The Planet, 2019, Fall

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DEAR READER,

Many of us have sat dutifully under desks for school earthquake drills, or lined up on playgrounds for fire drills. This is often where our preparation ends. We are familiar with the ideas of earthquakes, wildland fires, and floods. The news reminds us of the devastation caused by these events with increasing regularity. Yet we are still willing to bet they won’t affect us.

Perhaps the greatest tragedy of disaster is that we have the ability to minimize its impacts, but we often fail to prioritize mitigation before it’s too late. You may notice that the term “natural disaster” is absent from this magazine, except when surrounded by quotation marks. Ascribing disasters as natural absolves the people and processes responsible for designing our societies in a way that makes us vulnerable to hazards.

In this magazine, our team set out to examine disaster in all of its facets, from prevention to response and recovery. Within these pages, you will be introduced to curious canines with an unmatched penchant for a good game of hide-and-seek, whether the objective is to find treats or people. You will stand with the protestors of Canada’s Trans Mountain pipeline as they fight to protect their land and heritage. You will even witness the aftermath of the Oso landslide, and walk alongside a community still on the path to recovery.

These are stories of hope. Stories of strength.

With an ever-growing population and a changing climate, we must find ways to coexist with the hazards inherent to our environment. Simple tasks such as having an evacuation plan, getting to know neighbors, and keeping a supply kit in your car and home can be lifesaving. But ultimately, change is needed on a broader scale.

We must confront the unnatural aspects of disaster, recognize where responsibility lies, and demand that our leaders make equitable and proactive disaster policies.

Emily Dietzel
Editor-in-Chief
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ON THE COVER
Disasters are terrifying to think about and hard to imagine. However, preparing for a disaster with an emergency kit can be the difference between life and death. The equipment photographed are only a few of the necessary items to keep close. This image was taken at Boulevard Park in the woods by the railroad track, and takes advantage of the natural sunlight and shadows present there.

PHOTOGRAPH BY EMILY PORTER
Muddy trails slosh beneath boot-clad feet in Issaquah, Washington’s Cougar Mountain Regional Wildland Park, as rain drips down from the trees. A lone woman huddles, quiet and still, shrouded by darkness and tree branches. Seemingly out of nowhere a German shepherd springs onto the path, triumphantly notifying its handler of the woman’s presence. Moments later, a symphony of lights focus in her direction. The Search and Rescue Canine Unit training is completed, and the German shepherd, Shiloh, is rewarded with words of praise and treats. This time the woman rescued was a volunteer. In a real emergency, the stakes of hide and seek are much higher.

WITH OVER 1,000 MISSIONS since 1996, working as a part of the King County Search Dog (KCS) Unit isn’t just a helpful hobby; it’s a lifestyle. Joan Hitchner, an Operations Leader for KCS, compares it to taking on a part-time job. Trainers and their dogs racked up over 4,000 hours of training in 2018 alone. Dedicating many hours practicing their skills for real-life situations, they seek out those who are lost, both dead and alive.

There are over 5,000 search and rescue volunteers in the state of Washington. They receive up to 600 calls a year about missing persons. These volunteers and their four-legged fellows come together with many agencies to dedicate their time, personal resources and shared compassion to help others experiencing disaster.

As an Operations Leader for the KCS, Josh Gerstman is constantly on call. He and his wife Heather have worked with the unit for the last 22 years. They teach dog trainings around the globe and are now raising their 4th and 5th search and rescue dogs.

“If your life isn’t set up in a way that you can’t dedicate almost every weekend to some kind of training, and on top of that being ready to leave a family dinner, or your workplace, or your kid’s soccer game because you’re getting called on a search and rescue mission, this probably isn’t the activity for you,” said Gerstman.
The Gerstmans’ search and rescue dogs, Natick and Oso, are both chocolate Labrador retrievers. They are each about 70 pounds and have an aptitude for finding food just about anywhere. They were bred to possess high energy attitudes and the incessant need to track and find. The energy dogs would normally dedicate to games of catch are channeled into finding humans.

Natick gets his name from Gerstman’s hometown of Natick, Massachusetts. Oso is named in honor of friends and community members the Gerstmans worked alongside.

When the Oso landslide happened in 2014, KCSD was tasked with getting into the mud and recovering the bodies of those unable to escape destruction. Despite extensive training, this disaster posed several challenges the team had not anticipated. Massive amounts of water scrambled scents and entire houses were buried. This made smells of potential corpses almost indistinguishable from other odors.

All training for this kind of work relies on rewarding the dog’s natural ability to track specific scents. A dog’s sense of smell is estimated to be over a thousand times better than a human’s. As much as 30 percent of a dog’s brain is devoted to detecting and understanding what they smell. They can find differences in scent concentration between their two nostrils allowing them to determine the direction of smells.

Once trained in the basic discipline of finding a live person, they can advance to finding dead and decomposing bodies. Strengthening this skill is difficult because of the lack of training material. Gerstman said their team has to get crafty to help the dogs recognize and track these kinds of smells by using anything from hip joints donated from hip replacement surgeries, to placentas offered by new mothers. Using these materials, they familiarize the dogs with the scents to sniff out victims on real missions. But extraordinary circumstances can confound extraordinary senses.
“Honestly I hope we never experience something like Oso ever again,” said Gerstman.
It takes about 2 years to become a certified KCSD team member. There are currently 26 active members and 19 working dogs. King County Search Dogs are one part of the overall effort of King County Search and Rescue.

Not every mission calls for dogs, but when needed they play a valuable role in the search operation by ruling out areas where missing individuals are not, and focusing efforts on higher probability areas. The unique smelling capabilities of dogs make them top candidates for the daunting task of retrieving corpses. When someone has just died, their smell changes, a subtle transformation that people cannot detect, but dogs can. Whether recently fallen or 20 years dead, search and rescue dogs sniff out those who can no longer call out for help.

HAYDYN WAGNER is an environmental studies major and an outdoor recreation enthusiast. She constantly seeks new adventures and opportunities to broaden her knowledge about the natural world.

CLAY DINEHART is a business major and photojournalist whose love of the outdoors helps him to use nature to tell complex stories through simple photos.

ABOVE: Training search and rescue dogs to find people depends heavily on their directional sense of smell. Oso is one of many dogs currently pursuing a search and rescue certification.

BELOW: After a hard day of work Oso has his vest removed, signaling that his task is complete. Oso and Natick’s kennels contain fans to cool them on their way home.
First Nations people stand in front of a crowd of thousands on October 25, 2019 to speak out against the expansion of the Trans Mountain Pipeline in Vancouver, British Columbia.

Pink picket signs wave among a crowd of over 10,000 people gathering in front of British Columbia’s Vancouver Art Gallery for the October 2019 climate strike. Cedar George-Parker, a member of the Tsleil-Waututh Nation and Tulalip Nations, who has devoted his youth to fighting the Trans Mountain oil pipeline expansion, stands on the museum steps.

“If we keep this up, it’s going to be death to our planet. It’s going to be death to us,” the 22-year-old warns the crowd.
GEORGE-PARKER’S JOURNEY with the Trans Mountain pipeline began with a promise in 2015, exactly one year after five of his classmates were shot at Marysville–Pilchuck High School in Washington state. After seeing the lack of adequate counseling his peers received, he started questioning why governments were funneling billions of dollars into the oil industry when mental health services were critically underfunded.

“There’s so much bad in the world. Why add to it?” he said.

He vowed to make the world a better place, starting by blocking the proposed pipeline expansion that could threaten a marine ecosystem rich in biological diversity, the Salish Sea. It would nearly triple the oil carried across the Burrard Inlet, where his father’s family has lived for thousands of years. There’s up to an 87 percent chance oil will spill into the inlet in the next 50 years, further threatening its dwindling orca and salmon population, according to the Trans Mountain Assessment Report commissioned by the Tsleil-Waututh Nation. Fighting expansion of the pipeline has taken George-Parker from that Vancouver inlet to the United Nations and beyond.

Under this proposed expansion, the pipeline would increase from transporting 300,000 to 890,000 barrels of oil per day. It will stretch from Edmonton, Alberta to the Burrard Inlet, home to the Tsleil-Waututh Nation. The inlet contains Vancouver’s primary port area, the most active harbor in Canada. It is already experiencing environmental decline due to over harvesting and pollution from industrialization. George-Parker is part of the first generation in his family unable to eat salmon from the inlet or use its water for ceremonies.

“I know what I’m doing is bigger than just me. I put the movement first,” George-Parker said. “I put this first because it’s also part of my culture, sticking up for the land and the people.”

He is not the first member of the George family to fight for the land and the people who call it home. George-Parker’s father, Rueben George, has a history of campaigning against the pipeline, too.

Children like George-Parker’s 9-year-old brother are the reason he fights to protect the land, even when it wears on him. This often means being away from family, sacrificing birthdays and holidays spent together, said George-Parker.

Vancouver lawyer Eugene Kung specializes in environmental justice and pipeline law and is currently working with the Tsleil-Waututh Nation to stop the pipeline expansion. He watched George-Parker grow from a teen wrestling with grief, to a man leading the indigenous fight to protect traditional lands. Kung saw his young friend become grounded in his own identity and spirituality.

“It’s been wonderful to see him grow into a role of doing more public speaking, speaking his own truth and being his authentic self,” Kung said.

The long standing efforts of George-Parker and indigenous communities to protect their land are being echoed by a surge of youth environmentalists striking against climate change. In September 2019, 6 million people around the world flooded the streets during the United Nation’s climate summit to demand greater governmental action, inspired by Swedish 16-year-old Greta Thunberg’s viral climate strike.

“I think it’s beautiful that young people are standing up now because if they don’t, what’s
our future going to look like?” George-Parker said. “It’s not really environmentalism anymore. It’s just saving the world.”

To protect the land, members of the Tsleil-Waututh Nation transitioned from peaceful paddling protests to publishing a 1,200 page assessment detailing the potential effects of the pipeline on their title, rights, and interests. In March 2018, about 10,000 people followed members of the Nation to build the Kwekwecnewtxw, or “a place to watch from”. The single story wooden structure, reminiscent of a house, is used to watch over pipeline activity.

Since 1953, oil has flowed through the Trans Mountain Pipeline, occasionally escaping its confines. Kinder Morgan, the company that owns the pipeline, has reported a total of 84 spills originating from the system since 1961.

People assume if the pipeline expansion gets completed then the protests have not been successful, said David Tindall, a sociology professor at the University of British Columbia. But he predicts it will still have an impact.

“Because there’s been so much pressure and resistance in the pipeline,” Tindall said, “I think it’s much less likely that new projects of this scale will proceed.”

George-Parker lead one of Vancouver’s biggest climate marches along with Greta Thunberg in 2019 and stood up to Justin Trudeau - all before his 23rd birthday. But for George-Parker, the most outstanding memory is the sunny day of Aug. 30, 2018. On that day, the Tsleil-Waututh Nation received word that the Federal Court of Appeals ruled in favor of ending the pipeline’s construction, citing the Canadian government’s insufficient consultation with indigenous groups.

“So much time I spent on this, how much I missed out on being young, how much I missed out on family. I cried,” George-Parker said.

The pipeline expansion was reapproved by the Canadian government in June 2019, contrasting the national climate emergency they declared just the day before. September brought another turning point in the national debate. Six First Nations, including the Tsleil-Waututh, are appealing the approval in the Federal Court of Appeals. After George-Parker’s four-year battle against the pipeline, the future remains as murky as the oil that would run through it.

Fighting for generations to come, George-Parker stood on the museum steps with members of the Tsleil-Waututh, Squamish, Musqueam and other First Nations as youth asked government leaders to protect the air and water for their future. After speaking, he took his place at the front of the march alongside other indigenous activists, leading participants through downtown Vancouver.

“No matter how much I’ve traveled, I couldn’t wait to get home to my culture. I love my culture and I love my people and I love my land,” George-Parker said. “I’m not going anywhere. We will fight and we won’t stop.”

GRACE MCCARTHY is a senior journalism student using storytelling to encourage conversation about environmental issues.

SADIE SULLIVAN is a senior at Western who is majoring in studio art and concentrating in photography.
As an undergraduate at Western Washington University in the late 1990s, Brian Gouran often sat at the highest story of the Viking Union, gazing down at the happenings of the Georgia-Pacific pulp and tissue plant. He would go there during his lunch breaks, intrigued by the industry on Bellingham’s waterfront, before heading off to his next class.

“It was just a beehive of activity,” he said.

Now, Gouran is the director of environmental programs for the Port of Bellingham. He watched the evolution of the waterfront from its industrial past to the demolition of the Georgia-Pacific facility, and is now promoting environmental cleanup and redevelopment of the area for the Port.

The waterfront district is entirely composed of filled-in tidelands. It wasn’t land until the 1950s, according to Pete Stelling, associate professor of geology at Western Washington University. Georgia-Pacific wanted to build their pulp and tissue mill close to the water, where they stored their lumber. Using a boat with a hose attached, the company filled in the tidelands with mud from beyond the shoreline, tamped it flat, covered it with cement and constructed buildings for their processing plant. The entire port area is “built up on bay mud which has not been well consolidated,” said Stelling.

Because mud was used to fill in the area, there is an abundance of water beneath the cement surface. If the ground vibrates, the water will separate from the grains and move to the surface as the mud and clay particles sink.

“When there’s too much water at the surface, it just turns to soup,” Stelling said.

When Georgia-Pacific was filling in the waterfront area, they did not build a retaining wall around the perimeter. If the ground liquifies, the material under the cement could spill out into the bay, said Stelling.

In 1989, San Francisco’s waterfront liquefied following the Loma Prieta earthquake. Much like Bellingham’s waterfront, San Francisco’s tidelands were artificially filled with sand and mud. The cost of damage from the Loma Prieta earthquake totaled almost $6 billion. Liquefaction damage was responsible for over $99 million,
In the event of an earthquake, the water and soil will separate and no longer support building foundations, if left unchecked by soil densification.

The unsupported structures will sink into the slurry and be damaged. (Illustrations by Willow Cook)
Over the past few decades, Gouran has witnessed the waterfront change significantly since his time at Western. Further changes, be they liquid or solid, are only just beginning.

ABOVE (Photo illustration): Brian Gouran, director of environmental programs at the Port of Bellingham, has big plans for the development of the waterfront. He is working on issues underneath the surface, including the area’s high risk of liquefaction.

MADDIE SMITH is a senior pursuing a degree in environmental journalism. She is particularly interested in water issues and environmental justice.

JASON JAMES is visual journalism major and English minor, born and raised in Jacksonville, Florida, who loves the outdoors and plans to be a photojournalist.

According to a U.S. Geological Survey report, on a map of liquefaction risk in Washington state, created by the state’s Department of Natural Resources, the waterfront stands out in stark red, separating it from the low-risk yellows and greens of surrounding areas. Gouran said the Port is aware of liquefaction hazards, and every development project on the waterfront will go through a site-specific geotechnical analysis. GeoEngineers Incorporated have already conducted a study on the land now home to the All American Marine facility on the waterfront off Roeder Avenue.

Geologists determined soil densification was needed, a process which squeezes the soil together until it condenses, making the ground solid enough to build on. Like a machine crushing an aluminum can, air is removed until the material is tightly condensed. Workers drilled holes in the site, pounding rocks into the soil with a hollow tube attached to a drill. They repeated this process, overlapping back and forth throughout the entire site. Geotechnical studies like the one conducted for the All American Marine facility will be done for each waterfront location before developers are allowed to build, said Gouran.

The site just south of the downtown waterfront is still in the process of cleanup, an area historically occupied by Georgia-Pacific’s chlorine plant. One of the chemicals used at the former plant was mercury, which is highly volatile, making the cleanup process extensive. The Port capped most of the site with concrete but that does not mean it’s entirely safe. Capping the sediment minimizes hazards associated with mercury contamination. However, in the event of an earthquake the mercury could be disturbed from the sediment, according to Stelling.

As for the downtown waterfront area, cleanup is complete and development is underway. The recently constructed Waypoint Park is now home to Bellingham’s iconic Acid Ball. The giant metal ball was originally used by Georgia-Pacific to process wood, but now serves as an artistic reminder of the city’s industrial legacy.

The waterfront’s development goal is to provide more housing to Bellingham’s increasing population without contributing to urban sprawl. Developers are planning three residential buildings adjacent to Waypoint Park. The buildings will contain 94 residential units, which would aid the pressing need for new residential housing units city-wide. Other areas around Bellingham could be developed, but the waterfront district is highly desirable.

“The waterfront has always been the obvious choice because it’s right downtown,” said Nicholas Zaferatos, a professor of urban planning at Western and former member of Bellingham’s Planning Commission.

The project is also an opportunity for community partnerships. In collaboration with the nearby university, the Port developed a plan for the waterfront called Western Crossing.

Western Crossing’s goal is “to provide opportunities for learning that go beyond the classroom in a really attractive place in our city,” said Donna Gibbs, vice president of university relations and marketing, and liaison for Western in the partnership. Although plans for Western Crossing are still loose, the university hopes to integrate student research into the project.

Below: Bellingham’s waterfront plays a key role in local commerce, accommodating barges which ship heavy logs, and containers full of merchandise. If the waterfront were to collapse, local aquatic industry and transportation would be impacted.
Driving east on Highway 542, the town of Glacier, Washington winks by as the road twists through the foothills of Mount Baker. In the same crisp breath, the cozy collection of ski shops and eateries nestled into the damp, ferny forest wish adventurers well on their journey into the Mount Baker-Snoqualmie National Forest. Glacier settles into a valley that pours from Mount Baker’s side; the glowing face of its slopes are a deceptively friendly sight. Mount Baker isn’t always serene, but as an active volcano operating on geological time, its volatile nature is nearly invisible to human eyes.
**“THERE’S NO HISTORY of it, you know?”** said Sonya Buckner at the Mt. Baker Visitor Center in Maple Falls, “Your grandparents can’t say ‘Yeah, I was around when it erupted back then.’”

Mount Baker’s last eruption was over 6,500 years ago, and people living in the mountain’s shadow find that distance pretty comfortable. The common inconveniences of living remotely, such as being snowed in, are more concerning to residents than the possibility of an eruption. If the recent grumbling within the belly of Baker is any indication of an impending eruption, then the communities along these valleys have cause for concern. The U.S. Geological Survey and Whatcom County Division of Emergency Management are working together to prepare for a major event should the volcano reawaken.

In 1975, an unusual increase in heat emanating from Sherman Crater near the mountain’s summit alerted experts. This unrest was preceded by a steam explosion from the crater just about a century earlier in 1843.

“That’s a complicated message,” said U.S. Geological Survey Principal Seismologist Seth Moran. “Because on the one hand, you say, well Mt. Baker last erupted 6,700 years ago, so that’s a long time frame to keep in mind, but it’s also true that we know of these two instances in which it was restless.”

Mount Baker hasn’t fallen back into a peaceful slumber, and experts with the U.S. Geological Survey say residents should anticipate seeing more agitation, like steam explosions, within their lifetime. The most dramatic potential activity is an actual eruption, like the one that released lahar flows and ravaged the valleys of Whatcom and Skagit Counties over 6,500 years ago. Lahars are dense mudflows generated by the heat of an eruption, which melt ice and snow atop mountains and send debris cascading down the slopes. Considering the scars the flows left behind thousands of years ago, lahars are the experts’ primary concern. The U.S. Geological Survey measured the depth of lahar flows at over 30 meters near the middle fork of the Nooksack River, and at about 18 meters in Deming, Washington.

Moran is adamant that functioning equipment is essential in ensuring the safety of the 12,500 people directly endangered by Baker’s volcanic activity. The seismic monitoring equipment stationed at two locations on the mountain is expected to provide scientists with weeks, if not months, of fair warning should Mt. Baker threaten to blow. Although the ramifications of Baker’s expected eruption are high, residents would have ample time to evacuate the 16 kilometer radius.

The threat of a potential eruption doesn’t seem to phase those living under the shadow of Baker, such as Nai’i LeDain, who works at the Wake n’ Bakery cafe in Glacier.

“I feel like everyone kind of knows,” said LeDain. “There’s not volcanic action happening every day, so I think it’s kind of in the back of people’s minds mostly.”

John Gargett, the Deputy Director of Whatcom County Division of Emergency Management, sympathizes with the tension between caution and keeping a cool head. Gargett works in concert with the U.S. Geological Survey to organize agencies across 30 different jurisdictions in preparation for an eruption.

An eruption producing lahar flows flooding the Nooksack River could devastate the cities and towns along its banks. The cities of Nooksack, Everson and Lynden, as well as the Nooksack Indian Tribe, would feel the brunt of such destruction, but the impacts of an eruption are far more pervasive. People can relocate, but farms, pipelines, roads, and hiking trails can’t.

“I think you can begin to get a feel for the impact it could have on us,” said Gargett. “So we have to make those decisions smartly, we want to make them timely, and we want to ensure we aren’t overreacting in the short term.”

**ABOVE:** Wake n’ Bakery cafe barista, Nai’i LeDain, believes most residents are not worried about the possibility of Mount Baker erupting, because its activity is not readily visible on a daily basis. The bakery is only a 30 minute drive from the volcano, resting within range of lahar flows.

**LEFT:** Access to the Mount Baker Highway could be completely cut off if the volcano were to erupt. When unimpeded, this two lane road is crucial to evacuation efforts.

**ALLYSE SULLIVAN** is an environmental studies student at Huxley College. She enjoys exploring the diverse relationships between the natural world and the people who are a part of it.

**CLAY DINEHART** is a business major and photojournalist whose love of the outdoors helps him to use nature to tell complex stories through simple photos.
The age of the dinosaurs came to a crashing end when a meteor collided with the planet humans call home. The Earth rang like a bell, and a shockwave equal to a magnitude 11 earthquake shook the continents. Smaller animals took shelter underground, while larger animals were buried in the aftermath. A cloud of hot, meteoritic dust radiating from the crash site traveled at 16,000 kmph, raining superheated rock and causing massive electrical storms. There was nowhere to hide from the rain of fire. Just hours earlier, North America was a dinosaur paradise. Now, it’s hell on Earth.

THREE QUARTERS OF ALL SPECIES on Earth may disappear in the upcoming centuries and humanity is to blame. The planet is now in the midst of the 6th mass extinction; of the estimated five to nine million species, 11,000 to 58,000 are likely to be lost annually. This isn’t the first time a large portion of organisms have gone extinct, but now human interference is the culprit. Habitat degradation, the perpetuation of invasive species, and overharvesting are pushing species to the brink of collapse. Over the past 540 million years, Earth has witnessed five mass extinctions. They only occur when the planet loses more than three quarters of its species within a short period of time. Tigers, axolotls, red pandas, and leatherback turtles may soon fall victim to the guillotine of extinction.

While geological timelines show that life can persevere in even the harshest environments, Earth is quickly moving into unprecedented territory. In the 3.5 billion years of biological life on Earth, 99 percent of species have gone extinct. Will humanity join its numbers?
The animals and species of the poles have suffered as global climate temperatures continue to degrade their habitat. An estimated 35,000 square kilometers of sea ice has melted every year since 1979; which is bigger than the state of Maryland.

The world’s oceans are a vital source of commerce and function that supports human life. Roughly 80 percent of the oxygen in the atmosphere is a direct result of marine plants, and nearly 10 percent of people worldwide depend on fisheries for their livelihood. Yet the overharvesting of fish, ongoing climate change, and the constant introduction of pollutants threatens marine species.

The Amazon rainforest is one of the most diverse habitats on Earth, and it shrinks every year. The rainforests of the world not only provide oxygen, but also medicines. Quinine, found in the bark of trees in South America and Africa, is used to treat malaria. What other discoveries will the world lose as humanity continues to overwhelm its resources?

Common name: Pterosaur (Cretaceous)
HABITAT DEGRADATION
Habitat degradation is the disturbance of habitats due to human activities like the construction of roads, infrastructure, and agriculture. An estimated 40 percent of the Earth’s land surface is now used as cropland. Sixty-four million kilometers of road now divide the world’s ecosystems; enough road to travel to the moon and back over 80 times. The loss of livable area puts more pressure on species to find and compete for increasingly limited resources.

OVERHARVESTING
The human population on Earth is around 7.7 billion. Every person needs to eat, drink, and use commodities like clothing and housing. When people take more out of the environment than nature can reproduce, then entire populations can collapse. The passenger pigeon once darkened the skies of North America, so densely that they could block the sun for days at a time. Their population collapsed when human harvesting overwhelmed their ability to procreate. The last passenger pigeon died in the Cincinnati Zoo over 100 years ago.

INVASIVE SPECIES
Invasive species are able to change a habitat by outcompeting native species. Because evolution occurs slowly and humans travel quickly, a species introduced by humans to a new area can change an ecosystem.

POLLUTION
Pollution is as diverse as human ingenuity. While advancements in industry continue, so too do the discoveries of its consequences in nature. Pesticides like DDT do not dissipate into the environment after being used, but instead reside in the bodies of everything it touches. Plastics swamp the shores of beaches and are found even in the Mariana Trench, 11,000 meters beneath the surface of the Pacific.

CLIMATE CHANGE
Global climate changes slowly over time, allowing species to evolve to compensate for these gradual changes in weather, temperature, and habitat. The 6th mass extinction would not be the first extinction event caused by a quick change in climate. The end-ordovician mass extinction was likely caused by a rapid cooling in the Earth’s temperature. Water levels fell across the globe as water turned to ice, and 85 percent of the world’s species went extinct.

MELISSA BROWNING is a marine ecology pre-major in Huxley, and hopes to study marine life and pet sharks.
In the northwest corner of Washington state, tucked into a bow of the Skagit River, is the small town of Hamilton, with a population just over 300. It is a town that floods with astounding frequency and whose community hasn’t grown in size since the 1900s. Political intrigue and floodwaters flow through the rural town, and everyone’s asking: How can Hamilton stay afloat?

In an effort to create growth in the area and develop affordable homes for community members who want to move out of the floodplain, Joan Cromley, as the mayor of Hamilton, worked in conjunction with environmental nonprofit Forterra, to hatch a plan. Cromley lost her race for a third term as Mayor in November. Now, rumors are leading to confusion and a town divided over what could be a much-needed lifeline.

Hamilton’s history is fraught with flooding. On average, the town floods twice a year. Between 1980 and 2017, Hamilton experienced seven major floods. The Federal Emergency Management Agency has spent $5.4 million on the town during that time as a result of the consistent bombardment by the Skagit River.

Hamiton’s leaders have tried and failed twice to lure residents out of the river’s path with dry, affordable housing. In 1991, the city annexed nearby land outside the flood zone. But the project fell through and the property now sits barren, utilized only as a gravel pit. In their second attempt, homes were built with the promise of relocating residents in 1995. The houses were sold at market rate, and according to Mayor Cromley, not one person from Hamilton could afford to move into them.

Cromley is now betting on a third try, one she says is the town’s best shot, thanks to a partnership with Forterra, a Seattle-based land conservation organization.

“Forterra is a non-profit company with both environmental and community experience, so this is an exceptionally well-skilled partner for this kind of project,” she said.

The new development is a 16-hectare lot located on higher ground. Backers tout its sophisticated environmental design. It will boast an advanced wastewater and sewage treatment system, ample green space, and triple net zero homes. Triple net zero means the homes will produce as much energy and water as they use, and the building materials trap more carbon than is released during the material’s production and transportation process.

To achieve this, the houses will have solar panels and utilize state-of-the-art bio-processors which replace the need for traditional septic systems, taking human waste and converting it into fertilizer and clean water. The
water can then be used in toilets and landscaping irrigation, according to Tobias Levey, Forterra’s Vice President of Real Estate Transactions.

The cost of a home with all these amenities is a concern to many residents. With a median household income of $45,000 in Hamilton, those who want to move may not be able to bear the cost. To ensure Hamilton’s residents can afford to move away from the river and into the new development, Forterra is exploring fresh alternatives.

They are planning to increase philanthropic efforts and provide grants to lower the considerable upfront costs of a down payment. Additionally, they will provide access to a 40-year fixed rate mortgage to lower the monthly payments.

While the idea of an environmentally friendly development and innovative financing may appeal to most people, not everyone is eager to see it come to fruition. The mayor and her supporters see a dry refuge; others fear they will be pressured to leave their homes for a new neighborhood they can’t afford.

Some residents, like Renee Barley, simply don’t want to leave Hamilton. Barley lives on the river but says the flooding isn’t bad where she lives.

“I really care about this town, it’s like an older automobile, it can be fixed,” said Barley.

Carla Vandiver doesn’t want to leave Hamilton either. Vandiver will take over as mayor in January after defeating Cromley in the November election by a vote of 40 to 30. She thinks Forterra and Cromley are conspiring with business tycoon Janicki Industries, a local engineering and manufacturing firm, so Janicki can acquire Hamilton’s land. She also believes they are misleading residents about the affordability of the new homes and are lying about the environment of the new development site, which she believes is a wetland.

Levey and Cromley agree the development site contains a wetland. To maintain the proper buffers needed, only about half of the 16 hectares will eventually be developed.

“Forterra owns it, they’ve already done a wetland analysis, and so they know what buffers they need to have around the wetlands. Forterra is a very environmentally conscious group, and land conservation is actually how they started. So, if anything, they’re hyper-aware of wetlands and their importance,” said Cromley.

Cromley and Forterra chalk the rest of the accusations up to the town’s active rumor mill and lack of understanding about the project. They deny Janicki Industries has any control over the project, and reaffirm Janicki’s interest is purely as an employer. Janicki has more employees than there are residents in Hamilton. A majority of their workforce commutes from Bellingham and has an evident interest in attainable, local housing for their workforce.

“We’re always trying to be a great neighbor to our communities,” said Steven Lynn, Janicki Industries’ Marketing Director.

Cromley regards the allegations as baseless. She and a handful of Forterra representatives held a town hall meeting in an effort to squash the rumors flooding the town. On a gloomy Saturday morning in October, the rain was coming down fiercely on the corner of Petit Street and Hamilton Avenue. Hamilton Town Hall, a little blue and white house with a red brick chimney resting against the façade, was filled with concerned residents. Surrounding the old wooden tables, some residents read questions off crumpled pieces of notebook paper, while others loudly voiced their opposition.

Many of the residents had the same question: Would they be forced to move? The answer was a resounding “No.”

“People can stay in the flood zone for as long as they want, the plan doesn’t call for eminent domain or forced moving, it would literally be illegal,” said Levey. “Giving people more options doesn’t mean they are forced to take them.”

Forterra’s project is slated to continue, regardless of Vandiver’s election to the position of mayor.

Sam Barley Majoring in Public Relations and Double Minor in Business and Entrepreneurship

Jason James

Visual Journalism Major and English Minor, Born and Raised in Jacksonville, Florida, who loves the outdoors and plans to be a photojournalist.
THE LAND THAT WALKS

STORY BY EMILY HILL
PHOTOS BY RACHEL ALEXANDER

It’s a crisp day in late October, 2019 and Highway 530 is quiet and cold. A layer of frost covers the grass while cars zoom by. Rolling hills surround a large field which was once covered in sediment and debris. A gravel path leads to a cluster of cedar trees aligned in three rows. Each tree is dedicated to an individual whose life was lost the day of the Oso landslide. The land is still raw with heartache.
ON MARCH 22ND, 2014, in the small community of Darrington, Washington, a monumental landslide released 16 million metric tons of debris, killing 43 individuals, destroying two Sauk-Suiattle and Stillaguamish tribe cemeteries, and demolishing an entire neighborhood. The Oso mudslide is still known as the most deadly landslide in U.S. history. Five years have passed since that dreadful day and the town is still healing. Moving forward from a disaster is not an easy task and it takes devoted leaders to drive the recovery process forward.

The area is known to have a history of landslides, but nothing of this magnitude. Even some of the local Sauk-Suiattle tribal members call it “the land that walks”.

“It was something that you would never imagine” said Darrington Mayor Dan Rankin, who was with emergency personnel the day of the slide. “We all try to believe that this isn’t going to happen to me. I’m never going to get cancer. I’m not going to have a heart attack. I’m going to live to be a hundred. I’m not going to get in a car wreck. We all believe that those things happen to other people.”

After the mudslide reached its furthest point and the land quieted, the town of Darrington found itself practically isolated from the rest of civilization. A section of debris more than a kilometer wide shut down a portion of highway 530. Phone and internet services were disconnected while the fates of those trapped lay in the hands of the first responders.

“When they showed up down there, the initial responders, all they could see was a bunch of destruction and no more road, so they didn’t even quite understand the scope of what was going on,” said Darrington’s Deputy Fire Chief Drew Bono.

Darrington mayor Dan Rankin does more than run a community of approximately 1,350 people. He stays busy operating a lumber yard and leading relief efforts in the wake of the landslide.
At the time of the slide, Bono was not on the scene; he and a few of his colleagues were on Camano Island for a training academy. As soon as he heard the call, they made their way back to Darrington. Even though he wasn’t at the site, Bono could hear everything going on that day through his radio. When he arrived in Darrington, he was given the task to facilitate communication between the community, swarm of police, firefighters, volunteers and other emergency responders who descended on the scene.

Now, what’s left of the Oso landslide site is an enormous gaping hole on the side of the mountain. Recovering after a disaster such as this is a monumental task.

Bono gained unique insight into disaster management by volunteering with other communities experiencing devastation. After visiting a rural community reeling from disaster in the Florida panhandle, he noticed those in charge were at odds with one another.

“All the city administration could focus on is: ‘How are we going to replace the carpet in our city hall?’” Bono said. “I didn’t quite understand how well [the Darrington] community did until I was able to go see how other places in the United States deal with their versions of the Oso mudslide.”

Landslides are not the only hazard the town takes into account. If the Glacier Peak volcano were to erupt, Darrington would be directly in the path of a lahar flow. For this reason, Rankin’s disaster work now centers on teaching youth about the Pacific Northwest and the environmental hazards that exist within it. Hence the creation of the Glacier Peak Institute just five months after the devastating effects of the landslide. The non-profit institute provides opportunities for youth and young adults in the Darrington area to explore the STEM sciences outside the confines of the classroom.

“Surprisingly enough, when you grow up in Darrington you probably don’t hike, bike, fish, hunt or anything because there really aren’t many connections to that,” said Skye Schillhammer, a local videographer.

Every school year, the Glacier Peak Institute offers its students the opportunity to study salmon in hatcheries, conduct regional bat research and conservation, and develop a waterfront plan for the Sauk River Park 30 minutes south of Darrington, among other activities.

“It’s really the only thing connecting kids in Darrington to the outdoors,” said Schillhammer.

To raise money for the institute, the Kulshan Brewing Company in Bellingham held a showing of the documentary “From Slide to Ride”, created by Schillhammer. The film centers on the brand-new North Mountain bike trails which opened on October 19th 2019 just south of Darrington. Local residents built the trails in the wake of the Oso disaster to encourage outdoor activity and hazard awareness. The room was cozy and faces lit up with joy as people filtered into the small space at the back of the brewery.

“Every time I see this short film I get choked up,” said Rankin.

This was the first time many people had seen the film. Community members from Darrington, Bellingham and everywhere in between were drawn together to remember that world-shattering day in a unique way.

One of the biggest takeaways from that day was that the Darrington community will not let anyone tell them something can’t be done, said Bono.

“I believe that the community has decided that this happened, we can’t dwell on it, we need to move forward.”

As the lights turned back on after the film, the room bubbled with energy. Many in attendance appeared excited about this new frontier for the Darrington community. A sense of loss remains even now, but it is accompanied by something much greater than that: hope.

EMILY HILL is studying archaeology at Western Washington University and is fascinated by the relationship that exists between humans and the earth. She enjoys listening to the stories that people tell to share their own human experiences with the world.

RACHEL ALEXANDER is a photographer and visual journalist based in the Pacific Northwest. She has a passion for the outdoors, adventure, coffee and telling people’s stories through her photos and videos.
ABOVE: Five years down the road to recovery, wooden signs decorate the gate outside of the Oso landslide site as a memorial for the 43 lives lost and still remembered.

RIGHT: Mayor Rankin traces the 15 minute drive from Darrington to the mountain ranges where new mountain biking trails are open for public use. Community members hope the trails will encourage the public to learn about their environment and its hazards.
In the morning, Richard Rodriguez sits in front of his HAM radio, capable of connecting him with people anywhere from his hometown of Anacortes, Washington to Antarctica. HAM radios are a bit bigger than a cell phone with buttons and long, thick antennae. While he usually uses his radios for friendly chats, he and his amateur radio club are prepared to serve their community at a moment’s notice. If disaster struck and phones, laptops and televisions failed, HAM radio operators, like Rodriguez, would be at the forefront of emergency communications.

AT 67, RODRIGUEZ is a licensed HAM radio operator and an active member of the Skagit Amateur Radio Emergency Communications Club (SARECC) in Anacortes, Washington. The club may seem like a gaggle of senior hobbyists playing telephone over the radio, but they are actually preparedness-minded individuals ready to serve their community in a unique way. They are constantly honing and refreshing their radio communications skills so they will be ready when they’re needed most.

HAM radio refers to a portion of radio waves available for public use. It’s kind of like having a personal radio show. While emergency services like the Red Cross and law enforcement have their own radio frequencies to communicate, they would be of little help to the general public if modern infrastructure were to fail. HAMs have access to a variety of frequencies and can act as a segue for their communities and emergency services; they just need a license.

“Obviously, if everything’s up and working and there’s an isolated emergency, a text or a phone call is certainly going to be more efficient than an amateur radio,” said Rodriguez. “But if that’s not working then your choices become more limited.”

Rodriguez explained that HAM radio has existed for over 100 years and proves its usefulness best in emergency communications. For dedicated hobbyists like him, however, using a HAM is part of daily life. Whether going to SARECC club meetings to simulate communication emergencies, or chatting with other local amateurs, Rodriguez has a HAM handy.

“My interest was piqued by my dad, who was also a HAM radio operator,” said Rodriguez. Since the 1950s, his father operated a HAM radio until his death about 20 years ago. Today, Rodriguez uses his father’s call sign, which is a mix of letters and numbers HAMs use to identify each other on the air. If his granddaughter receives her HAM license, he hopes to pass the call sign on to her.

HAM radio fills a gap in the communications system. If something happened to electrical grids or cell towers, Rodriguez said HAM
They’re afraid of a giant earthquake that’s going to take the Seattle side of the mountain and sink it.”

Both Rodriguez and McLaughlin routinely participate in simulated emergencies. During the simulations, HAMs take their radio equipment outdoors and attempt to make as many connections around the world as possible under unfavorable, crisis-like conditions. Operators take their radios off their usual energy sources and power them with solar or battery power instead.

Jim Irving, 67, another member of the SARECC club, said they also do routine exercises called “fox hunts” in which a transmitter is hidden somewhere that interferes with their HAM radio signals. The transmitter makes a high pitched beeping noise over the air. Using their radio skills, members try to find where the radio operators would be essential for helping emergency managers maintain order. Rodriguez recounted a time when modern communication failed him during a political rally at the University of Washington with over 15,000 people present.

“There were so many people on their phones that I couldn’t make a phone call or even get out a text, let alone get online, and that wasn’t an emergency,” Rodriguez said. “So, if you can imagine some type of crisis and everybody trying to get on the phone at once, there just isn’t enough bandwidth to make that a viable option.”

In November of 2018, the club received a grant of $4,800 from the Shell Puget Sound Refinery to put a repeater on top of Mount Eerie. The repeater intercepts radio signals and broadcasts them at greater distances. Jim Irving said the club worked for three years to get the repeater up. It cost them roughly $11,000 in total.

Brenna Clairr O’Tierney, the external relations advisor for Shell Puget Sound Refinery, explained that Shell granted money because the club needed a repeater to fill gaps in emergency communications throughout the region. She said the new repeater allowed for a huge gain in overall signal coverage in the area.

“The community needs reliable coverage during natural disasters such as an earthquake or flood to be able to assist police, fire, hospital personnel and other first responders,” said O’Tierney.

Ed McLaughlin, a HAM radio operator for over 50 years and member of the Washington State Emergency Network from Tri-Cities, Washington, said many HAMs are preparing for when, not if, disaster strikes.

“What we’re preparing for is what they’re calling Cascadia Rising,” McLaughlin said.

There are two types of frequencies used in HAM radio, and both are reliable in the event of a disaster. When broadcasting, radio waves radiate out from the source and can be interrupted by terrain, buildings, and the Earth itself.

**HIGH FREQUENCY**

**VERY HIGH FREQUENCY**

Very high frequency radios are used by radio stations, air traffic controllers, and emergency responders for local communications. The other type of radio is high frequency radio.

High frequency radio waves bounce off the ionosphere and land in different parts of the world, allowing for long distance communications.
Rodriguez knows well the value of such training. During the Loma Prieta earthquake in 1989, he was unable to contact his family in Richmond, California without the use of a HAM.

“I had heard on the news that the Golden Gate Bridge had fallen down, and I could not get a message to them for weeks,” Rodriguez said.

Rodriguez was not yet a licensed HAM operator, but a friend who lived near him in Ohio used his own HAM to contact Rodriguez’ father. Since his father was also a HAM radio operator, he was able to tell Rodriguez that he and his mother were okay.

This was not Rodriguez’ first exposure to HAM, having watched his father operate one in the early 60s. Like him, many operators are getting their start early.

“We’ve got folks in the club that range from 10 to 90,” said Rodriguez.

SARECC member Peter Witheford, 72, lives in Anacortes but is originally from New Zealand. With his dual citizenship, he could operate HAM radios in both countries. Witheford said Americans are lucky to have access to amateur radio because some countries do not allow public access to radio waves. Allowing average citizens to participate in HAM radio is important because enthusiasts evolve with the technology and can better serve their communities with their expertise, Witheford said.

While not the most efficient means of communication for everyday life, U.S. citizens can use their access to radio waves in a crisis. Richard Rodriguez and his compatriots continue to meet regularly for SARECC, using their hobby to bolster emergency management in their community.
House-sized stacks of squished multi-colored metal cans tower in the pouring October rain among Douglas firs and red cedars. Bales of newsprint, plastic bottles, and cardboard patiently wait in the mud, while hundreds of kilograms of garbage lie only meters beneath the surface. Time, money and long hours of hard labor pour, along with the rain, into the creation of these enormous bales. When ready for market, they’ll be transported to distant buyers and given away for nothing. And some days, less than nothing.
DAVID CAMPBELL, the owner of Island Recycling on the southern edge of Whidbey Island, grew up with a desire to do something beneficial for the planet. In a fit of optimism, he quit his job as a mechanic to devote his energy to salvaging local waste for recycling. Campbell established a recycling business operating practically out of his own backyard. The Island Recycling facility now sits on top of a closed landfill tucked to the side of Route 525, on the forested fringe of Freeland, Washington. Campbell said the last four decades running the facility were an enriching learning experience.

But the world’s largest buyer of recycled materials, China, changed its rules in 2018 to reject any imported recycling materials tainted with more than half a percent of trash. American recycling businesses, previously relying on foreign markets, scrambled in panic as they continued to receive recycling with nowhere to send it.

One year prior to the implementation of China’s new “National Sword” policy, the country imported 5 million metric tons of recycling from around the globe. This is equivalent to the weight of the Great Pyramid of Giza with room to spare, or sixteen Empire State Buildings. American recyclers relied on Chinese buyers to take their contaminated, trash-mixed recycling for decades because they lacked the infrastructure to process it in the U.S. With contaminants causing multiple environmental issues and health problems in China, the Chinese government decided to step in.

Plastics imports to Chinese markets alone dropped by 99 percent, according to the country’s General Administration of Customs. For coastal American recyclers dependent on these foreign markets, especially in the Pacific Northwest where contamination rates have reached up to 20 percent, this chaotically flipped the industry on its head. A large majority of recycling centers in the U.S. don’t have the technological capacity, money, time or labor to efficiently sort out contamination. Chinese markets with abundant cheap labor, combined with already available infrastructure, made up for this flaw. Reliance on Chinese markets was economically savvy, and domestic recycling problems were easily forgotten.

Campbell expressed worry about the whole situation, as he stared out into the light drizzle misting the multi-colored rows of tea kettles glued to the roofs of his facility buildings. Employees rushed about the muddy yard in the crisp air, helping residents unload junk out of their vehicles. The sound of a baler pulverizing aluminum cans whirred softly behind the walls of the makeshift breakroom.

“It’s a wash. We don’t get anything for it,” said Campbell. “We used to get paid for every bale we haul and now we give them away.”

The problem facing Campbell is the absence of a domestic market to sell collected plastic and mixed waste paper for a profit. Akin to most counties in Washington state, Island County contracts Campbell’s private firm for their recycling program. The county helps cover the profit losses, keeping Island Recycling afloat.

“If they decide to stop paying for it, we’re going to end up going out of business,” said Campbell.

Multiple communities are faced with the quandary of whether to continue supporting a program that isn’t economically viable, or to drop recycling altogether at an even steeper political cost.

“So, it’s a real sore spot because they’re paying us more now to recycle mixed paper and plastic than they would’ve to landfill it. It’s a moral and ethical dilemma too. You want to keep doing this but at the same time, economics have to be considered,” said Campbell.

China’s departure caused recycling prices

BELOW: David Campbell sits in front of the recycled materials from across Whidbey Island, Washington. Once a profitable business, Island Recycling is now losing money because contaminated recyclables and mixed paper have lost value.
Kevin Moore, CEO of Northwest Recycling in Bellingham, Washington. “Many [recyclers] have stopped taking certain types of materials, many have gone out of business.”

Campbell and others desire to sell their businesses and get out of the industry altogether, but no one is willing to buy their facilities.

“I know a lot of people who would like to sell their businesses. Y’know? They feel like they don’t have a way out,” said Campbell.

Some, including Campbell, are optimistic that the abundance of cheap recycled material will inspire someone to create a processing plant able to turn recyclables into new products.

“We don’t want to be throwing it away,” said Cambell. “We want to see it recycled.”

The scarce handful of recycling buyers in the U.S. now held all the aces knowing that these recycling businesses, with their constant supply of waste, could no longer rely on China to take their contaminated recycling. Recyclers were forced to pay domestic processing plants to rid themselves of stockpiled mixed paper, plastic and cardboard.

Campbell isn’t facing this challenge alone.

“Instead of getting $10 to $20 a ton for mixed paper, we’re now paying $70 a ton, which really increases our cost of operation,” said Richard Neyer, the operations supervisor at the Western Washington University Associated Students Recycling Center.

The competition to find a home for their most worthless recycled materials, such as plastics and mixed paper, is so cutthroat that recyclers keep their buyers top secret.

The probability of building a facility able to accept metropolitan-sized volumes of recycling, is based on the level of risk entrepreneurs are willing to take. No one is willing to spend vast amounts of money on a business venture that does not easily turn a profit.

“It’s a very capital-intensive industry. To set up a recycling facility is very expensive,” said

ZACH GRIFFIN is a Huxley urban planning and sustainable development major, WWU AS Recycle Center Laborer, zero waste advocate, and is passionate in the realms of botany, natural philosophy, and architectural design.

SADIE SULLIVAN is a senior at Western who is majoring in studio art and concentrating in photography.

ABOVE: Island Recycling allows Whidbey Island residents to drop off their recycling for a small price. The facility is now overcrowded with materials because China, the world’s biggest buyer of recyclables, is cutting down on the amount of contaminated materials they will buy.

BEHIND: Cans with paper wrappers attached pile up at Island Recycling. Similar to mixed paper, contaminated cans are not wanted by most buyers, and must be sold at a minimal price, or disposed of at the expense of Island Recycling.
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