Climate change is already reshaping PNW shorelines: Tribal nations are showing how to adapt

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Credit: Unsplash/CC0 Public Domain

Keeley Chiasson plodded through the steep, sandy sediment near the base of the bluff. Carefully perched on a firm shelf, she scraped back the weathered surface of the wall, revealing stripes of cocoa, rust and tan sediments.

These layers may reveal clues about the history of this place and could inform communities here on how to adapt to a changing climate.

When factoring in variables including groundwater, wave action, material strength and vegetation cover, Chiasson and other researchers can unearth answers to how quickly a rising sea and stronger storm surges will gnaw away at these coastal bluffs.

Chiasson is surveying bluffs from the shores where shellfish spout water from the soft muck and homes and other infrastructure loom nearby. She hopes to help track short-term change across seasons, and collect geological data to model possible future erosion.

Tribal nations along the coasts of Washington and Oregon are navigating impacts ranging from ocean warming and acidification, which threaten culturally and economically important fisheries, to increased coastal flooding and erosion from sea level rise and storm surges.

The work at Tulalip illustrates how tribal nations are leading regional efforts to complete a challenging task: overcoming the worst effects of human-caused climate change.

Tribes in the Lower 48 states need about $1.9 billion over the next half-century for infrastructure needs related to climate change, according to estimates provided in a 2020 report by the Bureau of Indian Affairs. But coastal tribes in the Pacific Northwest often hit bureaucratic hurdles to access the money, workforce and collaboration needed to adapt, according to a new report by the Northwest Climate Resilience Collaborative.

The effects of climate change are most acutely felt in Indigenous communities, with roots that run thousands of years and generations deep in the land; those on the coast are particularly vulnerable.

"A lot of the people that live in these places that we're talking about are tribal members," said Ryan Miller, a citizen of the Tulalip Tribes and the Tulalip Tribes' director of treaty rights and government affairs. "It's not that we want to go kick everybody out of their houses, but we have to find a balance."

"Changes have to be made."

What does it take to move a village

The courthouse, community center, store, post office and dozens of homes in Quinault's lower village of Taholah were flooded within minutes when the ocean breached the seawall several winters ago.

At the confluence of the Quinault River and Pacific Ocean, the village had already begun to experience the effects of sea level rise and intense storm surges that caused flooding and landslides in early 2014 and again in 2015.

Some coastal tribes in the Pacific Northwest have uprooted entire villages to move to higher ground.

Cape Shoalwater, for example, has been losing about 100 to 130 feet of land per year for the last century, Shoalwater Bay Chair Quintin Swanson said earlier this year. Relentless winter storms forced the relocation of a cemetery and have claimed a schoolhouse, a lighthouse, a Grange Hall, a Coast Guard station, a clam cannery, homes and close to 2 miles of land.

A federal report has predicted seas will rise 10 to 12 inches by 2050. For Quinault Nation's village of Taholah, the sea could rise as much as 2 feet by 2100, according to research by the University of Washington.

Quinault drew up a master plan about a decade ago that has been guiding relocation efforts. To move Taholah alone, it would cost at least $424 million, according to preliminary estimates.

So far, the new village, about 120 feet above sea level, includes a community center offering elder and child care and other services, sewer systems and roads. Building residential housing and relocating families is up next.

Quinault also plans to relocate the village of Queets.

For Quinault, the challenges have been that the priorities of funders don't always fit well with those of tribal communities, in timing, amount of funding and purpose, said Gary Morishima, the nation's natural resources technical adviser.

Quinault recently received $13 million from the state's Climate Commitment Act for five projects to help move the two villages.

Even with historic funding, including from federal sources, a significant gap remains.

The Bureau of Indian Affairs estimated in 2020 that of the nearly $13 billion in federally appropriated resources for infrastructure retrofit and improvement, $500 million was designated exclusively for tribes.

These issues were among those highlighted in the new report by the Northwest Climate Resilience Collaborative. The collaborative is led by the Affiliated Tribes of Northwest Indians and the University of Washington Climate Impacts Group, with partners Washington Sea Grant and Western Washington University.

The team held listening sessions with 13 tribes along the Pacific Coast of

Oregon and Washington, and the Salish Sea.

Participants shared challenges in recruiting and retaining adequate staffing due to their remote locations and a lack of local affordable housing, as well as time-consuming grant writing and reporting, sometimes with no dedicated position.

"We're trying to piecemeal all these different grants together," Jamie Judkins, a citizen of the Shoalwater Bay Indian Tribe, said in one listening session.

The collaborative's five-year project aims to identify and address systemic inequities and other barriers to tribal nations' ability to adapt to climate change.

"They're not dealing with climate change alone," said Meade Krosby, a senior scientist at the University of Washington Climate Impacts Group and a co-author of the report. "They're dealing with it in the context of hundreds of years of inequities and injustices from colonization. We're not going to fix all of it with this project."

The report released this month is intended to lay the groundwork for potential policy solutions that can be proposed to the federal government.

Central to the issues shared in the report is the federal government fulfilling its trust responsibility to tribes.

"If the federal government had just done that from the beginning, we wouldn't be experiencing the climate crisis and the environmental crisis that we are," said Amelia Marchand, a citizen of the Colville Confederated Tribes and the senior tribal climate resilience liaison at the Affiliated Tribes of Northwest Indians and the Northwest Climate

Adaptation Science Center, and a co-author on the report.

Carrying on the work

There's a diversity of hazards associated with future climate impacts on Tulalip neighborhoods, said Lucas Rabins, a marine ecologist for the Tulalip Tribes. Homes atop a bluff or the shellfish below may be affected by increased erosion. In low-lying areas, storm surges and coastal flooding threaten.

Tulalip has identified Priest Point, Tulare Beach, Tulalip Shores, Tulalip Bay and Mission Beach as high risk areas. These places are important to both humans and marine life.

"We're so close to the land we're not only seeing the climate impacts within our community with our people, but we're also seeing it in the environment, we're seeing it with the clams, the shellfish, the trees and especially with the salmon," said Aaron Jones, interim natural and cultural resources director and a citizen of the Tulalip Tribes.

Some tidal flats along the coastline are rich with rockweed, sea-lettuce and flowy eelgrass, which support an array of life, from tiny snails lugging their shells up and down the grassy green blades to the silvery forage fish that feed salmon.

Butter, horse and littleneck clams, as well as the invasive Varnish clam, grow in the soft muck.

Peering through a laser range finder, Chiasson called out "base of bluff" and a series of measurements the device showed her alongside some of her visual observations. Max Lundquist, a marine biologist for the Tulalip Tribes, quickly scribbled them down.

As the researchers migrated down the shore, Lundquist grabbed some of the silty sand that sloughed off the walls, or chipped away at firm clays and other sediments to help further identify what glacial deposit it might be from, and the potential strength of the materials.

There are several studies happening in tandem, all beginning with a partnership between the Tulalip Tribes and the U.S. Geological Survey dating back a decade.

Chiasson is gathering information about the strength or erodability of these bluffs and their sediments to plug into an existing USGS model.

Meanwhile, Rabins has been flying a drone to build a 3D model that can be used to track changes in the bluffs over time with repeat surveys.

Rabins is also looking at the abundance of clams, which the USGS and Tulalip Tribes will use to model habitat sustainability and how increased erosion might affect clams and other culturally and economically important species, like Dungeness crab.

USGS modeling has shown sea level rise in Puget Sound of between 0.5 and 1 meter could double the rates of erosion of coastal bluffs.

Tulalip and other tribal nations across the Pacific Northwest have developed climate solutions rooted in nature.

Once all of the data Chiasson and others are collecting is in hand, USGS will work with Tulalip to determine how its proposed nature-based solutions could mitigate impacts to people and ecosystems.

This might look like anchoring large logs on the beach to disrupt the wave energy without completely blocking it.

Researchers will also model how things like kelp rafts, clam gardens or oyster reefs could help disrupt wave energy to improve habitat and protect homes.

"It's crucial to be involved in climate work to continue to protect and restore these treaty resources that our ancestors made such big sacrifices to make sure would be there for us into perpetuity," said Miller. "We're uniquely positioned as well to be able to carry that work and that message forward."

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