Integrating Climate Change into Multi-benefit Floodplain Management in the Snohomish and Stillaguamish Watersheds:

Adaptation Needs Assessment

Puget Sound Partnership: Near Term Action 2018-0741

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Introduction

The Snohomish and Stillaguamish rivers are home to some of Puget Sound's most valuable natural, economic, and cultural resources. From iconic salmon runs to a rich agricultural economy, these floodplains are vital to the long-term health and well-being of diverse communities, ecosystems, and species living within these watersheds. Climate change is a particular threat to floodplains because of the impacts on flooding, water availability, and a host of other key features of these areas.

In the Snohomish and Stillaguamish estuaries, continued sea level rise will increase the extent, depth and duration of coastal flooding and accelerate erosion along the shoreline. In the Lower Skykomish and Stillaguamish Valley, heavier rainstorms, declining snowpack, and increased winter streamflow will lead to larger, more frequent flood events. Beyond winter flooding, other climate impacts such as the increased frequency of extreme heat events may alter crop yields, while higher surface water temperatures threaten salmon recovery. Although flooding is not new for these communities, climate change will be experienced as a threat multiplier, exacerbating other pressures such as shifting land use, population growth, and heightened demand for development.

The purpose of this work is to support the effective integration of climate change into existing Integrated Floodplain Management (IFM) efforts in Snohomish County, specifically through the identification of climate-relevant adaptation needs. The intent of this study is to produce an *actionable* adaptation agenda, by engaging local floodplain actors throughout the research process and prioritizing existing opportunities to mainstream climate adaptation into ongoing projects, plans, and policies.

Research Methods and Analysis

This study focuses on floodplain actors who have a shared interest, obligation, or professional mandate to support effective multi-benefit floodplain planning and management in either watershed. Many of these actors are actively engaged with the Sustainable Lands Strategy (SLS), with SLS being the primary convener of floodplain leaders and practitioners in Snohomish County.

- **Farm, Fish, and Flood -** Floodplains combine rich ecosystem, social, and economic values, and with these different priorities for how to manage changing flood risk. Around Washington State many regions are working to advance integrated floodplain management by bringing these interests together to identify shared solutions. A diversity of groups from tribal, federal, state, county, NGO, and private sector organizations are currently involved or affected by this work. These entities have produced many different reports related to farm, fish, and flood activities, and many are actively working to advance floodplain resilience in Snohomish County.

- **Collaborative Scoping -** During the Fall of 2020 we met with several practitioners involved in integrated floodplain management efforts to determine appropriate project scoping, key questions and research needs, and appropriate methods for our analysis. The purpose of

this collaborative scoping was to build off previous and current efforts while tailoring our work to meet needs identified by the practitioner community. During this collaborative scoping phase, we heard that efforts to connect climate science to integrated floodplain management need to begin with an understanding of how that can be mainstreamed into existing efforts.

- **Document Review -** From January 2021 to April 201, we reviewed over 30 documents to understand the current state of climate information resources and use, identified challenges and opportunities for integrated floodplain management, and enumerated the different organizations and actors involved in current floodplain planning efforts in the Snohomish and Stillaguamish watershed. These documents were also used to identify adaptation themes and support adaptation action development.

- **Key Informant Interviews -** From May 2021 to September 2021 we conducted 12 key informant interviews, representing federal, state, county, private, and tribal interests in the floodplain. We developed a codebook based on principles of climate adaptive capacity (e.g., Moser and Eckstrom 2010; Gupta et al. 2010) and preliminary findings during the collaborative scoping and document review. We then used thematic analysis following Braun and Clark (2006) to identify key adaptation themes with associated challenges and identified adaptation actions to address those challenges. The analysis of interview findings was conducted through Atlas.ti, a coding software.

- **Workshop -** In December 2021 we held two virtual workshops, hosted as "Special Topics Sessions" by SLS. At the first workshop we presented our adaptation guidance documents, and the initial findings from the document review and interviews. In the second workshop participants joined breakout groups to comment on our draft adaptation agenda. This included roundtable review and discussion of identified actions. We also asked participants to provide input on the actions, identify resources and opportunities related to those actions, and note key actions that are missing. A total of 21 participants attended, representing a range of farm, fish, and flood interests.

Adaptation Themes

Each section of this report focuses on one of the five (5) dominant adaptation themes that emerged throughout the research process. Each theme incorporates challenges and barriers related to that theme as well as proposed and existing adaptation actions. These themes were identified through an iterative thematic analysis process during interview and document analysis and were also reviewed and discussed by floodplain practitioners for additional input during the workshops.

Attitudes and Behaviors. Individuals and communities have varied attitudes and behaviors towards adaptation, which are shaped by their unique values, socio-cultural dynamics, psycho-emotional experiences, and perceptions of risk.

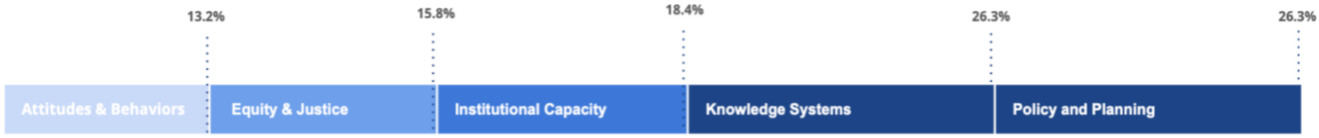
Knowledge Systems. Climate-informed adaptation practice requires the availability of decision-relevant science, and the ability of practitioners to effectively interpret this data into floodplain planning and management activities. The integration of diverse knowledge systems, such as Traditional Knowledge and local knowledge, can also improve shared understanding of and collective response to climate impacts.

Policy and Planning. Policies, regulatory frameworks, and planning processes can either enable or impede the implementation of adaptive floodplain management efforts. Climate services that are responsive to the current regulatory landscape, and leverage policy opportunities, are more likely to be used in practice.

Institutional Capacity. Institutions' capacity to adapt is determined by their governance structures, decision-making processes, and access to resources that enable them to respond to emerging knowledge, and resilience needs.

Equity. The costs and benefits of climate change impacts, and adaptation measures, are not distributed equally across society. Close attention to the systemic conditions that determine who is included or left out in decision-making will be necessary for equitable adaptation.

Across the five adaptation themes, most adaptation actions fell within the categories of Knowledge Systems (26.3%) and Policy and Planning (26.3%).



Adaptation Action Types

In addition to challenges and barriers related to each theme, we identified specific climate resilience actions through the document review, interview analysis, and workshop. These actions fall under six types of action. We provide a description of each adaptation action type as well as associated icons throughout this report. This is intended to help floodplain actors easily identify actions most relevant to their work and funding opportunities.

Communications
Practices to raise awareness, inform, and educate various audiences on floodplain issues.

Community Development
Empowering community groups with information and skills to collectively build resilience.

Partnerships and Coordination
Relationship-building across entities and jurisdictions to support strategic and coordinated action

Research and Analysis
Generating new knowledge to inform and improve adaptation practice.

Technical Training and Assistance
Direct support to increase staff proficiency in specific skills and technologies.

Tools and Resources
Applications that support practitioners to use data effectively in decision-making.

Related Resources and Opportunities

When available, related resources and opportunities are provided along with each adaptation action. This feature illustrates that **adaptation is an active, ongoing process on the Snohomish and Stillaguamish floodplains that many communities and entities have dedicated themselves to over the last decade**. While there are newly proposed actions, there are also many existing initiatives that present opportunities for further mainstreaming climate adaptation. This feature can support the grounding of future resilience efforts in the context of past and ongoing initiatives, and connecting entities to existing plans, programs, case studies, and considerations to support implementation.

Adaptation Theme

Attitudes and Behaviors

This adaptation theme considers how complex attitudes and behaviors shape how climate information and adaptation efforts are developed and received across different individuals, communities, and entities. Floodplain practitioners often referenced conflicting attitudes and behaviors towards climate change as a significant impediment to collaborative, adaptive floodplain management. Developing an understanding of the unique values, risk perceptions, socio-cultural dynamics, and psycho-emotional experiences of the various groups who live and work on the floodplain can improve the design, approach, and implementation of adaptation efforts.

Challenges

- **Reactionary, short-term behaviors.** Many properties within the 100-year floodplain in both watersheds are in private ownership. To achieve long-term, landscape-scale resilience, floodplain actors must have buy-in from landowners. However, we heard that most property owners tend to seek immediate, property-scale solutions that are reactionary to acute weather events or increasing development pressures. These reactionary approaches are reinforced by historic and current planning and policies that facilitate development within floodplains. While climate projections are far out into the future, many property owners struggle with the long-time frame of expected impacts, although they tend to understand risk as they see it happening currently.

> “People that live in the floodplain are flooded repeatedly and we're having to work with them quickly, trying to get them to sell so we can get them out. There's just a lot of resources going towards, I'd say, reactive measures, as it relates to floodplain management in both of those rivers. What I'd really like to see us doing is trying to really be proactive. I'm not saying that we aren't, but we just haven't invested enough resources to do it right.”
> — Government Planner

- **Perceptions of climate risk.** While collaborative floodplain management efforts aim to develop a shared understanding of risks, many adaptation decisions are still grounded on an individuals’ and communities’ assessment of the threat’s scale, urgency, and legitimacy. Individuals are more likely to take protective measures against hazards when risk is personalized but are also largely influenced by the type of protective actions their neighbors are taking. Individuals and communities may also have mistrust of government and institutions, and their source of information can determine their acceptance of risk. Perceptions of scientific

evidence can also be impacted by the politicization of risks and benefits, and we heard from floodplain practitioners that framing challenges with the terms “climate change” may not work for some communities.

> “How do we address those issues in a way that doesn't politicize the issue, specifically in communities that may not believe in climate, or climate change, but they definitely are seeing changes happening on the ground?”
> — Nonprofit planner

Generally, practitioners do not perceive climate change to be the most salient driver of risk on the floodplains. Other drivers, such as shifting land use, development pressures, and river hydrology are more commonly used to frame multi-benefit decision-making. Due to the complex interaction of multiple pressures on the floodplain, many actors operate with an underlying assumption that climate change does not severely change the risk profile within the floodplain. Climate-related risks must be discussed jointly with other concerns, to be considered and prioritized in collaborative floodplain management efforts.

> “Climate change prediction is necessarily a limiting factor in the ability of this community to adapt?”
> — Government Employee

> “Our work to restore the hydrological system is already clear. We're already doing what we can, so that restoration benefits both the fish and aligns with the response to climate change, with or without climate change information.”
> — Restoration Ecologist

- **Complex socio-cultural dynamics.** The identification of resilience needs and adaptation planning often happen at the reach-scale, due to the unique physical characteristics (e.g., land use, geomorphic characteristics, hydrology) of each section of the floodplains. However, each river reach also has a complex socio-cultural fabric, composed of varying relationship dynamics, local histories, and community values. We heard that oftentimes, reach-scale plans have narrowly focused on the needs of certain groups, such as large-scale producers/commodity farmers, without adequately considering this socio-cultural complexity. An understanding of socio-cultural dynamics can provide insight on community-level adaptive capacity and encourage an assets-based approach to resilience planning.

"There's so much diversity in the people living in the valley… in terms of how they look at the river, how they look at their land, how they look at ownership, how they think about stewardship, and how they think about the future… So, I think you have to take in the river, section by section, and consider both the physical dynamics as well as the social dynamics in order to make sense of all the different sorts of changes, and figure out what's the right direction."
—Government Planner

- **Psychological and emotional barriers.** Many of the interview participants described an overwhelming feeling of hopelessness and loss being experienced by those who live and work on the floodplains. Climate impacts can threaten one's notion of home, sense of physical and economic security, and social networks. The visceral experience of impacts can either motivate action, or denial. In addition, current adaptation practices such as acquisitions, buyouts, and relocation can be a traumatic experience for many. Apart from losing a sense of place, it can also trigger intergenerational traumas from collective experiences of historic/systemic injustices. Workshop participants also highlighted the psychological and emotional toll on practitioners working on climate change, and the need to develop support networks to prevent burnout.

On feelings of hopelessness
Farmers are anguished when they talk about bank erosion… They feel so powerless to stop it. There are not many interventions that you can actually legally do that work, and that causes a lot of stress and frustration for farmers. That's one of the main issues I hear in the Skykomish."
— Farm Representative

On sense of place and loss
"If you're a landowner, your heart is in your land. And, your land is connected to your lifestyle, your livelihood, your culture, your family history – all of it. So, landowners have this enormous sense of place and work, which is why there's an inherent conflict and resistance between what the science says and what people are prepared to accept."
— Landowner

On trauma and mental health
"Often overlooked are the traumas and emotional barriers for practitioners (those working in government, non-profits, etc.) who are dealing with the data and information and how to convey that to worried landowners and decision-makers. It can be emotionally overwhelming and can lead to burn out"
— Tribal Planner

Attitudes and Behaviors

Adaptation Actions

Action Type	Challenge	Adaptation Actions	Resources and Opportunities
	Varied perceptions of risk and uncertainty.	Engage *cities/towns* in collaborative processes to develop mutually accepted definitions of climate resilience and risk reduction. Engage with flood control districts, diking districts in how to manage their water infrastructure for climate resilience.	**Consideration:** Work with individual landowners to gain trust in Snohomish County risk assessments. Position these needs in future grant opportunities.
	Reactionary, short-term behaviors.	Design public communication materials that jointly discuss climate impacts with solutions, and provide suggested actions that can be taken in the near-term (e.g., know your evacuation plan/route, access to emergency information), while also appealing to intrinsically valued long-term community goals and outcomes.	**Potential Partnership:** SLS Communications Team
	Complex socio-cultural dynamics.	Invest in programs and activities that support peer-to-peer knowledge sharing and adaptation support, specifically across farm communities.	**Case Study:** Rural Voices for Conservation Coalition (RVCC) Peer Learning Exchanges - Tools & Resources

	Complex socio-cultural dynamics	Document and share stories of place-based climate impacts and climate resilience. Share challenges, lessons, and successes often.	**Case Study:** Nature Conservancy: PhotoVoice Project
	Complex socio-cultural dynamics	Develop a reach-scale understanding of the socioeconomic composition, local histories, relationships with the river, and community values that are unique to each section of the floodplain. Use findings to inform or facilitate a community assets-based approach to resilience planning, as opposed to a primarily risk-based approach.	
	Psychological and Emotional Barriers	Conduct research on farmers' perceptions on climate change, extreme events, and weather patterns, in relation to other factors such as land tenure, location, farm type, and farm size.	**Case Study:** Roesch-McNally, G., Garrett, A., & Fery, M. (2020). Assessing perceptions of climate risk and adaptation among small farmers in Oregon's Willamette Valley. Renewable Agriculture and Food Systems, 35(6), 626-630.
	Psychological and Emotional Barriers	Conduct research on landowner/community perceptions and attitudes towards existing adaptation strategies, specifically looking into retreat, acquisition, and buyouts.	**Opportunity:** Connect with planners in Sumas, Nooksack and Everson where relocation is a current challenge related to recurring flooding.

	Psychological and Emotional Barriers	Evaluate the mental health impacts of climate change and adaptation to various communities (e.g., landowners, practitioners, tribal members). Use findings to inform approaches to dialogue about climate impacts and solutions.	**Opportunity:** The Good Grief Network as a program that helps support folks in dealing with their feelings around Climate Change. **Resource:** Climate and Mind
	Psychological and Emotional Barriers	Explore trauma-informed approaches to resilience planning.	**Case Study:** Steve Moddemeyer, Whatcom County Reach-scale Planning **Existing Initiative:** Disaster Preparedness with Rebekah Paci-Green, Western Washington University
	Psychological and Emotional Barriers	Develop a communications guide, as well as training opportunities, for floodplain practitioners to communicate about climate change that 1) avoids politicizing the issue and 2) focuses on real-world experiences and solutions.	**Potential Partnership:** SLS Communications Team **Resource:** Skeptical Science

Adaptation Theme

Knowledge Systems

This theme considers the availability and accessibility of decision-relevant climate science, as well as the ability of practitioners to interpret and use this information in multi-benefit floodplain management. In addition, findings indicate the importance of other domains of knowledge in shaping local understanding of climate impacts, vulnerabilities, and adaptive capacity. These include Traditional Knowledge Systems, local knowledge, as well as other disciplines such as anthropology, economics, and political science. Several floodplain actors identified that more climate information is not necessarily the limiting factor in advancing climate resilience; attitudes and behaviors, policies and practices, and other factors can often be more important in the uptake of climate information and adaptive measures.

Challenges

- **Coordinated and strategic use of climate information.** We heard that the existing coordination efforts for integrated floodplain management operate effectively for those actors that participate. These networks (e.g., SLS, ITs) support collaboration for project prioritization, knowledge exchange, and capacity building. At the same time, floodplain practitioners have varied access to climate information. There are several key actors, such as cities and towns, that do not regularly participate in Integrated Floodplain Managements, preventing the shared awareness and coordinated use of climate information. Even within well-established partnerships, questions around the validity and accuracy of information have led to the use of differing data sources.

> "It would be nice if they were the main entity or resource, instead of having to go to all these different sources for data. If there was a resource for data that local jurisdictions could go to, and get that data in user friendly manner, it would be really helpful for government employees"
>
> — Government Employee

> "Surface water runoff from upland development is the primary concern for flooding in cities, but these areas haven't historically been engaged in Integrated Floodplain Management efforts."
> — Government Employee

> "Some technical experts felt that projected flood risk from Skagit Bay hasn't been reflected in current modeling done for the Ag Resilience Plan. [Others] also felt that these modeling results were too uncertain and wanted to complete their own." This has led to contradicting approaches to risk reduction, where one city is raising the sea-dike towards Army Corps standards while some experts say cities need to start considering the relocation of these assets.
> — Government Employee

- **Availability and accessibility of decision-relevant climate science.** The temporal and spatial scale of climate information is often incompatible with practitioners' decision-context. However, even when this information is available, it is rarely tailored for easy access and use by practitioners. Additional support and training are often needed to interpret and apply the results towards users' specific needs. These needs can vary depending on their role and organizational mandates, the scale of the project, and their unique priorities in the floodplain. While there are several existing climate-relevant decision support tools publicly available online, climate service providers do not have a sense of if and how these tools are being used, and whether they are effective.

> "From the fisheries perspective, we're interested in very specific geographies and habitat locations, so whenever we get something that's watershed specific, it's great. We often get models that are more sound-specific, but those don't really explain what's really going on here. Even watersheds that are right next to each other, like the Snohomish and Stillaguamish are extremely different."
> — Tribal Planner

> "It's been done. The County has done some modeling, and they've developed tools and maps… But how many people are actually using that? Nobody has really used climate information in decision-making, at least not in the agricultural community. If I am a farmer, those are just a bunch of blue lines. How does that relate to me? "
> — Landowner on the Stillaguamish River

- **Integration of other domains of knowledge.** Local and Indigenous Knowledge can fill temporal and spatial gaps in instrumental climatic observations, yet they have been insufficiently incorporated into floodplain planning and management. Floodplain managers, property owners, and tribal members hold important knowledge about potential vulnerabilities, critical thresholds and impacts of climate change that fall outside of western scientific inquiry. Moreover, new knowledge related to social science disciplines is emerging as a need given the central role of culture, policy, and institutions in advancing climate resilience (e.g., Social Science for the Salish Sea, 2019). For example, an economic assessment of climate risk can be compelling to farmers and decision makers, while anthropology, communications, and political science can inform public policy and program design. Overall, a transdisciplinary approach, that goes beyond a technical understanding of impacts, and integrates social science, community engagement, and local knowledge, would better support planning and implementation of climate change adaptations.

> I originally started gathering [flood depth] information from the one council member who's been a volunteer here for 30 years. He's lived through numerous floods, and has looked at those projections and says 'okay when it hits here on the river gauge, it's going to hit here in the city…' I then started taking all that information and drawing it onto physical maps and aerial photos."
> — Floodplain Manager

> We've had elders speak about traditional plant medicines that are really important to their cultural practices like huckleberries. With climate change, we know those medicines will be found in different places. So, how do we support those broader questions around cultural identity and practices concerning our tribal partners, while continuing to support western style food systems for our agricultural community? We've successfully been able to incorporate climate projections into the Ag Resilience Plan and Reach-scale Plans, but we need to go one step further and consider the Traditional Knowledge shared by our tribal partners."
> — Community Liaison

- **New technologies and science.** Our knowledge on climate change will always be incomplete and thus, there will constantly be a need for new science and technologies to improve our understanding of impacts and how to respond to them. There is currently good information available on changes in streamflow and flooding for the Snohomish and Stillaguamish watersheds, but either new or downscaled information needs have been identified in recent planning documents, specifically around the topics of groundwater and saltwater intrusion. Floodplain actors have also observed increased uncertainty on the timing, severity, and frequency of climate impacts, some of which could be addressed through updating or expanding on existing technologies.

> Farmers and emergency flood managers rely on river gauges for decision-making and suggested that they need access to more real-time flood information in more locations. As one farmer shared, "River gauges [needs more attention or resources]. That's a really big one that you know as a farmer that we rely on so much.
> — Floodplain Manager

> While we know that sea level is rising and that it will affect the erosion of our coast, we don't fully understand how quickly the bluffs along our coast will erode, and therefore the time frame that our coastal resources are at risk.
> — Tribal Planner

Knowledge Systems

Adaptation Actions

Action Type	Challenge	Adaptation Actions	Resources and Opportunities
	Accessibility of decision-relevant climate science	Provide floodplain practitioners with technical guidance and training to properly select and apply climate data for a range of various planning and decision-making activities (e.g., policy, priority-setting, project design, etc.)	**Resource:** Technical Guidance for Quantifying Climate Impacts
	Accessibility of decision-relevant climate science	Mainstream climate information in flood risk training for new landowners.	**Existing Initiative:** Agriculture Resilience Plan is working with Snohomish Conservation District to incorporate this into their new farmer training. **Resource:** Streamside landowner Workshops (focuses on native species, fish habitat, and current regulations but touches on flood and provides a space for questions.)
	Accessibility of decision-relevant climate science	Tailor climate services and products to users' specific interests, needs, and decision-making context. Conduct supporting user research to identify the spatial and temporal scales in which climate information would be most useful for various user groups.	**Case Study** Tribal Climate Tool

	Accessibility of decision-relevant climate science	Provide one-on-one technical assistance or small group assistance to support farmers developing climate resilience strategies (e.g. expand Snohomish Conservation District Farm Planning with climate resources, climate support).	**Existing Initiative:** Best Management Practices (BMP) Near Term Action Project. DU works with landowners and other partners on 'Farm Plumbing'
	Accessibility of decision-relevant climate science	Evaluate existing climate and weather tools used by farmers. Explore the mainstreaming of climate information into these existing tools, to support both long-term and immediate farm-scale decision-making.	**Resource:** Ag Weather Stations; River Gauges; and Flood Warning Systems **Opportunities:** USDA Decision Calendars
	Accessibility of decision-relevant climate science.	Conduct in-depth user research on the accessibility and effectiveness of existing Decision Support Tools (DSTs). Findings should be documented, and inform improvements to existing DSTs or in the development of new DSTs.	**Existing Tools:** Washington Coastal Resilience Tool Climate Visualization Tool
	Accessibility of decision-relevant climate science.	Develop visual communication tools and resources that illustrate climate impacts and how current efforts of habitat restoration can help mitigate those impacts (e.g. maps, images, animations, virtual reality).	**Resource:** Online Story Maps of the North Fork Stilly and Skykomish Reach Scale Plan
	Accessibility of decision-relevant climate science.	Conduct research on the impacts of climate change to vegetation, to better inform future habitat restoration and nature-based flood protection practices.	**Consideration**: Relative importance of Sno/Stilly to the Pacific flyway in light of climate change. This area may become much more

			important to continental waterfowl and shorebirds.
	Coordinated and strategic use of climate information	Develop a centralized, accessible, and regularly updated database of climate information and data relevant to the Snohomish and Stillaguamish watersheds.	**Resource:** Technical Climate Resources for Decision-Makers (Snohomish and Stillaguamish)
	Integration of other domains of knowledge	Engage floodplain managers to identify and document critical thresholds for climate impacts on floodplain infrastructure and assets.	**Existing Initiative:** These can be identified by partnering with FEMA & Ecology to offer workshops to connect with floodplain managers. **Consideration:** Integrate emergency managers as they have key information on changes and infrastructure.
	Integration of other domains of knowledge	Invest in participatory and transdisciplinary methods to develop local indicators of climate change, that consider ecological, cultural, and relational outcomes.	**Consideration:** Puget Sound Partnership Vital Signs

	Integration of other domains of knowledge	Develop an adaptation library that documents Best Case Practices for climate-relevant floodplain management efforts, from other geographies. Explore the feasibility of these strategies in Sno-Stilly.	**Resource:** Climate Adaptation Knowledge Exchange
	Integration of other domains of knowledge	Conduct research on the adaptive capacity of small-scale farmers.	**Opportunity:** Identify and utilize relevant water and farm management systems from other locations.
	Integration of other domains of knowledge	Assess the impacts of climate change to the local agricultural sector. Conduct a cost-benefit analysis to quantify the potential damages of inaction, and cost savings associated adaptation to aid farmers in decision-making and inform broader policy design.	**Existing Initiative:** County is working on Risk Assessments and a Cost/Benefit Analysis in the Snohomish and Lower Skykomish
	New science and technologies	Conduct an attribution study that examines the various sources of increased flooding.	**Consideration**: Attribution studies are not always conclusive because (a) it is not always possible to differentiate among the causes of flooding, and (b) data are not always available where they would be needed to make the necessary distinctions.

	New science and technologies	Integrate climate information into the development of water quality studies.	
	New science and technologies	Conduct new studies on future geomorphic changes with alterations in streamflow, as much of existing geomorphic studies focus on current rather than projected conditions.	
	New science and technologies	Develop site-specific hydraulic modeling for Diking District 7 and Stanwood area	**Resource:** Identified as a resilience need in the Agriculture Resilience Plan
	New science and technologies	Conduct new groundwater modeling studies, especially in the Estuary reach where saltwater intrusion can be an issue.	**Resource:** Identified as a resilience need in the Agriculture Resilience Plan
	New science and technologies	Increase the number of river gauges throughout the river systems and connect that information to real time data sharing (e.g., through smart phone alerts).	**Resource:** OneRain with SnoCo provides real-time flood information: Snohomish County Flood Warning System - Home (onerain.com)

Adaptation Theme

Institutional Capacity

This adaptation theme considers the capacity of institutions and entities working on the floodplains to rapidly respond to emerging knowledge and resilience needs. More specifically, institutional capacity can refer to authority structures, staffing, multi-jurisdictional coordination, decision-making models, and access to resources. In the context of the Snohomish and Stillaguamish watersheds, the Sustainable Lands Strategy (SLS) acts as the primary convener of floodplain practitioners and leaders in the area but does not have any regulatory authority on the floodplains.

Challenges

- **Accessibility and flexibility of funding sources.** While funding programs that support the majority of the IFM efforts in Snohomish County include provisions for climate change within their grant criteria, many floodplain actors feel that they still lack clarity and guidance to properly address climate in their project proposal and designs. In addition, incorporating climate resilience into project design can often be cost prohibitive given the large amount of land use and infrastructure considerations this would entail, such as the purchase of additional easements, building higher setback levees, and the removal of dikes. Existing habitat-oriented capital funding programs at the state, federal, and local level are designed for ecosystem restoration and protection but are not specific to climate resilience. Floodplain actors also reported that some entities that are critical to climate-resilient floodplain management are severely underfunded, such as local Flood Control Districts.

- **Organizational Capacity and Coordination.** Unlike other IFM organizations participating in Floodplains by Design efforts, the SLS is not led by any one agency with regulatory authority but is supported by Snohomish County's Surface Water Management department with broad participation from a variety of other entities (Wright, 2021). In this way, the authority and staff capacity to implement Integrated Floodplain Management strategies falls on participating entities. This decentralized coordination can enhance resilience, through the inclusion of diverse actors, opportunities for resource-sharing, and scaling multi-benefit approaches. However, many of the participating entities, such as state and county agencies, tribes, and non-profit organizations, may still lack organizational capacity to fully operationalize this approach. They are often stretched within their own entities, across multiple working groups, and between competing priorities.

> "I would say the biggest thing is that there's so few of us doing this type of work. We always need more capacity and funding."
> — Tribal Employee

> "Local project management capacity is a significant factor. That's usually the degree to which local governments are willing or able to invest in humans whose job it is to think about ecosystems." — Restoration Ecologist

- **Technical expertise and staff capacity.** Despite the availability of climate data and decision support tools, many professional staff lack technical knowledge and skills to be able to effectively integrate this information into IFM planning and management. Government staff often rely on the expertise of third-party consultants and scientists to guide climate-informed decision-making. However, we also heard that consultants and scientists are often capacity-strapped and may not always be available, cost-effective options. Especially within under-resourced, local government entities, professional staff often fill multiple roles and may not have the access or capacity for technical training opportunities. Practitioners shared that while climate projections have primarily been used in the design of site-specific capital projects and infrastructure, they need additional support for integrating climate information in priority-setting.

> I find that it's really hard to pin down the consultant to be available. Climate change scientists and consultants are going to be in more and more demand, and they're going to be harder and harder to get a hold of. I can't pay constantly for every conversation I want to have with a consultant, let alone get the consultant available"
> — Government Planner

> "What I know with 100% certainty is the average employee does not have time to research and understand climate change issues and remember it, and all the science behind it, they don't, and they won't."
> — Government Planner

Institutional Capacity

Adaptation Actions

Action Type	Challenge	Adaptation Actions	Resources and Opportunities
	Accessibility and flexibility of funding sources	Review and strengthen grant guidance on climate change so that projects more explicitly utilize climate change data and resources in project development phase and throughout.	**Opportunity:** Align with the ongoing FbD taskforce to revise grant criteria to incorporate climate resilience. **Resource:** Sea Level Rise Considerations in Washington State Capital Grant Programs (Department of Ecology, 2020)
	Accessibility and flexibility of funding sources	Diversify funding sources, and coordinate agency administration to reduce redundancies, delays and resources when applying for funding.	**Existing Initiatives:** SLS Funding Committee Align Grant Coordination group (Fish)
	Accessibility and flexibility of funding sources	Develop a funding matrix that assesses existing federal, state, and private funding program's ability to meet multi-benefit floodplain goals and outcomes (e.g., FFF interests, climate resilience, equity).	**Existing Initiatives:** SLS Funding Committee

	Accessibility and flexibility of funding sources	Identify opportunities to fund climate adaptation infrastructure through NOAA and other agencies, particularly to support Flood Control Districts and Diking Districts that are managing aging water systems and infrastructure.	**Consideration:** Diverse funding mechanisms will be required to support infrastructure needs (drainage, pumps) that are habitat friendly for long-term agricultural resilience in the face of climate change.
	Accessibility and flexibility of funding sources	Coordinate with large infrastructure funding where mitigation dollars are available, to take advantage of those opportunities when they arise.	**Case Study:** The Port of Tacoma participates in Pierce County's Floodplains for the Future Partnership (FFtF), in part so that they can coordinate their habitat mitigation efforts with the ecosystem recovery and flood risk management objectives of FFtF.
	Organizational Capacity and Coordination	Increase county-level support for coordinating local diking and drainage districts, flood control districts, across both watersheds. This includes administrative support, increased funding, climate, and floodplain management education, etc.	**Case Study:** King County Flood Control District

	Organizational Capacity and Coordination	Identify potential pathways to develop reach-scale communication structures for the Stillaguamish watershed, given the lack of diking and drainage districts in this area.	
	Organizational Capacity and Coordination	Increased alignment between Community Rating Systems audits/manual updates and two major County planning processes that impact floodplain planning, mitigation, and risk reduction. Assess where climate services best fit in the interaction of these processes.	**Existing Initiative:** Snohomish County Surface Water Management
	Organizational Capacity and Coordination	Strengthen, support, and expand on the existing network of municipalities that are coordinating for emergency flood management. Identify opportunities to mainstream climate adaptation into collaborative flood preparedness/emergency management activities.	**Existing Initiative:** Collaboration between the City of Sultan and City of Monroe for emergency flood management efforts
	Organizational Capacity and Coordination	Integrate climate considerations in priority setting and evaluation of projects.	**Opportunity:** Snohomish and Stillaguamish Integration Teams' work plans
	Organizational Capacity and Coordination	Form a state and federal multi-agency permitting team specifically to permit multiple benefit programs in floodplains that include climate resilience and other benefits to community (e.g., farming) Agencies could include EPA, NOAA, USFWS, FEMA, and all State permitting agencies.	**Existing Initiative:** This effort is already being started by EPA under Puget Sound Federal Task Force and could be collaborated with the State Habitat Recovery Pilot Program.

	Technical expertise and staff capacity	Identify resources to hire local government staff with climate change expertise. Invest in developing in-house climate experts.	**Opportunity:** Consider regular, paid internships for local colleges and universities to direct talented students to support project efforts and build a talent pipeline.
	Technical expertise and staff capacity	Provide education and training opportunities for local government staff to integrate climate science into their roles and responsibilities. Ensure training curriculum is accessible to employees that have limited understanding of climate data or may have limited time and capacity for training.	**Consideration:** Affiliate with colleges & universities to prepare training and introduce interns into the departments.
	Technical expertise and staff capacity	Work with climate service providers and service users to ease contracting burdens, and mitigate barriers to accessing new, updated science.	**Consideration:** The contracting process should allow long-term relationships for science and project implementation to form inside and outside the institutions.

Adaptation Theme

Policy and Planning

Policies, regulatory frameworks, and planning processes can either enable or impede the implementation of adaptive floodplain management efforts. For floodplain practitioners in the Snohomish and Stillaguamish watersheds, advancing policies that support both systemic change and on-the-ground actions are critical for adaptation. Additionally, climate services that are responsive to the current regulatory landscape and leverage emerging policy opportunities are more likely to be used in practice.

Challenges

- **Policy research and support for Ecosystem Service Markets.** Several practitioners identified that effective Ecosystem Service Markets can be a powerful tool for incentivizing climate adaptation and conservation on privately-owned land, as it creates a system of compensation for individuals maintaining healthy ecosystems and the entities willing to pay for these services for the public good. There are existing efforts to deploy these market-based tools towards achieving IFM goals. For example, Snohomish County has partnered with e-NGOs (environmental NGOs) to implement the Purchase and Transfer of Development Rights (PDR and TDR) towards farmland conservation, with active efforts across multiple programs (e.g., Skykomish Community Floodplain Solutions, Stillaguamish Valley Protection Initiative). The development of carbon markets, and trading water rights have also been identified as resilience needs, specifically for the agricultural community. However, floodplain practitioners have encountered regulatory challenges that have stymied the effective implementation of these tools, as follows:
    - There is a weak demand for ecosystem services within Snohomish County. While PDR and TDR markets have been set up in several jurisdictions in Washington State, King County has by far seen the most success. This is due to the presence of a strong real estate market, and the implementation of new TDR zoning ordinances. While there is a growing demand for expanding construction in urban areas within Snohomish County, cross-jurisdictional partnerships and robust public policy are still required to support incipient ecosystem service markets.
    - There are limited viable parcels and willing landowners, limiting the supply for ecosystem services. Currently, the cost for landowners to participate in TDR and PDR programs outweigh the benefits, deterring landowners.

- **Interactions between federal and state policies.** Floodplain practitioners expressed that federal and state policies often created regulatory challenges for individual- and community-scale adaptation. Policy goals lack coherence across varying levels of government and inhibit progress towards locally relevant goals. Simultaneously, local actors depend on federal and state entities to provide the high-level authority, resources, and funding necessary to achieve landscape-scale resilience. While on-the-ground

actors quickly become aware of local perceptions and experiences of public policies and programs, bureaucratic processes are not designed to easily respond to community-identified needs. Additionally, the pace of systemic change rarely aligns with the pace of rapidly evolving knowledge on climate impacts. Some examples of challenges around federal and state policies that were identified, are as follows:

On FEMA Flood Insurance Policies

"A huge number of the homes and structures in Snohomish County do not have flood insurance because the only ones that are required to have it are ones with a mortgage. And, even if you have buildings with nothing but sheep walking in and out of it, they'll require you to have flood insurance on those too, and flood insurance is very expensive. With my experience, I had repetitive loss. Because I claimed it on my flood insurance, FEMA said they would either buy you out or lift my home, so I went for the lifting. But what I didn't realize at the time is that they gave me compensation, but it would still cost me about $100,000 out of pocket. With buyouts, what they're offering people is not enough to make it worth it. But FEMA is the federal government. What other resources do people have?"

— Landowner, Stillaguamish River

On Washington State Streambank Protection Policies

"There's a large landscape in the river that's largely neglected. There are places that are too close to the river and so they're, they're regulated through a Byzantine regulation system, and landowners feel like they can't do anything there"

— Federal Employee

- **Coordinated land use planning, policy, and practice across scales.** Land use planning across jurisdictions do not always share the same climate resilience goals, or use the same baseline climate information, sometimes leading to disjointed land management strategies. Currently, the SLS and some of its partner entities are engaged in policy advocacy work, to connect local priorities to systemic change. Groups within the SLS are actively working to provide recommendations to Snohomish County on their Comprehensive Plan Update, with a focus on limiting development in the floodplains and concentrating growth in Urban Growth Areas (UGAS) to reduce flood risk. Several government planners have also called out existing siloes within the County government that have impacted several County planning processes related to floodplain management and risk reduction. For example, Snohomish County's Surface Water Management (SWM), Planning and Development Services (PDS) and Department of Emergency Management (DEM) are developing guidance to align land use permitting processes. Overall, there is a need for policy and planning frameworks that guide difficult decision-making in dynamic and uncertain river systems.

Policy and Planning

Adaptation Actions

Action Type	Challenge	Adaptation Needs	Resources, Opportunities & Considerations
	Policy research and support for ecosystem service markets	Conduct an economic assessment of non-market values provided by floodplains (e.g. ecosystem services, human health, and sociocultural value) to serve as a baseline for policy design and provide guidance to jurisdictions on incorporating ecosystem values into policy.	**Case Study:** City of Snoqualmie Natural Infrastructure Assessment **Consideration:** Engage Public Works, Surface Water Management and Planning Department's fiscal and budgetary staff for policy design and education on green economy policies. **Consideration:** Engage private landowners in land valuation.
	Policy research and support for ecosystem service markets	Conduct research on current viability of ecosystem service markets (e.g. Carbon Markets and Development Rights) to inform policy recommendations. Develop consistent standards and frameworks to assist the creation of viable markets in Snohomish County.	**Considerations:** Engage the Builders Association to make the markets work; soil health/carbon sequestration; nonprofits could manage markets

	Policy research and support for ecosystem service markets	Conduct policy research to support the creation of new ecosystem service markets, in anticipation of *future* adaptation needs. This could include water quality trading, water rights trading, mitigation banking, etc.	**Case Study:** Kittitas County Water Banking for Building Permits **Considerations:** Encourage tools that forecast the value over time of adaptation actions taken today that will build increasingly valuable future resilience but do not have an early return on investment. Offer "futures contracts" to deliver ecosystem services for adaptation conditions that do not yet exist for actions that take time to mature.
	Policy research and support for ecosystem service markets	Invest in improving farmers' ability to deliver on environmental services (air quality, soil health, restoration, etc.), to support farmers' ability to earn additional profit from conservation practices.	**Existing Initiatives:** Snohomish County Carbon Crushers
	Policy research and support for ecosystem service markets	Incorporate ecosystem services values into the purchase price of acquisitions, leveraging private interests to assist in those purchases.	**Considerations:** Valuing the risk of future climate conditions can point to the need to finance early action.
	Policy research and support for ecosystem service markets	Strengthen partnership and coordination with King County to develop a viable market for ecosystem services (TDR, PDR, etc.), encouraging participation in these markets by public, private, and non-profit sector participants.	**Resource:** King County Transfer of Development Rights Program

	Evaluation of federal and state policies	Strengthen financial incentives to bolster the participation of landowners in floodplain conservation strategies such as acquisitions, conservation easements, and Best Management Practices (BMPs). Conduct supporting research to understand barriers to landowner participation to better inform program design.	**Considerations:** NRCS is starting initiatives on climate resilience, and need to ask them what is known about landowner participation.
	Evaluation of federal and state policies	Evaluate Washington State's Integrated Streambank Protection Guidelines. Explore alternative support for landowners experiencing bank erosion. Assess efficacy of proactive bank stabilization and flow control strategies like planting trees along the river.	**Resource**: Washington State's Integrated Streambank Protection Guideline **Consideration:** WDFW has previously done outreach with homeowners in the Stillaguamish experiencing bank erosion.
	Evaluation of federal and state policies	Conduct research on landowners' experience with FEMA's National Flood Insurance Programs (NFIP). Monitor landowner experiences to FEMA Risk Rating 2.0, in relation to socioeconomic characteristics, to inform policy analysis in the future.	**Resource**: FEMA Risk Rating 2.0 Interactive Map **Existing Initiative:** Puget Sound Federal Task Force is starting a floodplain working group with FEMA as a main agency and education is an important component.
	Evaluation of federal and state policies	Conduct a water availability analysis, to support an effective water rights response to climate change. Proactively conduct policy analysis to identify water rights needs due to climate impacts (e.g., drought, low flows, need for irrigation), such as coordinated management and leasing of water rights at a landscape-scale.	**Stillaguamish IT**: Partnership with WA DOE to build irrigation efficiency and water availability program to address the needs of salmon and agriculture (SLS Work Plan 2021-2022)

	Evaluation of federal and state policies	Develop new climate change policies, criteria, and goals within existing ecosystem capital funding programs and coordinate across state, federal, and local level to encourage design and implementation of climate resilient projects.	
	Evaluation of federal and state policies	Identify common policies from federal and state as well as inconsistencies and work to eliminate them.	
	Coordinated land use planning, policy, and practice across scales.	Conduct research on forest management practices, and their efficacy in reducing climate-related flood risks.	**Resource:** Snohomish County: Working Buffers **Consideration:** Review Snohomish County's Comprehensive Plan and Capital Improvement Program plans to integrate within the policy framework.
	Coordinated land use planning, policy, and practice across scales.	Identify regulatory barriers to implementing adaptive land management practices (zoning regulations that do not support landscape-scale resilience; limitations to working buffers, etc.) to develop policy advocacy and strategy. Actions that minimize development in the floodplain will prevent the need for flood control.	**Existing Initiative:** Puget Sound Partnership is working on related efforts. **Consideration:** Need to engage the local regulators and policy makers, know where permitting problems are.

	Coordinated land use planning, policy, and practice across scales.	Identify the potential impacts of proposed land use strategies to the broader farm system, specifically the impact of acquisitions and conservation in the Lower Stillaguamish Valley in relation to Skagit. For lands restored to habitat, find ways to design diking structures that provide security to those who are farming on remaining lands.	**Existing Initiative:** Stillaguamish Valley Protection Initiative
	Coordinated land use planning, policy, and practice across scales.	Identify political champions interested in multi-benefit floodplain management and climate resilience goals and develop a network of support across higher levels of local government.	**Existing Initiatives:** The Puget Sound Federal Task Force floodplains working group with FEMA. **Consideration:** Local jurisdictions and NGOs need to be included in the task force.
	Coordinated land use planning, policy, and practice across scales.	Pursue the coordinated use of climate information across existing land use planning and policies in the County (e.g., transportation, housing). Include regulators	**Existing Initiatives:** Snohomish County Comprehensive Plan Update, municipalities' Comprehensive Plans (Everett, Arlington, Monroe, etc.), Lower Skykomish Land Strategy, Stillaguamish Valley Protection Initiative, Tribal Climate Adaptation / Natural Resource Management Plans **Consideration:** Engage regulators and permitters in the different jurisdictions and talk early and often with climate adaptation efforts

	Coordinated land use planning, policy, and practice across scales.	Conduct an economic assessment of how current and future development (upland runoff) impact flood risk, habitat quality (via ecosystem service valuation) to strengthen policy recommendations and improve compensation to farmers (e.g., stormwater fees to offset runoff and sediment costs from local jurisdiction)	**Existing Initiative:** SLS Comprehensive Plan Working Group **Existing Initiative:** County is working on Risk Assessments in the Snohomish and Lower Skykomish
	Coordinated land use planning, policy, and practice across scales.	Integrate robust climate considerations in the SLS policy recommendations for the Snohomish County Comprehensive Plan update. Identify climate considerations based on SLS policy framework (development patterns, health and equity, and cultural values)	**Existing Initiative:** SLS Comprehensive Plan Working Group **Existing Initiative:** County is working on Risk Assessments in the Snohomish and Lower Skykomish
	Coordinated land use planning, policy, and practice across scales.	Integrate climate projections into multi-criteria land planning tools and strategies (e.g., identification of priority parcels for acquisition, conservation, and buyouts).	**Existing Initiative:** Lower Skykomish Land Strategy (Community Floodplain Solutions) Stillaguamish Valley Protection Initiative

Adaptation Theme

Equity and Justice

Beyond the distinctive and dynamic qualities of the Snohomish and Stillaguamish rivers, there is also a great diversity in the communities, entities, and individuals that are either involved or impacted by changes happening on these floodplains. Each of these groups have varied access to the resources, information, and decision-making structures that facilitate adaptation. Additionally, floodplain management efforts have been beneficial to some groups, while disproportionately burdening others. Thus, this section considers the multiple dimensions of equity, understood as 1) Contextual Equity, the pre-existing conditions that determine various individuals and communities' ability to participate 2) Procedural Equity, how power dynamics influence the fairness of decision-making structures and processes, and 3) Distributive Equity, the allocation of adaptation resources as well as the distribution of related burdens and benefits.

Challenges

- **Contextual Equity.** Historic and systemic injustices continue to shape how exposure to climate-related risks and corresponding socioeconomic vulnerabilities are disproportionately distributed across the floodplains. Indigenous communities have experienced the forcible separation from their land, as well as spiritually and culturally relevant resources due to a history of settler colonialism. Additionally, tribes have historically acted as stewards of these lands and have contributed the least to climate change yet are experiencing the worst impacts. The agricultural community has also experienced a history of government neglect, in the face of rising commercial interests and development pressures. These pre-existing conditions of inequity need to be better integrated into the design of any adaptation response, as failing to do so increases the risk of replicating systems of harm and further widening the inequality gap. Continuous attention and acknowledgment of the past can create the healing necessary for effective and contextually sensitive community-based adaptation.

> "We don't talk enough about the racism being experienced by Indigenous communities, and how that's still impacting collaboration and planning today."
>
> — Community Liaison

> "Snohomish County is the second fastest growing county, as well as the second largest county in the state, population-wise… and so to the farmers, it's basically like the County has sold the farm…. There's been a fair bit of trauma there in terms of people's loss of farmland, and some lawsuits and other things that have happened."
> — Private-sector planner

- **Procedural Equity.** Over the years, floodplain actors have practiced deliberate sensitivity and care towards balancing the interests of farm, fish, and flood communities. Shared histories of loss, conflict, and trauma has underscored the importance of trust and relationality, resulting in a tight-knit network of floodplain actors, advocates, and decision-makers. While many floodplain practitioners view these partnerships as a strength, there has also been a concern around the inclusivity of existing decision-making structures and community engagement processes. Some floodplain actors have raised that certain population groups, such as small-scale and immigrant farmers, under-resourced municipalities, and people without housing are experiencing the most severe impacts on the floodplains, but historically have not been included in adaptation planning, policymaking, and budgeting. Furthermore, floodplain actors had deeper questions about *who* gets to decide who is included, and who gets to define what is equitable. There is also a need for greater efforts towards improving the accessibility of decision-making spaces, specifically for those who are differently abled, do not speak English as a first language, and have limited access to technology, transportation, or childcare.

> We have a few good people who are participating in these community engagement processes, but it's a small number. I fear that while they represent the interests out there pretty well at the table, I don't know that it gets communicated back to the farm community in any kind of way."
> — Private Sector Planner

> Practitioners shared that the emphasis on engaging farmers with large properties and enterprises is programmatically strategic because they generally have the most land available for river restoration or are in critical ecological areas. This has led to oversight of the needs of others in the farm community. "No one has ever connected to the Hmong community. And we also know that generationally, there are young farmers in this section of the valley. To be blunt, we always talk to the same landowners because we want access to their land, yet we're not thinking about the future social structure of this community."
> — Federal Employee

- **Distributive Equity.** During key informant interviews, some community-based practitioners expressed concern over the uneven distribution of government resources towards the adaptation of historically marginalized groups. Floodplain actors working within government have attributed this to fundamental flaws in federal- and state-level policy development, program design and grantmaking, which tend to favor municipalities, communities, and organizations that already have access to resources while providing little opportunity for those who do not. Additionally, the consideration of socioeconomic factors is lacking in how climate impacts and adaptation options are being experienced across the floodplains – particularly around issues of land loss and displacement.

> "If we're going to work with landowners to conserve some of those properties in the floodplain or buy people out, I think there also needs to be a much bigger focus on equity. So who's benefiting and who's not benefiting, especially if we're stepping in with public dollars to conserve land, and I think that's super important. "
> —- Local Government Planner

> "Community development is always under-funded. Community development is always a shoestring budget, and it's often used to just get access to people's land to do a few projects, rather than actually building coherence within the community and increasing stewardship of their landscape. "
> — Federal Employee

> Obviously, the agricultural community is suffering a lot with climate change as their livelihood depends on this land. But the tribes are also being very impacted by climate change...More specifically, the Tulalip Tribe, with where their reservation is and being on the water... I mean, they're already asking how to move their community back because of erosion and other impacts. While they have great climate scientists working on these issues on the reservation and within their U&A areas, I don't feel like these concerns have been very integrated. We need to help move people away from harm's way and there's just no funding for that."
> — Community Liaison

Adaptation Actions

Action Type	Challenge	Adaptation Needs	Resources and Opportunities
	Contextual Equity	Conduct a stakeholder analysis of floodplain actors, across each watershed. Develop an analysis of historic injustices, power dynamics and systemic barriers to identify who has been left out of decision-making spaces and inform future partnership development.	**Consideration:** Careful attention needs to be made regarding who is identifying and characterizing stakeholders. It's important to call every group by name, and move away from generalities, and phrases like "overburdened communities". **Existing Initiative:** SWM is renewing focus on DEIJ and bringing social justice lens to work (e.g., revising Clean Water and Storm Water Permitting).
	Contextual Equity	Acknowledge, validate, and intervene against racism, especially against Tribes, in the watershed. Examine how racism affects salmon recovery and climate resilience efforts.	**Opportunity:** Explore land reparations or a land co-management model with Tribes. **Case Study:** Voluntary Land Taxes

	Contextual Equity	Identify equity considerations in farm communities (going beyond the usual suspects), and expand engagement to include historically marginalized voices when defining agricultural resilience needs (e.g., focus of resilience planning has historically been commodity farmers, landowners; consider small-scale farmers, immigrant farmers, farm owners vs. farmworkers, etc.)	**Opportunity:** This could be a next step of the Agriculture Resilience Plan **Consideration:** Translation needs and accessibility, offer resources and meetings in multiple languages. **Case Study:** The PhotoVoice project brought new people into the Agriculture Resilience Plan, by developing a pathway for people to express their needs and influence decision makers.
	Contextual Equity / Distributive Equity	Identify jurisdictions that have historically been too under-resourced to participate in Integrated Floodplain Management efforts, despite potentially benefiting from collaborative support. Reallocate resources to support their participation.	**Consideration:** Encourage elected officials to allocate the proper amount of funds to conduct DEI Outreach or to even discourage divisions/departments from working in their silos and instead have them collaborate more.

	Distributive Equity	Conduct research and communicate the equity implications of market-based tools for climate adaptation and conservation.	**Consideration:** Some community groups may be opposed to market-based approaches to adaptation, as it is based on the commodification of nature.
	Distributive Equity	Redistribute financial/institutional resources to support tribes to advance their mitigation and adaptation priorities (e.g., Advancing food security/protection of First Foods/medicines, resources to support tribal relocation to mitigate climate risk, etc.)	**Opportunity:** Identify connections with the infrastructure package and align those funds to support this action.
	Distributive Equity	Integrate equity considerations in multi-benefit land use planning and management. Consider how costs and benefits of climate adaptation will be distributed across individuals and various community groups, through proposed land use shifts.	
	Distributive Equity	Integrate socioeconomic data with climate data into decision-support tools that are easy to use for people from local government (e.g., planners) and community organizations who have limited expertise in climate and spatial analysis	
	Procedural Equity	Broaden the base of participation in solutions-design. Ensure those most impacted by climate change are made aware of and are included in funding and decision-making processes.	**Opportunity:** Snohomish County Climate Advisory Committee

	Procedural Equity	Develop a participatory process for developing criteria for identifying high-priority agricultural land for relocation. (e.g., how is viable agricultural land defined and who is creating that definition?)	**Existing Initiative:** The Sky Valley Community Floodplains Solutions is developing a criterion for identifying viable agricultural land. If successful, this methodology could be applied to conservation and relocation efforts along other river reaches.
	Procedural Equity	Hold community and/or one-on-one conversations about climate impacts and adaptation options, particularly in areas that are experiencing repetitive flooding and/or bank stabilization/erosion impacts. Personalize risk information to support education and informed decision-making across a diversity of landowners.	**Existing Initiative:** Utilize Streamside Landowner Workshop model to inform after identifying these areas.
	Procedural Equity	Integrate tribes' cultural identity, values, and practices when defining resilience needs (e.g., tribes vs. public access to rural area in comprehensive planning update)	

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