

Costs and Benefits of Climate Resilience on the Pacific Coast

NOVEMBER 2022



The Pacific Coast Collaborative (PCC) is committed to enhancing the capacity for our social, economic, and environmental systems to prepare for and address disruptions due to climate change, recover from shocks and stresses, and thrive and succeed in a changing climate. As outlined in the 2018 PCC Declaration on Climate Resilience and 2021 Climate Resilience on the Pacific Coast: Framework for Collaborative Action, PCC partners are working together to establish the region as a model of innovation that fosters resilience in the face of a changing climate, sustains thriving communities, fosters equity, and creates jobs and new economic opportunities.¹

A key to building resilience is making needed investments in infrastructure, social systems, and governance. This document outlines the "business case" for making these investments to preserve lives, protect infrastructure and cultural resources, enhance natural habitats, and strengthen the economy of our region. Investing in resilience now pays dividends long into the future.

Below, we provide highlights of what is at risk for our region, illustrate the costs and consequences of climate impacts, and outline the benefits of investing in resilience. We show what we are doing to plan and prepare for a changing regional climate, outline what it will take to fill gaps in investment, and describe the type of governance, collaboration, and research needed to effectively build resilience along the Pacific Coast of North America.

WHAT IS AT RISK?

In recent years, the effects of climate change have already been seen and felt throughout the region. These changes have been impacting social, economic, community, cultural, and natural systems. Extreme weather events—alongside increasing temperatures, heatwaves, and precipitation—have

ABOUT THE PACIFIC COAST COLLABORATIVE

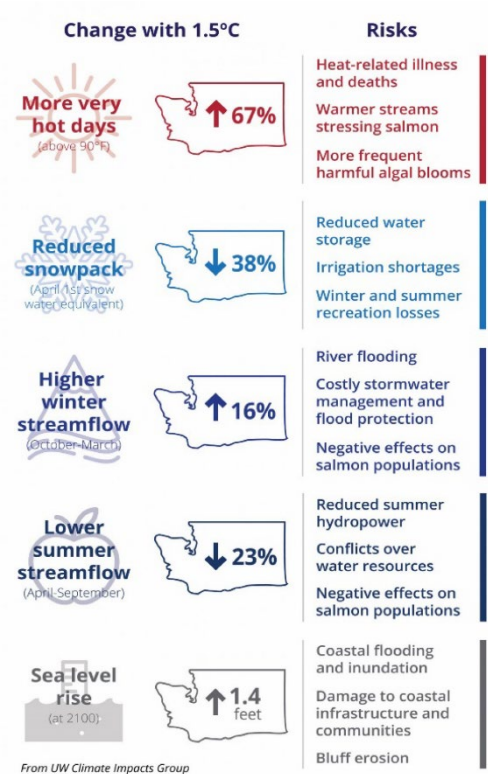
The Pacific Coast of North America represents the world's fifth largest economy, a thriving region of 55 million people with a combined GDP of \$3 trillion. Through the Pacific Coast Collaborative, British Columbia, Washington, Oregon, California, and the cities of Vancouver B.C., Seattle, Portland, San Francisco, Oakland, and Los Angeles are working together to build the low carbon and resilient economy of the future.

¹ Pacific Coast Collaborative Declaration on Climate Resilience (2018): https://46h83069gmc37idhm425hbh3-wpengine.netdna-ssl.com/wp-content/uploads/2018/09/PCC_Climate_Resilience_Declaration_FINAL-forweb.pdf; PCC-Climate Resilience on the Pacific Coast: Framework for Collaborative Action (2021): https://46h83069gmc37idhm425hbh3-wpengine.netdna-ssl.com/wp-content/uploads/2021/03/PCC_ClimateResilience_Framework.pdf.

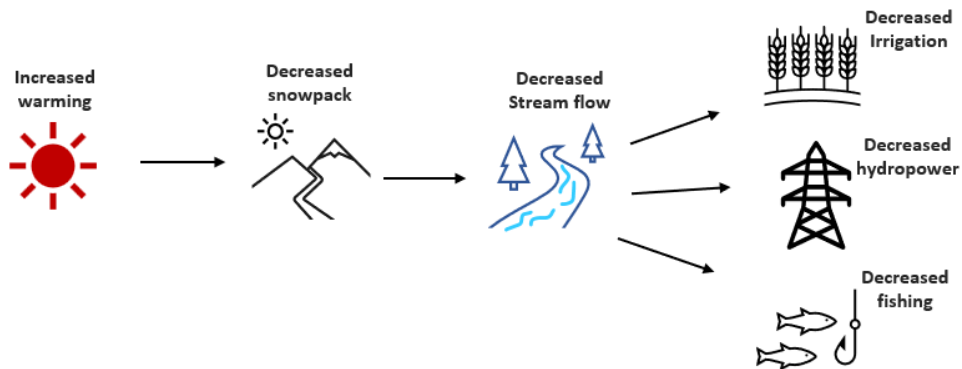
been linked to unprecedented wildfires and flooding, as well as ocean acidification. These are among the key threats that have severe consequences if not addressed.

Climate change is occurring and will continue. Recent climate projections for Washington state (see side graphic) illustrate the types of changes in climate predicted. Similar analyses in California, Oregon, and British Columbia also indicate more hot days, reduced snowpack, increased flooding, increased likelihood of drought, and sea level rise.² California’s Fourth Climate Change Assessment determined that these types of changes in climate could be forecast with very high or medium-high scientific confidence.³ Changes in natural systems ripple through connected natural and human systems (see graphic below).

Studies indicate that oceans, as primary regulators of the planet’s climate, have absorbed over 90% of the excess heat trapped by the Earth as a result of GHGs.⁴ Oceans also absorb 30% of the CO₂ released every year. This absorption has led to decades of steadily acidifying conditions. More is now known about impacts on the West Coast, where human influences on ocean ecosystems have proven to have dire consequences to shellfish and other aquatic species, their habitats, coastal populations, and coastal economies.⁵ Over half of the revenue for some, if not most, fisheries along our Pacific Coast comes from species that are vulnerable to ocean acidification.⁴



Climate Threats Ripple Through Connected Natural and Human Systems



² WA Office of Financial Management- Prioritizing Actions and Investments for Climate Resiliency in Washington (2020): https://ofm.wa.gov/sites/default/files/public/publications/OFM-Climate-Resiliency-Report-2020_0.pdf https://ofm.wa.gov/sites/default/files/public/publications/OFM-Climate-Resiliency-Report-2020_0.pdf

³ California’s Fourth Climate Change Assessment (2018): <https://climateassessment.ca.gov/>; California’s Changing Climate 2018: https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf

⁴ California’s Fourth Climate Assessment- Statewide Summary Report (2018): https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf

⁵ See, for example, the Third Biennial Report of The Oregon Coordinating Council on Ocean Acidification and Hypoxia (2022): <https://www.oregonocean.info/index.php/ocean-acidification/170-2022-legislative-report-2>

WHAT ARE THE COSTS AND CONSEQUENCES?

Our region is already experiencing costs and consequences for our economy, ecosystems, and society from a changing climate. If projected changes to the regional climate continue, what will it cost communities and infrastructure as sea levels rise? What will be the impacts on cultural resources and traditional practices? What will be the cost to the forest industry and residents' health from annual wildfires? What will happen to insurance costs and bond ratings as risks increase and become less predictable? Many sectors are developing information about future costs to improve resilience, and we know these costs will increase rapidly if current trends continue.

The current economic and social costs of climate disasters are escalating. State and Provincial costs of wildfire, flooding, drought, and impacts of ocean acidification reach well into the billions. For example, recent wildfires have cost \$10 billion in California alone.⁶ The cost of 2021 flooding in British Columbia may top \$5.77 billion.⁷ A 2022 report from the Canadian Climate Institute found that national income losses due to climate events could cause over \$19 billion in losses in Canada.⁸ The report also found that in two of their emissions scenarios there is an expected loss of household income, with a reduction of over \$500 in income per capita by 2025.⁷

Large-scale disasters are becoming more frequent and costly. Over half of all fire-related FEMA disaster declarations in California, Oregon, and Washington since 1957 have occurred in just the last ten years.⁹ In the last five years, there were over 17 disasters per year in the US with losses exceeding \$1 billion (adjusted for inflation) compared to an average of seven per year since 1980.¹⁰ Three of these billion-dollar disasters in 2021 resulted from wildfires, winter flooding, and a summer drought and heat wave. The cost of large disasters to the region is estimated at \$12.5 to \$29 billion, a dramatic increase since 1984 (see *graphic below*). In Canada, the cost of disaster recovery increased by a factor of ten between 2005 and 2014, largely due to flooding.¹¹

Disasters are compromising the health of our residents and ecosystems. Unprecedented heat waves and smoke events from wildfires have been some of the most widespread and visible contributors to health emergencies in our region. During the summer “heat dome” of 2021, temperatures reached 121F in British Columbia, setting a new all-time heat record for all of Canada. That event killed 800 people in Oregon,

“The catastrophic wildfires of 2017 and 2018 took 139 lives, destroyed communities, temporarily displaced hundreds of thousands of Californians, burned more than 2.8 million acres, created short- and long-term health problems, and caused irreparable harm to the state’s natural resources...Fifteen of the twenty largest California wildfires, as well as fifteen of the twenty most destructive, have occurred since 2000.”

— California’s Commission on Catastrophic Wildfire Cost and Recovery

⁶ Damage from California’s wildfires estimated at \$10 billion, experts say, David Louie (2020) <https://abc7news.com/california-wildfires-cost-of-cal-fire-stanford-wildfire-research/6897462/>.

⁷ Floods to cost \$7.5B: BMO, Tyler Orton (2021) [https://www.castanet.net/news/BC/352358/RBC-says-cost-of-flood-disaster-likely-to-exceed-7-5b-cuts-B-C-s-economic-outlook#:~:text=BMO%20senior%20economist%20Robert%20Kavacic%20compared%20B.C.%E2%80%99s%20catastrophic%20cell%200.4%25%20the%20month%20of%20those%202013%20floods;all%20costs%20converted%20to%20US%20dollars%20at%20\(1.30%20CAD%20%3D%201%20USD\)](https://www.castanet.net/news/BC/352358/RBC-says-cost-of-flood-disaster-likely-to-exceed-7-5b-cuts-B-C-s-economic-outlook#:~:text=BMO%20senior%20economist%20Robert%20Kavacic%20compared%20B.C.%E2%80%99s%20catastrophic%20cell%200.4%25%20the%20month%20of%20those%202013%20floods;all%20costs%20converted%20to%20US%20dollars%20at%20(1.30%20CAD%20%3D%201%20USD).).

⁸ Reducing the Costs of Climate Impacts in Canada, Canadian Climate Institute (2022): https://climateinstitute.ca/wp-content/uploads/2022/09/Damage-Control_-EN_0927.pdf.

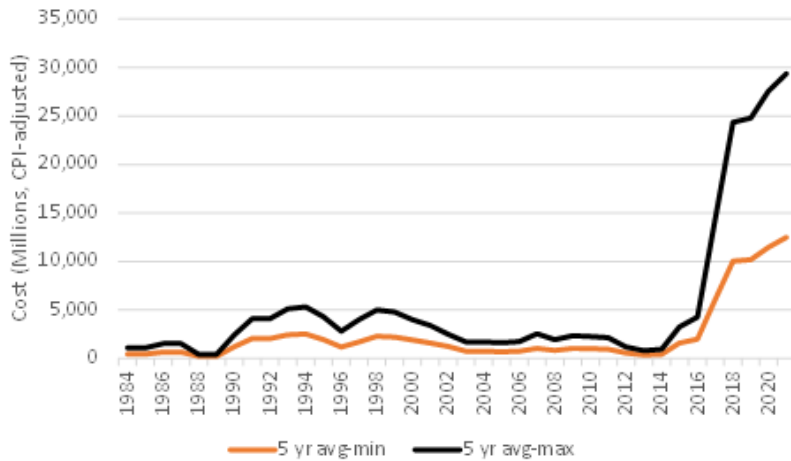
⁹ FEMA website: Disaster Declarations for States and Counties: <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

¹⁰ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). <https://www.ncdc.noaa.gov/billions/>.

¹¹ Geneva Association, Flood Risk Management in Canada (2020): <https://www.genevaassociation.org/research-topics/climate-change-and-emerging-environmental-topics/flood-risk-management-canada>.

Washington, and British Columbia.¹² It killed a wide variety of marine organisms on the region's beaches, setting off a chain of multiyear impacts to nearshore ecosystems and important commercial, subsistence, and recreational resources.¹³ Similarly, smoke from increasingly frequent and catastrophic wildfires has blanketed major cities and rural areas along the Pacific Coast, harming millions and driving up emergency department hospital visits.¹⁴ Health and other costs attributed to wildfire smoke grew over 200% annually between 2010 and 2015, and the increasing frequency of wildfires and smoke events since then have undoubtedly increased that rate of growth.¹⁵

Cost of Billion Dollar Disasters by Year: CA, OR, WA (Min-Max Range of 5-Year Average Costs)



“One in two houses in Oregon spends 30% or more of their income on rent or a mortgage. These households are less likely to rebuild in the event of a home loss or severe damage from an extreme weather event. Displacement and income loss associated with climate impacts will increase the risk of homelessness, food insecurity, and mental health effects.”

— *Fifth Oregon Climate Assessment*

Vulnerable communities are most impacted by a changing climate and least likely to be able to recover from disasters. While heat, smoke, and other changes from a warming climate affect everyone, they don’t affect everyone equally. A recent EPA study found disproportionate impacts from climate change on American Indian, Black, Hispanic and Latino, and Asian and Pacific Islander individuals as well as elderly and low-income individuals. In the US, Black and African American individuals are 40% more likely to live in areas with the highest projected mortality rates due to climate-driven extreme temperatures.¹⁶ They are also 34% more likely to live in areas with the highest projected increases in childhood asthma diagnoses due to climate-driven changes in particulate air pollution. American Indian and Alaska Native individuals are 48% more likely to live in areas where the highest percentage of land is projected to be inundated due to sea level rise.

¹² PBS Newshour, Weeklong heat wave scorches Pacific Northwest (2021): <https://www.pbs.org/newshour/nation/week-long-heat-wave-scorches-pacific-northwest>.

¹³ Raymond, et al., Assessment of the impacts of an unprecedented heatwave on intertidal shellfish of the Salish Sea (2020): <https://esajournals.onlinelibrary.wiley.com/doi/epdf/10.1002/ecy.3798>.

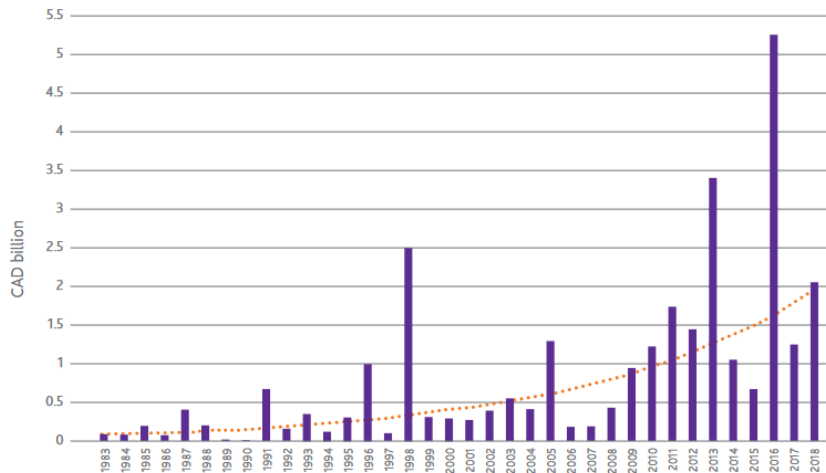
¹⁴ Hahn, et al., Wildfire Smoke Is Associated With an Increased Risk of Cardiorespiratory Emergency Department Visits in Alaska (2021): <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020GH000349>.

¹⁵ Dittrich and McCallum, How to measure the economic health cost of wildfires – A systematic review of the literature for northern America (2020): https://www.fs.usda.gov/pnw/pubs/journals/pnw_2020_dittrich001.pdf.

¹⁶ EPA, Climate Change Impacts and Risk Analysis, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts (2021) https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

As disasters increase, insurance is becoming less available and more expensive, making it more difficult for individuals, families, and communities to protect themselves against catastrophic losses. After disastrous wildfires in California, home insurance has become more difficult to obtain and more expensive; in some areas in the wildland-urban interface, insurance has been largely unavailable.¹⁷ In Canada, the cost of insured losses more than quadrupled between 2009 and 2018, driven largely by water damage from flooding (see graphic).¹⁸ These types of impacts affect the cost and availability of housing, which impacts renters and owners. People who are unhoused face additional threats from extreme weather.

Insured Catastrophe Losses for the P&C Insurance Sector in Canada (1983-2018)



Source: IBC Facts Book, PCS, CatIQ, Swiss Re, Munich Re & Deloitte. Values in CAD 2018; total natural catastrophe losses normalised by inflation and per-capita wealth accumulation

An estimated 12% of B.C properties were found to be at risk of flooding, exceeding the 8% Canadian average.

— Flood Risk Management in Canada

WHAT ARE THE BENEFITS OF INVESTING IN RESILIENCE?

Investing in climate resilience helps the region’s natural and social systems adjust to a changing climate and eases recovery and restoration after a disturbance.

Important attributes of community resilience that need to be considered include public health systems, resilient buildings and infrastructure, social and economic conditions of the region, and the integrity of regional ecological systems.¹⁹ Examples of efforts that increase resiliency include restoring or improving ecosystem sustainability, preventing natural resource degradation, and implementing measures that “anticipate, adapt, or minimize the effects climate change has on communities and the natural environment.”²⁰ Tribes and Indigenous Nations in our region are investing in multifaceted strategies that recognize the benefits of traditional knowledge and understanding of climate science.²¹

¹⁷ CA Governor’s Office of Planning and Research, Final Report of the Commission on Catastrophic Wildfire Cost and Recovery (2019), https://opr.ca.gov/docs/20190618-Commission_on_Catastrophic_Wildfire_Report_FINAL_for_transmittal.pdf.

¹⁸ Geneva Association, Flood Risk Management in Canada (2020): <https://www.genevaassociation.org/research-topics/climate-change-and-emerging-environmental-topics/flood-risk-management-canada>.

¹⁹ WA Department of Ecology & Washington Sea Grant, Resilience Action Demonstration Project (2022) <https://wacoastalnetwork.com/resilience-action-demonstration-project/>.

²⁰ WA Office of Financial Management, Prioritizing Actions and Investments for Climate Resiliency in Washington (2020) https://ofm.wa.gov/sites/default/files/public/publications/OFM-Climate-Resiliency-Report-2020_0.pdf.

²¹ For example: Swinomish Tribe wants to resurrect U.S clam gardening, Hannah Weinberger, <https://crosscut.com/environment/2021/12/swinomish-tribe-wants-resurrect-us-clam-gardening>.

Investing in resilience provides a strong return. According to the National Institute of Building Sciences, building resilience to natural hazards saves an average of \$6 for every \$1 spent.²² Strengthening infrastructure against floods and establishing building codes for natural hazard resilience provide even higher returns. A 2022 report from the Canadian Climate Institute on Reducing the Costs of Climate Impacts in Canada estimates that for every dollar spent, adaptation investments will provide a return of \$10-\$11.53 USD.²³

Resilience protects important regional economies. According to NOAA, the economic output of just six coastal counties hosting large West Coast cities (San Diego, Los Angeles, San Francisco, Oakland, and Seattle) is \$1.8 trillion, supporting more than 11 million jobs. In these counties, nearly 15,000 businesses are vulnerable to increasingly-frequent 100-year flood events. Some scenarios predict sea level rise of up to six feet in these counties by 2100, which would inundate areas where nearly 300,000 residents currently live.²⁴ These impacts also affect rural coastal counties. According to this same NOAA data, the primarily rural counties of coastal Oregon alone represent an economy of \$28 billion; flooding currently puts nearly 3,000 businesses at risk.²⁵

Building operational resilience strengthens organizations against disruptions. An operationally resilient organization is “able to anticipate, absorb, accommodate, and rapidly recover from climate events in its own operations and throughout its value chain.”²⁶ Public agencies, non-profit organizations, and businesses all benefit from greater operational resilience by strengthening human, political, financial, physical, social, and natural capital (see graphic below). Many organizations do not have a complete understanding of the vulnerabilities within their operational systems.

The Six Capital Assets That Build Climate Resilience: the Essential Building Blocks the Financial Sector and Individual Companies Will Need to Consider for Increasing Resilience to a Changing Climate

 <p>Human Capital</p> <p>refers to the skills and knowledge of available human resources, particularly in the workforce.</p>	 <p>Political Capital</p> <p>refers to access to decision-making to shape policy environments that enable resilience.</p>	 <p>Financial Capital</p> <p>refers to the volume of available financial resources and access to financial goods and services.</p>
 <p>Physical Capital</p> <p>refers to infrastructure and equipment, including those related to manufacturing facilities, transport, logistics, and communications.</p>	 <p>Social Capital</p> <p>refers to the strong relationships, collaborations, and bonds of mutual support and cooperation that are essential for addressing a systemic global challenge such as climate change.</p>	 <p>Natural Capital</p> <p>refers to the full range of services provided by biodiversity and ecosystems, including land and water.</p>

²² National Institute of Building Sciences, Natural Hazard Mitigation Saves (2019) <https://www.nibs.org/projects/natural-hazard-mitigation-saves-2019-report>.
²³ Reducing the Costs of Climate Impacts in Canada, Canadian Climate Institute (2022) https://climateinstitute.ca/wp-content/uploads/2022/09/Damage-Control_-EN_0927.pdf.
²⁴ NOAA Coastal County snapshots: <https://coast.noaa.gov/digitalcoast/tools/snapshots.html>.
²⁵ NOAA Coastal County snapshots: <https://coast.noaa.gov/digitalcoast/tools/snapshots.html>.
²⁶ BSR, Resilient Business, Resilient World: A Research Framework for Private- Sector Leadership on Climate Adaptation (2018) https://www.bsr.org/reports/BSR_Resilient_Business_Resilient_World_A_Research_Framework_for_Private_Sector_Leadership_on_Climate_Adaptation.pdf.

Resilience projects can boost local economies and asset values. Near Tillamook, Oregon the Southern Flow Corridor project restored 443 acres of tidal wetlands and opened 13 miles of tidal channels to provide habitat for salmon.²⁷ In doing so, it reduced flooding to 4,800 acres of the surrounding community, supported \$14.6 million in total economic output in the state, and increased the value of nearby homes by 10%. Forty-five projects funded by Washington's Floodplains by Design program have reduced flood risk and restored habitat in 15 major floodplains in the state.²⁸ This work has created 2,755 jobs, reduced flood risk for 2,212 homes, improved 7,840 acres of working lands and protected 1,337 more.

Resilience to future disruptions can be strengthened by including recovery strategies. Recent climate disasters have caused extensive damage to many communities. To ensure protection from future climate events, resilience measures must be built into the framework of recovery efforts.²⁹ The experience of Vernonia, Oregon shows that building communities back better after a disaster provides many advantages to the people and the environment. After destructive floods in 1996 and 2007, the State of Oregon and FEMA invested tens of millions of dollars in flood recovery and resilience strategies for Vernonia to reduce future risk to the community. This included elevating houses and businesses, upgrading sewer lagoons, and relocating the school, health center, and electric utility infrastructure out of the floodplain.³⁰ The town also held public meetings and presentations informing the residents of Vernonia on the planning process.³¹ In November 2015, there was another major flood, but as a result of the resilience measures and community preparedness, only minimal damage occurred.

Resilience investments should seek to restore healthy natural systems. A study by the Intact Centre on Climate Adaptation demonstrated that natural wetlands could reduce the costs of flood damage by 29% in rural areas and 38% in urban areas.³² An assessment of the naturally occurring ponds in one town found that they provided “the same stormwater management services as engineered assets that would have cost about \$3.5 million to \$4 million to construct”.³³ It is equally important to maintain healthy natural systems to sustain their role in bolstering resilience and avoid degradation that can undermine resiliency investments. In British Columbia, the naturally occurring White Tower Park ponds provide \$2.7–\$3 million USD in stormwater storage services annually.³⁴ In Washington, the Department of Transportation (WSDOT) is investing in innovative stormwater flow control via wetland and stream channel restoration that reduces flooding of Interstate 5 near Tacoma. WSDOT is also in the process of correcting about 400 fish barriers in the next eight years, helping restore natural salmon runs and increasing the resilience of state highways.

²⁷ NOAA, Oregon Habitat Restoration Project Supports Millions of Dollars in Community and Economic Benefits (2021) https://www.fisheries.noaa.gov/feature-story/oregon-habitat-restoration-project-supports-millions-dollars-community-and-economic?utm_medium=email&utm_source=govdelivery.

²⁸ WA Department of Ecology, Floodplains by Design <https://www.floodplainsbydesign.org/wp-content/uploads/2020/08/847580214NatureorgFloodplainsByDesignInfographic11x14v12.png>.

²⁹ See, for example, the American Planning Association's discussing of reducing future risk in the *Post-Disaster Recovery Guide for Planners* (2021): <https://www.planning.org/publications/document/9222285/>.

³⁰ Time to Prepare for Flood Season, Ben Fousek (2018) <https://www.vernonia-or.gov/announcements/2018/09/17/time-to-prepare-for-flood-season/>

³¹ FEMA, Vernonia Acquisition and Elevations Moving Properties out of the Floodway (2021) <https://www.fema.gov/case-study/vernonia-acquisition-and-elevations-moving-properties-out-floodway>.

³² Intact Centre on Climate Adaptation, When the Big Storms Hit: The Role of Wetlands to Limit Urban and Rural Flood Damage (2017) <https://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/07/When-the-Big-Storms-Hit.pdf>.

³³ Insurance Bureau of Canada, The Cost of Climate Adaptation at the Local Level (2020) <http://assets.ibc.ca/Documents/Disaster/The-Cost-of-Climate-Adaptation-Report-EN.pdf>.

³⁴ Geneva Association, Flood Risk Management in Canada (2020): <https://www.genevaassociation.org/research-topics/climate-change-and-emerging-environmental-topics/flood-risk-management-canada>.

WHAT ARE WE DOING TO PLAN FOR CLIMATE RESILIENCE?

It is important now more than ever that the region be ready for a changing climate and have plans in place to increase resiliency. Without climate resilience plans, the effects of climate change will be felt more severely, and recovery will take longer. Our region is ready with emerging climate resilience plans.

To strengthen British Columbia's resilience to future climate impacts, the province released a *Climate Preparedness and Adaptation Strategy* in June 2022 outlining actions to take by 2025.³⁵ The strategy describes four key pathways for resilience: strengthen foundations (e.g., collaboration with Indigenous Peoples, data, and education), enhance community climate resilience, foster resilience of species and ecosystems in a changing climate, and advance a climate-ready economy and infrastructure. For each pathway, the strategy describes key actions, such as working with Indigenous Nations and organizations, improving climate data and monitoring, developing a provincial flood strategy, and promoting reliable transportation networks.

In 2020, the report *Prioritizing Actions and Investments for Climate Resiliency in Washington* was delivered to the Washington State Legislature.³⁶ Developed by the Office of Financial Management with input from multiple state agencies with responsibilities for climate resilience, the report provides a list of recommendations to advance Washington's resiliency efforts. These include continuing investments into projects, activities, and programs that increase climate resilience; creating a mechanism for coordinating and reporting on climate resilience needs and progress across agencies; strengthening statutory requirements to incorporate climate resiliency and adaptation into state projects and programs; updating the statewide climate resilience strategy; and prioritizing funding for climate resilience. In 2021, Washington passed landmark legislation, the Climate Commitment Act, setting a declining cap on climate pollution and making major investments in clean energy, clean transportation, and natural climate solutions. A new state investment account is now established for projects that increase resilience to climate change.

In 2021, over 20 state agencies in Oregon came together to develop the *Oregon Climate Change Adaptation Framework*.³⁷ The framework includes three parts: guiding principles, an administrative framework, and climate change adaptation strategies. The guiding principles are to embrace flexibility in the face of climate change uncertainty, recognize that climate change is a stress multiplier, and acknowledge climate change will not be borne equally by all people. The administrative framework calls for an integrated climate change adaptation program, including establishing a multi-agency leadership structure and completing a comprehensive climate change vulnerability assessment. The framework identifies six main themes and related adaptation goals and strategies. For example, under the theme of social relationships, an adaptation strategy is to ensure that the capacity of community-based organizations is growing and ensuring the "most impacted" communities are represented in future decision-making processes.

By statute, California requires an updated climate adaptation strategy every three years. The first strategy report was published in 2009, and successive reports have built on lessons learned and addressed new

³⁵B.C., Climate Preparedness and Adaptation Strategy (2021) <https://www2.gov.bc.ca/gov/content/environment/climate-change/adaptation/cpas>

³⁶WA Office of Financial Management, *Prioritizing Actions and Investments for Climate Resiliency in Washington* (2020) https://ofm.wa.gov/sites/default/files/public/publications/OFM-Climate-Resiliency-Report-2020_0.pdf.

³⁷ Oregon Department of Land Conservation and Development, 2021 State Agency Climate Change Adaptation Framework https://www.oregon.gov/lcd/CL/Documents/2021_CLIMATE_CHANGE_ADAPTATION_FRAMEWORKandBlueprint.pdf.

challenges brought about by the intensifying climate crisis. In 2021 California published the most recent **California Climate Adaptation Strategy**.³⁸ It focuses on six priorities to promote climate resilience, including building a climate resilient economy, strengthening protections for climate vulnerable communities, and making decisions based on the best available climate science. Each priority is broken down into goals and action items. For the priority of building a climate-resilient economy, for example, a goal is to improve understanding of how future climate change events may impact the state’s economy. A related action is to assess the financial costs of sea-level rise on coastal communities.

Across the Pacific Coast region, many local governments have climate preparedness and resilience plans that address areas such as climate resilient infrastructure and buildings, healthy and vigorous natural areas and green space, connected and prepared communities, coastal preparedness, and racial equity and justice plans and programs. To lead and coordinate their resilience work, cities are investing in targeted programs and dedicated staff, including Chief Resilience Officers in Los Angeles, Oakland, San Francisco, and Vancouver. Los Angeles has also created a Chief Heat Officer position to support cross-departmental coordination on extreme heat with a focus on prioritizing those communities most vulnerable to the effects, including low-income communities of color. As all levels of government mobilize to respond to climate risks, strong collaboration across agencies and levels of government is crucial for the region to move toward a more resilient future.

WHAT WILL IT TAKE?

PCC states and cities are working toward a more resilient future, but more is needed to fill gaps in investment, ensure effective governance, expand collaboration, and increase understanding. What research will fill gaps in our understanding and inform necessary climate resiliency actions? How can we effectively consult and collaborate to determine what types of investments are needed? It is critical that governments, investors, and scientists all work together with underrepresented voices in the community so that valuable efforts can be set into place.

Fill the Investment Gap

Building resilience to a changing climate requires adequate resources. The current approach of project-by-project funding often just addresses short-term needs and is too fragmented. Instead, we need a holistic look at all public investments to ensure they are compatible with a resilient future. Specific support should be provided to those communities most vulnerable who will face a disproportionate amount of the consequences of inaction so that they are able to actively engage in decision-making. These are often people of color and Indigenous communities. While government funding should be leading many resilience programs, the costs should also be shared with the private sector. This funding should focus on restoration of healthy natural systems that provide multiple benefits, as well as prevention strategies, such as the California Heat Assessment Tool (CHAT), which acts as a “heat warning system” to prevent heat-related mortalities.³⁹

³⁸2021 California Climate Adaptation Strategy: Priorities, Goals, and Actions <https://climateresilience.ca.gov/> https://climateresilience.ca.gov/overview/docs/20220404-CAS_Priorities_Goals_Actions.pdf.

³⁹ CA Changing Climate 2018, A Summary of Key Findings from California’s Fourth Climate Change Assessment https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf.

Ensure Effective Governance

A strong, cohesive leadership team is needed to tackle climate resilience. California, for example, has established a cabinet-level lead for state resilience efforts. Other PCC members have established formal and informal interagency coordination mechanisms, but they lack clear high-level leadership and resources for a comprehensive approach to climate resilience. Effective governance must also build collaborations beyond state and provincial agencies to engage important partners such as Tribes and Indigenous Nations, neighborhood leaders, non-governmental entities, and private stakeholders.

Fill Gaps in Understanding

We need to continue our investments in region-specific climate science and monitoring. Long-term monitoring of trends is invaluable to advancing resiliency efforts and aiding decision making for climate strategies related to management of water, wildlife, wildfire, reforestation, and ecosystems. Monitoring can help us understand which strategies and actions are most effective at building resilience. We also need to invest in improving access to climate data and increase training at all levels of government on how to use this data to plan for future climate change, assess risks, and inform planning and management actions. Promising data collection and monitoring initiatives are already underway in the region. This includes British Columbia's recently launched Future Forest Ecosystems Centre (FFEC), which aims to integrate global climate model simulations with ecosystem knowledge to produce long-term forecasts of the drivers of ecological disruption. It also includes Vancouver's climate and health vulnerability mapping project which maps certain communities' exposure, sensitivity, and adaptive capacity to high temperatures, wildfire smoke, flooding, and ground level ozone.⁴⁰ Another example is California's investment in the USGS Coastal Storm Modeling System (CoSMoS). This tool aids in assessing impacts from sea level rise and coastal storms on shorelines and the surrounding communities and allows for the modeling of different scenarios.⁴¹

INDIGENOUS KNOWLEDGE

A strong scientific base of understanding must be formed that reflects diverse thoughts/voices and which values Indigenous knowledge. Indigenous knowledge belongs to Tribal and Indigenous Nations, and it is their right to decide whether, when, and how to share it. An example of this is the Indigenous Climate Hub in Canada, which was developed by and for Indigenous Peoples. The Climate Hub acts as a platform where climate change stories and experiences can be shared. It also improves Indigenous Peoples access to different resources and tools that can be used for adapting to and monitoring of climate change.

It is vital to include Tribes and Indigenous Nations in the process to co-design and inform actions taken. An example of important Tribal inclusion comes from California where the Karuk Tribe and the Klamath entered into a Memorandum of Understanding (MOU) with the Forest Service. This MOU established a framework in which they work together to identify, plan, and conduct projects at Six Rivers National Forest. These projects are meant to benefit the Tribal communities, foster economic development, contribute to watershed restoration, and yield job opportunities.

Sources: California's Fourth Climate Change Assessment: Statewide Summary Report (2018) https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

IISD, Toward a National Adaptation Strategy for Canada: Key insights from global peers (2021) <https://www.iisd.org/system/files/2021-06/national-adaptation-strategy-canada.pdf>.

⁴⁰ Vancouver Coastal Health, Community Health and Climate Change <https://storymaps.arcgis.com/stories/7bf7141bb6fd41fb9b61a02cfbc61ecd>.

⁴¹ California's Fourth Climate Assessment- Statewide Summary Report (2018): https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf.

CALL TO ACTION

The urgency for increased resilience measures in our region is growing. Early investment in resiliency efforts will not only avoid future losses due to predicted natural disasters, but it can also generate positive economic gains and provide social and environmental benefits.⁴² While the impacts of climate change can be felt by everyone, there are communities that will experience greater impacts due to factors such as race, age, income level, employment, and gender. Establishing a just and equitable approach to tackle this issue is essential. Effectively increasing climate resilience will require adequate resources and funding, and strong leadership support from city, state, provincial, and federal governments. The work to prepare our region for the changing future is underway. Now is the time to solidify governance structures and funding mechanisms and establish collaborative decision-making processes that keep us moving toward a more resilient future.

⁴² B.C., Draft Principles to Guide the Province of B.C.'s work on Climate Preparedness and Adaptation <https://engage.gov.bc.ca/app/uploads/sites/568/2021/06/Draft-Guiding-Principles-Climate-Preparedness-and-Adaptation.pdf>.