SPRING 2019

SAGE

A PUBLICATION *at the* YALE SCHOOL *of* FORESTRY & ENVIRONMENTAL STUDIES

ESCALATION

SAGE

James Beck
Pedasí firefighters help the coastal Pablo Barrios Wildlife Refuge fight back against anthropogenic fire; Photographers without Borders, Proyecto Ecológico Azuero.

STRUGGLING FOR CONTROL

Exposing harsh realities provokes us to rethink our relationship with nature—and with each other.

THE SOCIAL, POLITICAL, CULTURAL, economic, and environmental struggles that we will have to come to terms with in the coming years are inextricably connected.

It's this reality that links the stories in the following pages. It's this reality that allows each piece to build upon the other. It's this reality that will make you feel conflicted, and, perhaps, implicated. It's my hope that you'll find the threads that weave through what might at first seem like disparate narratives and artistic pieces.

The tension is tangible between ecological conservation and economic development in Jack Singer's critique of the natural gas industry and its impacts on Wyoming's rural communities and ecosystems. In Michigan, Sam Corden's photo essay of cormorants of the Great Lakes shows us how nature can fight back, and even overrun ecosystems. In remote Alaska, Lindsay Olsen explores how climate change and the growing aquaculture industry are ruining the livelihoods of small-scale fisherman and threatening the regional culture and economy.

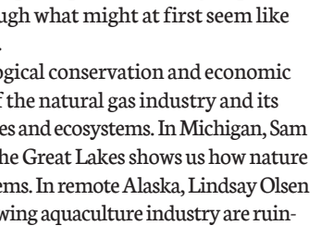
Weaved alongside malicious actors and overwhelming structural forces that harm communities and landscapes, you'll find profound hope and revelation. Ben Soltoff reminds us that the realities of climate change aren't so distant in his intimate portrait of fellow New Haven residents. In Morocco, Ashia Ajani interviews the determined leaders of a women-led bee cooperative and uncovers gender's role in their fight for land and water sovereignty. In a reflection piece about his visit to Ghana, A.J. Hudson visits the lands of his ancestors—forever scarred by the lasting legacies of colonialism—and is forced to reimagine the meaning of home. Thomas Lewton takes us to rural India. There, he details a displaced people's battle against an invasive plant species and how they have turned it into an artistic outlet to share with the world their struggles and calls for coexistence. And vibrant youth activists take on the U.S. government, in Paul Rink's piece, for failing to act to protect the planet for future generations.

From our backyards to remote forests and mountain ranges, those who often feel the least sense of agency, through their determination and action, provide the most hope.

That hope is reflected in the magazine's visual pieces as well. An awe-inspiring photo essay by Matthew Barney tells us of the creation of a monumental sculpture featured in his latest body of work, *Redoubt*, which creatively explores humanity's place in the natural world. And Hannah Habermann's poetry and photography provoke a rethinking of space, place, and our relationship to the natural environment.

Take your time as you read these stories. Listen to the voices. Recognize the diverse perspectives. Consider your relationship to these people and places—and to the systems that attempt to overpower them. Ask yourself how you can elevate the voices of others.

Common values are woven throughout every struggle for control or connection across the globe. Find them. Name them. Share them.



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OUTLOOK

RANCHING FOR NATURAL GAS

A small town's relationship with fracking, ranching, and wildlife in the West's wildest ecosystem.

- **Story by JACK SINGER**
- **Photographs by A.J. HUDSON**

An aerial view of a natural gas pad during a low-flyover of the Pinedale Anticline, Wyoming.

"THE COLD KEEPS THE YUPPIES AWAY."

A local from Pinedale, Wyoming said this to me years ago about the small town located in the sagebrush hills of Wyoming's Upper Green River Basin. Dry winds, persistent snowpack, and sub-zero temperatures dominate the valley for six months each year. Jagged peaks of the Wind River and Wyoming Ranges flank the valley's eastern and western margins, about 75 miles south of Wyoming's famed Jackson Hole. Pinedale, Sublette County, and the Upper Green mark the southern border of the Greater Yellowstone Ecosystem, the largest intact temperate ecosystem in the United States. Pinedale has the scenic beauty of Yellowstone and the Tetons to the North, but none of the fuss and frill.

I arrived to Wyoming in 2016, working for a Nevada-based non-profit and the Wyoming Bureau of Land Management (BLM) as an ecologist. I observed pristine sagebrush ecosystems across Wyoming and Nevada, but the natural magnificence of the Upper Green River Basin stunned me like nowhere else. Gas infrastructure in the Upper Green resembles the local ecology—larger, denser, and with a sheen of grandeur and vigor unmatched in Wyoming's high desert. The Jonah Field and Pinedale Anticline are the crème de la crème of natural gas on public lands, and the sight of them always dismays me.

Pinedale, which had a permanent population of less than 2,000 in 2016, is the largest town and the seat of Sublette County. The densest gas fields on U.S. public land, the Pinedale Anticline and the Jonah Field, are visible from city limits. Managed by the BLM, the 6,500 drilled wells in these fields produce 5 percent of our nation's natural gas. Since the discovery of gas in the 1950s, companies have tried various tactics to extract it, even proposing atomic explosions 10,000 feet belowground. But it wasn't until fracking began in the early 1990s that corporations really profited from Pinedale's buried gas deposits.

Wildlife experts deem the Jonah Field a habitat sacrifice zone; the well pads have replaced any previously viable habitat. Gas companies leased and developed the Pinedale Anticline later, when technology had improved so that wells on the Anticline could be built larger but spaced farther apart to preserve winter habitat for mule deer, pronghorn, elk, and sage grouse. Mitigating habitat damage has been an explicit focus of private industry, federal land managers, and residents involved with planning and advocacy, but the impacts to local wildlife have been devastating nonetheless.

The Grand Mesa Deer Herd, once the largest mule deer herd in the

U.S., spends winters on the Pinedale Anticline a crucial stopover on its 100-mile annual migration. Fifteen years after the rigs appeared, the deer have not fully reoccupied their range. Their population has decreased by 40 percent, a loss of over 3,000 deer. The shrinking herd has raised alarms in local communities, scientific papers, and state government offices, but lawmakers have not yet addressed the issue in legislative policy.

Julia Stuble, a public lands advocate for the Wyoming Outdoor Council, spoke with me about gas development in Pinedale. She told me, "A lot of things about this have sucked. A lot of it could have sucked less," referencing the hardships that residents and ecosystems have endured. Demand for cheap gas, bipartisan federal efforts to dominate global energy, and desperate economic circumstances (increasingly common in rural America) have all influenced Pinedale's natural gas development. Investigating how Pinedale's gas development could have "sucked less" offers lessons for the responsible management of federal lands and resources.

When I began to study Pinedale's brief and intense history with natural gas, I expected to discover a story of good versus evil, in which industry personnel lied openly to me and local environmentalists railed against the greed of fracking companies. Such a story would read well for people like me, who grew up in America's coastal states and condemn fossil fuels while benefiting from them. The colorful cast of characters who call the front lines of these gas fields home know that the truth is more complicated. Their perspectives tell a far more interesting story, and we cannot forget their community when we discuss the ecological catastrophe of Pinedale's gas fields.

A group of elk feeding on one of the Wyoming Game and Fish Elk Feedgrounds near Pinedale. These places are designed to act as refuge to Elk to survive the winter in a landscape that is increasingly developed and lacking natural food sources.

THE PINEDALE ANTICLINE and Jonah Field gas deposits contain 50 trillion cubic feet of natural gas—enough to serve the nation's gas needs for about two years. Just 20 years ago, cattle ranching was the primary form of work. Today, natural gas accounts for nearly half of Sublette County's employment and over 90 percent of its economy. An influx of young men working the gas fields has overwhelmed Sublette County's limited personnel and resources, increasing crime, traffic, and demand for housing and social services. Population has expanded ten-fold since the 1990s, and Pinedale has struggled to maintain its identity amidst the wave of big business that swept over this once-sleepy valley. But growth has not been steady; Pinedale's economy has been tossed around by booms and busts.

The biggest boom came during the early 2000s, when the Jonah Field's well-count increased from around 300 to over 3,000 in under a decade. Then, during the 2008 recession, gas prices plummeted and employment levels in Pinedale followed. Rig workers who had boosted local economies disappeared. Now, residents understand that growth and hardship are equally unpredictable in their small community's big future.

One resident told a local historian that when gas first arrived, "Everybody was asking the same questions: 'How much is it going to be? How many people are coming in?' and no one had the answer." Another said, "One of the biggest frustrations of this whole boom is that it was just so overwhelming. So overwhelming." In exchange for economic benefits, many people feel their cow-town's character was replaced by a boomtown culture full of transient male workers.

Mindi Crabb, Sublette County's Director of the Travel and Tourism Commission, worked during the early 2000s to attract tourism to Pinedale. "Except every hotel and motel room was booked [by gas workers] for months ahead," she told me. For the next few years Hampton, Best Western, and Motel 8 bought up property on Main Street. They built hotels that exceeded the local firefighting capacity, forcing local governments to spend over a million dollars on new trucks and equipment. The chain hotels replaced small businesses and increased temporary housing capacities, but they fell largely out of use during the 2008 recession. Today, year-round vacancies in every hotel—and an indoor water park commemorating a gas company's generosity—serve as bizarre reminders of this rural municipality's rapid change.

Capricious global markets drive the development and termination of gas production, with no mechanism for local shopkeepers or rig workers to know when growth will stagnate. One day, when the gas is gone, the infrastructure will be obsolete and the workers will leave. Already in Pinedale, hundreds of wells have gone out of use; all will eventually follow. Wyoming bears evidence of abandoned mining and drilling at scales that dwarf the East Coast's fossil fuel extraction. Long after the gas fields slow down and close, delicate sagebrush ecosystems will take hundreds of years to recover.

IN THE HAZY background of shiny buildings built during the good times, air quality has declined dramatically in Pinedale's remote valley. Ozone levels have occasionally risen to twice the EPA exposure limit for human health. An unusual mixture of natural condition—persistent snow cover, extreme cold, and high-elevation sunshine, paired with evaporation ponds full of fracking waste—create the perfect environment for ozone production. Sunlight reflects off of snow to react with atmospheric nitrous oxides, the chemical byproducts of extraction that are released from drilling and evaporation ponds. The reactions produce surface-level ozone, which is toxic to humans at low concentrations. If winds die down for a few days, ozone can collect in the valley at dangerous levels.

Ozone spikes are usually associated with hot cities. Rural Wyoming, which has long dealt with fossil fuel extraction, was unprepared to deal with this side effect because scientists had not previously linked fracking to ambient ozone pollution. Locals have endured days when ozone levels are so high that officials advise them to remain indoors. Calls and visits to local clinics for eye and respiratory irritation increase on the days during and after these ozone violations.

I asked Stuble, who has held Pinedale near to her heart for as long as she can remember, about the potential human health impacts from elevated ozone. "A lot of this," Stuble explained to me, her voice laden with the earnest effort it took to refer to Pinedale's myriad changes, "was just error, small mistakes, no parallel to follow...this wasn't some evil people behind closed doors, screwing the people."

Stuble doesn't blame the BLM or local gas operators; for her and other residents, terrible surprises like ozone and sudden economic downturn stem from decisions made by some of the United States' largest and most-profitable corporations. Residents like Julia understand that local employees at the gas pads must work quickly and produce quarterly results, not in an effort to deceive the community, but because they operate within a system that provides heat and energy for millions of Americans. That system values the bottom line first.

When asked why collaboration failed to solve these issues, frustrated community members universally complain that gas operators had too much power. I reached out to Paul Ulrich, Director of Government Affairs for Jonah Energy, the largest gas operator in the area, to hear his perspective. A former Navy SEAL, Paul is clean-cut and fit with the appearance of someone who can manage a gas field and coach the local youth hockey team. Although companies operating on the Jonah Field have merged, gone bankrupt, and changed hands repeatedly, Paul has worked here for over two decades, and he'll remind you of that.

"Our folks on the ground, and I'm here in Pinedale, we care very much about our environment. We recreate here, we live here," he said over the phone. When I asked him about the local ozone problem, he acknowledged the link to natural gas. "Prior to 2005, conventional wisdom said that ozone wouldn't happen in winter, it's exclusively an urban summertime problem. Unfortunately, we proved them wrong."

Ulrich told me that bringing "hun-

dreds of tours, thousands of people, out in the Jonah Field, [was] one of the best things we did, but I'd like to see the industry on a whole adopt a greater sense of transparency." Ulrich, like most natural resource managers, believes that land development and conservation initiatives are most successful when they are guided by science and built on broad community support and input.

But collaboration often requires compromise, which can be difficult for gas operators beholden to shareholders and quarterly gains. Ulrich corroborated Stuble's story, describing how Sublette County has reacted to the ebbs and flows of the market. "When companies are operating on the bottom line, that's a very hard thing to do. Market booms and busts are seriously an issue for us."

I asked Paul what he learned from the past and how he would do better next time. He wasted no time in delivering a well-formulated answer: "Lessons learned: be transparent about what we knew, what we didn't know, and how we were gonna get there."

RESEARCHING THE DECISION process that led to the Jonah Field and Pinedale Anticline eventually took me about five miles up a gravel road, bouncing along the floodplain of the majestic Upper Green River, its banks lined with huge cottonwood trees and dense willow thickets. I stopped briefly at the original homestead cabin of Albert P. Sommers, who built this house—now a National Historic Monument—in 1908. Today his grandson, Albert Sommers, lives on the same property.

Albert is the elected representative of House District 20 of the Wyoming State Legislature, a self-described "legislator, rancher, and conservationist"—three words that seldom apply to one individual. He has become the de facto speaker for Sublette County's old guard of agriculturalists. Until this point, I had only spoken with people whose memories of Pinedale extended to around 1995. I wanted to learn what ranchers, which accounted for Pinedale's entire population and economy until 1990, thought about fracking.

Albert greeted me from his porch as I drove up. He and his wife, Sue, welcomed me into their living room, which faced a beautiful view of the Green River and its Western banks.

Albert has lived in this home all his life, grazing his family's cattle on the property every winter and bringing them up into the Wind River Range each summer. There is no place for him in either the drill-baby-drill or tree-hugger camp. As a cattleman and a statesman, he is deeply beholden to Sublette County's land and economy. His view of environmentalism is complex, patient, and rooted in a worldview that is unique to Wyoming, where land and water are critical, but energy production is omnipresent.

While environmentalists may see Abert—a rancher and Republican lawmaker—as an enemy, sitting down and speaking with him yields a different story.

When Albert spoke of his land, home, and cattle, he choked up, overwhelmed by his love for this landscape. "If you take care of a cow, she will take care of you," a phrase he told me summarizes his land ethic.

Albert and his long-time neighbor were the first ranchers in the area to designate a perpetual conservation easement on their 10,000 acres of property. Ten years ago, when he made the decision, land trusts and easements were vilified in this conservative agriculturalist community. Today, he feels that there is greater understanding among his close friends and neighbors in Sublette County. Albert's easement includes a remarkable gift: 5 miles of public fishing access along the scenic Upper Green River. He wiped away tears when he expounded on the arrangement, telling me that if the American people ever truly need his land, he fears that eminent domain and economic forces would supersede the easement in deference of extraction. Until then, his conservation easement is his single best way to posthumously protect the dearest thing he has ever known: his land.

Albert is tied deeply and personally to this land, and when I asked about gas development, he offered a long-term perspective. "Up at Jonah Field," he told me, "development was too dense, horizontal drilling wasn't there yet." Horizontal drilling allowed gas developers to create fewer wells with less surface disturbance, extracting gas from areas not covered directly by a pad.

"Now when they finally got to the Pinedale Anticline, there was less impact, better spacing, and a remarkable change in reclamation." Where operators once may have built 20 one-acre well pads, modern fracking would instead use three or four well pads, each about three acres. The total disturbed area is similar, but the pattern is more concentrated, creating deeper patches of undisturbed habitat

Reclamation has also changed dramatically since the 1980s. While it was once standard procedure to abandon mines or well pads and move on, companies are now legally bound to remove concrete, replace topsoil, and seed-in native plants. It will still take over one hundred years for sagebrush to return to its former vigor, but reclamation is shortening the recovery timeline.

The Pinedale Anticline—the same habitat that feeds mule deer in winter—has long been an important spring feeding ground for Sublette County's cattle ranchers. After the wells were established and drilling

A stretch of road on Route 191 with the Wind River Range in the background as seen while leaving the Pinedale Anticline.

concluded, ranchers returned to graze their cows among the well pads for a few weeks in early summer. Albert takes an analytical view of these tradeoffs, telling me that "...with energy, we must give up something." In Wyoming, where potential and current revenue for wind, uranium, gas, oil, and coal are higher than almost any other state, residents know these tradeoffs well.

I asked Albert if all the social change has upset the balance of things or changed Pinedale for the worse. "My ag-community, we're kind of tight," he said. "We keep our heads down. As more people move in, we let it roll over us." He pointed out that in many ways, fracking has made the town closer. "When all that money started coming, everybody seemed to go looking for how communities handle this. We looked at mitigation funds in Colorado, the need for increasing social services, infrastructure investment, pulling in resources to offset negative impacts," he said. His wife, Sue, chimed in "People fanned out, and made groups, and showed up for meetings...made a difference."

Albert continued, "I think the community as a whole has probably gained because of the increase to our tax-base. The Pinedale Aquatic Center, senior centers, libraries, $2.6 billion of school improvement, all on the backs of coal and gas."

AS I SPOKE with residents about gas development in Pinedale, it became harder to separate its implications: mule deer decline, community change, and toxic ambient air quality cannot be discussed in isolation. These residents can never step back and consider their home-place as a case study or experiment: it is their life. It falls on the rest of us to learn from this example and improve. As consumers striving to live in a just society, we all owe debt to the communities on the frontlines of energy production. We have to find ways to make this process "suck less."

The Greater Yellowstone Ecosystem cannot be treated as a handful of potential gas fields. Federal land managers must recognize what is at stake. We are losing crucial habitat and the integrity of the longest terrestrial wildlife migration corridor in the lower 48 for a few decades of natural gas. This issue concerns all Americans. The character of wildlife, public lands, and rural livelihoods depend upon our ability to demand more from natural resource professionals.

Public officials and industry personnel should accept the mistakes made here as hard-earned lessons. Energy development can value sentient by creating rigorous timelines to regulate extraction and help communities prepare for change. Natural resource managers must listen to the unique needs of each community that shoulders the burden of energy demand. We should earnestly consider the advice of community stakeholder groups, or better yet, imbue them with decision-making power to enhance their stability.

THE FUTURE OF FISH

Have innovations in the aquaculture industry removed the need for both the fisherman and the sea?

• By LINDSAY OLSEN

IN MY HOMETOWN of Homer, Alaska, fishing is a mainstay of the economy. Each summer thousands of people take to the sea in pursuit of the millions of sockeye salmon that return to spawn in Alaska's cold, nutrient-rich waters. The salmon are caught in nets, and picked out individually by hand. They ride, suspended in chilled water, in the hulls of boats, and are lifted by cranes in large bags that ooze slime. They are gutted, filleted, and deboned by cannery workers. Then, they are shipped around the world. This process is loud and complex. It requires many people trained in a specific knowledge of both mechanical and natural systems—learning that is often passed down through generations. I worked in the commercial fishing industry for 11 years. First, at age 15, on the back deck of my father's boat. Then on boats large and small across the state. Where I grew up, fishing isn't just a job, it's the backbone of a culture.

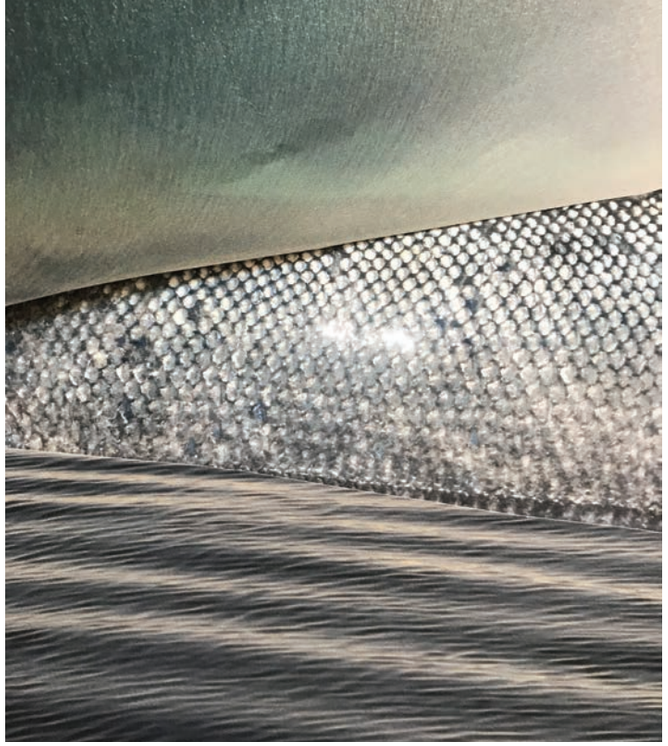
If Alaskan fishermen have one common enemy, it is farmed fish. What makes the aquaculture industry so objectionable is its automated co-opting of a historically human task. In its efficiency, it questions the very necessity of the fisherman's role, threatens to make her job obsolete. Fishermen believe that to grow fish in pens or tanks is to cheat. Bumper stickers read, "Friends don't let friends eat farmed salmon." There is a vehement, deeply ingrained cultural need to prove that a wild-caught fish is tastier, purer, simply better.

IN FLORIDA, an hour south of Miami, the Norwegian aquaculture company Atlantic Sapphire is building a 400,000 square-foot facility to grow Atlantic salmon. They plan to fill their tanks with over 30 million gallons of freshwater extracted from southern Florida's largest aquifer. Using seawater could introduce disease, so instead the company will mix the groundwater with several thousand pounds of salt. To offset the balmy outside air temperature, the entire facility will need to be refrigerated. Salmon are a cold-water species, so the water in the tanks will be chilled to 59 degrees—approximately 30 degrees cooler than the swimmable ocean nearby. Once operational, the company plans to produce 90,000 metric tons of salmon per year, enough to meet 10 percent of the US market demand. Due to Florida's incentivizing tax structure and lax environmental regulations—specifically a statute that allows companies to dispose of industrial waste by injecting it 3,000 feet underground—Atlantic Sapphire has stated that Miami was a perfect fit to launch their U.S. operations. Their fish are advertised as "Made in USA," free from the environmental externalities of ocean farming and the carbon footprint of international airfreight. The company plans to harvest its first crop of land-raised salmon in the summer of 2020.

Atlantic Sapphire is one of only a few aquaculture facilities in the United States employing a new technology called RAS—Recirculating Aquiculture Systems. Unlike traditional aquaculture, which keeps fish in underwater pens in the open ocean, RAS creates an artificial aquatic environment on dry land. It is one of a growing number of strategies engaging with an existential threat to the seafood industry. The FAO reports that one-third of wild global fish stocks are critically overfished. With increased levels of ocean acidification and record high water temperatures, marine ecosystems now remain in a state of chronic stress. The future health of our oceans—and the bounty within them—is no longer clear. Beyond questions of sustainability, wild capture fisheries may also one day cease to be profitable. In response, some companies have begun to ask a bold question: What if our seafood wasn't grown in the sea?

IN NEW ENGLAND, this change is also taking hold. Inside a warehouse in central Connecticut, 300,000 European sea bass are growing in tanks. After 14 months they will be killed silently in a cold-water slurry, packed whole on ice, and delivered to high-end restaurants in Boston and New York City. Ideal Fish, the company growing the sea bass—which they've rebranded under their Italian name branzino—claims that these are "the world's purest fish."

The branzino arrived in Connecticut much like 90 percent of America's seafood: they were flown from abroad. Hatched in France,



the fish are shipped as juveniles. When they arrive in Waterbury—a landlocked town 30 miles from the coast—they are approximately the size of an almond. For four months the fry are kept in quarantine. Ideal Fish doesn't add antibiotics to its feed, a practice widely accepted in aquaculture, so foreign pathogens pose a serious threat. In the wild, the spread of disease is hampered by distance. But in these tight growing conditions, a single virus could wipe out the entire stock. Once vetted, the juveniles are transferred by suction tube to 30-foot tall cement tanks. There, they will live out the remaining 10-12 months of their lives, swimming in circles.

The fish are fed daily with automatic installments of protein-rich meal. Aquaculture is often criticized for the inefficiency of its supply chain—for instance, brine shrimp caught in the Great Salt Lake in Utah are fed to salmon farmed in Norway. Ideal Fish buys its feed from Canada. It is composed of roughly equal parts wild-caught anchovies and discarded fish trimmings, sourced from fisheries around the globe. The company claims it is the most sustainable option available on the market. But despite their 12-million-dollar facility that can recirculate 100,000 gallons of water every 20 minutes, they have yet to fully contain a system—the branzino still rely on ocean protein to grow.

The inside walls of the warehouse are painted blue and decorated with steel cutouts of fish. Without the visual cues, it would be easy to assume the place has nothing to do with fish. The tanks are so tall, you can't see inside. There is no sign of blood or slime. The whole operation is remarkably odor-free. It is also mostly silent. Aside from the soft, mechanized whir of the pumps and filters that deionize and re-oxygenate the water, there is no other noise. The system is completely automated—salinity and oxygen levels can be monitored remotely through an app—requiring only two staff members to be on site at any given time. Otherwise, under fluorescent lights, the fish continue to swim and grow untended. The dead ones are periodically collected by centrifuge and sucked down the drain. In the future, Ideal Fish hopes to grow basil with the waste.

During harvesting, the fish are killed whole and sold guts-in. They arrive at their final destination so quickly that this doesn't sour the flesh. Each tail is tagged with a plastic barcode, allowing any consumer with a smartphone to scan and read the exact time the fish died and the distance it traveled to their dinner plate. This is one of many ways Ideal Fish and companies like it hope to transform American seafood—an industry notorious for its poor traceability. They say this is the future of fish.

OUR WORLD IS changing, and in the North, it's changing fast. The last five years in Alaska have been the warmest on record. Ironically, the oscillation in ocean temperatures has produced record high returns for salmon in Western Alaska. Limited entry permits in Bristol Bay are selling at an all-time high. Anomalies like these make it easier to ignore larger trends: a string of snowless winters, shorelines absent of sea ice. In 2016, hundreds of thousands of sea ducks died from starvation as their prey moved to the deep in search of colder water. Their floating carcasses amassed in tide rips, where they were snagged in gillnets and hauled onboard. Even the most politically conservative fisherman knows the end is coming. Underneath the bluster of denial there is a resignation that climate change threatens this way of life. But when? 10 years? 50?

As our oceans continue to warm and we turn to more mechanized systems of production to procure our food, I find myself conflicted. Yes, the future of food requires innovation and change, but must it also eliminate the parts that make it largely human? Perhaps it's fitting that as the natural world bears the burden of our industrialization, industry born out of wild places should also die. But if there is a lesson to be learned here, it seems unlikely to be housed in a warehouse in Connecticut or Miami. To catch a fish from water is to recreate a timeless human experience. To grow one with pumps and tubes is another thing entirely. In 20 years, there will be nine billion people on the planet. If we continue down our current path of consumption, unhindered and unabashed, I doubt either system can produce enough.

Artwork by Thorey Munro, an architect and commercial fisherman in Bristol Bay, Alaska. Her collage work explores the deep entanglements of bodies, light, time, water, death and life in coastal Alaska. She and the author worked together on her fishing boat, the K2, for many years

Chasing Shadows

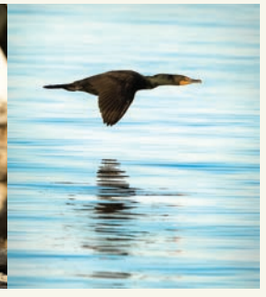
Political tension about declining fisheries is building amid the Great Lakes. Follow a photographer's journey to find one of the most elusive hunters on the water.

• **Story and photographs by SAM CORDEN**

FROM THE BIBLE, to Shakespeare, to fishermen's legend, double-crested cormorants have earned themselves a long-standing and infamous place in human history. The sleek black birds can be found around the world as remarkable adaptors, and voracious hunters of fish. In bountiful times, cormorants were considered by many to signify good luck—an indication that fish were near. But in our current era of fish decline, this centuries-old rivalry between man and bird has escalated to new heights, and the issue of how to deal with them could soon go from the pages of Coriolanus, to the halls of the U.S. Congress.

This past June, I spent a few weeks with Interlochen Public Radio—a Michigan based station that I used to broadcast for—searching for double-crested cormorants around the Great Lakes. We chased the story because for years across the region, people were allowed to kill the birds to help keep fish populations high. But in 2016 the laws changed in favor of the cormorant, and lethal control suddenly became illicit.

Following the new protections, fishermen and women, as well as fish hatcheries, have been battling with cormorant numbers that are back on the rise, and fish numbers that are falling accordingly. Without lethal measures at their disposal, everything from loud boat motors to fireworks have been used to deter the birds from certain areas, but little



thus far has proven adequate. With the decline of fish such as yellow perch, mirroring trends of the cormorant's regrowth, support for lethal measures has come back into vogue—and stridently. It was this battle of opinion—to kill, or not to kill—that led us to report.

Before we began our photographic hunt, our expectations were limited. We had been told all types of stories from people on opposing sides of the issue ranging from why cormorants deserved protection, to why they were an appendage of the devil himself... but nothing topped one of the best conservation tales I've ever heard. The story came from an old vigilante who was tired of the damage inflicted by the birds on his favorite island to hunt. Cormorant feces, high in acidity, has a habit of taking lush vegetation and killing it, reducing once flourishing ecosystems to ecological boneyards. In order to target the cormorants, he introduced male raccoons trapped out of season to ensure that no females were accidentally brought in. The male raccoons eradicated the birds by foraging the eggs, and then with no mates to breed, vanished. A rather ingenious approach to save the trees.

So, with no sure plan of attack, three of us—the director of the station, a friend who offered the use of his dad's old boat, and I—packed up our gear and left in search of the birds. Across the Great Lakes, cormorants choose to nest in remote places near little human activity, but with high spirits and a bit luck, we strode confidently into their domain.

Our first encounter with the birds was along the Les Cheneaux Islands—a chain of 36 islands in the northern reaches of Lake Huron, with an intriguing history of small, charming towns connected only by boat. As we approached one of the islands at dusk, we knew we had found what we were looking for. Even from a distance, we could see the black cloud of birds hovering like locusts above the rocky island ahead. Closing in, camera and $11,000 telephoto-lens in hand, we thought we were in luck, only to find that the slightest notion humans sent the birds flying. After little success and night quickly falling, we made camp on a rocky beach which overlooked the Mackinac Bridge, twinkling miles away. Sprawled around a fire, we discussed the failures and revamped our plan of attack...how to get closer; how to approach smarter.

The next morning, once we had freed our boat that had run ashore with the tide, we went back to the same island but anchored half a mile out. Loaded up with rain gear and my camera bag, I paddled a small, antiquated kayak the rest of the way. In spite of my quiet advance, I was immediately abandoned by the birds yet again. Leaving the kayak, I waded through the shallow waters which moved a bit slower than the open lake, thick with feces and well-nourished algae.

The islands are an interesting venue of cohabitation. Most places that cormorants choose to nest are also home to large numbers of gulls, which are far less skittish and far more protective. In turn, as I walked around the island hoping for cormorants to reappear, I persisted through endless dive-bombs from the gulls and constant shelling of excreta from above.

As the days marched on, we developed a trying relationship with the birds from afar. On one hand, they became our most loathed adversaries that we couldn't catch up to; on the other hand, we had time, we had food, and the birds gave us a reason to continue enjoying our afternoon naps and beers.

Moving south from the Les Cheneaux's, we found better luck in the straits of Mackinac—the region where the upper and lower peninsulas of Michigan lie close to one another. Here, the birds were slightly less elusive, and the weather far more encouraging. We started to capture some shots, giving our efforts a much-needed shot in the arm, but our indifference to the contentious issue remained.

It wasn't until our next stop, 100 miles further south into Lake Michigan, that our individual biases began to take shape. After a night of mosquito-infested camping along another one of Michigan's beautiful sweeping beaches, we found the mothership: The ancient hull of the Francisco Morazan—a Liberian freighter making its way from Chicago to Holland in 1960 that wrecked and became a permanent fixture of the seascape.

The ship wasn't simply a habitat for cormorants and gulls...it was an infestation. The birds could be found perched on every inch of every ledge, and white droppings covered the red-rusted walls of the hull. Nested high above our boat, the colony hardly noticed our presence. Drifting with our engine cut, they let us circle the ship again and again—some birds coming, others going, but the mothers never alarmed to the point of abandoning their nests.

As we made our passes, watching the cormorants in their chosen element for the first time, our collective loyalties began to shift towards those who wanted to put an end to the birds.

From deep within the belly of the ship, a putrid scent enveloped the steel mass, and their guttural moans chilled our spines. The Francisco Morazan, however, was only part of the scene. Standing tall above the vessel, just as our lone vigilante had warned, was the elevated coastline covered in dead trees. Lines of black cormorants sat perched on the lifeless branches, casting a Hitchcock-like guise over the water. Hundreds of nests were scattered about, from which came the seep of acidic feces that put the once-green giants to rest.

Our experience with the ship and proximate shoreline was surreal. Like monkeys reigning over ruins in a lost corner of the jungle, this ship was the birds' domain, and they owned every inch of it. One look at the wreck and it was easy to understand the formidable force that the fishermen and women of the Great Lakes are facing. Cormorants are keen, sizeable, and as it turns out, extremely prolific. With the ability to dive 100 feet and eat up to a pound of fish a day, a decision will have to be made: Will the birds be left to their own devices—or will those who rely on the lakes for their livelihood be allowed to take measures into their own hands?

Although our journey was never intended to spawn any conclusion, it helped us to paint the controversial bird in the light they exist: If you give them an inch, they take an island. If you give them a mast, they take a ship. With control tactics still uncertain and no population decline in sight, one can only guess what the double-crested cormorant may be inspired to take next.

COLONIALISM'S ROOTS RUN DEEP

INDIA'S INDIGENOUS FORESTS are threatened by an aggressively invasive plant species. *Lantana camara* was introduced by the British Empire, along with an ideology in which nature is a resource, and humans are separate from it. Can we forge a new relationship with nature—one based on coexistence?

STORY AND PHOTOGRAPHS BY THOMAS LEWTON

FOR TENS OF KILO-METRES ALONG THE ROADSIDE, DELICATE PINK FLOWERS FLECK

an impenetrable green thicket that rolls out from the forest floor. A few decades ago, the Bandipur Tiger Reserve—a dry deciduous forest in India's Western Ghats—boasted a diversity of flora. But today almost two thirds of the Reserve's ground area is densely carpeted by *Lantana camara*, an invasive plant species from South America

Lantana was introduced into India's urban centres by the British as an ornamental shrub over 200 years ago. The miniature bouquets of colourful flowers that blossom so readily from lantana must have been an exciting discovery to botanists and gardeners alike. But lantana was not only beautiful, and the plant quickly demonstrated its versatility and resilience.

Now, across India, over 13 million hectares of land is occupied by lantana, which has adapted to flourish in a diversity of ecosystems—from the foothills of the Himalayas, to Goa's tropical coastline. Just like the British Empire, lantana quickly found a foothold across the Indian subcontinent.

"It's a huge problem facing our protected areas," says AJT Johnsingh, a veteran ecologist who's studied the reserve's wildlife for decades. "As far as Bandipur is concerned, in another 50 or 100 years' time, we'll have only lantana. All other tree species will die out," he says.

Most day-trippers to Bandipur—mostly Indian families excited to catch a glimpse of a tiger or sloth bear—pay little attention to lantana's intrusion and, if anything, the thick shrub only helps with their animal sightings. With lantana covering most of the forest floor, there is little room for the plants that spotted deer, elephants, and other herbivores feed on, drawing them out to the roadside verges covered in more edible grasses.

A lack of food also pushes elephants out of the forest and into the villages surrounding Bandipur, where tomatoes and cabbages offer sweet alternatives to sparse natural vegetation—leading to conflict with the communities who live here. An elephant herd can devastate vast areas of crops in a single night, while surprise encounters between humans and elephants can be fatal—for both species. Across India, and the world, elephant numbers continue to plummet towards extinction.

"Now the forest is reduced, you can't plant crops without elephants coming and destroying them," says Suresh, 41, a leader for the Bettakurumbas indigenous community who lives in a village on the outskirts of the Mudumalai Tiger Reserve—which borders Bandipur. Sitting in the Bettakurumbas community centre, with silver hair and moustache neatly combed, Suresh's face remains stoic as he reminisces about how things used to be. "When I was a child, our community used to live in the forest where there were lots of animals. There was no conflict at that time," he says. "But we've lost that connection."

Forest fires have also become far more damaging in these tiger reserves since the recent colonization by lantana. "It changes the flammability of the forest. Fires are much more intense than they usually would be," explains Ankila Hiremath, a plant ecologist at the Ashoka Trust for Research into Ecology and the Environment (ATREE). With some lantana thickets towering over four metres high, the forest floor has become a tinder box through which fire spreads quickly and violently, clearing large areas of land. Lantana's natural competitors are now turned to ash, and the plant quickly takes root. "It's creating the conditions for its own survival," says Hiremath.

Further along the road, the dense undergrowth thins out, giving way to a small stretch of tropical savannah dotted with trees—and without a living lantana plant in sight. Junglescapes, a charity that works with local communities to restore the degraded forest in and around Bandipur, began working this experimental plot of land in 2014. Since then, they have restored over a thousand hectares.

"It's so nice to see a new plant," exclaims Ramesh Venkataraman, Junglescapes' founder, as he bends down to take a photo of the recently germinated *Cassia fistula*—whose seeds are a favourite food for sloth bears. Breaking lantana's vicious growth cycle is labour and time intensive. "When you remove lantana you'll find nothing in that area. Not a single blade of grass," Venkataraman describes. As lantana spreads, it creates an insidious root network, while dense branches thick with leaves stop sunlight from reaching the forest floor. Other plants, starved of light and nutrients, rarely germinate.

Around 60 percent of Bandipur is covered by "impenetrable" lantana, according to a recent study by a local charity called the Shola Trust, and most of the remaining area is colonized to some extent. Restoring the forest to anything like its pre-lantana invasion state will clearly be a long and slow process—if indeed it's possible at all. But Venkataraman, a retired corporate

The Nilgri Hills on the edge of Mudumalai Tiger Reserve, Tamil Nadu.

Miniature bouquets fleck a *Lantana camara* thicket in Bandipur Tiger Reserve, Karnataka.

executive turned environmentalist, enjoys a challenge.

"It's a monster, a real monster," he exclaims, walking past the hacked limbs of dead lantana bushes towards the frontier of the plant's invasion. A sea of lantana spreads out in sharp contrast to the thick grasses and orange flame tree blossoms that flourish only a stone's throw away. Here, on the bank of a small watering hole, a dozen men slice the root stems of a lantana bush that towers over them, before rolling it over and posing for a photo.

"Because of lantana there is no grass and we've lost so many plants, especially medicinal plants," says Kalyaa, 55, as he steps aside from his tiring work in the heat of the midday sun.

All the workers belong to the indigenous community Genukurubas—which translates as 'honey gatherers'. Speaking under the shade of a nearby tree, Kalyaa describes his community's holistic use of plants and trees. "We collect honey from bees and gum from trees, and also berries and tubers to eat." He pulls out a small round fruit from his pocket, gesturing with his hands that it is used to make a traditional paint dot on his forehead. "Before there wasn't any lantana in our forest, but in recent years it's really come," he continues. Not only is lantana destroying the natural habitat of elephants and other wild animals in the forest, but also the ecosystems that indigenous communities have depended on for centuries.

Venkataraman believes that the recent and sudden expansion of lantana throughout Bandipur is down to mismanagement inside the reserve as much as the plant's inherent talent for colonization. Heavy machinery used to clear lantana may also have brought to light huge numbers of lantana seeds, which can lie dormant in the soil for several years—paving the way for the plant to spring back with renewed strength.

But this blunt approach to the control of invasive species wasn't the only culprit: recent evidence also connects lantana's spread to the eviction of indigenous communities (collectively called Adivasi in India) from these forests since the 1970s.

"My ancestors all lived in the forest. Only recently did we move to the village," say Mari, 68, another of the Junglescapes' workers, speaking with youthful energy—his age only betrayed by his long grey hair and beard. Almost 50 years ago, Mari had to move outside the reserve boundary after the 1972 Wildlife Protection Act (WPA) came into force. "We got a house and land, but didn't know what to do," he says.

In post-independence India, population growth and economic expansion led to deforestation across the nation—a continuation of the large-scale environmental destruction that began with the British. Tiger numbers collapsed too as their habitat was lost, and hunting remained a popular past-time for the elite. Bandipur was no exception: originally called the Venugopala Wildlife Park, it was created in 1941 as a private hunting grounds for the Maharajas of Mysore. In the hope of protecting wildlife, the WPA, and Project Tiger which followed shortly after in 1973, sought to set aside land that would be strictly free from all human activity. Yet in the process legislators and conservationists overlooked the Adivasis' historic relationship with these ecosystems.

"If you do not burn the forest, it will burn," is a common Kattunayakan Adivasi saying. Such expressions are founded on centuries of experience, but seem prescient in the light of the damaging forest fires of recent years. Now new evidence suggests that fire kills lantana seeds in the soil, and so the traditional Adivasi practice of creating periodic low-level fires may have been keeping lantana in check. "These areas have been burnt in the past," says Hiremath. "Fire management was an intrinsic part of how they managed the forests, but with the coming of lantana the nature of fire has changed."

Starting fires in India's protected wildlife reserves is illegal, and ironically many Adivasi are now employed by the reserve authorities as fire watchers. Hiremath points to the origins of this approach in the colonial-era Indian Forest Service. "Most of the foresters were European-trained, and at that time fire was widely viewed as something that was damaging," she says.

Just like the first lantana seeds that appeared in India in the 1800s, the idea that fire was always harmful to forests also arrived with the British Empire.

THE SEPARATION OF NATURE FROM CULTURE

WHEN BRITISH IMMIGRANTS landed on the Indian subcontinent, they sought to create a home away from home by growing traditional English gardens. Such garden imperialism, Eugenia Herbert notes, was not only driven by nostalgia or homesickness, but was an attempt to put the "stamp of civilization" on an alien and untamed land. Alongside rose gardens and well-manicured lawns, some gardeners chose to plant their beds with the seeds of lantana, whose colourful flowers bloomed with ease in this foreign climate—not realising how little control they had over their shrubs.

But English gardens were one of the less damaging aspects of what sociologist Vandana Swami calls "environmental colonialism." In India, the British Empire's appetite for timber led to the greatest ecological transformation under their rule. Between 1853 and 1910, they laid some 50,000 kilometres of railway tracks across the nation, built from millions of timber sleepers—with even more trees felled to fuel the engines of steam trains.

Fearing the supply of timber would run out, the Indian Forestry Service was formed in 1866 by German forester Dietrich Brandis, who introduced the practices of scientific forest management that had been developed in the new forestry schools of France and Germany. Across India, forestry officials applied the principle of "maximum sustainable yield." Meticulously collecting data on the number and size of trees, they created tables of growth rates and loss rates, precisely calculating how much timber could be extracted without damaging the long-term profitability of the forest.

Colonial officials saw nature as a commodity, and for them, some trees were simply more valuable than others. Diverse mosaics of tropical forest made way for plantations of teak and other species that served a more useful purpose to the British Empire.

The plantation forestry model is the antithesis of the astounding natural diversity of tropical forests: more tree species exist in half a square kilometre of some tropical forests than in all of North America or Europe. Yet despite the apparent differences between these ecosystems, forestry officials attempted to copy and paste European forestry methods into India, changing centuries of indigenous forest management in the process.

The belief that all fire is harmful to forests, despite being contradicted by long-held, local knowledge, is just one example of this colonial, 'scientific' paternal-

Kalyaa, 55, of the Genukurubas Adivasi, digs out the roots of a *Lantana camara* bush.

Ramesh Venkataraman stands by a pile of uprooted lantana thicket on restored land in Bandipur Tiger Reserve.

"My ancestors all lived in the forest. Only recently did we move to the village." —Mari, 68, of the Genukurubas Adivasi

Kutty, of the Bettakurumbas Adivasi, crafts a baby elephant from dried lantana sticks.

A herd of elephants made from lantana will soon migrate around the world.

ism. And was part of a much wider conviction that Adivasi practices were damaging nature. With this in mind, the Forestry Service removed the their customary rights and paved the way for India's natural resources to be monopolised by the Empire.

It would be naive to assume that in pre-colonial times people existed in perfect equilibrium with nature. Humans have always made use of nature for their own needs, and across the Indian subcontinent there existed a diversity of cultures inhabiting the land in different ways. The British were not the first empire to control the customary rights of the peasantry either. For centuries before their arrival, a multitude of empires and dynasties imposed restrictions on what local communities could do within the natural environment.

Yet even under the rule of these pre-colonial powers, hunter gatherers, pastoralists, and plough agriculturalists shared the environment communally, with a conservation ethic that was regulated by social norms—rather than elite scientific expertise. Driven by the needs of community, rather than commercial enterprise, the degradation of ecosystems was, to an extent, kept in check. Historian K. Sivaramakrishnan notes how the Apatani people of Arunachal Pradesh would plant trees that took far longer than a human lifespan to reach maturity. This selfless act may be overly romanticized, but contains a truth about a communal rather than a capitalist approach to nature.

In competition with other European powers, the British Empire sought to take control of resources and communities as quickly as possible, and on an unprecedented scale. They ordered forests by genera and species, and forest dwellers too—by tribe and caste. As Swami writes, the impact is clear: "There is as yet no evidence of total collapse or sharp conflict among communities over ecological issues in the pre-colonial period like those one can find during the colonial period."

For the first time, a global empire placed the lion's share of its resource demands on a subcontinent. As well as supporting railways in India, timber built the ships of the British Empire's Navy—forests back home having largely disappeared centuries earlier. The arrival of the British marked a watershed not just for India, but for the world. As ships sailed from colony to colony, they carried with them this new ideology in which nature is fundamentally a resource, and humans are sharply separated from it.

AN ELEPHANT IN THE ROOM

UNDER A METAL roof amidst a coffee plantation on the outskirts of Mudumalai Tiger Reserve, eight elephants stand motionless, staring blankly. This is no circus show: they are not living, but crafted from the stripped back remains of dried lantana bushes, each one created in the image of local wild elephant.

Kutty, another member of the Bettakurumbas Adivasi, sits on a stool by the baby of the herd, whose head is still half-formed. Carefully measuring each stick and hammering nails into place, he turns to explain, "I'm trying to finish the trunk. First, I draw the elephant, and then from the drawing we build the frame with iron rods." The income Kutty receives for this lantana craftwork is some consolation in the face of the destruction lantana has wrought.

Soon the little one will join a hundred other elephants, and the herd of organic beasts will migrate across India, and then the world. As they are exhibited from Delhi to London, this art exhibition and act of protest—supported by the Shola Trust and WWF—will call "for us to live well with all other life forms on earth."

Living well alongside wildlife is something Bettakurumbas are well versed in. "We are the most knowledgeable about elephants. We lived alongside them and know how they behave," Suresh asserts with pride back at his community centre. "When I was a child and we wanted to capture an elephant, we talked to its spirit. We didn't use [tranquilizers] like they do now. But we've lost that connection."

Animist beliefs—in which living creatures, and even objects, are understood to have a spirit—are common among many Adivasis. In this worldview, humans are not separate from nature, and a relationship is built on mutual trust. This understanding of the world is often dismissed as backward, when compared with the apparent successes and power of reductionist scientific reasoning. But as the full extent of our environmental destruction dawns on us, hand-in-hand with a helplessness about how to change, inspiration may be found in such animist beliefs.

"We—all of us on Terra—living in disturbing times, mixed-up times, troubling and turbid times," writes feminist and multispecies theorist Donna Haraway in her book *Staying with the Trouble*. In our current crisis, and in the hope of a liveable future, she advocates for re-thinking our view of humans as exceptional creatures and instead fostering an understanding between species. "We require each other in unexpected collaborations and combinations....We become with each other or not at all," she writes.

Learning to "stay with the trouble," to co-exist on a damaged earth, motivates the migration of the Shola Trust's lantana elephants around the globe. As well as working with Bettakurumbas to craft these elephant sculptures, the charity also creates "human-elephant coexistence plans" in the area surrounding Mudumalai Tiger Reserve—helping villagers to understand how elephants move in and around their land, which crops are enticing to elephants and so shouldn't be planted, and even observing and photographing each elephant to learn their individual behavior.

The Shola Trust seeks a new approach to wildlife conservation where humans and nature share space, as opposed to environmental idealism or "fortress conservation," in which animals are saved inside isolated pockets. Here lantana's spread, alongside population growth in the surrounding towns and villages, is rapidly forcing humans and elephants to find ways to coexist—or else face conflict and the continued extinction of non-human species. "We've inherited ideas of conservation as something that you do in inviolate landscapes, and you move people out of landscapes and conserve them," says Hiremath of ATREE. "But in India, that's not a model that can be applied widely," as the nation's population density prevents strict separation.

Meanwhile, the eviction of Adivasi from their traditional lands—and the separation of humans from nature—continues. Indigenous people now face eviction following a ruling from India's Supreme Court in February that they are illegally living on protected land. Under the 2006 Forest Rights Act, many families were granted the right to live and work here. But conservation groups insisted that many of these claims were bogus and so spearheaded court proceedings to evict the Adivasi, in the name of wildlife.

The global human population continues to rise—expected to reach nine billion people by 2050—while ecosystems are disrupted further by climate change and invasive species like lantana. In this volatile environment, humans must make renewed efforts to forge relationships with non-humans based on mutual respect. "Our task is to make trouble, to stir up potent response to devastating events, as well as to settle troubled waters and rebuild quiet places," writes Haraway.

Central to this will be a dismantling of the colonial, capitalist view of nature as a resource to be commercialized, alongside small pockets of conserved wildlife. Looking to Adivasi worldviews, and those of other indigenous communities, we may find the buds of a new approach to nature—one based on coexistence.

In his lifetime, Suresh has witnessed seismic change: his eviction from home, the transformation of the forest by lantana, and the steady loss of indigenous knowledge from his community. Behind each of these traumas lies a colonial legacy, rooted in how humanity perceives and acts on nature. Suresh understands that we are living through troubled and changing times, but also that we need to find new ways of coexisting. "Yes, I want the old culture back," he says earnestly. "But we can't take it all back. We have to find what is right for this generation."

YOU CAN NEVER GO HOME

Reflections on Ghana's Year of Return

Story and photographs by A.J. HUDSON

"You can never go home again, but the truth is you can never leave home, so it's all right."
—Maya Angelou

I WANT TO talk about the murky, muddy, and deeply challenging notion of birthright—of placing your feet on the land of the ancestors—and of the brave impossibility of ever going home. The Birthright program is promised to almost all adults in the Jewish diaspora, and access to it is in many ways considered a cultural right of being Jewish. But I'm not here to talk about my own complicated half-Jewish experiences in the Middle East or the state-sanctioned discrimination I faced in Israel as a person of color. I wanna talk about Black Folk. I wanna talk about the other textbook example of a people we so often connect to the term diaspora. I wanna talk about the other peoples who have been oppressed and brutalized by the Europeans and their empires.

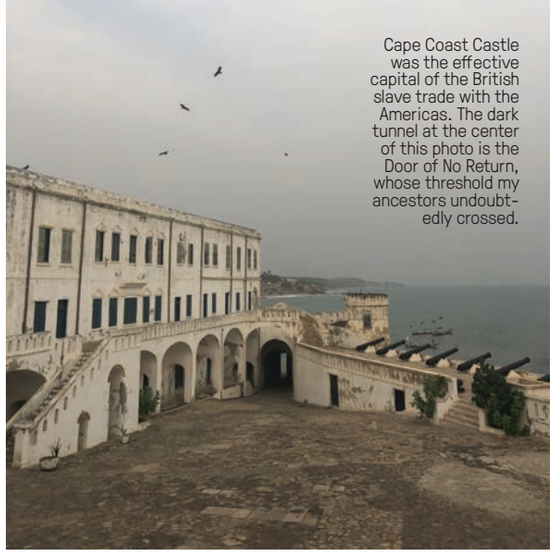
This legacy was my father's greatest gift to me. His side of our family was stolen from Western Africa—most probably from Ghana, according to extensive DNA testing. My father's heritage also formed my predominant identity growing up because, well, nobody in the United States looks at me and sees a Jewish boy.

A busy market in the streets of Accra, the capital of Ghana after independence from the British.

The Hassan II Mosque, in Casablanca, Morocco, is the largest mosque in all of Africa and underscores the Arab influences in the region.

Hand-carved boats crafted by subsistence fishermen in British Jamestown, the colonial district of Accra and the poorest part of the capital city.

The canopy walkway in Kakum National Park, near Cape Coast, Ghana, stretches across the majestic treetops of this coastal rainforest.



Cape Coast Castle was the effective capital of the British slave trade with the Americas. The dark tunnel at the center of this photo is the Door of No Return, whose threshold my ancestors undoubtedly crossed.

NOW, AFTER HAVING visited Ghana during its "Year of Return," which marks the 400th anniversary of slavery in the British colonies, I ask myself: Why don't Black people have our own Birthright program? Why don't we immigrate in droves back to West Africa? My time in Ghana taught me about what that homecoming could mean, and what it can't.

It was a privileged opportunity to travel to Ghana and experience firsthand the land of my ancestors. I went with a group of Yale students stretching across the Black Diaspora from Brazil to Detroit. This experience is something that I believe all the ancestors of the enslaved are owed, yet very few will ever get. While I'm glad to have gone, I also found this journey morally infuriating, devastating in the weight of its history, and profoundly confusing to my own identity. Instead of closure or resolution, I am left with a crescendo of questions and incriminations. Can we ever go home?

My journey to Ghana started with a trip to Morocco—a place I never expected to feel so familiar. Ghana would also feel familiar. A long layover brought me to Morocco and ended up leading me to a much greater understanding of a more concealed truth within the fabric of the archetypal Africa. It was not the people or the place that I recognized: it was the power. There is one thing that unites the entire continent, certainly Morocco and Ghana, and undoubtedly quietly contributes to its monolithic nature in so many minds. Every single country on the continent of Africa was colonized and imperialized by Europe.

Every single one.

What started as a few white-washed castles along the Gold Coast spread like a cancer, fueled by human bodies and natural resources, until even the most remote segments of jungle were under European rule. Had my ancestors known what would come after first trading those strange goods with those strange white men who lived in stone-hewn white castles on the coast...would they have razed those slave forts to the ground? Would they have ousted the cancer before it spread? Would I—a result of the collision of those two worlds—even exist? No part of Africa, or its many peoples, survived untouched or free of the burden of colonialism. The pan-colonization of the continent gave way to an important and potentially very real homogenization. It had always felt uncomfortable to talk about. Yet, now I know firsthand how much more uncomfortable it is to witness.

MUCH OF WHAT I observed in Ghana so clearly echoed what I'd already seen on visits to the Caribbean and South America. The poverty, the infrastructure, the disinvestment, the food, the architecture, the Christianity. And the foreign multinational conglomerates. Ghana reminded me more of the Dominican Republic or Puerto Rico than any version of Africa I'd ever imagined.

I did not truly understand the wounds suffered in Africa, or the wealth the Americas and Europe reaped, until I was standing in the Cape Coast Castle in a Christian chapel built above the cellars where my ancestors were held before they were shipped to the "New World." This experience made me realize how much we idealize mother Africa. Present-day Ghana is much more "colonized" than I expected: it's very traditionally Christian and extremely homophobic; its lands visually scarred from extractive and exploitative industries.

Ghana also paid for its role in the slave trade in ways that I had not anticipated. As a child, I had pictured Ghanaians selling my ancestors and getting rich. In truth, the entire triangle trade was a gigantic scam. The West Africans were trading human beings for teacups and guns while the Europeans and Americans were building the wealth and power which sustain their bloated livelihoods to this day. The entire coast of Ghana has been ransacked for gold, the native plants have disappeared from the diets of Ghanaians, and their once fertile soil is now used to grow cacao for gourmet chocolates eaten thousands of miles away.

Ghana imports the vast majority of its food making the country incredibly food insecure; more than 70 percent of the rice Ghanaians eat is purchased from abroad. Several food science organizations have shown that this kind of lack of productivity in many tropical countries often results from a history of colonial land exploitation, non-native industrial land-use practices, and the forced growing of annual plants more suited to temperate climates. Despite being one of the most photosynthetically productive regions on the globe, West Africa cannot feed itself.

This is because much of the land and the people have been repurposed for first world profit, privilege, and luxury. Ghana's limited wealth is derived from land-based resources that mainly serve to make the white nations that colonized Africa more comfortable: chocolate, gold, and oil. These are also items that are refined and only made truly profitable by value-added through processing infrastructure that Ghana doesn't have. Although Ghana was one of the very first African countries to gain independence in 1957, from a natural resource perspective, little has changed in those 60 years. Ghana is an enigma. It is resource-rich and wealth-poor, despite being one of the world's biggest gold producers. Ghana's total wealth is estimated at around 60 billion USD. There is twice as much money in the collective coffers of the Ivy League.

I THOUGHT THE British had poetically named the colony "Gold Coast" because of its beautiful sunset colored cliffs or the reddish-brown sand on its beaches. Instead, its name is quite literal. The Europeans originally set up camp in Ghana because of the mineral richness of the land, remaining there as an economic power to this day, exploiting its resources, joined most recently by China and the U.S. Had it not been for this natural wealth, Ghana may not have become the capital of the slave trade and its rivers and valleys may have been left unscarred by mining.

Colonialism has left indelible marks on both sides of the Atlantic—marks both literal and spiritual. Inequalities that continue to grow, even as their origins are steadily erased and forgotten.

There aren't any real survivors from the transatlantic slave trade—it irreversibly changed every place that participated in it. The world we are left with is truly ugly at times, and I saw some of the ugliest pieces of our human history in Ghana. I stood on what remains of those moments in the petrified muck of blood, vomit, and shit that coats the floors of the slave dungeons in Cape Coast Castle. Yet, there is also an unspeakable beauty in Ghana that is all the more lovely for the stark contrast that it shines when held next to its history of slavery and colonial rule.

Ghana's enduring culture and its tenuous, yet steadfast ties to Black identity worldwide is a glorious victory. Perhaps, if the Year of Return is successful, more will see this victory firsthand.

A group of Yale students enters the darkness of the Male Slave Dungeons in a door below the castle chapel. Slaves were kept here for weeks to months until enough were gathered to economically fill a shipload.

A row of handwoven Kente cloth, which has become an ardent symbol of the Black Diaspora, used for weddings and graduations by Black Americans, is stretched along a wall in a small village in the province of Volta.

WE VISITED A traditional village in rural Volta where they still practice the ancient traditions of Kente cloth weaving. I saw boys half my age spin the loom at speeds too fast to capture with my camera. Their artisanship was peerless and the fabrics they made were beyond beautiful—a marvel to behold. The strands of thread crossing the open air Kente weaving room reminded me of all the connections between the continent and the diaspora. Each thread a forgotten link, made invisible by time and white supremacy. So many of them are no longer invisible to me. The roots of a worldwide Black culture: our food, our music, and even our grammatical "mistakes" all find their origin in the places I explored on this trip. Every meal in Ghana was a taste of self-discovery, every sound was an echo of a song whose rhythm I already knew, and every sight was a slow pilgrimage toward caressing my past—the often-unknowable past of the descendants of the enslaved. The ultimate gift of going home, even if home has been forever transformed, is getting to know yourself a little better. But there is no mother Africa to return to. Our home was lost when we were taken from it—forever changed with our irrevocable departure. What we are left with, and perhaps our only home, is the Black Diaspora.

The word diaspora literally translates from Ancient Greek to "I scatter" or "I spread." It has come to represent any people who have common ties despite having no home, particularly the conquered and enslaved. But it can also translate to "I sow" or "I seed." In Ghana, I heard the stories of our enslaved ancestors hiding seeds in their hair. Stories my own grandmother used to tell me about Okra when I refused to eat the slimy vegetable. They'd weave the seeds into their braids so that they could plant them in the horrifying new world where the slave ships were headed. There is nothing as brave as the audacity of a seed that grows in harsh and infertile soil. We can never go home again, but the truth is: we never left.

Author's Note: Some will argue that Ethiopia is unique in that it was never technically colonized. All of its neighbors were colonized, its rulers overthrown, much of it was occupied during the 20th century, and its present borders forever changed from pre-colonial times. I consider it effectively colonized, despite formal technicalities.

◂ 42’ Lodgepole Pine trunk and root structure staged on ridge overlooking Sawtooth Range and Dry Creek Burn area, near Stanley Lake. The Dry Creek Fire burned in August 2016.

REDOUBT

A PHOTO ESSAY BY MATTHEW BARNEY

Felling of the Lodgepole Pine from burn area near Elk Creek, Sawtooth Mountains, Idaho.

THE YALE UNIVERSITY ART GALLERY is pleased to announce *Matthew Barney: Redoubt*, an exhibition of the renowned contemporary artist's latest body of work (2016–19). The exhibition includes an eponymous two-hour film that traces the story of a wolf hunt in Idaho's Sawtooth Mountain range, intertwining the theme of the hunt with those of mythology and artistic creation. Also featured are four monumental sculptures, more than forty engravings and electroplated copper plates, and an artist-conceived catalogue.

With *Redoubt*, Barney has combined traditional casting methods and new digital technologies with unprecedented techniques to create artworks of formal and material complexity as well as narrative density. The four monumental sculptures in the exhibition, for instance, derive from trees harvested from a burned forest in the Sawtooth Mountains. Molten copper and brass were poured through the trees, creating a unique cast of the core as the metal flowed inside. Each sculpture is a literal vestige of Idaho, with the remains of the tree being subsumed into the artwork.

Redoubt was filmed in Idaho's rugged Sawtooth Mountains and continues Barney's longstanding preoccupation with landscape as both a setting and subject in his films. By layering classical, cosmological, and American myths about humanity's place in the natural world, *Redoubt* forms a complex portrait of the central Idaho region. Like most of Barney's previous films, *Redoubt* is without dialogue; but in a marked shift, Barney has more fully incorporated dance into the narrative of the film, allowing the characters to communicate choreographically. Throughout the film, the characters' movements are formalized into choreographies that echo, foreshadow, and interpret their encounters with wildlife."

Barney is among the most ambitious and provocative artists of our time...Both *Redoubt* and its related publication—which features essays by leading scholars of art history, dance theory, and environmental studies—speak to the artist's expansive interests.

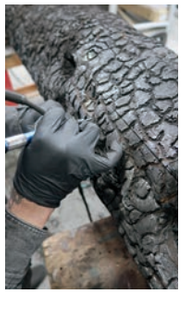
EXCERPTS FROM YALE UNIVERSITY ART GALLERY PRESS RELEASE, "*MATTHEW BARNEY: REDOUBT*," JAN. 2019.

Molten copper and brass are poured into the vacancies between the sand mold and the tree, incinerating the foam and replacing it with metal. A deep pit has been excavated in the floor of the casting room to hold the mold.

At Walla Walla Foundry in Washington state, combustible foam is placed in helical path following the spiraling cracks in the surface of tree.

CNC mill tools the geometry of a picatinny rail into the root structure and trunk of tree.

Cracks in charred surface of tree are hand tooled to open pathways for molten metal flow.



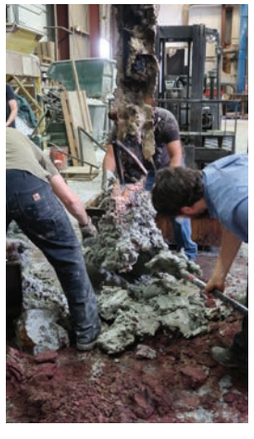
The brass and copper crucibles are poured simultaneously to distribute the two metals evenly over the length of the tree.

Resin bonded sand forms a fireproof barrier around tree and a mold around the combustible foam.

The steel flask containing the mold is removed from the casting pit. From the heat of the molten metals, the tree is still smoldering inside the sand mold.

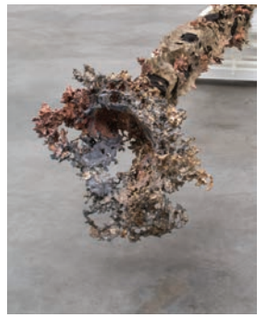
▲ Resin bonded sand is broken away from the tree, exposing the gating system which transports molten metal in and around the tree trunk, and allows gasses to escape from the casting process.

▲ The surface of the tree is sprayed down with water to extinguish the smoldering burn.



▲ Molten copper and brass exiting the end of the tree trunk is captured in a vat of bentonite clay and water. The clay slurry creates cavities for the metals to chill without forming an alloy, leaving a marbleized combination of the two metals.

▲ Detail of the sculpture, Elk Creek Burn, 2018, showing cast leakages of marbleized brass and copper emerging from knot holes in the tree trunk.



▲ Detail of Elk Creek Burn, 2018, showing the explosion of marbleized brass, copper and lead at the end of the sculpture.

▲ Elk Creek Burn, 2018.

▶ A pack of Grey Wolves in a burn near Elk Creek.

JULIANA V. U.S.

THE TRIAL OF THE CENTURY

▲ Youth plaintiffs and attorneys lead a rally on the steps of the Eugene District Courthouse after oral arguments in the *Juliana v. United States* case on Wednesday, July 18, 2018.

Although previous generations have struck out on national climate action, 21 youth activists are stepping up to the plate, and they aim to hit the ball out of the park.

By PAUL RINK

ON JULY 15, 2018, the very heart of the year, I found myself walking through a forested wonderland just outside Veneta, Oregon. A towering woman covered in layers of ruffled purple satin and pink lace passed by on stilts, singing "La Vie en Rose" to the overstory. Friendly, bare-chested vendors—female and male—sold their wares under elaborately decorated signs reading "Fantasy Horns," "Perfume Oils," and "Huffing Salon." To my left, bubbles streamed from the nostrils of a giant cerulean man made entirely of plastic and fabric.

The Oregon Country Fair has long been a center of high-intensity mysticism, unafraid to push the boundaries of normalcy. It is a place where fairies are real and family-friendly nudity is not an oxymoron.

Yet it is not a place wholly divorced from reality. Nowhere was this more apparent to me than at a small stage with a tie-dye backdrop in the heart of the makeshift woodland village. Six young people stood awkwardly before a crowd explaining the lawsuit they had filed against the federal government for actively developing a fossil fuel-based energy system that perpetuates climate change.

In many ways, the young speakers seemed to fit right into their free-spirited surroundings. They were young and energetic with free-flowing hair and loose t-shirts. They laughed nervously in the face of so much attention and played hand games when it was not their turn to speak. One, named Kiran Oommen, eventually stepped forward with a guitar to lead the rest in a breakneck song condemning oil and coal.

Photographs by ROBIN LOZNAK/OUR CHILDREN'S TRUST

Watching them onstage, I began to recognize the subtle incongruence of their presence in this temperate wonderland. The speakers' sense of purpose anchored the audience to a righteous sense of realism, lest a plume of strawberry-scented marijuana smoke lift the gathered group away. Yet, despite their anti-escapism rhetoric, the youth were met with enthusiastic admiration and applause rather than with derision or annoyance. One of the fair's co-founders stepped forward to praise their performance and to guarantee a donation of $10,000 to support their case.

Something about this youth-led lawsuit, *Juliana v. U.S.*, seemed to resonate. Perhaps it's the case's sympathetic, David v. Goliath narrative. The youth contend that the government has known for decades both about the contribution of fossil fuels to climate change and about the negative effects climate change will have on our planet's future livability. The young plaintiffs maintain that the government violated their constitutional rights to life, liberty, and property by continuing to develop and promote fossil fuel interests despite this knowledge. Rather than financial compensation, they seek an injunction against further fossil fuel infrastructure development as well as an enforceable national climate action plan. They go to court, attend rallies, and otherwise promote their message while also participating in school sports, attending summer camp, and, you know, being kids.

No one embodies the striking juxtaposition of youthful joy with self-righteous sense of purpose better than Kelsey Juliana herself, the named plaintiff in the case. She is a vibrant, self-confident 23-year-old with an easy laugh and a motherly demeanor toward her fellow plaintiffs. A native of Eugene, Oregon, she essentially grew up at the Oregon Country Fair where her parents have occupied a booth every year for over two decades. It was likely her parents' own penchant for political activism—they participated in the Warner Creek protests, the longest blockade of a federal timber road in U.S. history—that led her to depart from high school graduation for rural Nebraska where she joined the 2014 Great March for Climate Action. The passion with which she throws herself into climate activism has inspired many, including several of her *Juliana v. U.S.* co-plaintiffs whose friendship with her helped convince them to join the case.

Despite the self-assurance of Kelsey and her co-plaintiffs, many remain skeptical of their efforts. Although they represented a potent sense of soberness amidst the casual hippie culture of the Oregon Country Fair, they are often depicted as dewy-eyed idealists in news reports about the court case itself. In fact, many legal scholars and practitioners either denounce or dismiss their legal efforts as far-fetched and likely to create bad legal precedent for future climate change litigation.

▲ Kelsey Juliana takes a break from speaking to dance with a child at the Oregon Country Fair.

▲ Twenty-one young people aged 11 to 23 have instigated this ground breaking legal action against the federal government. In the fall of 2017, a group of them celebrated during a press briefing in Eugene, Oregon.

Such incredulity is somewhat understandable. The core legal arguments presented in *Juliana v. U.S.* are novel to say the least. This case constitutes the flagship example of "atmospheric trust litigation," an unconventional legal strategy developed by University of Oregon law professor Mary Wood. According to Wood, the government holds the nation's natural resources, including the atmosphere, in trust for the general public and thus has an obligation not to undermine those resources. This theory is based on a legal principle known as the public trust doctrine, which has historically been used to protect water resources. Only in the last decade have lawyers begun arguing that the public trust doctrine incorporates the atmosphere. These new atmospheric trust lawsuits have seen some success at the state level (notably in New Mexico) but have never before been successful in federal courts.

Additionally, the obstacles to the case extend beyond the novelty of its legal arguments. *Juliana v. U.S.* will also confront difficult questions at trial that are common to many climate change litigation strategies. Should the government (or any one particular entity) be held responsible for its contribution to a global problem? Did the government's actions actually cause the youth plaintiffs' harms? Are courts the proper venue to address climate change injuries? Many are concerned that the case will crash and burn in the face of such inquiries.

Perhaps these criticisms miss the point of *Juliana v. U.S.* and the strategic efforts of Our Children's Trust, the legal NGO behind the case. First of all, the lawyers involved present strong, well-researched legal arguments, despite external cynicism. Furthermore, a myopic analysis of the case's impact on U.S. common law is likely to miss what can be described as a systems-based approach to climate activism. The plaintiff's requested remedy that the government develop a federal climate action plan reveals an expansive objective that may start with particularized courtroom advocacy but extends to broader governmental behavior change. If the youth win the case, then the real work of implementing actionable climate policy will have only just begun for the executive branch. If they don't, then perhaps the case will have raised enough national awareness to facilitate the election of public representatives who will do the job anyway.

Our Children's Trust is not bashful about its lay-it-all-out-there approach to climate activism. Many aspects of the *Juliana v. U.S.* case are clearly structured to enhance broad public awareness not just for the case but also for the urgency of the climate crisis more broadly. The plaintiffs themselves, for example, come from a wide range of U.S. states and even the Marshall Islands. Their collective complaints highlight the many impacts that climate change is having and will have on citizens throughout the country. From the "thousand-year flood" that submerged Jayden Foytlin's Louisiana home in 2016 to the increased frequency of ice storms in Nathaniel Baring's hometown of Fairbanks, Alaska, the plaintiff's past, present, and future injuries bring the stakes of climate change into sharp relief.

At the same time, the case remains firmly rooted in Oregon. On many occasions, community members equipped with rally posters have gathered on the Eugene District Courthouse steps, waiting patiently for oral arguments to finish. Each time, as soon as the plaintiffs have emerged from the courthouse, the audience has erupted in cheers, listening excitedly to the ensuing political demonstration and status updates on the case from the Our Children's Trust legal team. Youth plaintiffs at these rallies have been unafraid to articulate the gravity of their legal claims. Alex Loznak of Oakland, Oregon, for example, has stated, "The government's actions to worsen climate change are inconsistent with our most deeply held moral values." With billboard quotes such as this one, the marketing materials practically write themselves.

And I do mean marketing. Due to a robust media campaign and activism network, *Juliana v. U.S.* has spread like wildfire, gaining national and international attention that extends far beyond the confines of any district courthouse. In addition to the federal case, Our Children's Trust has maintained several active, state-level legal claims spanning from Florida to Washington. The legal team also works internationally, helping lawyers in other countries file atmospheric trust litigation within their own domestic jurisdictions. Most notably, Our Children's Trust supported a similar youth-centered climate change case in Bogotá, Colombia. Using a fast-track courtroom procedure for cases involving fundamental rights, the non-governmental organization DeJusticia was able to file its case in January 2018 and receive a favorable ruling from the Colombian Supreme Court three months later. Throughout this legal process, Our Children's Trust assisted DeJusticia by making connections with expert witnesses, sharing best practices, and filing supporting documents.

Juliana v. U.S. has captured the attention and imagination of people around the world; yet, the lasting legacy of Our Children's Trust's efforts may ultimately derive more from its expansive outreach campaigns and its wide-ranging international and state-by-state legal advocacy than simply from the *Juliana v. U.S.* case itself. Although the organization maintains that it can and will win *Juliana v. U.S.* outright, such a victory remains subsidiary to its deeper objective of combating climate change. The fundamental goal of Our Children's Trust is to compel meaningful climate action so as to avoid catastrophic environmental impacts in the future. Whether this action comes as a result of *Juliana v. U.S.* is less critical than that the action happens at all. Although the federal case is one tool to accelerate climate action, the legal team at Our Children's Trust is not going to put all of its eggs in one basket. Clearly, they believe that the future of human existence on earth is too important for undiversified advocacy.

The youth plaintiffs serving as the face for *Juliana v. U.S.* seem to feel the same way. Frequently branded as "climate warriors" by the media, many of them engage in other methods of climate advocacy outside of the federal case. Vic Barrett of White Plains, New York has organized his own grassroots climate campaigns and marched with over 400,000 people during the People's Climate March in New York City. Journey Zephier of Kapaa, Kaua'i, Hawai'i, serves as a National Earth Ambassador for United National Indigenous Tribal Youth. In striking contrast to the Oregon Country Fair, youth plaintiff Xiuhtexcatl (pronounced "shoe-tez-caht") Martinez wore a suit and sat next to Senator Bernie Sanders on a December 2018 panel about the need for immediate climate change action. In keeping with the artistic abilities of many of the youth plaintiffs, Xiuhtexcatl performed a rap, outlining a personal ethos that could serve as a tagline for Our Children's Trust: "Nothing they can do will stop the waves that we've been making. That's the roots of revolution. It's the power that we're taking."



THE SPACE IS NOT EMPTY.

Text and photographs
by HANNAH HABERMANN



if I tell you sagebrush,
tell you red-tail hawk,
mule-deer
drinking spring water,
sun-bleached mesa tops
under snow-covered peaks—
(let's put a bison on top
while we're at it)

but then I tell you oil rigs,
tell you dried-up riverbeds,
trash heaps
leaking underground,
suburban homes
sprawling across satellite pictures
and still there's nowhere to live—

does that make this space less appealing,
less *marketable*? when geographies don't look the way
pictures say they should—
In what ways do investment,
care, willingness to look
change?

I guess it depends who we're talking to.

the third tent on the left was dark and empty, except for a large clay pot at its center.
in it was a woman, her arms curled around her knees. the air was dusty and hot—
she breathed it in shallowly, eyes closed, knotted hair pressed against the potting soil.
out of her skin grew a million delicate plants, their leaves growing in pairs from slanting stems. they were
not unlike feathers, these leaves, green and elegant and slender.

watch, the directions read.

outside the men and women and children whispered behind their hands as they paraded past, pausing to read the sign staked into the ground—"*a native of brazil, but naturalized in the tropics of the world, the mimosa pudica is remarkable because of the ability of its leaves to 'go to sleep' at the slightest touch.*"

one father held his daughter up so she could see inside the pot.
she reached her hand out to touch a leaf growing from the woman's arm,
and ever so suddenly, all of the leaves on the woman's body folded inwards,
falling towards each other in unison—
almost as if they had been practicing.

someone let out a quiet *oh*. the people suddenly became aware that the tent had grown quite hot and started to wonder what to do with their hands—they wiped their brows and looked around for the exit. the girl hid her face in her father's coat jacket, believing she had done something horribly wrong.

a week later the tents packed up and left town. somewhere in the back of the caravan of semi-trucks,
under a piece of taut canvas, the woman continued to sleep in the clay pot.
at every rest stop her mother came to check on her, lifting the sheet ever so slightly,
to let a little of the dusty afternoon warmth in.

grow, darling, grow, she said,
touching the woman's forehead lightly,
and then turned to leave.

(n.):
it's easy, the way the textbooks make it seem—foreground *here*, background *there*.
the guide is pointing, now, saying *look*—there's the mountain silhouette, the bison chewing grass, the river turning across the plains.

ansel adams stood *right here* once, he's saying now—implied is the understanding that the picture should be taken from this same spot, that you've only really *seen* this place if you've seen it from here. line up the frame, take the shot, walk away.

(v.):
last night, the rocky mountains turned over in their sleep, shifting the curve of their hips a few inches to the right—the geologists woke up from their dreaming and stood with their mouths open, the red needles on their seismographs spinning frantic cartwheels between 0 and 100.

all the formulas about ecosystem services were now skewed three units positive, sending biologists scrambling to adjust their carbon sequestration flow charts. in the morning, the economists drank harsh cups of coffee and scratched their heads, at a loss for what to make of things that didn't stay the same.

Editor's Note: Visit www.sagemagazine.org to view this piece in its entirety.

EXPOSED

► | **GEESE TRACKS** | West Haven Memorial Park, near the Yale Bowl, is a wooded enclave where Tat LaGrave set up a camp she called Rose Haven.

► | **LOU** | Lou is homeless and spends much of his time on New Haven Green, even during extreme weather.

TO THE ELEMENTS

Homelessness gets harder in a changing climate.

Story and photographs by BEN SOLTOFF

BY NOVEMBER, TAT LAGRAVE had been homeless for nine months. She spent her days in a tent in a park beside the West River in New Haven, Connecticut. Her campsite was set back in a grove of trees, out of sight from the busy streets nearby. The woods were littered with cardboard beer boxes, a muddy pair of jeans, and an overturned shopping cart. Despite this mess, Tat appreciated the natural beauty of the site. She called her camp "Rose Haven" because of the wild roses growing around it.

When I met Tat, she had just turned 50, but she had a youthful enthusiasm. Her hair was short and blonde. She spoke fluidly, with an almost theatrical flair. She told me that some people call her Bubbles because she is so positive.

"I make people sick with my cheerfulness," she said.

Tat would read books in her tent to pass the time. She once tried to work her way through Homer in Latin—she picked up "a smattering" of the ancient language in high school before she dropped out. When we spoke, she was engaged with more exciting material, the original Tarzan series by Edgar Rice Burroughs.

"They're sick, man," she said, "These books are violent. They're graphic. They're insane. It's like modern-day, cutting-edge, brutal survivalism. Just livin' on the edge type stuff."

Tat grew up in an upper-middle-class family in a few different Connecticut suburbs. She left home as a teenager because she didn't get along with her stepfather. After that, she lived all over the country, sometimes housed and sometimes not. Over the last few years, she's been struggling with substance abuse and an abusive relationship. When she finally left her husband, she brought her twelve-year-old autistic son Daniel with her. "He's my best friend," she said, beaming. "He's my soulmate."

The two of them lived together for a while, but she lost custody when she could no longer afford their apartment due to a health insurance issue. It was a tough blow, and she began drinking again to cope. She sought help at rehab centers but was dismayed to find that the sober spaces she encountered were "anything but." Residents found ways to sneak in drugs and alcohol, so she struck out on her own and eventually made her camp at Rose Haven.

Tat used to sleep in her tent each night, but in September, she began spending the night in a shelter run by a local non-profit called Columbus House. To explain why she moved to the shelter, she shared an old Russian

expression, “The indoor cat has found itself outdoors.” She then added, “I’m very much an indoor cat.”

By that time, living outside had taken a toll on her. “I was tired. I was sore. I was hungry,” she said, “I had to come indoors.”

Across the country, hundreds of thousands of people endure the hardships of homelessness. More than half a million people in the U.S. were without a home on any given night in 2017, according to a report from the U.S. Department of Housing and Urban Development. The same report also estimated that 193,000 homeless people were unsheltered, meaning that they did not have access to the type of the emergency housing that Tat sought at Columbus House.

People experiencing homelessness often struggle to meet basic needs like health and nourishment. One of the biggest challenges is simply the amount of time they spend outdoors exposed to harsh weather. As the climate gets more hostile, the homeless feel the brunt of the impacts, and they often have the fewest resources to respond.

In a 2018 report, the Intergovernmental Panel on Climate Change (IPCC) warned that a rise in temperature of more than 1.5˚C could lead to severe and widespread impacts from extreme weather events like heat waves, storms, and floods. Extreme weather is becoming the norm, and the worst has yet to come. The world is on track to reach the IPCC’s grim milestone as soon as 2040.

Heat waves are one of the starkest impacts of global warming, and they have become increasingly prevalent in places like New Haven. The 2014 IPCC Assessment found that over the course of the 21st century, heat waves are likely to occur more often and last longer. For some locations, the IPCC observed that heat waves were already occurring twice as frequently in 2014 as they were in the 1950s.

Tat LaGrave set up her camp at Rose Haven in July 2018. During the hottest and most humid months of the year, she had little recourse to avoid the heat, other than sitting still for as long as she possibly could. The high temperatures were particularly challenging for Tat because she suffers from respiratory problems, which get worse with heat.

“My lungs just go wheeegh,” she said, making a shrill wheezing sound and constricting her fingers in a mock strangling motion. “I don’t know how to describe it.”

On hot summer days, she made sure to wear a shirt with a front pocket, to keep her inhaler within easy reach. When she needed to go somewhere, she moved slowly and stopped frequently for a few puffs of medication. The short walk from her tent to the abandoned couch on the riverbank could take as long as half an hour. “I’d have to hit my puffer three times,” she said

I also met with Dina Campanella, another Columbus House client who struggles to breathe on hot days. “I feel like I’m sucking air through a straw, and the humidity is sitting on top of me,” she said.

Dina has been homeless on-and-off for the past seven years. In that time, she has known many other people who have suffered similar health challenges. “We all got medical issues in one form or another,” she said. “Usually when you have lung problems, the weather affects them.”

Heat also affects the heart and circulatory system. Roland Gibbons, also a client at Columbus House, told me he was living out of his car last summer. He has high blood pressure, which causes him to feel increasingly uncomfortable as the weather gets warmer. On hot nights, he could get no more than three or four hours of sleep, so he would go to cool places during the day to get some extra rest.

“I would find a little corner in the library and do the whole, book-in-front-of-me, eyes-closed type of thing,” he said. “Catch up on my sleep that way.”

To learn about the human health impacts of hot weather, I contacted Dr. David Hondula, a researcher at Arizona State University who has been studying heat for the last ten years. He believes that heat is not treated with the seriousness it deserves.

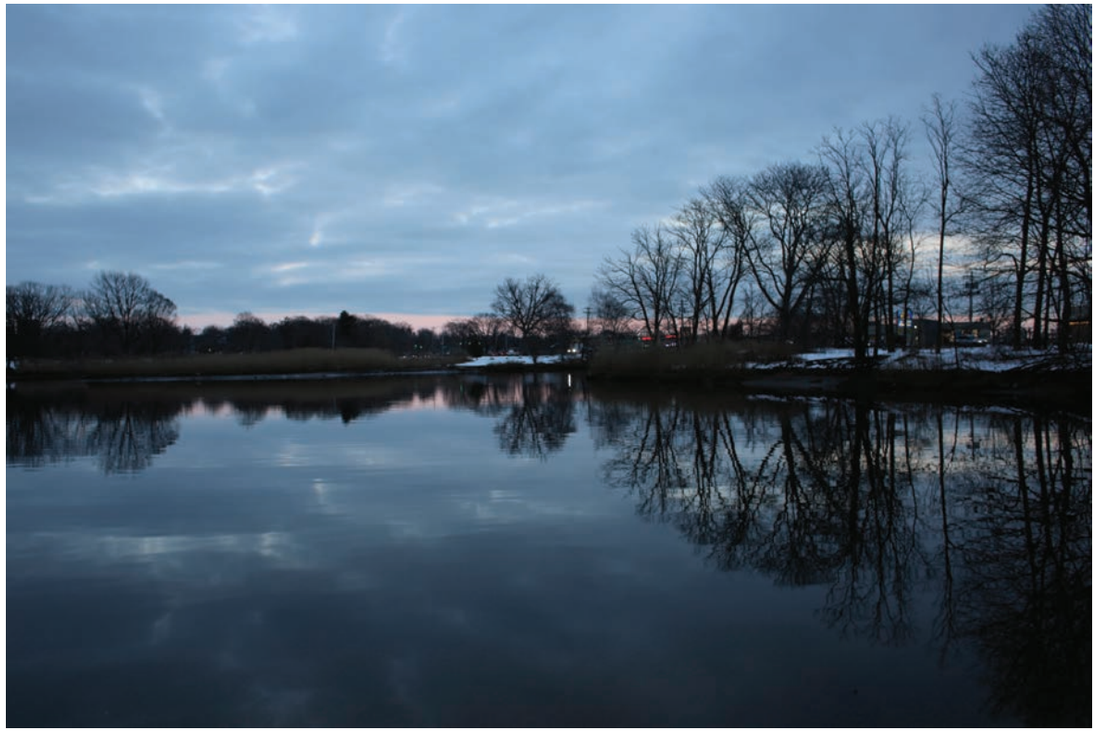
“Heat has had a significant public health effect in our country and others for a long time,” he said. “And, with a few exceptions, it’s been living in the background, as a silent hazard of sorts.”

Dr. Hondula explained that part of the reason that heat does not garner enough attention is the invisible nature of its effects. While there are more hospital visits on hotter days, heat often isn’t listed in the hospital records as a cause of illness because it’s rarely the primary cause. Instead, heat tends to exacerbate existing respiratory and circulatory problems—like the difficulties that Tat, Dina, and Roland have been dealing with for years.

Dr. Hondula is particularly concerned with how heat affects homeless people. “This is a population that is truly experiencing heat on the streets of the city day in and day out,” he said. “There are certainly other groups of people who have high exposure, but the homeless would be at or near the top of the list for who is hottest on a day-to-day basis.”

He talks about heat the way that other public health researchers might talk about a chemical toxin. In our conversation, he described an individual’s heat exposure as a “dose of heat.” He and his colleagues conducted a heat exposure study in 2017, clipping thermometers to volunteers’ belts and backpacks and taking temperature readings every five minutes for one week. The researchers found that homeless participants were exposed to severe heat 241 percent more often than participants who were not homeless. The homeless, in other words, got more than a double dose of heat.

COLUMBUS HOUSE SHELTER | Columbus House runs an emergency shelter on Ella T. Grasso Boulevard. The organization also provides many other services to help people who are experiencing homelessness.



WEST RIVER PARK | NEAR ROSE HAVEN | Twilight at West Haven Memorial Park, where Tat’s campsite Rose Haven is located.

Excessive heat can have dangerous health effects beyond the breathing and sleeping difficulties that Columbus House residents have experienced. Like a chemical toxin, it's often fatal in high doses. A 2014 report from the National Center for Health Statistics showed that heat was responsible for over 600 deaths in the U.S. between 2006 and 2010—more than five times the number caused by storms, floods, and lightning combined.

Dr. Hondula found that homelessness is the single biggest predictor of heat-related death in Maricopa County, Arizona, where he currently does his research. In Maricopa, people who are homeless are 100 to 200 times more likely to die of heat exposure than the rest of the population.

"You couldn't pick a better risk factor for identifying whether someone is likely to suffer a heat-related death," he said.

The heat hits hardest in cities. Urban areas experience a phenomenon called the urban heat island effect, causing them to be warmer than the surrounding rural areas. During the day, the temperature in a city can be two to five degrees Fahrenheit hotter than outside the city. At night, when cities hold onto heat as rural areas cool down, the difference can be as much as 22°F.

These trends mean that people experiencing homelessness in New Haven will have to contend with more heat in the coming decades. In a 2016 report called Cities in Hot Water, students at the Yale School of Forestry & Environmental Studies detailed how climate change is likely to affect New Haven. According to that report, from 1971 to 2000, Connecticut had an average of 20 days per year of temperatures exceeding 90°F. By 2070, the state might have as many as 60 days per year at those temperatures. In New Haven, the urban heat island effect could potentially increase the amount by another ten days.

Columbus House opens its doors to single adults at 4 PM for overnight stays, which means that clients like Tat LaGrave have to spend most of their daytime hours elsewhere. However, the organization makes an exception for weather emergencies, such as extremely hot days. Staying open in these circumstances significantly strains the organization's budget.

The CEO of Columbus House, Alison Cunningham, told me she wishes that the organization could afford to let people stay every day, but right now it's just not financially feasible.

Heavy rain has never been a reason for the shelter to stay open, so many of the clients spend rainy days wherever else they can stay dry. During strong downpours, Tat found shelter in restaurants or other businesses, hoping that they would allow her and her friends to take refuge as long as possible.

"Usually Dunkin' Donuts is pretty cool about it," she said. "Not always. If you look disreputable, they'll pretty quickly ask you to leave. But generally speaking, if you behave yourself and you're moderate, they're actually willing to put up with the fact that three people are sharing one coffee."

In a recent rainstorm, the woods around the West River flooded. Fortunately, Tat's tent was on high ground protected from that flood, but her friends on the other side of the river didn't fare so well.

"They went to Dunkin' Donuts for coffee and they came back two hours later and were calf-deep in water," she said.

Those friends lost what few material possessions they had, and they had to start over. Dina Campanella has endured similar losses to flooding. She was living by the West River a few years before coming to Columbus House, and her campsite flooded on three separate occasions. Each time, she did her best to cope.

"You pray that you're far enough away that it doesn't soak everything you own because you don't own a lot to begin with," she said, "And then you improvise. You start using trees and whatever you can find as clothes lines to start salvaging what you can. Or you just throw it all away and start again from scratch."

Dina doesn't go back to that area anymore. She usually goes to the New Haven Public Library or the New Haven Green during the day. When it's raining, she'll sometimes ride the bus for hours because she has nowhere else to go in the early morning before the library opens.

"I have my handy-dandy bus pass that my sister buys for me every month," she said, "so I'm lucky."

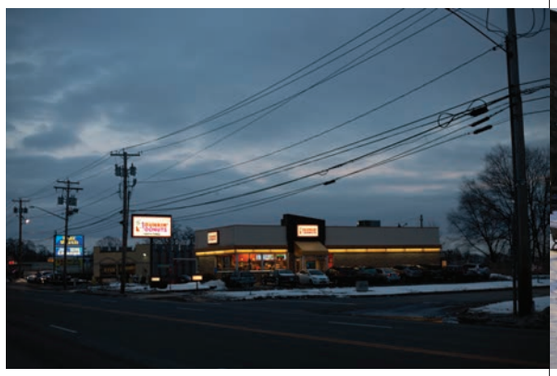
Tat thinks that the flooding in Connecticut has gotten worse over time. Specifically, she has noticed drier periods interspersed with intense rainfall, leading to floods.

"That didn't used to happen in this area," she said. "I don't remember it being as common."

Coastal areas like New Haven have an even higher risk of flooding than inland areas due to rising sea levels. The Cities in Hot Water report found that New Haven was highly susceptible to climate-related flooding. It projected that a combination of sea level rise and stronger storms would increase flooding in the city by three to seven feet by 2100. At that rate of flooding, homeless encampments like Rose Haven would be wiped out long before other structures.

The hotter and wetter conditions also affect non-human species that live in the city, including the ones that carry disease. According to the Centers for Disease Control and Prevention (CDC), as winters get milder and summers get wetter, rats and insects will likely breed and thrive for a longer portion of the year. People experiencing homelessness are especially vulnerable to diseases carried by these animals because they spend more time outside than the rest of the population and have less access to medical care.

Over the summer, Tat needed mosquito coils and bug spray to ward off the insects around her campsite. The area around the West River is full of grass and standing water, making it prime habitat for disease-carrying creatures.



DUNKIN' DONUTS | Businesses like Dunkin Donuts are a key source of shelter for homeless people on rainy days.

NEW HAVEN GREEN | New Haven Green is a regular hangout for people experiencing homelessness, but it's also a hangout for rats and other animals that carry disease, which will likely thrive in a warmer climate.

"The insect population was unbelievable," she said. "The mosquitoes and ticks were unreal this year. I mean, unreal. You could walk through ankle-high grass and find four ticks on your legs."

Recent research has shown that climate change has extended the range of the Asian tiger mosquito, which carries West Nile Virus and Chikungunya. This species—and many other types of mosquitoes—are now showing up in New Haven. The CDC warns that ticks are also flourishing due to climate change. Connecticut is the epicenter of Lyme disease, so ticks have long been common in the state, but they're dying less often now due to the milder winters, which increases the risk that they'll transmit the disease.

For people experiencing homelessness, being sick aggravates an already dangerous situation. When I met with Tat, she had recently recovered from an illness lasting several weeks. She spent much of that time lying in her tent. She felt nauseous. Her head ached. A fever came and went intermittently. She coughed up multi-colored phlegm. She suspected she initially got sick while hanging out on New Haven Green—a place where people frequently spend time in close proximity to rats. She may not have contracted a rat-borne disease, but she had reason to be concerned. Many cities have observed recent spikes in rat populations, and public health researchers believe that climate change is a factor.

Even while Tat was struggling with her illness, she still had to leave the Columbus House shelter every morning.

"There's no staying," she said. "You gotta go. No matter how sick you are, you gotta go, and quite frankly, it sucks."

Columbus House receives more than half of its budget from the state government, and its contracts do not provide funding for the shelter to stay open 24 hours a day. In a world of more frequent heat waves, more intense rainstorms, and more widespread disease, Columbus House clients will need a higher level of support.

"Ideally, I'd like to say we can be flexible," said Alison Cunningham, CEO of Columbus House. "Practically, I'd say that's hard."

During our conversation, Alison explained that Columbus House is doing as much as possible to help New Haven's homeless population, but she also expressed concern that these efforts are not enough. "I worry tremendously about people who don't come into the shelter," she said.

Even when people do come into the shelter, it isn't a permanent solution. Tat LaGrave left Columbus House a few weeks after I met her. Her ex-husband had long been promising to find her a place to stay. Despite her doubts, she took him up on the offer. Shortly into the new arrangement, he took her money to get high, so she "high-tailed it back to New Haven."

When she returned, her tent in Rose Haven was completely trashed with food wrappers and cans. Over the next several weeks, I tried to follow up with Tat to talk more about climate change, but there was never a good time. Tat was constantly dealing with personal challenges like fighting an illness or finding a new place to say. Climate change is a crisis, but so is every day of being homeless. These global and personal crises are intertwined. The effects of climate change are already making homelessness more difficult, and it seems those difficulties will only get worse. As always, Tat will cope as best as she can when more severe impacts start to hit. In the meantime, her main concerns will continue to be where to find shelter and her next meal.

After staying at Rose Haven for another week—one of the coldest weeks of the year—she found a room with an elderly church volunteer in Waterbury, where she could live for free in exchange for doing the housekeeping. She sent me this update via a string of text messages around Christmas, ending with her characteristic optimism: "Things got dark for a minute, but I have hope...And as long as a body has that, cheer is just a smile away!"

Editor's Note: Some names have been changed in the interest of privacy.

THIS IS YOUR LAND

PHOTOGRAPH: JOSLYN SULLIVAN

Exploring one small community's big fight for water and land sovereignty during the era of climate change.

By ASHIA AJANI

▲ | LANDSCAPE SHOT OF BEN SMIM

THE HONEY COOPERATIVE

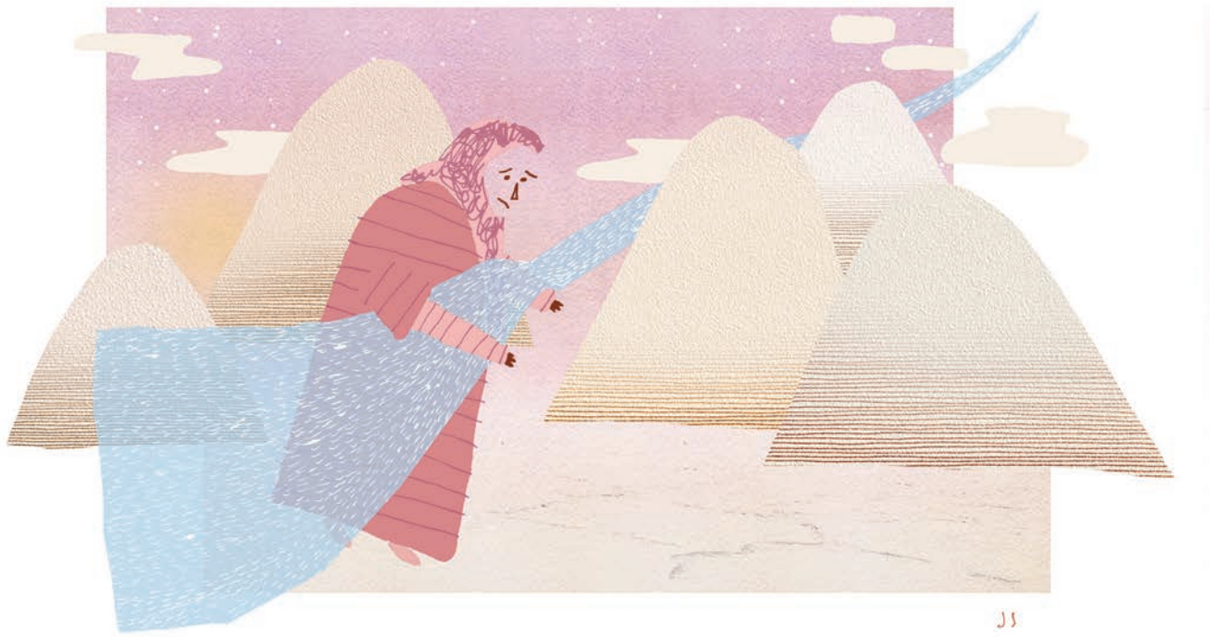


ILLUSTRATION: JEN SHIN

IN APRIL 2018, my climate change study abroad group and I took a five hour bus ride from Rabat, Morocco to Ben Smim village, a small community nestled in the Atlas Mountains. The Atlas Mountains are a vast mountain range with gorgeous landscapes and pristine water sources. Ben Smim is a place ripe for exploitation; most of the population consists of impoverished indigenous Amazigh people, who are engaged in a constant struggle against water privatization. My group visited the Atahadi Cooperative, a small, women-led bee cooperative whose members are waging their own struggle for water rights in Ben Smim.

We were greeted by Zhour and Fatem Zara, two women who own shares in a bee cooperative that has been dealing with government neglect, climate change, and political disenfranchisement.

"Allah makes you poor. Allah makes you rich," Zhour chuckles at my raised eyebrows. She explains, "If you are poor, you cannot change your status. God only gives us what we can handle."

Zhour is an indigenous Amazigh woman from Ben Smim. She is nearing fifty and smiles brightly at anyone who looks her way. Her face and hands are the only exposed skin; she is as brown as the hills that surround her home. Adjusting her maroon djellaba, a loose-fitting robe prevalent in northern Africa, Zhour tells me that she is not worried. She is poor, yes, but she lives. And thank Allah for that.

Zhour is a founding member of the Atahadi Cooperative. Painted butterflies and flowers, faded by dust and sun, greet us. Inside, the walls are white and bare, and an old wooden shelf sporadically stocked with glass jars of honey takes up most of the space. The two speakers, Fatem Zara and Zhour, welcome us in Darija (Moroccan Arabic). At Atahadi Cooperative, they raise bees and make honey. Or at least they used to.

Zhour and Fatem Zara have lived in Ben Smim their entire lives. They are landless peasants; they work the land but do not profit from its ownership. This is the story of most people in Ben Smim: stagnant in their hometown, bound by an endless cycle of farm work, odd jobs and seasonal labor. Many work at the Ain Ifrane Bottling Company, a water bottling factory a ten minute drive from Ben Smim. Zhour herself worked at Ain Ifrane for a while. But life here is defined by unstable employment. The cycle of poverty is ingrained in the landscape.

In 2008, Zhour, Fatem Zara and other women in the village were presented with an intriguing opportunity. An American woman by the name of "Madeleine," whose name is a suggestion and whose identity remains a mystery, came to Ben Smim. She was working on her PhD on "female empowerment" and proposed a new business venture for the women of the region—beekeeping. The Ben Smim ecosystem is one of sweet grass, lavender, apple blossom and mint, so producing honey in this region seemed natural. Madeleine helped organize the women, first by collecting 200 dirham (approximately 20 USD) from about 20 women to invest in a crate of bees. Madeleine returned to the U.S. after helping set up the cooperative. Eighteen crates of bees and proper business and distribution documents from the Ministry of Agriculture later, Cooperative Atahadi was up and running.

"We make really good honey. We've won awards. We've sold out shelves," Fatem Zara tells us. For a brief time, the honey cooperative changed the lives of its members. The women gained financial security previously unseen by landless peasants in Ben Smim. They purchased thirty more cases of bees and honey processing equipment. For a couple of years, there was no more cleaning other people's houses, no backbreaking farm labor without proper contracts and a newfound sense of freedom.

"We do this to empower the women," Fatem Zara says. "The men work in the fields. But it is only seasonal work, and we need money."

She laughs softly, "And men do not want to work in a cooperative with women."

How much of that is true and how much of that was influenced by Madeleine is unclear. But one thing rings true: shared economics in this region equals freedom. Freedom of choice, freedom of mobility and vision of a return to collective, collaborative living.

In Ben Smim, there is not much in the way of social mobility. If Allah makes you poor, you are really poor. Capital

WE DO THIS TO EMPOWER THE WOMEN.

THE MEN WORK IN THE FIELDS. BUT IT IS ONLY SEASONAL, AND WE NEED MONEY.

AND MEN DO NOT WANT TO WORK IN A COOPERATIVE WITH WOMAN.

accumulation is reserved for the rich and the oligarchy.

"I do this for my daughters," Fatem Zara says. "They are all teenagers, and they need an education."

Fatem Zara and Zhour tell me that a changing regime in 2011 and unprecedented legislative restructuring have brought many obstacles. The operations of the honey co-operative were no longer under the Ministry of Agriculture and were transferred to the authority of the courts, which revoked their authorization to distribute honey. Many other vendors in the area confirm to me that they had difficulties getting proper authorization, but I could find no legal documents or legislature confirming this.

"We used to sell out shelves," Zhour says. "Now, we can't even pay back the women who put the initial investment into the cooperative."

The years since have been an uphill battle to maintain sovereignty. According to Fatem Zara, the courts refuse to authorize their cooperative practices because the "higher-ups" haven't given approval. Many other organizations, including a small tea company that operates out of the same building as Cooperative Atahadi, also cannot receive authorization. An assessment by the European Bank for Reconstruction and Development in 2012 found that courts in Morocco "suffer from a lack of material and human resources," rendering litigation and enforcement procedures "lengthy and uncertain."

Zhour believes it has nothing to do with gender or race; it is a matter of power, of determining who remains poor and who can climb the social ladder. There were originally 18 women involved in the cooperative. Now there are only five or six who are holding on to the same hope that guides Zhour and Fatem Zara.

"The courts don't respect us because we are poor," Zhour says. "Just that. It's because we are poor and uneducated."

"Now I can't afford to send my daughters away," Fatem Zara says. "Public schools require annual application and entrance fees. I can't afford textbooks. I can't afford computers." The paint and exhaustion are written on Fatem Zara's face.

"My daughter is sick. She needs a PET scan. But I can't afford that," Zhour chimes in.

"All but four crates of our bees have died since then," She continues. "And it is getting worse."

In 2016, a drought killed off most of the cooperative's bees. This is not uncommon—more intense weather events have been plaguing pastoral communities like Ben Smim. In the early 2000s, farmers used to be able to predict, almost to the day, when the rain would come. Now, torrents damage crops, hail is increasingly common, and long periods of drought spark the search for new water sources—usually requiring deeper and deeper wells. There is a spring in Ben Smim, but much of the water is owned by Ain Ifrane, a subsidiary of Euro-Africaine des Eaux (EAE), or Euro-African Waters. The cooperative is caught between unfair state legislation and regional water privatization.

> MOST PEOPLE ARE UNEDUCATED HERE.
>
> AND MOST PEOPLE ARE GREEDY.
>
> THAT'S A BAD COMBINATION.

One person in our group asks about Madeline, this unknown American woman who seemed to disappear almost as soon as she arrived.

"We have no way of contacting her," Zhour says. "And it is a pity: the organization would've been so much more successful with her. The government would respect an American woman. We would have our authorization."

"I have little hope," Fatem Zara says matter of factly.

At the end, our group buys the last few jars of honey they have left. It adds up to about 180 USD. Some of us go into the other parts of the building and buy lavender water, tea leaves, and honey-based shampoo as little acts of resistance when we don't know what else to do.

AIN IFRANE TOOK OUR WATER

FROM 2010 TO 2014, Zhour worked for Ain Ifrane. She wasn't on the assembly line, but she was a maid and cook for the staff. She worked from 6 am to 6 pm, cooking for mostly male employees.

According to Zhour, if people speak up for their rights, they are fired. She had no contract and no health benefits. Though, the floor manager said that 70 percent of the bottling company employees are from Ben Smim, Zhour says this is a lie. During her time with the plant, 40 villagers, out of a team of 73 employees, worked in the plant. Now, she believes that number is down to 20. When asked about this, a representative at the factory simply said, "people move in and out of the village a lot."

In the spring of 2014, Zhour was electrocuted by some exposed wire. She was taken to the hospital, received no care, and was then discharged without a proper diagnosis. She was later fired, and she tried suing the company. The local court approved the suit, but once she made it to regional court, she was pushed out, primarily by her own lawyer. She believes that he was bribed. Bribery is common within the Moroccan courts, as "most people are uneducated here," Zhour says. "And most people are greedy. That's a bad combination. People used to work together. We monitored and owned the land collectively, but that wasn't good enough for some. People do not fear God anymore."

A few days before my group went to the Atahadi Cooperative, we visited the Ain Ifrane bottling company. With my clumsy French, I decipher the posters scattered along the foyer of the plant: "Working together gets the job done!" "Smile while you work!" "Good effort is its own reward."

A woman in a white lab coat greets us in the lobby. She introduces herself in French. She knows that we are a climate change group, so she makes sure to answer all of the proper questions before we have a chance to ask them.

"Yes, Moroccans need bottled water." (The tap water is safe to drink for people who have been in the region long enough, but the high levels of chlorine in the water that take some getting used to if you are not accustomed to drinking highly chlorinated water). Yes, we work with the indigenous people to manage the water. No, we do not use chemicals in the processing of the water; it is extracted, filtered through pipes and transferred here. No, we do not recycle the bottles here, a plant in Casablanca does that for us. Yes, there is an ever increasing demand for bottled water in Morocco."

She does not expect our questions about the workers. Are they happy? What are the health benefits for employees?

"We prioritize Ben Smim villagers," she says. "We have about 73 workers in the plant. There is a doctor on site. Everyone is provided two medical check-ups per year."

The floor manager is much more eager to talk about the plant itself rather than the people that keep it running.

"We sell 56 million bottles of water per year," she says proudly. "We process about 95 million liters of water per year, that's about five percent of the water source. Most of the water belongs to the villagers."

In order to understand the process of water privatization in Ben Smim, one must revisit the origins of the plant itself.

Ain Ifrane was started by a French investor named Nicolas Antaki in the early 2000s. Ain Ifrane quickly became a part of EAE, a transnational bottling company. EAE was then purchased in 2010 by Brasseries du Maroc, owned by the French multinational corporation Castel since 2003.

The legacies of French colonialism have deep roots in Morocco. The Moroccan government, in a continuing effort to assert itself as an independent and sovereign nation, makes trade deals with its former colonizers, France and Spain. Most industries in Morocco have French and Spanish investment. There are also French and Spanish landholders throughout the country. The Moroccan government, particularly King Mohammed VI, who has holdings in almost every major industry in Morocco, benefits from these investments. Landless peasants do not.

Land in Ben Smim was collectively managed until the early 2000s. There are four noble families that run the area. The land is under their jurisdiction, but everyone in the village belongs to one of the four families. Little by little, the noble families started making decisions for everyone in Ben Smim. Now, it is hard to tell who has jurisdiction over what parcels of land.

"When Nicolas [Antaki] came to Ben Smim in 2001, he said that he had full authorization to build the bottling company. He had documents from Rabat. But the whole village was against the idea," Zhour says. People wanted to hold on to their ancestral lands. The members of Ben Smim were split, but some had better connections to the government than others. One family in particular wanted to pursue this venture and was willing to get military forces involved to break up the land.

"Then in 2008, Nicolas came back. Some people opposed the project and others were for it. One of the families kept pushing for the bottling factory to be built. They thought it would bring jobs. Military force allowed the project to continue. They consume most of our water. The company brought in a professional to help with the redistribution of water. Conflicts arose again. In the end, the redistribution never took place."

The Moroccan government actively promotes a water-intensive form of agriculture that cannot be maintained with the current privatization of water. Morocco exports apples, oranges and vegetables that demand a lot of water. New wells are dug every year to support this produce. Ain Ifrane loses 0.027 liters of water during the bottle-production process. That may seem insignificant, but it adds up over time. The Moroccan government encourages a linear approach to development, and poor farmers, without many other resources, continue this water-intensive approach.

This process is devastating for Morocco, a water insecure country. For a country to be water secure, it should

have at least 1,000 cubic meters of water per person per year. Below 1,000 is considered a "stress zone," Morocco's designation since 2000. The current estimate per person per year is now 700 cubic meters. Over the last three years, groundwater levels have decreased by ten meters.

"People don't consider themselves doing any sort of wrong," Dr. Lisa Bossenbroek said. Bossenbroek, a postdoctoral fellow at the School of Governance and Economics in Rabat, has conducted sociological research in Morocco for the past two years. "The state brings in this kind of development, and the actors just act out this development."

According to Zhour, the government told Ben Smim residents that by law they were entitled to 60 percent of the water source in Ben Smim. Residents are receiving nowhere near that amount. The holy month of Ramadan was filled with protests, police brutality and arrests. People from other cities and even some anti-privatization activists from Tunisia came to protest the construction of the bottling company. Twelve villagers from Ben Smim were arrested, including Zhour. They were on the front lines demanding their water rights back, demanding their land back, protesting the degradation of Mother Earth.

But in the end, the bottling company was constructed. Government authority and government greed were too powerful. After that, people went back to their hometowns. A shroud of defeat cast itself over residents and non-residents alike.

"At least we don't have to pay for our water anymore," Zhour says. "The charges and fines against the villagers were dropped with one stipulation—that we didn't speak out against the bottling company ever again."

PROTECT THE EARTH, PROTECT GOD

BEN SMIM IS associated with healing and purity in Morocco and beyond. In the 19th century, French colonizers drank from the Ben Smim reservoirs and claimed it healed their illnesses. It makes sense that large industrial forces would want to exploit this resource. But in the era of climate change, one industry's monetary gain is a devastating ecological loss for communities. Ben Smim farmers have been coping with the privatization of water in the region. Zhour used to work on an apple orchard, picking apples after she was fired from the bottling company. She says she no longer has access to this work because farmers have dealt with fewer yields.

We are back in our student lodgings in Ben Smim overlooking the Atlas Mountains. The room smells like oranges, a major export. Zhour's eight year-old daughter fidgets in her lap as her mother speaks, "Agricultural activity has decreased significantly since the bottling plant was installed. There is not enough water for agriculture, particularly during hot summers."

Modern agriculture is a significant contributor to climate change. In 2011, agriculture accounted for 10 to 12 percent of global greenhouse gas emissions. But in Morocco, the agriculture sector also accounts for 17 percent of the overall GDP and employs upwards of 60 percent of the country, not including seasonal pickers and informal labor.

Moroccan agriculture often operates on a system of "invisible" farmers: private investors who own the land and hire others to manage it for them. These private investors often live in the city, hours away from their farmland, and only check on operations occasionally. This kind of agriculture is profitable for private investors, who reap the benefits of owning land but not working it, and for the managers, who can make decisions regarding water management, harvesting, and of course, hiring.

"We are essentially exporting our water," a farm owner lovingly called Jawad the Farmer complains. Jawad is originally from Casablanca, five hours away from Ben Smim. Jawad used to be a software engineer in the United States. After 10 years in the United States, his father and grandfather passed away. Jawad came to Ben Smim to farm after his father and grandfather left him parcels of land in the area. His decision to come back was catalyzed by the passing of his father and grandfather.

"But what can I do?" Jawad the Farmer expresses in exasperation. "I have to keep my farm running. People want apples. They want fresh fruit. How would I make a living growing something else?"

"You cannot rush nature," Zhour says. "This is why we are seeing so many social problems. People want to rush the land. People think they can control water, that they can control production. This is not true."

In Ben Smim, the combination of agricultural intensification and privatization of water has created a wasteland. The soil is brown and dry and cracked. Grass grows in uneven patches. Even the donkeys that pass by, led by raisin-faced herders, look parched. The picture of Ben Smim featured on the water bottles, with a snow-capped mountain and fertile, emerald fields, tells a completely different story. As with most companies, Ain Ifrane is selling an idea.

When hardships fall upon farmers and landless peasants, many of them take it in stride. Cheikh Naeem, a mathematics professor at Al Akhawayn University in the nearby town of Ifrane, has a special interest in the current status of water resources in Morocco. He is originally from Pakistan but studied in the United States and was recruited to teach at Al Akhawayn. He attributes the strength of the community to their individual religious beliefs, "The people, they say 'alhamdulillah, I have survived another year.' They ask for better conditions for the next year and keep moving forward."

PHOTOGRAPH: JOSLYN SULLIVAN

▲ | ROAD THROUGH ATLAS MOUNTAINS

"In Islam, water is considered a pristine resource for all humans," Professor Naeem says. "At the end, the people in power will have to answer to their Lord for the crimes they have committed. This gives some of the landless peasants solace."

"I thank God for what I have," Zhour says. "Allah has kept me here for a reason. So I thank Allah."

"I have done my good works," Zhour affirmed. "I have lived properly. Allah will reward me in the next life."

Her next life may be set, but the future and present of Ben Smim remains uncertain. Dealing with agricultural decline, water insecurity, and climate change will not be an easy task. And many villagers have given up protesting the bottling company.

"Our only hope is outside help," Zhour says. "The local community is powerless. The government runs over us like ants."

Towards the end of our conversation, I ask Zhour and Fatem Zara why they stay.

"We want to make honey," Zhour says simply. "We want to control our future."

Fatem Zara sighs a heavy sigh that takes up the space of the whole room. For a moment, we are all silent: me, the two Amazigh women, and the translator who has sleepy eyes.

"We're not going anywhere," Zhour says firmly. "This is our land; we protect our land. We're not going anywhere."

Editor's Note: All quotes from the women at the cooperative were translated from Darija by a translator.

ISTF PHOTO CONTEST WINNERS

▼ **James Beck**
Pedasí firefighters help the coastal Pablo Barrios Wildlife Refuge fight back against anthropogenic fire; Photographers without Borders, Proyecto Ecológico Azuero.

▸ **Katherine Meier**
A single seedling emerges from the charred remains of the Tuanan Forest, 2015, Central Kalimantan, Indonesia.

▲ **Camila Taylor Rodriguez**
Sargassum seaweed invasion, 2018, Barbados.

▼ **Evelin Eszter Tóth**
Vunidogoloa was the first village in Fiji to relocate to a new site due to sea level rise. A family gathers in a newly-built home.

YALE ISTF 25TH ANNUAL CONFERENCE

Examining tropical changes: resilience in the face of disturbance and transgression

• **By MELAINA DYCK, RENATA LOZANO, CAROLINE TASIRIN, SARA SANTIAGO, AND ANDY LEE**

THIS YEAR, the oldest, entirely student-run conference at Yale F&ES—the International Society of Tropical Foresters (ISTF) Conference—celebrated 25 successful years and pushed its annual gathering of practitioners and researchers in new directions with the theme Examining Tropical Changes: Resilience in the Face of Disturbance and Transgression. The conference highlighted the critical role of indigenous peoples and frontline communities in stewardship of tropical forests, as well as the disproportionate impact of disturbances and transgressions on those communities' lives and lands. The conference further underscored the urgent pressures facing communities globally from immense environmental change, and with them, mounting political and social upheaval. As keynote speaker Leila Salazar-Lopez stated, "You do not have to be a mother to be terrified for the future for your children. We cannot wait another single minute to make change on regional, national, and international climate policy.

The ISTF conference brings divergent ideas into conversation. ISTF 2019 included speakers from 22 countries, representing researchers, practitioners, policymakers, activists, and indigenous leaders. Conference sessions delved into topics including the socio-environmental impacts of colonial legacies in tropical regions, preparation for and recovery from disasters like hurricanes in small countries, the essential role of traditional knowledge and indigenous land rights in protecting landscapes, and technological advances that support climate change mitigation and secure human rights. In addition to a variety of speakers and presentations, conference organizers were excited to include three new events this year: a performance of Javanese gamelan by the Yale Gamelan Suprabanggo ensemble, a photo contest for conference participants (winners' photos featured left), and live-scribing by artist Heather Leavitt Martinez.

PHOTOGRAPH: A.J. HUDSON

A visual practitioner and lettering artist, Heather Leavitt Martinez graphically recorded the conference with inspiring and engaging visual content. Leavitt Martinez live-scribed the speakers' main messages as they were presenting to support the audience's comprehension with vivid illustrations. Leavitt Martinez's work was displayed throughout the two days of the conference to allow participants to continue reflecting and processing content from panels, keynote presentations, breakout sessions, and flash talks. Students and participants were fascinated with the outputs; several expressed they had never seen anything like the live-scribing before and they felt the art made the conference content more accessible. Presenters enjoyed seeing their key findings captured in beautiful and quirky cartoons. By including this new medium, ISTF was able to make the conference more accessible to a range of learning styles and foster conversations after the presentations were over.

The 25th annual ISTF conference made visible what is often invisible. It centered the perspectives of activists and community-leaders, who are not often heard in academic settings, and experimented with creative modes to transmit key ideas. The conference envisioned tropical forestry work and research for the future. This present moment of escalating transgressions and disturbances in tropical landscapes calls for reimagining resilience and creating new ways to visualize solutions.

SAGE

EXPANDING ENVIRONMENTALISM THROUGH
PROVOCATIVE CONVERSATION AND THE ARTS.

The Jonah Gas Field in Wyoming seen during a low flyover. This network of active gas pads and the roads linking them stretches across the entire region.

Photograph by A.J. HUDSON