Beyond the Horizon

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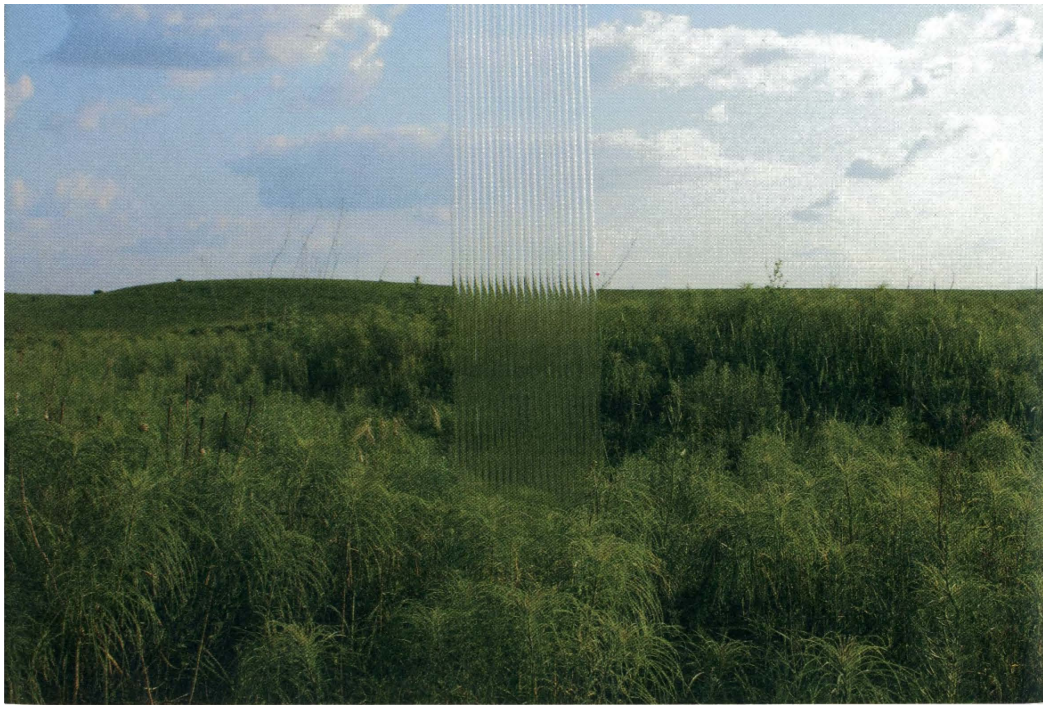

Blurred Horizon
Amy Hoagland

BEYOND THE HORIZON

In practically every depiction of the Flint Hills, it's there. The line.

Sometimes it's as sharp as a blade. A dark, earthen-colored slash slicing across the canvas. Other times, it bleeds. Colors mingling, pigments loosened by water or blurred by distance.

In either case, the artist has divided the world the way most of us do — into two halves: Earth and sky, land and air, matter and vapor. Opposing realms separated by that long, unbending, unbroken *line*.

Indeed, the word "horizon" comes from the Greek verb *horízō*, which means "to divide." Horíz, in turn, derives from *horos*, an old word for "boundary." The horizon cleaves the physical world in two.

And yet the horizon is an illusion. The sky meets the ground not *out there* but all around us, all the time. It may be a fact of our visual field, but *the line* is little more than a mirage, conjured by the curvature of the Earth. Like the end of a rainbow, it recedes infinitely before us.

The line deceives us in another way. It obscures the deep, intrinsic land-sky connections that gave birth to the Flint Hills and that remain integral to its ability to sustain life.

We learn at an early age that plants rely on rain and sunlight to grow and that most inhale carbon dioxide and exhale oxygen. Increasingly, we also understand that, in the tallgrass prairie, much of the digested carbon is sequestered, stored in the grasses' deep, matted pillars of roots and the surrounding soil.

But this is just the barest of sketches of what is a dizzying array of dynamic relationships. If we had X-ray vision, we would see that the ground — and all the life that grows and feasts upon and within it — is not a hard line at all, but a loose and fuzzy

interface, permeable, like the wall of a cell, perpetually mediating the meeting of Earth and sky.

Perhaps a better way to view the Flint Hills, then, is not in wide, horizontal panorama but in cross section, a tall, narrow slice of stone-soil-prairie-troposphere, a 40,000-foot tableau stretching from deep below the surface to the parapets of the tallest cumulonimbus.

Start at the top, miles above where passerines forage among the prairie grasses. Here, invisible rivers flow northward from Mexico's Yucatan Peninsula and collide with the wrung-out westerly winds tumbling over the Rocky Mountains, forming a climate that is prone to extremes.

Although scientists have had a handle on the basics of Earth's hydrological cycle since the 1930s, it was only in the 1990s that researchers discovered that water traveled through the atmosphere in much the same way — and in much the same volumes — as it did on land: in established channels that could be mapped and measured. Atmospheric rivers like the kind that snake their way thousands of feet above the Great Plains transport water in the form of vapor from the tropics toward the frigid poles. They can be hundreds of miles wide and deeper than fifty Mississippi Rivers.

All that water vapor eventually coalesces and falls to the ground in the form of rain, snow or hail. But the pattern is highly variable. Because deep-rooted prairie grasses do better than most tree species in the face of such variability, they have an advantage in Kansas' extreme climate. So while we want to say, "The Flint Hills are a place of billowing grasses and unpredictable weather," it's more accurate to say, "The Flint Hills are a place of billowing grasses *because* of the unpredictable weather."

Historically, this atmospheric instability also played a role in the maintenance of the prairie. The collisions happening miles above ground generate electrical imbalances between the ground and the atmosphere, which in turn produce lightning. Without frequent lightning strikes to set the prairies ablaze, the ecosystem may never have gotten established.

The drama of a Kansas storm, then, is both a mirror and an augur of the drama that unfolds across the landscape during a prairie fire: jagged lines of fire spiderwebbing across both land and sky, connected at the point at which the lightning touches the ground.

If what happens in the uppermost reaches of the troposphere shapes the prairie through colliding masses of electrically charged air and water vapor, the conditions closest to the surface — what we experience most viscerally as "weather" — is equally important to its ecology, and not just in terms of sunlight or rain. We may not think of wind as an ecological force, but the Flint Hills are home to more than 70 different grasses, and every one of them is pollinated not by buzzing, hopping, humming insects but by the breeze.

Prairie grasses produce pollen inside of tiny yellow, red or tawny-colored flowers called anthers. The wind sweeps this pollen up into the atmosphere, where it can sail for miles before falling earthward, where, with luck, it will find a feathery, female stigma to pollinate. Like the wind itself, this process is largely imperceptible to humans, but it's vital to the basic health of the prairie. If we could flip a switch and shut off the wind — as no shortage of Kansans have likely dreamt of doing — the prairie would wither to dust.

At this point, we've reached the ground, *the line*, where the sky surely, obviously, ends in a hard stop. Or does it?

After all, what *is* the ground? Rock, soil, decaying plant matter. But also: water, oxygen, carbon dioxide. Generally speaking, the "ground" is 25 percent water and 25 percent air, which is another way of saying that any square meter of ground is about 50 percent sky.

The ground beneath our feet might begin to feel even more unstable if we were to realize that most of the microorganisms that reside in prairie soils are aquatic, living out their lives in microscopic droplets of water. That bears repeating: A significant amount of the soil's microfauna — the tiny beasts that chomp and slurp their way through the underworld — are not land animals but *water creatures*. They swim about, hoovering nutrients out of the water and preying on other, sometimes parasitic microorganisms. When the soil dries out, these microscopic habitats disappear, and some of the animals die. Others shrivel up and encase themselves in protective chrysalises, in which they lie dormant until the sky opens up and douses the land once again. If the human eye could perceive it, then, we would see a cycle in which the giant rivers overhead flow into a trillion tiny reservoirs underground.

Perhaps most astonishing is the fact that these land-weather interactions are reciprocal. The amount of moisture in soil and vegetation is not only the result of, but also a *cause* of atmospheric patterns. As water vapor is released from the ground — through evaporation and transpiration — the additional moisture can drive changes in local temperatures, cloud formation and eventually precipitation, resulting in a positive feedback loop. As the sky gives birth to the prairies, so the prairies give birth to their otherworldly skies.

We can't descend any further. The only thing left to do is to scrape away the soil. Expose the bedrock, a layer cake of

limestone and shale, some strata of which are 70 feet thick. And what is limestone besides the remnant of a former climate? A living record of when the Earth's atmosphere was far warmer and wetter, when what today we call Kansas was little more than the sediment at the bottom of a shallow sea?

The author and naturalist Robert MacFarlane writes that "limestone can be seen as merely one phase in a dynamic earth cycle, whereby mineral becomes animal becomes rock." Wait long enough and that rock will "eventually supply the calcium carbonate out of which new organisms will build their bodies, thereby re-nourishing the same cycle into being again."

MacFarlane's observation reveals the true value of a vertical orientation. Viewing the Flint Hills in cross section not only helps us understand the invisible processes that sustain the prairie ecosystem — it also connects us to other places, other times. What we see when we look at the Flint Hills is a landscape made and remade through forces that are global in nature and that stretch back to a time beyond any human accounting.

There is beauty in a horizon. For many, it represents possibility, a future not yet realized. But *the line* is also a dangerous fiction, obscuring the interconnectedness of a world not easily sifted into binaries. When I think about the line now, I think about all the other boundaries we erect that seem solid but in reality are porous and that, if looked at hard enough, might dissolve entirely.

Timothy A. Schuler is an award-winning magazine journalist and a contributing editor at Landscape Architecture Magazine. His essay, "The Middle of Everywhere," was included on a list of the most notable science and nature writing in The Best American Science and Nature Writing 2020. A native Kansan, he lives in Honolulu, Hawaii.

Inland Sea
Bryce Lafferty