.C.: New Society Publishers; Oyler, Marilyn, and Gordon Harper. 2007. "The Technology of Participation." In *The Change Handbook: Group Methods for Shaping the Future*, 732. San Francisco, CA; and Berrett-Koehler; Fritzen-Pedicini, Charissa, Susan C. Bleasdale, Lisa M. Brosseau, Donna Moritz, Monica Sikka, Emily Stiehl, Rachael M. Jones. 2019. "Utilizing the Focused Conversation Method in Qualitative Public Health Research: A Team-Based Approach." *BMC Health Services Research* 19 (1): 306.
- ¹²¹ American Political Science Association (APSA). 2012. "[A Guide to Professional Ethics in Political Science](#)." Washington, D.C.: The American Political Science Association.
- ¹²² Sanford, Terry. 1967. *Storm over the States*. 1st ed. New York: McGraw-Hill, p. 80.
- ¹²³ For a review, see Milakovich, Michael E. 2009. *Public Administration in America*. 11th ed. Boston: Wadsworth Cengage Learning, pp. 112-120.
- ¹²⁴ See respectively Seidman, Harold. 1986. *Politics, Position, and Power: From the Positive to the Regulatory State*. 4th ed. New York: Oxford University Press, p. 197 and Manvel, Allen D. 1969. *Urban America and the Federal System*. Washington D.C.: United States Advisory Commission on Intergovernmental Relations, p. 5.
- ¹²⁵ Adapted from Cole, Daniel, Graham Epstein, and Michael McGinnis. 2019. "[The Utility of Combining the IAD and SES Frameworks](#)." *International Journal of the Commons* 13 (1): 244–75.