

The Art of Adaptation: Exploring Climate Change Through Future Foods

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We transform the world, but we don't remember it. We adjust our baseline to the new level, and we don't recall what was there," observes Daniel Pauly¹, a French marine biologist who studies the long-term effects of the fishing industry on the world's oceans. In 1995, Pauly developed the concept of 'shifting baselines' based on the work of landscape architect Ian McHarg. Pauly took the concept and applied it underwater to explain why fisheries scientists fail to accurately evaluate fisheries whose population and size have steadily declined from relentless human exploitation.² According to Pauly, there is little context for how much

biodiversity has been lost in fish communities over the course of human civilization because fisheries scientists determine the state of fisheries based on research from past decades and do not consider the harmful effect that thousands of years of fishing has had on sea life around the world. From bone harpoons sharpened over ninety-thousand years ago to the rise of steam trawlers during the Industrial Revolution to modern commercial fleets hunting in waters deeper than ever before, humans continue to repeat a reckless pattern of "exterminating the population upon which they originally relied, then moving on to other species," Pauly explains.³

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to the brink of extinction and caused irreversible damage to their ecosystems, yet there is no sense of urgency to reduce consumption of sea life commensurate with the destruction that the human diet has caused. The problems continue to worsen as climate change, sea level rise and ocean acidification decimate the small percentage of remaining underwater species—in addition to the intensifying floods, wildfires, cyclones, droughts and extinction of large mammals and wildlife



happening on land. Although humans are beginning to recognize their culpability, it is difficult to grasp the true scale of the degradation they have caused because each new generation's baseline of what is 'natural' continues to drift further from reality. The flawed perception of ecological loss skews humans' ability measure change. Their interactions with nature, which are constantly being reformulated, create new expectations of what the world is supposed to look like that are passed down to the next generation.⁴

"I was talking to my grandmother, who is a hundred years old, about how she grew up," says Allie Wist, an art director and researcher based in New York City. "Her family canned meat and went to the grocery store twice a year. They had a big garden and a pump for water but no heat and no plumbing. I was thinking about that and how much has changed since then. When did we take all of this as normal?" Wist has devoted much of her research to exploring connections between shifting baselines,

climate changed landscapes and the future of the food system through the medium of photography. Last spring, Wist and her team of three female artists—photographer Heami Lee, food stylist and recipe developer C.C. Buckley, and prop stylist Rebecca Bartoshesky—produced a series of images titled, *Flooded*,⁵ a collaborative project depicting a fictional dinner party set in a time after the effects of climate change have altered human (primarily North American and European) eating habits. The team created imaginative recipes and stylized images centered around food scarcity, using foraged and non-native ingredients to conceptualize how humans might adapt their diets to rising sea levels in a climate permanently changed.

As whimsical as they are eerie, the images transport viewers underneath watery hues of aqua green and ocean blue, through pools of slick seaweed floating alongside clam shells, beyond towering pillars of fungi to an overhead view of a sparse dinner table set for three. Light glistens against the smooth edges

of antique glass in varying shades of amber and turquoise that decorate the table's marble canvas. Tall stems filled halfway with Grenache and Chardonnay sit closely to ribbed tumblers offering freshly desalinated water. Heavy metal utensils glinting under refracted light lie askew as if the diners abruptly left before taking their first bite. Speckled ceramic plates the pale color of a robin's egg are plated with small servings of foraged and fished dishes: sunchoke chips scattered next to burdock and dandelion root hummus; a pair of thick brown mushrooms with curling gills; a tray of oysters on the half-shell with slippers attached nestled on a bed of ice surrounded by clusters of bright green sea vegetables; milky ceramic bowls flecked with mint green hold mollusks and mustard greens submerged in a clear broth; a tangled mound of jellyfish and seaweed lies in an elongated ochre glass bowl; royal blue dessert plates hold gelatinous discs of carob and agar agar pudding, promising a bittersweet finish to the meal's end.



"Part of our task in making these photos and creating this narrative is to push beyond what we think of as what is possible. To create a larger spectrum of imagination and more oppor-

tunity to participate in positive change," says C.C. Buckley, a Brooklyn-based food stylist and recipe developer. Buckley explains to me via email the intention behind the dishes and their ingredients, which

she sourced from local farmers' markets, nearby Manhattan Chinatown and Koreatown vendors, and foraged in Brooklyn's sprawling Prospect Park. The decision to use sea vegetables like kelp, wakame, dulse, nori and irish moss—accentuated by mostly bivalves and fungi—is one hypothetical answer to the project's underlying question: how does a food system altered by climate change adapt to use the remaining natural resources responsibly? *Flooded* swaps inefficient processes for more thoughtful methods of crafting nutrient-dense dishes centered around plant foods. Agar made from red algae replaces gelatin made from the skin and bones of factory farmed animals. Carob is used instead of chocolate to acknowledge that regions where the cocoa plant is grown will soon become inhospitably hot due to global warming.

The futuristic recipes—which are part metaphor and part literal application—presume a theoretical shift wherein humans relate to non-human animals and edible plants as allies with common



interests instead of viewing them as objects. “Facilitating a mutually beneficial relationship between humans and plants is not only crucial to our individual health but also our collective health as humans and the health of the planet and all its organisms,” Buckley explains.

In the past year, *Flooded* has been shown as an exhibit in different parts of the world. “Depending on where you go, people have different responses to it,” Wist tells me over the phone. “In Finland, the concept of foraging is not radical at all. In Hawai’i, we never had to explain why climate change is an issue, and they already have a huge seaweed eating culture called limu that regards sea vegetables as beautiful, not strange or terrifying.” In Iowa, however, the exhibit drew some dissenting opinions about global warming. The sobering reality of climate change and the leading role our food system plays in its acceleration is undeniable, yet the topic is still met with skepticism in parts of the US where animal agriculture provides the main

source of employment and food. It is no coincidence that Iowa, the leading producer of corn, soy, factory farmed hogs and egg-laying hens in the US⁶, was the one place where *Flooded* provoked a defensive response from locals regarding the effects of climate change.

A common response, Wist notes, has been the question of how to incorporate research reflected in the art series into daily life. But climate change adaptation is a problem she did not intend to solve, only explore. “I’ve started to call it ‘gastronomic science fiction,’” she laughs. “Because we based the project on research but never said it was a prediction.” She hopes that people are inspired to eat more vegetables and fewer animals but more importantly, Wist wants viewers to reconsider the value system that shapes their relationship with plants, nature and food, and to recognize that what appears to be normal today wasn’t always. Humans in North America are perhaps more geographically removed from where their food is grown and more ignorant of how it is produced

than ever before, Wist contends, and collective knowledge of foraging, growing and preserving food in ways that revitalizes human health and surrounding ecosystems has been outsourced to a food industry that favors cheap, often destructive means of food production.

Consider slaughterhouses and meat processing plants—the final destination of nearly all farmed animals regardless of how ‘humanely’ they are raised. These facilities outsource the true cost of managing wastewater and groundwater contamination, air pollution, greenhouse gas emissions, antibiotic resistance and disease spread (such as *E. Coli* and salmonella) to local communities, food safety advocates and public health officials. Protected from public view, these facilities operate under dangerous and exploitative working conditions where the rights of employees are violated alongside the animals.

Flooded envisions a move away from animal agriculture coupled with a resurgence of localized gardening, fermenta-



tion, pickling and canning as the new (old) norm. Underwater kelp farms and bivalve hatcheries are imagined alternatives to the meat and dairy industries, which isn't a wholly unrealistic narrative. As sea waters rise from melting glaciers in Greenland and Antarctica, and coastal flooding continues to accelerate in the gulf and mid-Atlantic states, the U.S. may take more of its farming underwater. Unlike aquaculture—which is essentially submerged factory farming replete with unnatural confinement, pollution, sickness, antibiotic abuse and unfathomable suffering of its captives—kelp forests and oyster farms help to purify the water, rejuvenate ecosystems and mitigate some of the damage caused by fishing and land-based agriculture.

“Plentiful, healthy, and virtuous, kelp is the culinary equivalent of an electric car,” declared the *New Yorker* in 2015, reporting on the rise of kelp farms and oyster hatcheries in the US⁷. But edible algae, affectionately called sea vegetables, have long existed outside of our dysto-

pian future. According to the FAO⁸, evidence for the use of sea vegetables as human food dates back to sixth century China, and they are still commonly eaten across Asia and elsewhere in the world. Seaweed has more than 10,000 species ranging in hues of green, red, purple, and brown, and is rich in protein, B vitamins, trace minerals, iodine, amino acids and omega-3 fatty acids. Though North America has been slow to embrace seaweed as a whole food, its chemical components are staples in the food industry. Carrageenan, agar and alginate are common ingredients used to emulsify, thicken and bind processed foods. Seaweed has other uses for humans, too. It can be converted into biofuel through anaerobic fermentation, is a common ingredient in cosmetics, and is used to feed land animals and farmed fish.

But much like the electric car, seaweed is not a cure for unchecked human consumption, and comparing them produces an ironic metaphor that exposes the same flawed logic Pauly observes among

fisherpeople: a pattern of behavior that assumes humans can pivot their consumption to a new source instead of drastically reducing the amount they consume, be it of animals or energy. Much like fish communities, seaweed is also in a fragile state. “Sea grasses are among the most endangered biomes in the world,” says Troy Vettese, an environmental historian at New York University. Vettese asserts that “the sea is in worse shape than terrestrial biomes,” and while nearly all fish stocks have collapsed, plastic pollution in the oceans continues to multiply. “Carbon is acidifying the ocean, sea grasses are disappearing, coral reefs are dying and nitrogen pollution creates huge dead zones,” he tells me via email. “We probably should not look to the oceans for salvation.”

Many of the same plants featured in *Flooded* are in as much danger of being wiped out as the schools of fish seeking shelter among their fronds. According to Environmental journalist Alastair Bland⁹, kelp forests from Tasmania to France and California to

Denmark are experiencing deforestation due to their waters' rapid acidification and increased temperatures that attract hordes of incoming sea urchins. Bland reports that when sea urchins move in, they quickly transform lush kelp forests into desolate, densely-populated barrens. Even after they have consumed all vegetation and driven out other organisms, their hardiness gives them staying power. When faced with starvation, the sea urchin's jaw and teeth become calcified and its exoskeleton changes, allowing it to climb the food chain to consume different and larger

prey like barnacles and abalone shells. Like a sci-fi monster whose own starvation makes it stronger, the sea urchin becomes aggressively mobile the more scarce resources become. Natural predators who would keep sea urchin populations in check, like sea stars and rock lobsters, are in short supply due to disease and overfishing.

Kelp and other sea grasses are vital to the health of the planet. They reduce harmful nutrient and nitrogen runoff from agriculture, and produce oxygen that counteracts blooms of oxygen-depleting phytoplankton caused by pollution from sewage



treatment facilities. Likewise, fish and invertebrates along the continental shelf play an important role in the carbon cycle. “Coastal ocean ecosystems offer some of the greatest opportunities for carbon storage,” says Oswald J. Schmitz, professor of ecology at Yale University.¹⁰ According to Schmitz, the world's largest and most efficient carbon sinks are found on continental shelves where the rate of carbon absorption is forty times faster than in tropical forests due in large part to sea life. Bivalves and other invertebrates undergo a physiological process to prevent calcium build-up that releases carbon to the ocean floor that is “equal the annual fossil fuel carbon emissions by such countries as Brazil, the UK, or Australia,” says Schmitz. Unfortunately, fishing has caused hundreds of years' worth of carbon stores to be released into the atmosphere and continues to reduce the potential of future carbon absorption as fish stocks decline. In short, humans cannot have their carbon sinks and eat sea life, too.

Vettese suggests that humans leave sea life off their plates altogether. “If you want to eat a diet that is both the best adapted to climate change and has the fewest carbon emissions then eat a vegan diet,” he says. Legumes, for example, are a hardy source of protein that are easy to grow and do not require fertilizer “because they fix nitrogen from the air,” Vettese continues, adding that a diet free from animals and their byproducts also allows more land to be rewilded because “vegans only need a tenth as much space to grow enough food, about 0.1 hectare compared to 1 hectare for an omnivore. Land-use change and animal agriculture more broadly is one of the leading sources for CO₂ emissions.”

Wist and her team are aware that sea level rise is not the only issue surrounding climate change nor are underwater food sources their only imagined solution. The team is currently working on the next iteration of the series, *Drought*, which will look at the desertification of landscapes. Much like in *Flooded*, they

plan to conceptualize recipes and dishes that reflect human adaptation to a drier climate. Among the foods that will be incorporated are breadfruit—a species of flowering tree that doesn’t need fertilizer, is drought-resistant and produces a starchy, nutritious fruit—and other desert staples like cacti, agave and yucca. Buckley says she hopes the ingredients and tone of the upcoming project “evoke imagery of dried vulnerable earth.” She plans to incorporate dehydration methods for preserving foods that do not require electricity in recipes like kelp jerky. Wist hopes that *Flooded* and *Drought* will nudge people to make better food choices, demand industry regulation, increase environmental protections, and provide a way for people to connect with their surrounding landscapes or at least consider how the earth’s oceans and glaciers are going to affect their lives. “I’ll be the first to admit this research changes,” says Wist. “If we invest our energy into something, how do we know it isn’t going to cause a problem in that ecosystem

that we don’t know about, when we harvest this particular thing or if we go all vegan?” But the evidence suggests that some changes, like adopting a vegan diet and eliminating the use of fossil fuels, are more likely to reduce known forms of ecological destruction than create new ones.

The inevitability of climate change and how humans will adapt to it cannot easily be answered in full only imagined in part, and artistic explorations give us something to gnaw on. But the more pressing question is not what humans will do, but what humans must do—especially for North Americans and Europeans who consume the majority of earth’s resources. There is no doubt that humans are the earth’s most destructive species whose consumption must decrease to avoid greater loss of biodiversity and species extinction. Should human actions result in our own demise, there is consolation in the fact that the earth, along with its more resilient inhabitants, will continue to adapt and thrive without us.

Photo Credits

All photos by Heami Lee

Notes

- 1 Pauly, Daniel. “The ocean’s shifting baseline.” TED, April 2010.
- 2 Pauly, Daniel. “Anecdotes and the shifting baseline syndrome of fisheries.” *Trends in Ecology and Evolution*, vol 10, no. 10, 1995, p. 430.
- 3 Pauly, D. “Commentary: fishing down marine food webs” In: Paul J. Harrison and T. R. Parson (eds.) *Fisheries Oceanography: an integrative approach to fisheries ecology and management*. Blackwell Science, Oxford, 2000, p. 195-199.
- 4 Kahn, Peter H. Jr. “Children’s Affiliations with Nature: Structure, Development, and the Problem of Environmental Generational Amnesia.” *Children and Nature*. Massachusetts: Massachusetts Institute of Technology, 2002.
- 5 <http://www.alliewist.com/work-projects/Flooded>
- 6 “2017 State Agricultural Overview: Iowa.” United States Department of Agriculture National Agricultural Statistics Service.
- 7 Dana Goodyear, “Is Seaweed the Next Superfood?” *The New Yorker*, 2 November 2015.
- 8 McHugh, D.J. A guide to the seaweed industry. FAO Fisheries Technical Paper, No. 441, 2003.
- 9 Bland, Alastair. “As Oceans Warm, the World’s Kelp Forests Begin to Disappear.” *Yale Environment* 360, 20 November 2017.
- 10 Schwitz, Oswald. “How ‘Natural Geoengineering’ Can Help Slow Global Warming.” *Yale Environment* 360, 25 January 2016.