

ABANDONMENT AND RENEWAL



YAHARA2070



What would life in 2070 be like if we aren't prepared for escalating environmental challenges?

From the ashes of catastrophe, life somehow manages to rise again. This thought hung on Daisy's mind, sweat pouring down her face, as she uttered a reassuring click to Bud and Betsy, the pair of Belgian draft horses drawing the plow. The community had outgrown its garden, and Daisy was charged with negotiating a new patch of rich soil from the shrubby old field, which had not seen a

plow in decades. Despite the heat and her perspiration, she reveled in the back-breaking work, for it was the full expression of her life purpose: rebuilding.

Daisy moved to Hope Prairie Community from the Great Lakes Climate Change Refuge two years ago with her husband, Felix. Over the years, the pressures of climate change had pushed thousands of people into refuges dis-



Daisy moved to Hope Prairie Community with her husband to start a new life. Here, she is plowing a new crop field with the help of Bud and Betsy. The lack of access to fuel and infrastructure in Yahara causes farmers to rely on draft animals and human labor.

persed across the country. These safe havens were established by the federal government to absorb refugees who fled from communities destroyed by the climate's fury. Feeling crowded and thirsting for a life free from the stifling restrictions imposed on refugees (necessary for order, but cumbersome for daily life), Daisy and Felix packed up their lives into two suitcases and made the journey to Wisconsin.

Thirty-five years prior, in the year 2035, Daisy and her mother fled Madison after the disaster. Daisy was barely a year old. Although she remembered nothing about her homeland, Daisy had always held onto the dream of returning there, an indescribable longing for an unfamiliar home. She knew from her mother that, because of the danger, few people still lived in Madison and the surrounding area. But Daisy and Felix hoped the largely abandoned landscape would offer them the chance to start a new life, perhaps a new society. Following this glimmer of hope, they migrated toward a land from which so many had fled not too long ago.

They took it as a sign that they stumbled upon Hope Prairie so quickly after their arrival. On their first night in Yahara, they stayed with an old friend of Daisy's mother, who lived in what was left of Middleton. When chatting about the couple's potential next steps, their hostess told them about the subsistence farming community with a big dream. Hope Prairie sounded exactly like what they were seeking.

Three years before Daisy and Felix's arrival, a troupe of young, optimistic east coast refugees merged with a clutch of equally young and optimistic Wisconsin dwellers to found Hope Prairie. The community blossomed from their shared dream of shaping a new society

from the dust of Yahara's crumbled past. When the great disaster befell the watershed, the human population had been decimated, and many of the survivors fled. Most of the former human settlements lay in ruins, and the landscape had been transformed by the hands of nature. The resulting autonomy and rejuvenating ecosystems offered these idealistic homesteaders a virtually clean slate from which to realize their vision.

The group settled in the ruins of a suburban development that hugged a former prairie preserve and some abandoned farmland, and fixed up a few of the large houses to create communal living spaces. As a subsistence farm, Hope Prairie resembles the few dozen of such farms that have filled the void industrial agriculture left after the disaster. For the most part, each cultivates only what it needs to feed its members; Hope Prairie has grown to twenty-seven. The homesteaders found the soil in the old farmland still ready for crops. A recent history of drought and fire allowed very few trees and shrubs to root on the sloping, south-facing fields, which made them easy to till. The community's breaking of the rich soil seemed somewhat reminiscent of settlers past.

The soil still replete with phosphorus, Hope Prairie's vegetables and fruits flourish (corn and soy lost their value after the disaster; few farm them anymore). The community also has a handful of dairy cows and a herd of goats, which are pasture-raised, now the widespread practice among Yahara's farms. A dozen chickens roam the central courtyard freely by day, but are locked up in the coop at night, to keep them safe from the raccoons, foxes, and wolves. The community trades its surplus with neighboring subsistence farms and commu-

nities in the city center for goods they cannot make or services they cannot perform for themselves. This bartering system has replaced the monetary system of pre-disaster society. The community recently banded together with a neighboring farm to further diversify and expand their cropland—a collaborative model they are copying from other subsistence farms in the watershed.

Daisy's current task was part of this new effort. The collaboration thrilled her, as it was proof to her their model was working. They could survive off the land and with each other, and work together in a productive partnership. In their new environment, they found nature to be a fickle roommate, feral and prone to mood swings. Only by working together and adapting to the shifting conditions could they survive. This lifestyle stands in contrast to life before the disaster—at least, according to how Daisy understood it. Back then, people largely ignored nature's complaints and warnings, and their ignorance set the course for the disaster from which this new society would sprout.

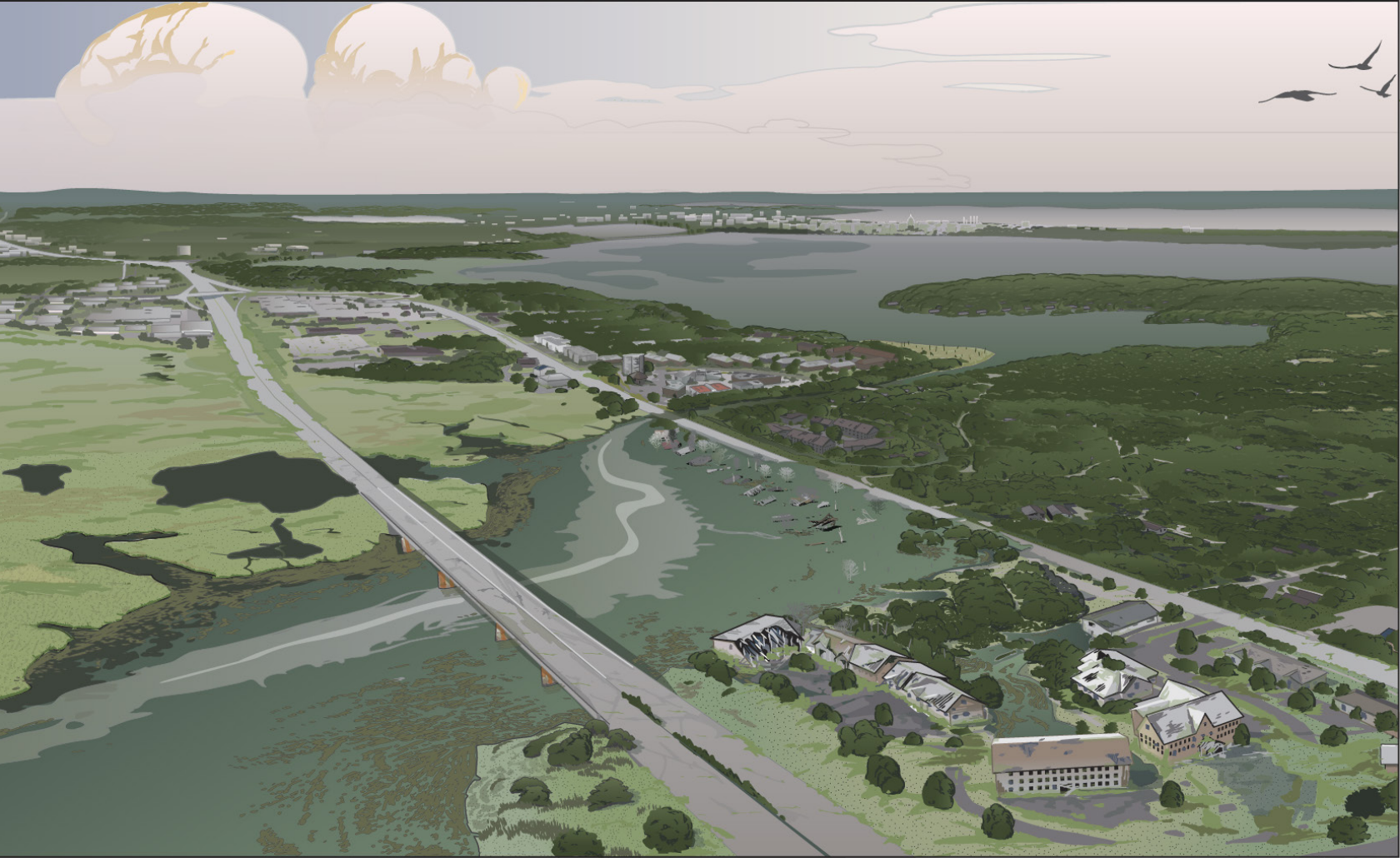
The Disaster Generation

As young adults in Madison in the 2020s, Daisy's parents, Jay and Amy, were part of what became known as the Disaster Generation. Born and raised in Wisconsin, they met during their undergraduate years at the University of Wisconsin-Madison and, like many, chose to stay in the area after graduation. Jay continued on to graduate school to study limnology and eventually became a research scientist, and Amy took a job at a local environmental nonprofit. Their lines of work placed them in the thick of the growing predicament

around the region's deteriorating water quality, and they were among those fighting the upstream battle to turn around the dire situation.

Climate change was intensifying more rapidly than predicted, and the devastation became more extensive than the United States was prepared to handle. After decades of inadequate preparation and inaction, the accumulation of droughts, storms, and disease outbreaks that struck the country and globe eventually caused collapse in many regions. In the United States, the coasts and southern states were the hardest hit, a problem made worse by their large and dense populations. The federal government exhausted its capacity and resources on damage control in these areas, leaving the Midwest to fend for its own.

Despite the national government's neglect, the Midwest was increasingly expected to feed the country, since food production in the disaster-weary coastal and southern states was falling rapidly. This decline catapulted food prices, and many Midwestern farmers capitalized on the resulting bonanza. Yahara's farmers were no exception. To keep up with the rising demand, they felt pressure to use more and more fertilizers, worsening the already immense eutrophication problem. Foreign investors and large corporations caught wind of the gold rush and began buying up and consolidating farmland. Absentee landowners were eager to sell; the money outweighed any reason to keep their deteriorating land. As rental land disappeared, so too did the ability of small-scale farmers to make ends meet, leaving them with little choice but to sell their farms to the corporations. Soon, the only farms left were massive corporate-owned farms that bullied any effort by regulators and watchdogs



An ecological disaster that resulted from accumulated and unresolved environmental challenges forced most people to abandon the Yahara Watershed. In the abandonment's wake, human settlements decayed, while natural systems underwent unfettered growth. This view overlooks the Beltline and W. Broadway, where they cross over the Yahara River, near the outlet of Lake Monona.

to reduce the intensified pollution-causing practices. At the same time, urban development spread over the phosphorus-rich land, increasing erosion and runoff into streams and lakes. Water quality quickly deteriorated, setting Yahara on a trajectory toward disaster.

The worsening state of Yahara's freshwater was largely disregarded by policymakers, industry, farmers, and the public, however. Because of the nation's food crisis, food production had become a matter of national security, and any attempt or suggestion to constrict production was seen as unpatriotic. Even humanitarian and food aid organizations saw no choice but to ignore the environmental warnings for the sake of feeding the nation.

In fact, the Wisconsin state government

declared it would waive runoff regulations in the name of national security. This sense of patriotic duty had become the only bipartisan issue the state had been able to rally around in years. Strong divisiveness, residual from earlier in the century, still saturated the air in the capitol. In light of the chronic political discord and subsequent public disenchantment, the legislature's ability to shake hands across party lines on this decision was considered a victory. But this victory helped seal Yahara's fate.

The 2020s and 2030s were exceptionally warm and wet. Frequent and ferocious storms caused the Yahara lakes to repeatedly breach their banks, and flooding was a recurrent problem. A devastating storm put the summer

of 2031 in the history books. The storm caused Lakes Waubesa and Kegonsa to overflow and converge, flooding the towns of Dunn and McFarland in the southern part of the watershed. Many of the existing control structures could not withstand the floodwaters, which consequently inundated most low-lying areas, destroying homes and property, drowning roads, and causing incalculable damage. Water management officials struggled with where to put the excess water, and most of the watershed was declared a disaster area. With little federal aid available to help clean up and a state and local government unprepared to deal with the magnitude of the damage, conflict flared. While the floodwaters and tension receded by 2032, the bad luck continued.

The flood of 2031 had sent a deluge of runoff into the lakes, worsening their already over-taxed waters. Lake Kegonsa's unfortunate shallowness and position at the bottom of the lake chain made it the recipient of the most runoff. The lake became increasingly clogged up with putrid algae each summer. In the summer of 2033, a heat wave chased many people into its dirty waters to cool off; neither officials' warnings to stay out of the lake nor the lake's stench could stop them. Late one muggy afternoon, with Kegonsa cloaked in a green scum, a couple dozen swimmers and three dogs mysteriously fell severely ill; the dogs and half the swimmers died by the following day. While this bizarre occurrence chased many people out of the water and caused a stir among the media and public, its shelf life in the public's consciousness was similar to most disasters: short. By autumn, it had already fallen from the public stage, relegated to merely a freak incident that probably wouldn't happen

again.

Local scientists did not lose interest in the incident, however. A research team, which included Daisy's father, Jay, investigated the odoriferous algae that had bloomed the day before the tragedy. As they suspected, the culprit turned out to be not a tiny plant, but cyanobacteria. This particular species was no usual suspect, however. It was exotic and extremely toxic. Samples from the Yahara lakes showed they were all infested—the depth of the other lakes had thus far prevented similar deadly blooms. But the depth would not be adequate defense for long, for catastrophe was brewing.

The summer of 2035, Daisy's first year of life, was yet another scorcher. Another rainy spring preluded a series of heat waves, which set the stage for a perfect storm. Early summer blooms sent repugnant odors wafting through major corridors: up State Street, through Monona's lakeside neighborhoods, into downtown Middleton. Dane County issued frequent odor alerts, shutting down businesses and closing off streets when the air was too foul to breathe. The lakes were permanently closed to swimming due to the great numbers of people becoming ill from direct exposure to the bacteria via the skin and ingestion, some of them losing their lives.

In the thick of the summer's third heat wave, the first wave of catastrophe hit. As the noon-day sun climbed the sky one stagnant afternoon, the lakes' calm, warm waters began to simmer with life. Masses of the toxic cyanobacteria lurking in the lower lake layers floated to the surface, dying the waters a deadly bright-green and exhaling a poisonous breath into the air. The fumes crept into the lungs of people on boats, along shorelines, at the Union

TOXIC CYANOBACTERIA: FACT AND FICTION

Today, cyanobacteria are the most abundant microorganism found in the Yahara lakes during the mid to late summer. They flourish as a result of the high volume of phosphorus pollution in the water, which snowmelt and rain flush into the lakes from agricultural fields and urban areas. Some species are buoyant, and when the conditions are right—namely, a warm, windless afternoon preceded by a storm—they float to the surface, forming a thick paint-like scum, called a bloom, along downwind shorelines. When the floating cyanobacteria die and decay, they turn a brilliant shade of bluish-green, hence their common name “blue-green algae” (however, they are not technically algae, since they are not plants). Sometimes, the dying masses cause foul odors.

Some species of cyanobacteria produce toxins called cyanotoxins, which are a public health hazard. These toxins can affect the nervous system and livers of humans, pets, and livestock, especially if ingested. Exposure to cyanotoxins has been blamed for long-term degenerative nervous system conditions and even human deaths—at least one, that of a teenage boy in 2002 who had been swimming in a scum-infested golf course pond, has occurred in the Yahara Watershed. Because of these risks, authorities close beaches or issue advisories when cyanobacteria levels are high.

This scenario’s plot hinges on the evolution of a new cyanotoxin that comes in the form of a vapor, which the bacteria would release as it floats to the surface. Unlike currently known cyanotoxins, which dissolve in water, this new one moves through air. In the initial disaster, a series of blooms occur about ten to 15 days apart. The bacteria sicken any creature that breathes in their toxic vapor, usually fatally so. However, such a toxin is science fiction—as far as today’s scientists know, no toxic-fume-emitting species exists. Nevertheless, the evolution of a species that emits a noxious vapor is not outside the realm of possibility.

Terrace, across the isthmus, and within any close proximity to the water, instantly sickening them. Within a couple of days, most of them died.

Among the casualties was Jay. That morning, he had recognized the onset of optimal weather conditions for a massive bloom. Curious about the cyanobacteria’s behavior, he had gone out on Lake Mendota to take samples. He returned severely ill and died the next day.

As the death toll climbed over the following days, hysteria swept over Yahara. The hospitals lacked the capacity to help the torrents of afflicted people, the county lacked the resources to do anything to help, and the state lacked the organization to adequately respond. With several state legislators and high-level administrators among the victims—the capitol’s proximity to the lakes leading to their demise—government fell into a state of emergency. Disaster plans had never considered a catastrophe of such size, and decision makers were at a loss for how to bring order to the chaos. Their pleas for federal assistance went unanswered, as the nation’s money and attention continued to be funneled to the regions ravaged by storms and seas. Recognizing their insurmountable dilemma, state and county officials agreed to evacuate the watershed; it seemed the only option. People were already fleeing, and with the capital at the disaster’s epicenter, no one was willing to stay behind to

assist survivors and clean up the lakes—it was simply too dangerous.

Throughout the hot summer, the bacteria claimed more victims in a series of episodic blooms. On exceptionally hot and stagnant days, any person who walked downwind of their potent odor would get a deadly whiff. Once sickened by the bacteria's fumes, one's chances of survival were slim—the mortality rate was roughly 90 percent. Many of the fatalities were the young, elderly, and immune-compromised. Only the hardiest individuals survived. While people had discovered safe zones far enough away from the lakes, the resulting restrictedness and uncertainty of life made staying in the region an undesirable option. Fear and hopelessness drove away thousands of survivors.

Even so, some people were unable or unwilling to leave so quickly, Amy among them. As the tragedy sank in, unrest boiled among those who stayed. Some took out their anger with looting and violence. Others channeled theirs into grassroots efforts to rectify the wrongs that led to the tragedy. Enraged and emboldened by her grief, Amy joined a citizens group called Lake Justice. While fingers were pointed in many directions, the scapegoat became Cropco, the largest corporate farm giant in the watershed, which was attempting to keep its business going amid the chaos. Its operations had played a big role in befouling the lakes, and the company's leaders had ignored the danger they were creating. But despite Cropco's size, they were no match against Lake Justice. The abdication of state and county government left no judicial system to deal with the accusations against the company. With so many farmworkers gone, no support from the state, and a

clear sense of industrial agriculture's death in the region, Cropco leaders eventually caved to the citizen outrage, sensing they had no choice but to close up shop. Mob rule prevailed. A similar fate cascaded through the industry, as agricultural corporations throughout the watershed abandoned their operations. Suddenly, Yahara's feeding tube to the nation was cut.

By the summer's end, the toxic bacteria had taken the lives of more than 100,000 people. Although slowing, the exodus to safer air continued. By winter, the only people left in the watershed were a handful of farmers determined to see the harvest through, and those too poor or reluctant to leave.

Some refugees followed the state government, which had moved its surviving operations to Wisconsin's original capital, Belmont. The town's location in the Driftless Area rendered it attractive; the region's dearth of lakes meant it was safe from the cyanobacteria, and the rugged topography invited the migrants to establish farms. But many of Yahara's homeless were too enraged by the state's ineptitude at preventing the crisis to follow them, or they were too fearful the catastrophe could happen elsewhere in the state, where runoff prevention measures were equally ineffective. So they left Wisconsin altogether. Once symbols of pride, Wisconsin's lakes had acquired new meanings: of danger and death. They were no longer natural assets to which people were drawn, but natural disasters waiting to happen.

Grief-stricken for her husband and her home, Amy eventually joined the exodus. While Lake Justice helped drive industrial agriculture from the watershed, they could do nothing about the ecological mess that was left behind. No other choice in sight, Amy and baby

Daisy followed the flood of refugees to the Great Lakes Climate Change Refuge, one of the federal government's newly established strongholds for climate refugees.

Within a few years, the watershed's population dwindled to less than one-tenth of its pre-disaster size. The majority of those who stayed lacked the financial or social resources to flee. They lived among the ruins of the aban-

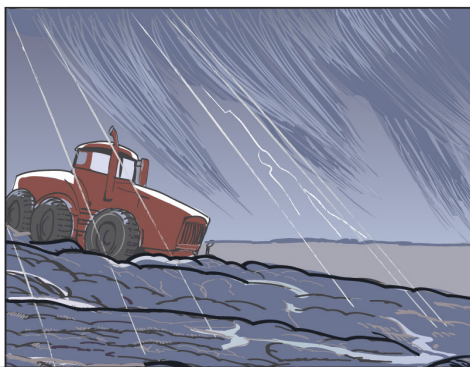
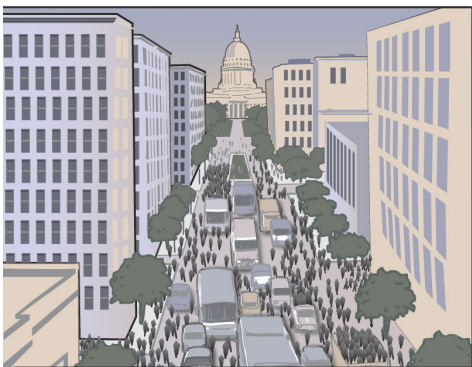
doned settlements. Ghost towns haunted the landscape. Shops and restaurants—empty of their people, but not of their wares—waited in vain for customers. Houses and office buildings remained standing, as though they expected their occupants to be home or back from lunch break any minute.

The Yahara disaster joined a growing list of climate and environmental catastrophes to

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Intensified farming, spurred by a national food crisis, severely pollutes the lake and creates health risks.



Thousands abandon Yahara in the disaster, and the floods of the 2040s begin to transform the landscape.



In the renewing landscape, lake levels go back to their natural state and people rebuild.

A national food crisis through the 2020s and early 2030s intensified farming in Yahara. The resulting lake pollution enables the disaster: a new species of toxic cyanobacteria emerges and fatally sickens thousands of people. Most survivors flee Madison and the surrounding municipalities, allowing the landscape to transform relatively untouched by humans in the decades following. By 2070, post-disaster people have settled into a new way of life.

A TRANSFORMED WATERSCAPE

A couple of decades prior to 2070, a swim on any summer day could have been one's last. Over the decade following the disaster, heavy rains continued to unleash massive floods that inundated the watershed with leftover nutrient pollution from the agricultural gold rush of the 2030s. Now with a drier climate and nearly emptied of its human population, Yahara's lakes are getting some relief and water quality is on the mend. Even though large amounts of phosphorus will remain in the soil for decades, a much smaller amount flows into the lakes. This is because the now-dense riparian vegetation intercepts most of the runoff. Toxic cyanobacteria blooms still occur, but people have learned to keep their distance from the lakes during the blooming season. As time passes, the blooms are becoming less frequent and intense.

The water landscape has also transformed. The floods of the 2040s submerged the Tenney Park locks and eroded the artificial barriers between the lakes, such as that at the inlet to Lake Waubesa. As a result, lake levels rose, with Waubesa and Kegonsa peaking the highest at 854 feet above mean sea level. While this peak is only six feet above normal early-century levels, Yahara's flat topography caused the water to spread far beyond the lakes' modern-day shorelines. Lakes Monona, Waubesa, and Kegonsa merged into a single multi-basin lake with terraces of wetlands.

Freed of human-made control structures, the lower lakes' water levels remained higher than the historic normal when the rains moderated in the 2050s. By 2070, the lower lakes, along with the Yahara River and smaller water bodies, such as Mud Lake, have settled as an extensive complex of wetlands, slowly flowing water, and shallow lakes. This area is known as "the Marsh." It is a difficult place to live in or near, because of the waterlogged soil and the summertime threat of the cyanotoxin vapor. However, fish are abundant. Game are also plentiful, but not during cyanobacteria season; they too have learned to avoid the area. The Yahara people harvest fish in the early spring, when they come inshore to spawn. In autumn, they hunt wild pig, turkey, and waterfowl. Although no one lives in the Marsh, it is essential to people's livelihoods.

In contrast to the lower lakes, the level of Lake Mendota has dropped about five feet, matching its 1840 level, when its original, beach-lined shores still existed. With the Tenney locks destroyed, people no longer use the lake as overflow storage during intense rains, as they used to, which has allowed Mendota to return to its natural state. Waves have gradually washed away the black mud and uncovered the sand beaches that the Native Americans once knew.

which people the world over had succumbed in the middle of the twenty-first century. Famine, migration, and unrest sent wealthy countries—the United States included—into states of fear and paranoia, prompting them to bolster their military defenses and close their borders to contain their problems. Infected by a “fend for oneself” mentality, these countries became increasingly isolated—relationships were severed, networks broke down, the global economy eroded. Stressed by chronic crisis, the U.S. government’s coffers and stamina rapidly dwindled. Regions such as Yahara lay neglected at the bottom of the national triage list. However, this neglect helped lay the groundwork for a drastic transformation in the watershed.

A Watershed Restoration

With a running start, Felix hurled himself off the pier into Lake Wingra’s cooling waters. Instant invigoration swept over him as the sweaty film that covered his body turned into cool lake wetness. Summers are hot in Madison—hotter than they used to be—but the lake offers some relief. No one has air conditioners anymore; the scarcity and unreliability of electricity doesn’t allow such a luxury. The climate had defied early-century scientists’ predictions. It had slipped into something warmer, flaunting temperatures an average of eight degrees higher than 50 years prior.

Felix floated contentedly. Summer was still nascent, and it was not yet the time of year when being so close to Lakes Mendota and Monona could be lethal. With large-scale agriculture now extinct in Yahara and a nearly vanished impact from urban runoff, lake water quality is on the mend. Lake Wingra, especial-

ly, has benefitted from the abandonment. There was no longer any need, or anyone, to sand or salt city streets, relieving the lake of the silt that plagued its waters earlier in the century. As a lake fed by now-recovered springs, rather than the Yahara River like the others, Lake Wingra has received a continuous flush of clean water, quickly improving its water quality to a swimmable state, if you can get out past the weeds.

The toxic cyanobacteria that had caused the disaster still linger in the other lakes, however, exhaling their poison when the summer is its hottest. During these months, people and most animals simply avoid getting too close or migrate to escape the fumes. Hope Prairie is several miles southwest of Madison, a safe enough distance that allows them to remain there year round, as long as they don’t venture too far in the wrong direction. Seasonal and sometimes-restricted movement is part of the new pattern of life.

Lake Wingra’s swampy shores are thick and wild with vegetation. What used to be Vilas Park is overgrown, hiding the ruins of homes in the empty neighborhood around it. Felix often tries to picture what the neighborhood and park used to look like, busy with people. It is hard to believe this jungle had been so manicured but a short time ago. Nature moves quickly when unbridled.

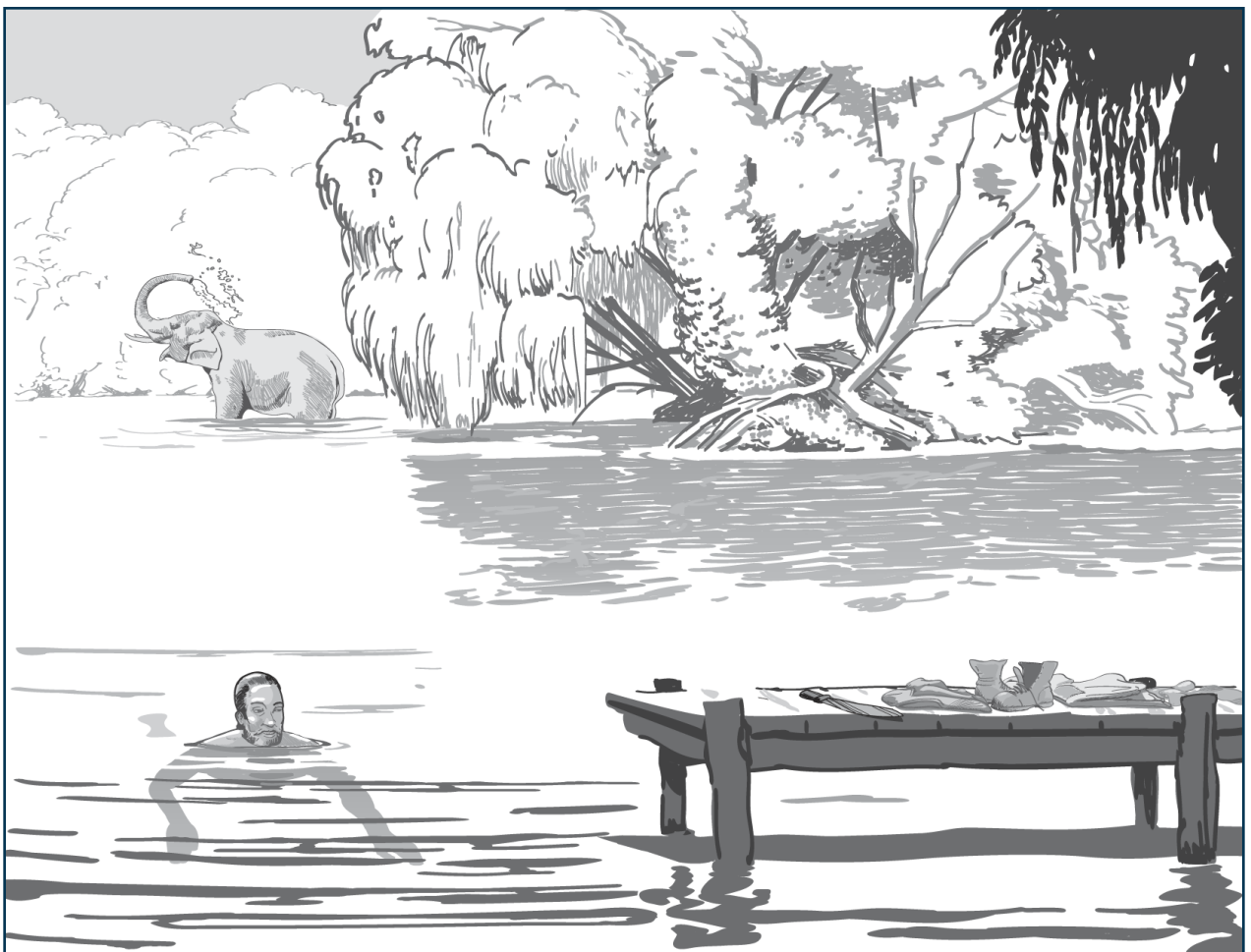
After the disaster, while Yahara’s people slowly struggled to get back on their feet, nature and time worked together in quick step. By land and water, the ecosystems began an uninhibited course of succession. Nature seemed to rejoice in its liberation, stretching its limbs into the spaces the people left. While houses and buildings, picked over by survivors, decayed to mere shells, grasses, flowers,

shrubs, and trees sprouted across the earth they once knew. All around the watershed, wetland, savanna, and forest eventually took back the nooks and crannies humans had vacated.

The course of succession was somewhat predictable—ecology textbooks used to describe a similar course for old farm fields that lay fallow, except now more exotic plants emerged in the mix. In the wake of the abandonment, the exposed soil endured several years of heavy erosion as the climate became even soggy the decade following the disaster. But, eventually, weeds took root and spread, setting the stage for longer-lived trees and

shrubs, which soon followed. By the 2050s, the climate began to dry out. The landscape slowly became more arid, as intermittent drought returned to the climatic rhythm. Prairie and savanna began to return, pruned by frequent wildfires. By now, native and invasive plants species have settled into place, and the landscape blooms with a novel but still-maturing mix of the old and the new.

Felix heard a loud rustle on the shoreline that startled him into alertness. Cougars are known to stalk these shores, and even though he knew the odds that one would bother to jump in after him were miniscule, he couldn't



Felix takes a swim in Lake Waubesa in the company of one of Yahara's elephants. By 2070, the region's small human population and climate change has enabled a unique community of flora and fauna to inhabit the watershed.

help but feel a sense of dread as he eyed the distance between himself and the pier, where his machete lay. Then, a trumpet-like noise belled from the trees, and the mammoth head of an elephant emerged. Phew, thought Felix. Just an elephant.

Also novel to the post-disaster watershed is a motley crew of fauna. Rid of humans, their only predator, wolves and big cats returned, at first feasting off of abandoned livestock and pets, and later adjusting their palates to the evolving mix of herbivores, a collection consisting mostly of small animals, such as squirrels, woodchuck, cottontail rabbits, and former game birds, such as wild turkey, ducks, and grouse. The once-abundant whitetail deer is now rare in this part of the state; a disease had decimated the herds back in the 2020s. Feral pigs eagerly filled the resulting ecological void. Some species, such as beaver and mink, made a healthy comeback to the watershed, their abundance matching that of their ancestors in the 1800s.

And the elephants—mostly zoo escapees, but also strays from private collections. During the agricultural gold rush, as many of the country's frequented tourist destinations on the coasts became submerged or otherwise uninhabitable, Dane County smelled the opportunity to become a new leading tourist destination. With its sudden influx of wealth, it had begun to spruce up the watershed's attractiveness, which included buying a menagerie of new animals for the zoo, including a small herd of elephants. After the disaster, with no humans to feed them and crazed by hunger, many of the zoo animals managed to break free from their enclosures. They scattered about the landscape, and those able to survive on their

own created unique pockets within the ecosystem. Social and intelligent, the elephants have been particularly successful survivors, even in the now-milder winters. Once settled into the regenerating savannas and wetlands, which resembled their ancestral habitats, they filled the ecological niche left empty by the extinction of their Pachyderm predecessors, the mammoth and the mastodon, thousands of years prior.

Zoo animals weren't the only strangers to set up camp in the watershed. A number of foreign reptiles, mammals, and birds, especially those native to southern states, had migrated to Wisconsin, taking advantage of the expanded habitat range the warmer temperatures laid out for them. Armadillo, cottonmouth snakes, and ostrich (surplus from Texas' collapsed ostrich meat market) are now common. The lakes teem with a unique blend of native and non-native fish: northern pike, black bass, sunfish, tilapia, and exotic Central American catfishes. Nonnative plants had hitched a ride with the wind and migrating animals, moving in with Wisconsin natives along the lakeshores and across the landscape, creating plant communities never before convened in the world.

Felix often thinks of Hope Prairie, also a mix of migrants and natives, as similar to the novel flora and fauna communities that had formed in post-disaster Yahara. Like the plants and wildlife, the community has also learned to work with what is available to them and to adapt to ever-changing conditions, in pursuit of resilience—a secret to which their plant and animal brethren were already privy and pre-disaster society had failed to crack.

Resilience for the post-disaster people also meant reconciliation with Yahara's lakes. With industrial agriculture and expansive urbaniza-

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AGRICULTURE'S LEGACY AND TRANSFORMATION

While a complex recipe of factors led to the disaster, the industrialization of Yahara's agriculture was a key ingredient. The intensity of both demand and production had generated a dependency on fertilizers, feed supplements, insecticides, and herbicides. This dependency resulted in a slew of imbalances that contributed to the collapse of pre-disaster society and left legacies for the following generations.

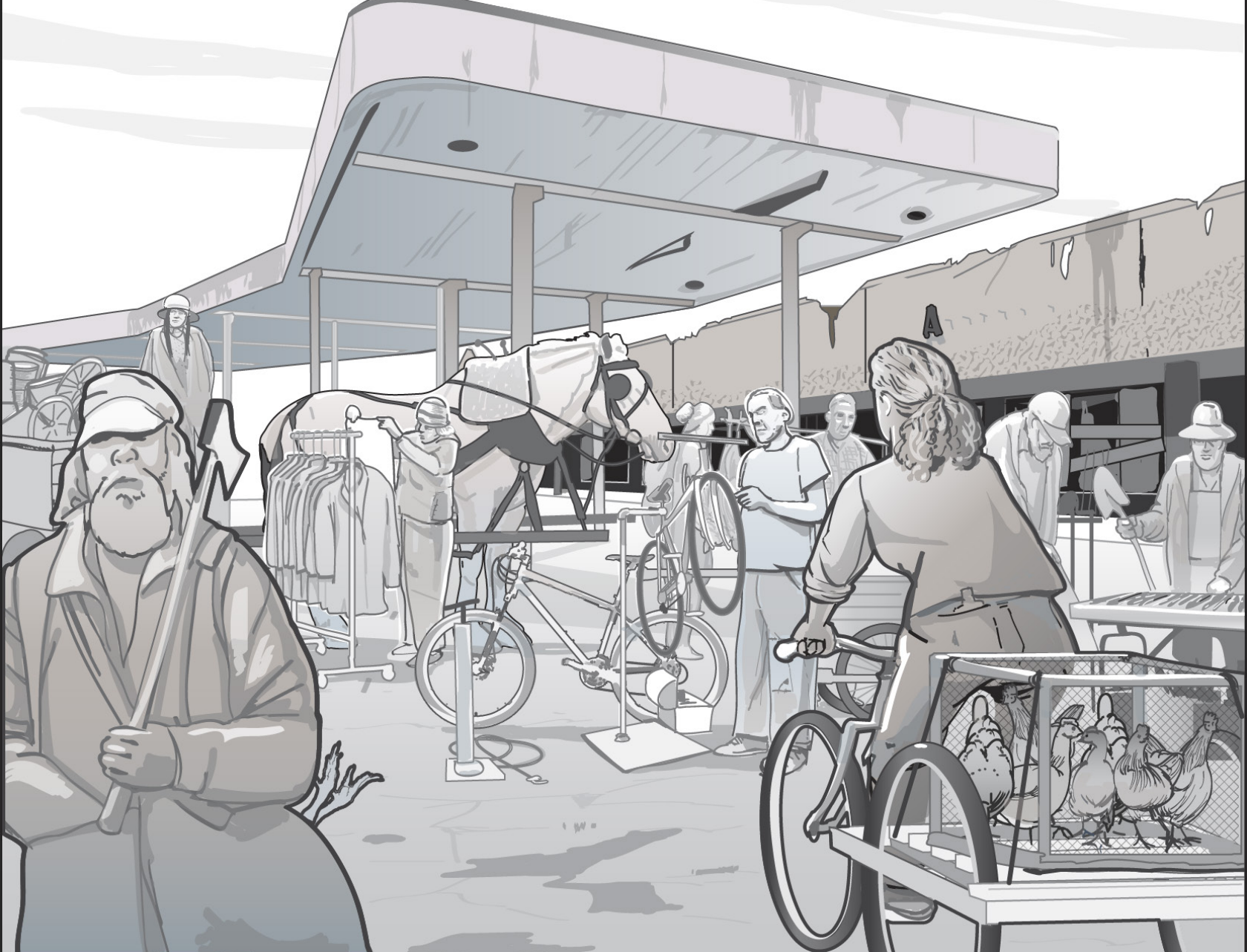
In the disaster's lead-up, the amount of manure that flowed from livestock farms exceeded the land's capacity to absorb it. Manure is rich in phosphorus, which binds easily to soil particles and can thus accumulate quickly in the soil. Although a necessary nutrient for plant growth, too much phosphorus disrupts normal ecological systems. Runoff from snowmelt and precipitation transports the excess phosphorus from the soil into the lakes. A lake oversaturated with phosphorus is susceptible to algal and cyanobacterial blooms. By the eve of the disaster, the state of the Yahara lakes had pushed the region to the brink of danger.

Another fertilizing nutrient, nitrate, had reached levels the watershed was also unable to absorb. Nitrate moves easily in water and, thus, polluted the region's shallow groundwater, subsequently contaminating shallow private wells. Moreover, the heavy insecticide use

through the 2020s and early 2030s had decimated bees and other pollinators. Only the colonies lucky enough to live on nature reserves and organic farms survived to pollinate crops.

After the disaster, the various pollutants that constituted the chemical legacy of industrial agriculture faded at different rates. In the absence of insecticides, the pollinators came back within the first few years. Groundwater began to shed its nitrates, but the nutrient still haunts shallow wells. The soil and surface waters are sloughing the phosphorus, but at a pace slowed by the nutrient's abundance. Occasional big storms or early spring snowmelts still wash phosphorus into the streams and lakes, but to a lesser degree than before the disaster.

Industrial farming became impossible after the disaster. No one can maintain a farm at such a scale and with such needs, especially with so little access to liquid fuel, fertilizer, and pesticides. Small-scale farming is the only option. People grow a great diversity of grains, vegetables, and fruits on smaller plots of land, which they cultivate manually or with horses and mules. They also rotationally burn fields to enrich the soil. In fact, most of the farmland lies in fire-prone areas, where the recent decades of frequent fire have made the land most arable.



The ruins of a former gas station serve as an urban marketplace. Bartering has become the primary means of commerce in Yahara, and resourcefulness is a necessity.

tion gone, water quality has improved since the disaster and is continuing on a healing path, despite the scars it still carries from its polluted past. Post-disaster Yahara people underwent an enhanced sense of dependency on the lakes, as compared to previous generations—fish, small game, and some riparian and aquatic plants are central to their diets. The lakes and their tributaries are also transportation hubs, since public transit and cars were made obsolete by the decaying infrastructure and lack of access to oil and gas. Thus, as in previ-

ous generations, the lakes are the livelihoods of the post-disaster people. Unlike previous generations, this dependence is magnified, and there is a universal acceptance of the necessary precautions to protecting the lakes. The disaster had left a deep wound in the Yahara people's psyche; no one was willing to try that luck again.

In this sense, the meanings the Yahara people attach to the lakes once again shifted after the disaster. As the Disaster Generation aged and the memory of the tragedy faded,

the lakes' symbolization of death and danger also faded. They moved back to the center of the collective cultural identity, but not as glorified landscape décor, there for human pleasure; rather, they embody the Yahara people's renewed connection with the ecosystem: dynamic, dependent, and deferent. To Daisy, Lake Mendota, especially, carries a poignant meaning. Its surface reflects the lore of the disaster and the ghost of her father, and its waters swarm with irony—once death-bringing, now life-giving. Similarly, the Yahara people's lifestyle, especially that of Hope Prairie, has transformed, and a sense of stewardship has become pervasive. In their reconciliation, both the lakes and the people have apologized to each other for their unintended transgressions.

Stewardship goes hand-in-hand with survival. Some might say the Yahara people's life quality has fallen a few notches. They live simply and efficiently, using all that is available to them, wasting nothing. Clothing is handed down until threadbare, when it then becomes rags and other scrap material. Furniture picked from abandoned homes is given new lives or broken down for fuel. Abandoned backyards became cropland. Plastic bags are reused with a longevity unheard of in pre-disaster times. Books (and with the university libraries abandoned, there were plenty), fishing poles, tattered board games, and bicycles (another plentiful artifact from pre-disaster society) serve the pastime needs—what little pastime is allowed by day-to-day existence. Healthcare is limited, with no organized system save a couple of small clinics and a few trained medical professionals. Given the spotty availability of medical resources, people are highly vulnerable to disease. Once well-controlled diseases,

such as influenza and tuberculosis, occasionally flare in communities, and invasive diseases, such as dengue fever, have arrived. People with formerly easily treatable disabilities, such as myopia and hernias, find life to be quite hindered. Medical emergencies, such as appendicitis and heart attacks, are usually fatal, unless the patient can get to one of the hospitals outside the watershed in time. The adage "life is hard" has regained its connotations once antiquated by industrialization. Winters, even if milder, are unquestionably hard.

Others, however, might say the Yahara people have reached a higher level of life quality, as their lifestyle is focused on happiness, connection, and resilience, rather than wealth and material goods. Wood scraps have more value than the cell phones, computers, and the other personal technologies that were left to waste after the disaster. The mundane have become luxuries, the luxuries have become trash. Among the few abandoned technological items that have proved useful in post-disaster society are the solar panels and small-scale wind generators. However, electricity is a luxury afforded to only those living in a few of the communities on the outskirts. The rest rely on wood from abandoned buildings and from forests for fuel. Overall, technological progress has been relegated to the yet-forgotten "old days," back when pre-disaster society let wanton materialism rule—a reign post-disaster people view as their predecessors' doom.

While resourcefulness and resilience are survival factors for all post-disaster people, the motivations to make a go of it in the feral watershed differ somewhat. Daisy, Felix, Hope Prairie, and their fellow subsistence farms and intentional communities are mavericks,

attracted to the wildness of the landscape and the chance to blaze a new trail for society. The freedom allowed by the region's lack of governance lured others to the watershed. Poverty gave others no choice.

In the post-disaster population mosaic, the subsistence farms and communities form a periphery around a few highly dense "urban" clusters, though they more like compact towns in pre-disaster terms. These clusters are inhabited primarily by disaster survivors and their descendants, who had neither the material nor social resources to leave. The abandonment included that by the federal government, which viewed the region's plight as a lost cause. Survivors had no choice but to stay, weather the disaster, and rebuild on their own.

In the post-disaster era, inequality and individualism spell danger. Both interfere with the resourcefulness and cooperation that enable survival. Individuals who were unable to cooperate with fellow survivors to find food, water, and shelter—to simply live—became isolated and eventually disappeared. While some of these individuals' inability to cooperate was based in a general unwillingness, others suffered from severe depression or post-traumatic stress disorder. Since no services remained to help them through their darkness, those unable to cope simply fell to the social wayside. They constituted the second wave of the disaster's victims.

In a sense, inequality has dissipated in post-disaster society. With social services as nonexistent as a central government and no coordinated system otherwise to provide any sort of framework, cooperation across social strata has been crucial throughout the renewal period. Communities have helped each other

get back on their feet and find pathways forward. They have forged ties to share, trade, or teach basic needs and skills, especially since it became easier to specialize in certain products or services and, thereby, create a division of labor. Hope Prairie Community is known for its goat milk and meat products, which it trades with nearby urban communities for goods and services, such as metalwork and carpentry.

Isolated from the global economy, which had teetered further into collapse, post-disaster Yahara's bartering system is serving more needs than merely the exchange of goods. Along with reliable communication technology, gone are the digital social networks that had constructed much of the social scaffolding and knowledge-sharing earlier in the century. Bartering and survival have become the bones and sinews for the watershed's new social network.

The Resilience Generation

Felix gave Willy a reassuring nudge to the flank as they crested the hill toward Hope Prairie. The old horse needed encouragement to keep moving the hot day. The saddle bags, laden with the day's bounty—an assortment of berries and fish—surely didn't help either.

They passed by a neighboring farm's field, abloom with rows of leafy greens, squashes, and tomatoes. Though still early summer, the growing season had shifted significantly in the past couple of decades. As they plodded by, they caught the attention of a large, unfriendly looking dog—probably one of those wolf mixes that farmers had begun breeding—who promptly sent them a warning bark. People have been having problems with elephants raiding their fields, and these wolf mixes pro-



Hope Prairie Community members work on their farm. Their lives are focused on community, survival, and resilience.

vide some guardianship over the fields. Their might is minimal though, given the intrepidness of an elephant.

When Felix and Willy arrived at the barn, they found Daisy unhitching Bud and Betsy. Horse power had indeed taken back its original meaning, a thought that flitted across Felix's mind, amusing him. The community shares one pickup truck, the engine of which they rigged to run on food grease. They are one of the few farms large enough to produce enough biodiesel to occasionally run a truck engine; even so, they are always running low. Horses are much more reliable.

With the horses tucked away in their stalls, Felix and Daisy headed for the common house, where the community members were assem-

bling for a meeting. The order of business was with the community well. While groundwater quality had slowly improved alongside the lakes, problems with roots in the past still persisted. The recklessness of the Disaster Generation's agricultural practices had saturated the soil and groundwater with nitrate, a fertilizing nutrient that is harmful in excess. Since the post-disaster communities lack the equipment to dig wells that can reach the deeper aquifers, they can access only shallow groundwater, which is still nitrate ridden. But the need for water outweighs the risks, and no severe signs of contamination had appeared, until recently.

Within a couple of weeks after the birth of one couple's first child, his hands, feet, and mouth turned blue. Also Hope Prairie's

firstborn, the ailing baby sent the entire community into a state of concern. An older community member, who is a Wisconsin native, had recalled hearing about such symptoms as blue baby syndrome, a disease caused by the ingestion of water with excessive nitrates. Alarmed, the community debated what to do. Should they dig a new well elsewhere, perhaps upland, away from old farm fields or near a wetland, which might remove the nitrate? Or should they build cisterns and drink rainwater instead? It is uncertain whether their decision will help the baby, however. His condition worsened, and his parents took him to the state's main hospital in Belmont, the re-crowned capital, to save him.

Past-rooted problems are found not only in the water. With the dust from the disaster settled and a feeling of stasis growing, inklings of pre-disaster life—the way things used to be—are beginning to emerge, and with them some of the sides of society Hope Prairie has been trying to avoid.

Some members of a neighboring farm, which was known as a survivalist haven, have become paranoid about a return of government rule and industrial agriculture. They have come to Hope Prairie a few times now to discuss forming an ad hoc troupe of vigilantes to police the watershed and watch for the potential arrival of a governance task force or corporate prospectors. Hope Prairie does want to preserve their autonomy, but this defensive mentality is discordant with their peaceful vision. So they have repeatedly declined involvement.

The community has also been hearing rumors that a small group of better-off town folk erected a gate around their enclave, worried that the neighboring communities would try to

steal their accumulated goods and resources. And while the region's reputation as a toxic hazard keeps most outsiders out, a few have found their way in, usually sniffing out economic interests. A couple of businessmen from Belmont recently moved to Madison with eyes out for entrepreneurial prospects. When the toxic stench isn't too ripe, they detect the scent of an economic comeback in the blossoming of post-disaster society. Collectively, the Yahara people are ambivalent about what this could mean.

In ecology, resilience—the ability of nature and its systems to bounce back from disturbances and catastrophes—is somewhat of a nirvana. Social resilience, or the ability of a society to adapt or transform in response to environmental change, is equally nirvanic. While resilience lies at the end of their rainbow, Hope Prairie Community's vision does not entail a bouncing back to the way things used to be. Developments that hint of inequality—unequal wealth, resources, power, and access—are unwelcome artifacts of pre-disaster life and don't fit into their vision for a new world. They are not rebuilding with the same bricks used by generations before them. Theirs is the Resilience Generation. Unexpected turns and hazards surely lie in the road ahead. Like generations before them, it will be their challenge to navigate the surprises and find the route toward a prosperous future. ■

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