# Drought to Deluge

## The 2024 Floods of Northwest Iowa, and Adaptations to Come

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Travelling west on the road towards Hawarden, we passed a broken railroad. The gravel beneath it had been washed away, leaving the steel rails and ties twisted and suspended over the open air. The flooding from the Big Sioux River was still high in the surrounding fields of early growing corn. By looking at the line of brown and dead stalks, we could tell where the water had been just four days before from the relentless barrage of rainfall. A work train sat on the tracks not far off, and new wooden ties, soaked in black oil, were off to the side waiting until they could be replaced.

We met up with Sunday, our contact for the members of the Sioux County Conservation Board, at the Prairie Woods nature center. The camping lot was filled with R.V.s, from those lucky enough to have them, taking refuge there where the water hadn't reached. Despite everything they'd been through, Sunday had a cheery smile. She was elated to see us, glad for the help. Sunday introduced us to Myron, the fellow who we would be working with that day. He led us over to the site, the Big Sioux Recreation Area, right on the Big Sioux River before the border to South Dakota. We drove through Hawarden, not ten minutes away from the nature center where the people of the town had their waterlogged belongings piled on the side of the road in their front yards, nothing more now than husks still reeking with sewage and the ghosts of their lives. The power and water services remained shut off to most in Hawarden, and many of the surrounding towns.

Just before we reached the recreation area, we passed seven grain silos that sat busted open, the pale, golden seeds spilled over the ground. The pink Sioux quartzite road was broken and busted from debris brought in by the irregularly high-water levels. Here, it rose nearly 5" higher than any of the previous recorded floods had (1) reaching multiple feet into the first floor of homes. The bed of a rusted, blue pickup lay upside-down, abandoned, in the ditch on the side of that broken road. The grass of the park itself was stained in dark mud. The ground was soft and squelched underfoot. Big Sioux still covered the road and bridge over to South Dakota, and part of the park.

Myron showed us the registration office and bathrooms. The walls were dark with water damage a foot above the floor, where the water had stood for days. A thick ooze of sloppy mud covered the ground tile. The parts near the doors which had been exposed to the heat of the summer sun were flakey and pale, which cracked as the rest folded into the wide, tin shovels like a soiled blanket being shoved aside, or toxic fudge. The wet stuff took a little more time to scoop out, switching between the shovels, dust pans, and long poled squeegees. Us five interns and AmeriCorps members who volunteered to go that day, scooped the first layer of muck and cleared some of the surrounding debris. Slogging through the park between the buildings, I was stopped by a bombardment of high-pitched

tweeting. A yellow warbler fluttered desperately, its stomach bright like a flare against the dark green leaves of the Ash tree above me.

"You've got one on your boot," Jordan said.

I looked down. "A fledgling."

The ragged child with a head of feathers like a crazy, balding, old scientist was perched on the top of my left, rubber boot. It gazed up at me, mouth agape, as if expecting to be fed, or in some brave attempt to shoo me off. The parent seemed to learn I was of no threat to the child, and the shrill cries died down. The fledgling hopped off my boot and waddled closer to the tree. We stopped and watched the young and its mother for a while, recognizing the beautiful grace of the baby's clumsiness. They too were refugees in their own home, though much less affected than the humans were by all that had occurred with the massive rains of Iowa this June.

We stopped for lunch around noon, driving to the high school, where they had air conditioning at least. The Iowa national guard had brought in cots for those displaced and set them up in the gymnasium, along with a few lines of fold-out tables. The cots were covered in mismatched quilts, blankets, and stuffed animals. A few people sat with cat carriers and dog crates, but it seemed most of the people of Hawarden were out slugging through the mud, as we had been. There was a lunch being served to volunteers there, but we'd brought our own. We didn't want to take from these people where we had plenty, so we sat down at one of the tables and ate out pre-packed sandwiches, apples, and cookies. I looked over, and saw some of the high school aged kids eating lunch too. Most had on a t-shirt from some sports team or another; wrestling, softball, and football were all represented. Their mascot is the Falcons, taken, as all high schools do, directly from the professional team, the Atlanta Falcons. The kids were there to volunteer. I presume more so to do with assisting their neighbors directly, while we were helping the rec center. It made me think of my own time in high school, spent in Atlanta, something I realized I haven't done in a while. Knowing who I was back then, I figured I would have been in their shoes too, volunteering to help out wherever I could after a natural disaster. I probably would have jumped at the opportunity, though, thankfully, one never befell me. It would've been me then, and it is me now. I was in Hawarden after all. Red Cross disaster relief members meandered around the school and outside, handing out water cases to folks from the stacks they had in palates along the exterior wall, next to the line of red porta-potties, some of the only working bathrooms left in the whole town. On our way out we were thanked for coming and helping the community.

Passing large, plantation style homes and short, ranch styled ones, we drove the five minutes back to the flooded rec site, around the neon-orange barriers blocking the roads to the general public. We finished by power washing the floors before tearing them out, along with the ruined drywall and soaked insulation, releasing the overpowering stench of rotting fish.

Many of the folks I've talked to across Iowa kept referring to the flood of '93. Some claim 2024 was worse, much worse, while others weren't hit as hard as they were in 1993. In '93 they even made t-shirts that said, "I skied I-9." Back then, the state of Iowa saw a standard hydrograph, where the water steadily rose at a consecutive rate, something that is manageable by many human industrial systems. This year, we started with that too. It was flooding, but it was planned for and could have been fine for a while, dealing minimal damage. People even rejoiced from the break in the drought they'd been facing. Then, June of 2024 gave us, on average for the affected areas, 8.16 inches of rain more than the normal monthly June rainfall in just three consecutive days (1). This set new records in river basin heights across the Vermillion River (avg 3.5"), Big Sioux (avg 2.18"), Rock River (avg 3.2"), Floyd River (avg 2.03"), Little Sioux (avg 2.64"), and the Des Moines River (0.31") (1). The next issue was, Iowa being a land of many rivers, everything drains into each other, things get overwhelmed, and waters rise. 10 inches overnight is simply not doable. There is no warning, but still, it happens. A standard hydrograph catches locals having a laugh, paddling their kayaks down the street to the Casey's for a slice of pizza and a case of beer. 10 inches in one night turns that manageable wetness, and the silliness humans have a need to imbibe in, into immeasurable sorrow and losses which are uninsured, that insurance companies don't cover, or won't pay out on.

I was in Spencer, Iowa multiple days, volunteering via the Samaritan's Purse. Being an AmeriCorps member, and seeing first-hand what afflicted Hawarden, I wanted to assist in disaster relief. I decided to collect as many volunteers as I could over one weekend to go down there. My AmeriCorps term being based on West Okoboji in Milford, I called 4 churches, 2 schools, 3 environmental organizations, 3 boy scout troops, the girl scouts organization, and opened the volunteer opportunity to the Lakeside Campus, the Friends of Lakeside Labs, and the other Green Iowa AmeriCorps members. I got fifteen volunteers. Fifteen strangers to help other strangers we will probably never see again. At the time we went back in early July, Samaritan's Purse was the best funded and organized relief effort, where I could actually assist and do some good. In rubber boots, I shlepped through sewage muck still soaking carpet and drywall. I brought children's books and toys to the curb, along with medicines and photo albums too ruined by the hazardous waters to salvage. Covered head to toe, in a full Tyvek suit with a 3M 5301 respirator, I knocked loose molded ceilings and stairs. I scrubbed floors and walls and sprayed shockwave, a non-toxic, ammonia-based mold preventative over everything.

Our first official day there, I'd worked with Mike. His house didn't have a basement, so the water came into his first and only floor. The entire thing was gutted by the time my group arrived. Walls were torn out at least four feet up, if not all the way to the ceilings. Furniture and appliances had been thrown to the curb or were already hauled off by the D.O.T. Mike and Linda, his wife who was still working as a nurse at the hospital when we were there, left when the water had reached the lip of their front door. When they went down the road to the Walmart with their two Jack Russells for relief and supplies, the water had already gone up two more feet. Mike told me that while walking on the roads, the water got up to their necks, while trudging along the sidewalks, it came up to his mid-chest. "It took minutes," he said, his eyes harrowed and long, red from

crying. They were living with Linda's brother in another city, both still driving daily to full time jobs.

John is 73 and had lived in his house in Spencer for 30 years. He was an avid bow hunter, having switched to a crossbow due to his back some decades ago. When I met him, we were in his basement tearing out the sopping wet drywall covered in green and black mold. He and his wife had lost their cars, and were living in a brother-in-law's trailer some ways out of town. John told me about how many others were living in the American Red Cross shelter nearby at the fairgrounds. From first responders, the Iowa DNR, and the Iowa Army National Guard, 720 people were rescued from the floods. More were found by friends and family. Churches, high schools, and universities were turned into Congregate Shelters, some housing up to 222 individuals each (3). One woman near John and his wife, had been kicked out of one of these shelters for fighting with her boyfriend. John wanted to invite her into the trailer with him and his wife, but hesitated. "You can't really offer that to strangers," he said. I could hear the remorse on his voice, and see the regret in his eyes. I was in his house, this man who was and is a stranger to me, pulling up the structure of rooms he'd spent hundreds of days in, tinkering and fulfilling hobbies. That's one way people get close. We come and help each other. I watched him cry at the end of the second day when we were saying goodbye, a dam of emotions he'd either been holding in, or couldn't muster until then. "You'll all be right here," he choked out as he tapped his heart looking around the circle of volunteers.

It was June 21st when the Iowa governor's cabinet declared a state of disaster in the 9 affected counties. From that, FEMA was approached and is providing financial assistance to some of these people, but many don't qualify for much. It's a lengthy and draining process, with forms and photos required to prove the extent of the damage, and most folks there don't have others to help them. Most applicants are capped to receive only as much as $5k, if they even get anything, all of course for specific qualifying categories via the Iowa Individual Disaster Assistance Grant Program (IIAGP) (2). When your basement of memories is gone, when you lose all your furniture and appliances, or the structure of your house is totally compromised or destroyed, what's $5k? Down at the fairgrounds in Spencer, FEMA does have ongoing efforts with boots on the ground to provide food and shelter for residents. It might not be much individually, but it's something, and right now, everything stacks. Still, some heckle their neighbors with the "lazy, freeloading bum" mentality for accepting government handouts. Floods and severe storm damage already generally account for 73.8% of funds used in Iowa natural disaster relief, ranging between $20.0-$50.0 billion (4). I am forced to wonder, if at least some of that money is not sent to the people who have lost so much through no fault of their own, in order to try and help rebuild, then what is it good for?

None of this is a new occurrence. The water levels of rivers have and will always rise and fall. Floods have been happening in Iowa forever, and will continue to happen. Some 7,000 years ago the Dakota people came to what is now known as the Jeffers Petroglyphs near modern day Comfrey, Minnesota. The story on their part goes that the rocks there are red from the blood of those who died in the great flood. What is new, and the issues we now face, is the severity of it all. In the last 100 years the planet's average

temperature has risen roughly 2-degrees Fahrenheit, largely due to carbon dioxide emissions, which have been heavily, and unnaturally, increased by modern human practices (11). Every 1-degree Fahrenheit rise in temperature can mean 4% more water vapor in the air. This rapid increase of moisture in the atmosphere leads to quicker and harsher releases of rainfall, just like we saw in 2024. Four years ago, in 2020, there was nearly 9% more moisture in the air as there was in 1920 (10).

Gaia, the earth, is adapting to us now, something that, on its own, might happen in hundreds or thousands of years, but it's happening now, with our movement of insect, plant, and animal species that become invasive and our hyper industrialized infrastructure. Post ice age, when the world was unstable with massive fluctuations in heating and cooling, glaciers melted and froze, moving them across Iowa, readying the soil for future growth. First came evergreen forests, then hardwoods, then grasslands as Iowa was commonly known for. The prairies stuck and the roots of prairie plants dug deep, making the topsoil extremely fertile and capable of absorbing water (7). With European colonization, invasive species such as Garlic Mustard, Krown Vetch, Buckthorn, and others were introduced for various reasons. Many of the new species out-compete native plants and animals, as the ecosystem hasn't adapted to these mostly European ones (5). Iowa used to be around 85% prairie. Today less than 0.1% of that remain (7). Prior to European settlement roughly 11% (4-6M acres) of Iowa was wetland basins. Today nearly 95% of those basins have been drained (5). Wetlands hold back flood and rain waters, slowing the rate that water re-enters streams and rivers. In watersheds where wetlands have been lost, flood peaks may increase by as much as 80% (12). If the flood peak of June 2024, the point when the water is the highest and most disastrous, flooding into people's homes and staying still for days or weeks in some cases, had been 80% less across the board, we can only speculate the damage we could have prevented.

In 2024, 30.6 million acres of Iowa's total 35.7 million are farmed via 88,637 farms, each averaging 345 acres of land (6). We have built homes, restaurants, and cities along rivers and around them. Where they would naturally curve and change their path, we have channeled them, attempting to control them with dams and our infrastructure. It doesn't work. Gaia will continue to adapt. Especially in urban areas, removing vegetation and soil, grading the land surface down to be smooth and convenient, and constructing drainage networks has increased runoff from rainfall and channels it to streams rather than allowing the water to be absorbed into the soil (8). Some say we need to go back, to restore things, but the question remains debated as to what and when we attempt to go back to. Iowa won't return to being 85% prairie. Not now, not after all we have done and rely on the land for. Now, 85.7% of Iowa is farmland, used mostly for single crop farming. A lack of cover crops and lack of multi-cropping loosens the soil of farmlands and allows for nutrients, silt, and chemicals used to drain into nearby waterways. Land with less structured root systems have a more difficult time absorbing the rainfall with 20% lower evapotranspiration rate, the rate at which water makes it back into the air, than in prairies or multi-cropped areas (9). Then, everything from farms and cities goes into the water. Sewage systems back up and need to be rerouted, sometimes even before treatment. Fish and the aquatic plants inhale that water. Land animals drink it. We sit by and swim in it. The Lakeside Labs on West Okoboji found algal blooms and a spike in E. Coli levels across the lakes and rivers just after the floods.

That is the state of our current society. We have built things in order to help us, and make us more comfortable, but in doing so, we are pushing Gaia to a brink where, just like in ourselves, when things are repressed for so long, they will eventually burst out into a total meltdown of a disaster. A flood of tears rather than a period of healthy coping. Whether you call it climate change, or just simply see the differences in the weather, the world is changing rapidly. We cannot deny our rising excess of natural disasters, floods, fires, and more. We as a collective society are greatly responsible for speeding up the changing of the Earth and we must adapt to it. Policy must adapt to it. Daily lifestyles must adapt to it. We must accept change, which is terribly difficult for most of us. But the question is, how? We can't just root up an entire city and move it from the coast or riverbed. We've built infrastructure with so many moving parts which peoples' lives rely on. If we are going to continue to live in this way, or live period, we have to adapt to the consequences of living in this way for a very short amount of time presents to us. Considering the length of our generations, the length of our species being around, the length Gaia has been around, living this way has lasted an extremely short amount of time, which we all seem to have developed some collective amnesia over. The past 100 years have only occurred in less than the last second of December 31st on the cosmic calendar, where the Big Bang is January 1st (13).

In Carl Sagan's book, The Dragons of Eden, published in 1977 he stated, "Only an extragenetic learning system (one outside of our inherent traits, the human cognitive ability to learn) can possibly cope with the swiftly changing circumstances that our species faces. Thus, the recent rapid evolution of human intelligence is not only the cause of but also the only conceivable solution to the many serious problems that beset us." Fifty years later, the question still remains of if can we rise to the challenge that we have known we are facing.

Due to the Endangered Species act passed in 1973 the Department of Natural Resources (DNR) has it written into their responsibilities that they are not allowed to let species go extinct, and must do all they possibly can to prevent that from happening. In South Dakoda the DNR, along with Fish and Wildlife, has a hand in spawning and thus continuing the species of Pallid sturgeons, an ancient, bottom-feeding fish which was a top tier predator in the Missouri and Mississippi rivers. These two rivers, of course, are laden with dams. In order to make these dams most productive, as we tend to want to do, the rivers have been dug deeper and narrower than they were. Pallid sturgeons like shallow and wide if they are to spawn naturally. This summer, I tagged along with the aquatic ecology class offered at Lakeside Labs to the South Dakoda DNR to participate in the largest Pallid sturgeon spawn on record. Normally, every year they capture females who hold a host of eggs ready to be fertilized. The facility then raises the babies in indoor vats as they grow to be big enough to be moved outside into man-made basins that resemble the habitats of the Mississippi and Missouri rivers until they are ready to be released into the wild. The DNR takes great care to ensure the families of Pallid sturgeons are spread out from one another, preventing inbreeding, which before the dams wouldn't be much of a problem. Normally they collect eggs from 6 females. When we went, they collected eggs from 60. The hope is to reintroduce them to areas of the rivers upstream of

the major dams. If they are ready to survive and begin to thrive there, that could be a major win for the needed diversity of the rivers' ecosystems and thus the water quality.

Some cities in Eastern Iowa have been installing rain gardens and permeable pavement, along with other bioretention systems, in public areas as well as informing and encouraging citizens to install them into personal yards. The rain garden is a depression or a shallow bowl, level within itself to be able to temporarily pond the runoff and absorb it into the soil. Water in the soil is able to dilute any toxins and algae, where alternatively in developed areas those toxins would run straight into our rivers and streams. Permeable pavement allows for rain and snow to seep through the surface into the soil and gravel below the first layer of asphalt, concrete, or other paver types. Not only does this assist in decreasing the flood peak levels, but it calls for less need in things like road salts during winter months. The DNR has been implementing these for years now, mostly in Eastern Iowa where the larger cities are, and they have seen major results. I often wonder if it is enough. It will be a different world; one we must adapt to. These systems are more about longevity and adjusting to the average rainfalls, which are in themselves increasing and becoming more frequent. The flood of 2024 was a major event, but it does not come alone, nor will it. There will be others to come, and on average, the day-to-day storms will also become more intense. Still, the more I participate in and learn about all these many kinds of things that have happened and are happening in our daily lives, the more I am confronted with both questions as well as hope. There are ways forward through this, but if we are to advance, we must participate, reevaluate, and continue to adapt to Gaia's changing earth, together.

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13. “The Dragons of Eden” book, by Carl Sagan, Published 1977