Oh, it could get very bad.

In 2015, a study in the Journal of Mathematical Biology pointed out that if the world’s oceans kept warming, by 2100 they might become hot enough to “stop oxygen production by phyto-plankton by disrupting the process of photosynthesis.” Given that two-thirds of the Earth’s oxygen comes from phytoplankton, that would “likely result in the mass mortality of animals and humans.”

A year later, above the Arctic Circle, in Siberia, a heat wave thawed a reindeer carcass that had been trapped in the permafrost. The exposed body released anthrax into nearby water and soil, infecting two thousand reindeer grazing nearby, and they in turn infected some humans; a twelve-year-old boy died. As it turns out, permafrost is a “very good preserver of microbes and viruses, because it is cold, there is no oxygen, and it is dark” — scientists have managed to revive an eight-million-year-old bacterium they found beneath the surface of a glacier. Researchers believe there are fragments of the Spanish flu virus, smallpox, and bubonic plague buried in Siberia and Alaska.

Or consider this: as ice sheets melt, they take weight off land, and that can trigger earthquakes — seismic activity is already increasing in Greenland and Alaska. Meanwhile, the added weight of the new seawater starts to bend the Earth’s crust. “That will give you a massive increase in volcanic activity. It’ll activate faults to create earthquakes, submarine landslides, tsunamis, the whole lot,” explained the director of University College London’s Hazard Centre. Such a landslide happened in Scandinavia about eight thousand years ago, as the last Ice Age retreated and a Kentucky-size section of Norway’s continental shelf gave way, “plummeting down to the abyssal plain and creating a series of titanic waves that roared forth with a vengeance,” wiping all signs of life from coastal Norway to Greenland and “drowning the Wales-sized landmass that once connected Britain to the Netherlands, Denmark, and Germany.” When the waves hit the Shetlands, they were sixty-five feet high.

There’s even this: if we keep raising carbon dioxide levels, we may not be able to think straight anymore. At a thousand parts per million (which is within the realm of possibility for 2100), human cognitive ability falls 21 percent. “The largest effects were seen for Crisis Response, Information Usage, and Strategy,” a Harvard study reported, which is too bad, as those skills are what we seem to need most.

I could, in other words, do my best to scare you silly. I’m not opposed on principle — changing something as fundamental as the composition of the atmosphere, and hence the heat balance of the planet, is certain to trigger all manner of horror, and we shouldn’t shy away from it. The dramatic uncertainty that lies ahead may be the most frightening development of all; the physical world is going from backdrop to foreground. (It’s like the contrast between politics in the old days, when you could forget about Washington for weeks at a time, and politics in the Trump era, when the president is always jumping out from behind a tree to yell at you.)

But let’s try to occupy ourselves with the most likely scenarios, because they are more than disturbing enough. Long before we get to tidal waves or smallpox, long before we choke to death or stop thinking clearly, we will need to concentrate on the most mundane and basic facts: everyone needs to eat every day, and an awful lot of us live near the ocean.

FOOD SUPPLY first. We’ve had an amazing run since the end of World War II, with crop yields growing fast enough to keep ahead of a fast-rising population. It’s come at great human cost — displaced peasant farmers fill many of the planet’s vast slums — but in terms of sheer volume, the Green Revolution’s fertilizers, pesticides, and machinery managed to push output sharply upward. That climb, however, now seems to be running into the brute facts of heat and drought. There are studies to demonstrate the dire effects of warming on coffee, cacao, chickpeas, and champagne, but it is cereals that we really need to worry about, given that they supply most of the planet’s calories: corn, wheat, and rice all evolved as crops in the climate of the last ten thousand years, and though plant breeders can change them, there are limits to those changes. You can move a person from Hanoi to Edmonton, and she might decide to open a Vietnamese restaurant. But if you move a rice plant, it will die.

A 2017 study in Australia, home to some of the world’s highest-tech farming, found that “wheat productivity has flatlined as a direct result of climate change.” After tripling between 1900 and 1990, wheat yields had stagnated since, as temperatures increased a degree and rainfall declined by nearly a third. “The chance of that just being variable climate without the underlying factor [of climate change] is less than one in a hundred billion,” the researchers said, and it meant that despite all the expensive new technology farmers kept introducing, “they have succeeded only in standing still, not in moving forward.” Assuming the same trends continued, yields would actually start to decline inside of two decades, they reported. In June 2018, researchers found that a two-degree Celsius rise in temperature — which, recall, is what the Paris accords are now aiming for — could cut U.S. corn yields by 18 percent. A four-degree increase — which is where our current trajectory will take us — would cut the crop almost in half. The United States is the world’s largest producer of corn, which in turn is the planet’s most widely grown crop.

Corn is vulnerable because even a week of high temperatures at the key moment can keep it from fertilizing. (“You only get one chance to pollinate a quadrillion kernels of corn,” the head of a commodity consulting firm explained.) But even the hardiest crops are susceptible. Sorghum, for instance, which is a staple for half a billion humans, is particularly hardy in dry conditions because it has big, fibrous roots that reach far down into the earth. Even it has limits, though, and they are being reached. Thirty years of data from the American Midwest show that heat waves affect the “vapor pressure deficit,” the difference between the water vapor in the sorghum leaf’s interior and that in the surrounding air. Hotter weather means the sorghum releases more moisture into the atmosphere. Warm the planet’s temperature by two degrees Celsius — which is, again, now the world’s goal — and sorghum yields drop 17 percent. Warm it five degrees Celsius (nine degrees Fahrenheit), and yields drop almost 60 percent.

It’s hard to imagine a topic duller than sorghum yields. It’s the precise opposite of clickbait. But people have to eat; in the human game, the single most important question is probably “What’s for dinner?” And when the answer is “Not much,” things deteriorate fast. In 2010 a severe heat wave hit Russia, and it wrecked the grain harvest, which led the Kremlin to ban exports. The global price of wheat spiked, and that helped trigger the Arab Spring — Egypt at the time was the largest wheat importer on the planet. That experience set academics and insurers to work gaming out what the next food shock might look like. In 2017 one team imagined a vigorous El Niño, with the attendant floods and droughts — for a season, in their scenario, corn and soy yields declined by 10 percent, and wheat and rice by 7 percent. The result was chaos: “quadrupled commodity prices, civil unrest, significant negative humanitarian consequences . . . Food riots break out in urban areas across the Middle East, North Africa, and Latin America. The euro weakens and the main European stock markets lose ten percent.”

At about the same time, a team of British researchers released a study demonstrating that even if you can grow plenty of food, the transportation system that distributes it runs through just fourteen major choke-points, and those are vulnerable to — you guessed it — massive disruption from climate change. For instance, U.S. rivers and canals carry a third of the world’s corn and soy, and they’ve been frequently shut down or crimped by flooding and drought in recent years. Brazil accounts for 17 percent of the world’s grain exports, but heavy rainfall in 2017 stranded three thousand trucks. “It’s the glide path to a perfect storm,” said one of the report’s authors.

Five weeks after that, another report raised an even deeper question. What if you can figure out how to grow plenty of food, and you can figure out how to guarantee its distribution, but the food itself has lost much of its value? The paper, in the journal Environmental Research, said that rising carbon dioxide levels, by speeding plant growth, seem to have reduced the amount of protein in basic staple crops, a finding so startling that, for many years, agronomists had overlooked hints that it was happening. But it seems to be true: when researchers grow grain at the carbon dioxide levels we expect for later this century, they find that minerals such as calcium and iron drop by 8 percent, and protein by about the same amount. In the developing world, where people rely on plants for their protein, that means huge reductions in nutrition: India alone could lose 5 percent of the protein in its total diet, putting 53 million people at new risk for protein deficiency. The loss of zinc, essential for maternal and infant health, could endanger 138 million people around the world. In 2018, rice researchers found “significantly less protein” when they grew eighteen varieties of rice in high–carbon dioxide test plots. “The idea that food became less nutritious was a surprise,” said one researcher. “It’s not intuitive. But I think we should continue to expect surprises. We are completely altering the biophysical conditions that underpin our food system.” And not just ours. People don’t depend on goldenrod, for instance, but bees do. When scientists looked at samples of goldenrod in the Smithsonian that dated back to 1842, they found that the protein content of its pollen had “declined by a third since the industrial revolution — and the change closely tracks with the rise in carbon dioxide.”

Bees help crops, obviously, so that’s scary news. But in August 2018, a massive new study found something just as frightening: crop pests were thriving in the new heat. “It gets better and better for them,” said one University of Colorado researcher. Even if we hit the UN target of limiting temperature rise to two degrees Celsius, pests should cut wheat yields by 46 percent, corn by 31 percent, and rice by 19 percent. “Warmer temperatures accelerate the metabolism of insect pests like aphids and corn borers at a predictable rate,” the researchers found. “That makes them hungrier[,] and warmer temperatures also speed up their reproduction.” Even fossilized plants from fifty million years ago make the point: “Plant damage from insects correlated with rising and falling temperatures, reaching a maximum during the warmest periods.”

JUST AS PEOPLE have gotten used to eating a certain amount of food every day, they’ve gotten used to living in particular places. For obvious reasons, many of these places are right by the ocean: estuaries, where rivers meet the sea, are among the richest ecosystems on Earth, and water makes for easy trade. From the earliest cities (Athens, Corinth, Rhodes) to the biggest modern metropolises (Shanghai, New York, Mumbai), proximity to saltwater meant wealth and power. And now it means exquisite, likely fatal, vulnerability.

Throughout the Holocene (the ten-thousand-year period that began as the last ice age ceased, the stretch that encompasses all recorded human history), the carbon dioxide level in the atmosphere stayed stable, and therefore so did the sea level, and hence it took a while for people to worry about sea level rise. The United Nations’ Intergovernmental Panel on Climate Change (IPCC) predicted in 2003 that sea level should rise a mere half meter by the end of the twenty-first century, most of that coming because warm water takes up more space than cold, and while a half meter would be enough to cause expense and trouble, it wouldn’t really interfere with settlement patterns. But even as the IPCC scientists made that estimate, they cautioned that it didn’t take into account the possible melt of the great ice sheets over Greenland and Antarctica. And pretty much everything we’ve learned in the years since makes scientists think that those ice sheets are horribly vulnerable.

Paleoclimatologists, for instance, have discovered that in the distant past, sea levels often rose and fell with breathtaking speed. Fourteen thousand years ago, as the Ice Age began to loosen its grip, huge amounts of ice thawed in what researchers call meltwater pulse 1A, raising the sea level by sixty feet. Thirteen feet of that may have come in a single century. Another team found that millions of years ago, during the Pliocene, with carbon dioxide levels about where they are now, the West Antarctic Ice Sheet seems to have collapsed in as little as a hundred years. “The latest field data out of West Antarctica is kind of an OMG thing,” a federal official said in 2016 — and that was before the really epochal news in the early summer of 2018, when eighty-four researchers from forty-four institutions pooled their data and concluded that the frozen continent had lost three trillion tons of ice in the last three decades, with the rate of melt tripling since 2012. As a result, scientists are now revising their estimates steadily upward. Not half a meter of sea level rise, but a meter. Or two meters. “Several meters in the next fifty to 150 years,” said James Hansen, the planet’s premier climatologist, who added that such a rise would make coastal cities “practically ungovernable.” As Jeff Goodell (who in 2017 wrote the most comprehensive book to date on sea level rise) put it, such a rise would “create generations of climate refugees that will make today’s Syrian war refugee crisis look like a high school drama production.”

What’s really breathtaking is how ill-prepared we are for such changes. Goodell spent months reporting in Miami Beach, which was literally built on sand dredged up from the bottom of Biscayne Bay. He managed to track down Florida’s biggest developer, Jorge Pérez, at a museum opening. Pérez was not, he insisted, worried about the rising sea because “I believe that in twenty or thirty years, someone is going to find a solution for this. If it is a problem for Miami, it will also be a problem for New York and Boston — so where are people going to go?” (He added, with Trump-level narcissism, “Besides, by that time I’ll be dead, so what does it matter?”) To the extent that we’re planning at all, it’s for the old, low predictions of a meter or less. Venice, for instance, is spending $6 billion on a series of inflatable booms to hold back storm tides. But they’re designed to stop sea level rise of about a foot. New York City is building a “U-Barrier,” a berm to protect Lower Manhattan from inundation in a storm the size of Hurricane Sandy. But as the sea level rises, winds like Sandy’s will drive far more water into Manhattan, so why not build it higher? “Because the cost goes up exponentially,” said the architect. The cost is already starting to mount. Researchers showed in 2018 that Florida homes near the flood lines were selling at a 7 percent discount, a figure growing over time because “sophisticated buyers” know what is coming. Insurance companies are balking: basements from “New York to Mumbai” may be uninsurable by 2020, the CEO of one of Europe’s largest insurers said in 2018.

SOME OF the cost of climate change can be measured in units we’re used to dealing with. Testimony submitted by climate scientists to a federal court in 2017, for instance, said that if we don’t take much stronger action now, future citizens would have to pay $535 trillion to cope with global warming. How is that possible? Take one small county in Florida, which needs to raise 150 miles of road to prevent flooding from even minimal sea level rise. That costs $7 million a mile, putting the price tag at over $1 billion, in a county that has an annual road budget of $25 million. Or consider the numbers from Alaska, where officials are preparing to move one coastal village with four hundred residents that’s threatened by rising waters at a cost of up to $400 million — $1 million a person. Multiply this by everyone everywhere, and you understand why the costs run so high. A team of economists predicted a 12 percent risk that global warming could reduce global economic output by 50 percent by 2100 — that is to say, there’s a one-in-eight chance of something eight times as bad as the Great Recession.

But some things can’t be measured, and the damage there seems even greater. For instance, the median estimate, from the International Organization for Migration, is that we may see two hundred million climate refugees by 2050. (The high estimate is a billion.) Already “the likelihood of being uprooted from one’s home has increased sixty percent compared with forty years ago.” The U.S. military frets about that because masses of people on the march destabilize entire regions. “Security will start to crumble pretty quickly,” said Adm. Samuel Locklear, former chief of U.S. Pacific Command, explaining why climate change was his single greatest worry.

The biggest worry for people losing their homes is . . . losing their homes. So, let me tell you about a trip I took last summer, to the ice shelf of Greenland. I was with a pair of veteran ice scientists and two young poets — a woman named Kathy Jetnil-Kijiner, from the Marshall Islands in the Pacific, and another named Aka Niviana, who was born on this largest of all the Earth’s islands, a massive sheet of ice that, when it melts, will raise the level of the oceans more than twenty feet.

And it is melting. We landed at the World War II–era airstrip in Narsarsuaq and proceeded by boat through the iceberg-clogged Tunulliarfik Fjord, arriving eventually at the foot of the Qaterlait Glacier. We hauled gear up the sloping, icy ramp of the glacier and made camp on an outcrop of red granite bedrock nearly a kilometer inland. In fact, we made camp twice, because the afternoon sun swelled the stream we’d chosen for a site, and soon the tents were inundated. But after dinner, in the late Arctic sunlight, the two women donned the traditional dress of their respective homelands and hiked farther up the glacier, till they could see both the ocean and the high ice. And there they performed a poem they’d composed, a cry from angry and engaged hearts about the overwhelming fact of their lives.

The ice of Niviana’s homeland was disappearing, and with it a way of life. While we were on the ice sheet, researchers reported that “the oldest and thickest sea ice” in the Arctic had melted, “opening waters north of Greenland that are normally frozen even in summer.” Just up the coast from our camp, a landslide triggered by melting ice had recently set off a hundred-foot tsunami that killed four people in a remote village: it was, said scientists, precisely the kind of event that will “become more frequent as the climate warms.”

The effect, however, is likely to be even more immediate on Jetnil-Kijiner’s home. The Marshalls are a meter or two above sea level, and already the “king tides” wash through living rooms and unearth grave- yards. The breadfruit trees and the banana palms are wilting as saltwater intrudes on the small lens of fresh water that has supported life on the atolls for millennia. Jetnil-Kijiner was literally standing on the ice that, as it melts, will drown her home, leaving her and her countrymen with, as she put it, “only a passport to call home.”

So, you can understand the quiet rage that flowed through the poem the two women had written, a poem they now shouted into a chill wind on this glacier that owed up to the great ice sheet, silhouetted against the hemisphere’s starkest landscape. It was a fury that came from a long and bitter history: the Marshalls were the site of the atom bomb tests after the war, and Bikini Atoll remains uninhabitable, just as the United States left nuclear waste lying around the ice when it abandoned the thirty bases it had built in Greenland.

But, of course, climate change is different, the first crisis that, though it affects the most vulnerable first and hardest, will eventually come for us all.

Science can tell us a good deal about this crisis. Jason Box, an American glaciologist who organized the trip, has spent the last twenty-five years journeying to Greenland. “We called this place where we are now the Eagle Glacier because of its shape when we first came here five years ago,” Box said. “But now the head and the wings of the bird have melted away. I don’t know what we should call it now, but the eagle is dead.” He busied himself replacing the batteries in his remote weather stations, scattered across the ice. They tell one story, but his colleague Alun Hubbard, a Welsh scientist, conceded that there were limits to what instruments could explain. “It’s just gobsmacking looking at the trauma of the landscape,” he said. “I just couldn’t register the scale of how the ice sheet had changed in my head.”

But artists can register scale. They can transpose the fact of melting ice to inundated homes and bewildered lives, gauge it against long history and lost future. Science and economics have no real way to value the fact that people have lived for millennia in a certain rhythm, have eaten the food and sung the songs of certain places that are now disappearing. This is a cost only art can measure, and it makes sense that the units of that measurement are sadness and fury — and also, remarkably, hope. The women’s poem, shouted into the chill wind, ended like this:

And so, we must — in fact, this book will end with a description of what that rising might look like. But if, as now seems certain, the melt continues, then the villages of the Marshalls and the ports of Greenland will be overwhelmed. And we will all be a little poorer, because a way of being will have been cut off. The puzzle of being human will have lost some of its oldest, most artful pieces.

“The loss of Venice,” Jeff Goodell writes, wouldn’t be about just the loss of present-day Venetians. “It’s the loss of the stones in the narrow streets where Titian and Giorgione walked. It’s the loss of eleventh- century mosaics in the basilica, and the unburied home of Marco Polo, and palazzos along the Grand Canal. . . . The loss of Venice is about the loss of a part of ourselves that reaches back in time and binds us together as civilized people.”

We all have losses already. Where I live, it’s the seasons: winter doesn’t reliably mean winter anymore, and so the way we’ve always viscerally told time has begun to break down. In California, it’s the sense of ease: the smell of the fire next time lingers in the eucalyptus groves. There are many ways to be poorer, and we’re going to find out all of them.