INTRODUCTION

ON MAY 3, 2022, Chicago mayor Lori Lightfoot stood in the city's historic water tower and announced the launch of a new municipal water branding campaign: Chicagwa. "We are here today," Lightfoot told the gathered officials and members of the press, "to draw more attention to how we use our city's beloved crown jewel, Lake Michigan."[1] Run in association with National Drinking Water Week, the Chicagwa campaign used a limited-run set of canned water (with cans designed by local artists) and a cheeky ad campaign to promote the quality of Chicago's municipal drinking water. Bottled or straight from local taps, Chicagwa's "great drinking water" came from neither "an exotic island" nor a "fancy glacier." Instead, as the short film campaign narrated by urban historian Shermann "Dilla" Thomas pointed out, Chicagwa water came from right next door: the great lake "snuggled up" against the city's eastern border.[2] "Water is the reason Chicago even exists," Thomas noted

as a mustachioed actor drank water, "it's pretty much Chicago's entire past and also its future. And we're sitting on a nearly endless supply of it, which the Department of Water Management will be turning into clean, refreshing drinking water long after our great-grandsons' great grandsons can grow their own thick mustaches."[3]

When I moved to Chicago's South Side neighborhood, Hyde Park, in 2001, I was surprised by how much I liked the drinking water. I liked it *despite* the fact that it came from the corner of Lake Michigan once infamous for its polluted waters teeming with wastes from the Chicago meatpacking and other industries. I grew up in a different Hyde Park—a small town of less than five thousand in northern Utah—and would happily describe the heavily mineralized, minimally treated, mountain spring water from my hometown as the ideal water to anyone who asked. Despite my taste for hard water, I really liked the water coming out of the tap in my little Chicago flat.

My family did not share my fondness for this new Hyde Park's water. Years later, my brother admitted that when he and his wife visited, they snuck bottled water into my apartment to drink on the sly. The water coming from my taps, he recalled, tasted a "little bit musty and dry, almost like it had de-oxygenated. . . . [I]t tasted like chlorinated lake water." Had we walked over to Lake Michigan and taken a sip of the raw lake water, we would have encountered a completely different beverage altogether.

The water coming out of taps in small towns like the one I grew up in, or in large metropolitan areas across the world like Chicago or Paris, tastes and smells fundamentally different from the raw water that enters municipal water systems. Someone—many someones—has done a lot of work over the past hundred or so years to manage the tastes and smells of water delivered throughout municipal water systems. Their work has "taught" tap water drinkers to expect water to taste a certain way: to expect, for example, that the water in the Hyde Park neighborhood in Chicago *could* and maybe even *should* taste

like the water in Hyde Park, Utah. Indeed, many of the people I have talked with over the last decade describe the water they drink out of taps or bottles as "good" or "bad." Yet when I ask people how their water tastes, they often struggle to respond. Most say their preferred water tastes of nothing.

When I describe the water from my former Chicago neighborhood as good, and my brother responds that it is bad, we are both highlighting our personal tastes rather than some quantifiable quality of the water. The *personal* nature of such preferences makes them subjective. Policy makers and scientists in the twentieth century generally excluded matters of taste from regulatory systems due to the subjective nature of personal preferences.[4] Despite the subjectivity of sensory experiences, the people in charge of producing municipal water worked very hard over the twentieth century to figure out how to make water's tastes and smells fade into the background so that consumers could ignore or overlook its flavor. Making water taste like nothing is still one of their core goals. Their success has depended on the development of new forms of sensory and technical expertise. In fits and bursts, over the twentieth century waterworkers got better at communicating with each other about how to identify, treat, and manage unwanted tastes and smells in the water they produced. With each improvement of their skills, waterworkers made it increasingly easy for drinkers to not pay attention to the relationship between the water they drank and the natural and man-made environments it came from. As this book argues, that expertise put a wedge between how many individuals experience and understand the world surrounding them and how that environment actually is.[5]

This book is about the work that has gone into making drinking water taste relatively unremarkable in countries with well-developed municipal water infrastructures. It focuses on the development of new practices of sensory expertise over the twentieth century in the United States and France and investigates how that expertise has shaped the

management of tastes and smells found in raw and treated drinking water. It asks what impact the changing types of sensory data available to everyday drinkers have had on how people with a range of different levels of expertise respond to the ingestible environment: the molecules, minerals, and materials that make up things we eat and drink. This book claims that the work of erasing tastes and smells in municipal water has altered awareness of the ways that the environment has been polluted, and in the process has come to shape the personal, political, and technological decisions shaping our environmental futures.

PAYING ATTENTION TO SENSORY DATA

The types of sensory data we pay attention to shape what we sense. Similarly, what we sense shapes what we pay attention to. A waft of smoke or the rotten-egg smell from the sulfur-containing molecule mercaptan, which is added to natural gas, can catch and direct our attention toward the environment, but only as long as we are capable of perceiving these cues.[6] These little bits of perceptible data activate action. Smoke invites us to check the oven, look for a fire, or flee a building. In contrast, what we cannot taste or do not smell offers different lessons about the environment: erase the ability to smell, and the mercaptan causing that nasty rotten-egg odor will fail to signal that anything is wrong, sometimes with disastrous consequences.[7] Similarly, the perceptible data found in water, its tastes and smells, influences how individual drinkers and their neighbors, friends, and colleagues react to that water. For example, when the water coming out of taps remains unremarkable, day in and day out, it becomes easy to assume that everyone across the municipality, region, state, and beyond enjoys the same luxury. Such assumptions can get in the way of attending town council meetings. They can make it hard to support expensive new infrastructure projects. Sensory data, made imperceptible, paves a path toward inaction.

Nineteenth- and early twentieth-century urban industrialization resulted in an out-of-sight, out-of-mind approach to disposing of polluted waters, often to the dismay of downstream locales. As areas urbanized, physical environments were reconfigured in ways that prioritized urban dwellers' needs over rural water rights. Prioritization of wealthy urban inhabitants' desires for water over the needs of a city's poorer residents mirrored the geographical unevenness in access.[8] The World Health Organization (WHO)/United Nations International Children's Emergency Fund (UNICEF) Joint Monitoring Programme for Water Supply and Sanitation notes that approximately three-quarters of the world's population has access to a safely managed water source. While that portion may seem large, it also means that an estimated one out of every four people does not have access to such a source. Within the United States, 97 percent of the population in 2020 had access to safely managed water supplies, leaving approximately 9.89 million people who *should* have access to safe water without it.[9] In some cases, this lack of access is due to rural use of unregulated water sources such as homestead wells, whose safety depends on whether activities such as mining, fracking, or smelting have contaminated the water.[10] In other cases, lack of access is due to urban infrastructural decay.[11] Many still live in a world characterized by compromised water quality.[12]

At the same time, for people with access to what the US Environmental Protection Agency (EPA) defines as community water systems, the water coming out of their taps is often plentiful, relatively affordable, and generally of good—or good enough—quality.[13] This evaluation comes from the most readily available toolkit humans have for evaluating water quality: eyes, noses, and mouths—everyday sensors that indicate no need for worry. Water that lacks flavor, that provides refreshment, allows concerns about infrastructural failure or environmental degradation to fade away. This is water that invites drinkers to put their attention elsewhere.

Yet putting one's attention elsewhere carries risks to individuals, societies, and even the watery environments that sustain all life. A

century of chemical innovation altered aquatic ecosystems: plastics are now found in rural freshwater streams, deep in remote ocean currents, and even in the Antarctic; pharmaceuticals and personal care products from sunscreen to shampoo appear in waterways; radionuclides from mining or nuclear weapons testing contaminate waters throughout the desert Southwest; and salts used to soften water, melt ice, or fertilize fields impair surface waters and wetlands.[14] At the same time, megadroughts and climate change threaten the viability of communities, be they along coasts or in arid regions.

With all of this in mind, you might ask why you should pay attention to water's aesthetic qualities—be it coming out of a tap or flowing into a municipal water treatment facility—when there are so many more pressing challenges around access and safety. This is a good question. It shares an assumption currently codified by regulatory structures in countries like the United States: that good tasting water is a luxury, while safe water is a right. It is a good question, also, because it highlights the divide defining whose expertise is allowed to matter in policy decisions and regulatory codes. Paying attention to the management of water's aesthetic qualities makes it possible to see that the lack of flavor in many drinking waters is not at all natural.[15] In writing about the taste of water, rather than just safety, I invite you to join me in taking seriously the role that sensory data can and has played in shaping how experts and everyday consumers govern environmental futures. In calling attention to the work of trying to erase smell and taste from water, I aim to stir the pot, to bring mouths and noses back into the work of thinking about our relationship with each other and our environment.

INDUSTRIAL TERROIR

As soon as we start thinking of water as a food in addition to a substance necessary to life, a whole new world opens up. This is a world where water's tastes and smells *matter*. In prioritizing taste and smell,

this book and its arguments walk a tricky line; as noted water scientists Irwin (Mel) Suffet and Joel Mallevialle point out, "Palatable waters aren't always potable."[16] For example, lead, with its ability to damage developing brains, is either undetectable or at especially high levels, tastes sweet.[17] Just because something tastes good does not mean it is safe.[18] By prioritizing water's perceptible qualities, I do not discount the significant public health gains made through twentieth- and twenty-first-century water treatment research. Rather, I aim to expand conversation in food studies, science and technology studies, and beyond to consider how technological innovations put in place to manage mundane moments of tasting and smelling link *and* unlink sensing, perceiving bodies and environments in ways that actively shape futures. Indeed, thinking of water as a foodstuff allows conversations about taste and smell to bubble up and sit alongside conversations about public health and safety—conversations that have dominated public-facing discussion about water production and circulation since governments realized that while stinky waters slowed economic growth, cholera-containing waters could entirely stop it.

Water rests uneasily in Western categorizations of food. It is an integral part of all foods. Like food, water is necessary for maintaining life. In calling water *food* I invoke all of food's other potential meanings beyond that of maintaining life. Food nourishes. Food is grown, harvested, prepared, husbanded, produced, slaughtered, cooked, eaten, wasted, and composted. In contrast, water is the substance whose presence *allows* food to exist. Water allows food to nourish bodies. By collapsing food and water, rather than continuing to hold them in separate but intertwined categories, I insist on prioritizing certain aspects of water over others: most obviously for this book, taste and smell, and to a lesser extent, texture. This insistence can, and perhaps ought to, be criticized for its very human-centeredness, given that water's presence and absence fundamentally shapes all life on earth. By insisting on water as food I center the fact that it will eventually interact with

tasting, smelling, desiring bodies—many of which are human, and many of which are not.

The potable water flowing from city taps or sitting bottled on grocery store shelves is a highly industrialized product. When we start thinking about water as food, it becomes easier to question the assumption that the water coming out of taps, drinking fountains, and bottles naturally tastes and smells the way it does. It becomes easier to ask questions such as "Why doesn't my water taste more like the river I walk next to, or lake I fish in?" And perhaps more critically, "Why doesn't it bother me that they are different?" Once we start to pay attention to the tastes and smells found in water, it quickly becomes evident that there is a lot of work going on. This insight, though simple, is central to critically examining the work being done by engineers and innovators to address an anticipated future of water scarcity, and it provides a template for future work opening the boxes and bags circulating through the global food system.

Even as I insist in this book on collapsing water into food, I do not ignore that water is a substance constantly crossing uses. Only a small fraction—estimates generally land on about 3 percent—of the municipal water coming out of taps is used for eating and drinking. Water lubricates the workings of domestic and industrial sectors. If you recall high school chemistry, you may remember learning that water is capable of (eventually) dissolving or breaking down almost all of the things it comes into contact with. As such, the tastes and odors found in raw water mark water's travels: they reflect the microbes, minerals, soil, agricultural and industrial runoff, animals, and plants water encounters before it is treated and distributed. As explored throughout this book, especially in chapters 1 and 3, the molecules that perceptibly mark place have resisted and continue to resist technological taming. Instead, the tastes and smells found in the "cooked" water delivered through taps (and bottles) subtly signal where in nature a water came from as well as the human labor done to transform its taste.

The combination of what environmental historians refer to as a water's "biogeophysical genealogies" (the biological, geographical, and physical things and places a water has come into contact with) with active treatment processes aimed at managing perceptible markers of place results in a specific form of *terroir*: industrial terroir.[19] By using the term *industrial terroir*, I am riffing on an increasingly global mode of thinking about how food and place interact. Initially associated with French wine production, the term *terroir* emerged over the twentieth century as a way to frame how people relate to and think about the land foodstuffs come from and the work that goes into making those foods. In her examination of how the concept of terroir as taste of place expanded from France to the United States, Amy Trubek notes that nineteenth-century French speakers used terroir as an agricultural term that referred to the earth from which food came.[20] Nineteenth-century French folks primarily understood *goût de terroir* as foods that "tasted of the earth" they grew in, and secondarily understood *goût de terroir* as reflecting the labor practices, values, and production approaches used in producing foods.[21] For example, champagne became champagne in large part due to producers' efforts in the Champagne region of France to define their production methods and legally link those practices to the specific region and its soils. Producers drew on this self-imposed constraint in aggressive, external-facing advertising campaigns that promoted champagne not just as a beverage, but as a beverage with terroir.[22]

When advertisers and promoters of local foods use the term terroir, they are closely welding together ideas about the locality of how and where a food is produced and the larger cultural and economic values underlying its production.[23] Similarly, when producers use the idea of terroir to promote the tasty qualities of their wine, pork, cheese, maple syrup, tequila, or tea, they are using a form of terroir characterized by the taste of place *as made available* through labor practices designed to maximize the connection between taste and the place where a food is

produced. Terroir closely links taste, place, and production practices throughout the food chain.

In using the term industrial terroir, I highlight how industrial food production seeks to divorce taste from place through technological, regulatory, and expert practices of *making unavailable* the sensory qualities that mark place-based uniqueness. Water producers working within the ideals of industrial terroir (even if they do not refer to it as such) aim to minimize and mask place-based uniqueness; in the case of water, the tastes minimized are not only the local tastes of earth, rocks, plants, and animals, but also the unique tastes of place caused by industrial pollution.

The creation of industrial terroir depends on the development of expert practices of working with the senses, something Jacob Lahne and I suggest can be categorized as sensory labor.[24] Sensory labor happens when observations about perceptible molecules found in the ingestible environment are transformed into data that can be used to shape individual or institutional decisions. Experts and everyday folks practice sensory labor. For experts, that work often occurs in field sites or laboratories with the objective of turning sensing into data that can circulate away from the bodies that did the sensing. Yet sensory labor is going on all the time. For example, each time you or I decide to purchase a "new and improved!" version of a familiar product, we compare the new experience with our memories of the previous product. If it aligns, or is better, we will purchase again. If not, we may decide to put our money elsewhere. As people perform sensory labor, they *produce value* for themselves and for others.[25]

While it may seem obvious that people have drawn on their sensing capabilities to navigate and measure the environment for all of human existence, the practice of turning human sensing into "data" is recent. Indeed, the idea of data itself is relatively new: what can become and count as data keeps shifting, even if the rhetorical framing of data as a "given" thing out there in the world remains.[26] The twentieth century

witnessed a radical reconceptualization of sensory information. Chapter 2 shows that as researchers interested in sensing took advantage of new instruments like gas chromatographs, the way they understood tastes and smells changed. No longer were tastes and smells just experiences; rather they were caused by specific, identifiable molecules: tastants and odorants. With appropriate instruments and skills, scientists and technicians could measure and manipulate those molecules. They could even mobilize tastants and odorants as specific forms of data that people could sense (become aware of), perceive (become aware of and consciously recognize or categorize), and pay attention to.[27] Scientific and technological innovations allowed experts to use the knowledge gained through instruments to produce standardized taste profiles that everyday eaters perceived as the same, or at least within a range of sameness, be the item purchased in Chicago, Illinois, Phoenix, Arizona, or even in a town in another country.[28] Making sensory experiences into data facilitated the emergence of the increasingly uniform, industrialized terroir of municipal water. In the process, it set in place an unofficially held, but nonetheless powerful, set of understandings around the value of tastes and smells found in drinking water. To track who has access to specific sensory cues about the environment requires following the development of techniques for identifying and responding to tastes and smells.

NOT-KNOWING WATER

One summer while conducting research in France, I came across a booth hosted by the City of Paris's municipal water provider, Eau de Paris, at the farmer's market in my neighborhood. One of the volunteers handed me a colorful map of the city split into different sections (see figure 2).

Each section, the volunteer told me, drew its water from a different source. One area south of the Seine got its water from an underground

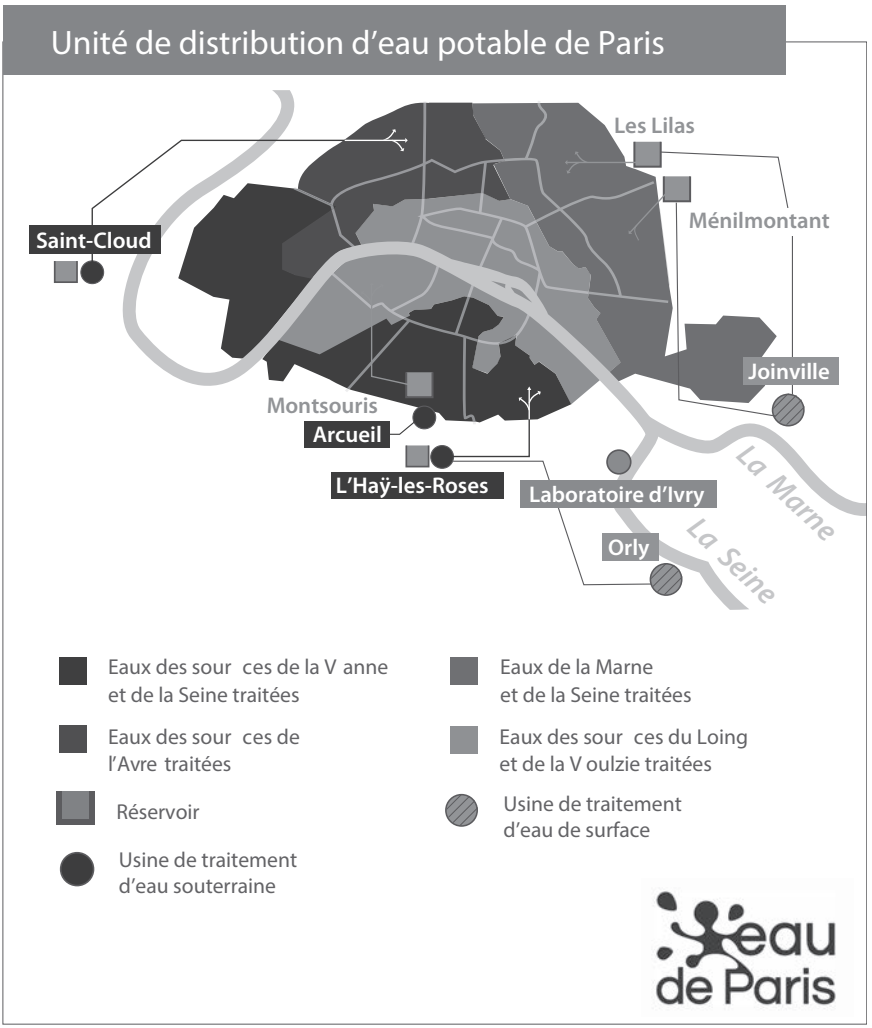

Figure 2. Map of Paris showing origin of water supplied in different neighborhoods. Courtesy of Eau de Paris.

aquifer. The region I lived in received water from a nearby river. All, the volunteer pointed out, had been treated for safety; all had essentially the same mineral content and flavor. Eau de Paris even offered beautiful glass water carafes for sale reiterating this message—each carafe had a unique design reflecting the arrondissement on one side

and an identical "nutrition label" on the other outlining the mineral content of the water.

Without that colorful map and helpful volunteer, Parisian water would have remained a uniform product for me. I had drunk tap water at different places all around the city. Yet my mouth, nose, and eyes had found nothing remarkable to pay attention to. My combined senses did not notice that the water I drank in the library came from a different source than the water in my small apartment—indeed, from sources so different that had someone handed me a glass of the raw water from each I would have easily distinguished between the two. My senses *could not* alert me to those differences, because the differences that did exist were so small that they fell below my threshold of perception. I did not know something, because I could not sense it. In not being able to sense the differences, I could not perceive anything to pay attention to.

The study of how people come to not know things is called *agnotology*.[29] For example, governments and companies use security clearance and trade secrets to limit who can access information; Peter Galison estimates that "the classified universe is five to ten times larger" than what is found in our libraries.[30] Social customs can similarly limit what scientists pay attention to. Londa Schiebinger shows that colonial scientists collecting medicinal plants in the Caribbean chose to not bring back knowledge to Europe about the abortion-inducing powers of the peacock flower, despite being aware that pregnant slaves used it to avoid bringing children into slavery.[31] Dominant cultural values also influence what histories are recorded. Kevin Dawson points out that many Western histories are "physically and mentally landlocked" and as a result have contributed to overlooking the rich underwater cultural lives of enslaved Africans in the new world.[32] Built infrastructure also plays a role in shaping what can be perceived. As Emily Thompson demonstrates, changing architectural and building practices over the twentieth century made some sounds more perceptible, while other sounds were dampened and destroyed through the use of building

materials like acoustic tiles and insulation.[33] Social, cultural, and physical infrastructures shape what things are unavailable to the senses and thus are moved outside of everyday realms of perception and attention.

As the preceding cases highlight, not knowing is unevenly distributed among people. Those with security clearances can access information that everyday people cannot, but that access may well change as people switch jobs or security priorities shift. British colonial scientists—and the people they interacted with—in the Caribbean were aware of the peacock flower's medicinal potential. Yet British scientists chose to not circulate that knowledge in a new context because it did not align with how they understood the world. Enslaved Africans challenged racial hierarchies through their aquatic prowess, a fact that more recent social discourses entirely overlook. We see in these cases different aspects of agnotology: how one comes to not know something is shaped by accepted processes of learning to understand the world (epistemology). It is also influenced by how groups actually understand the world itself to exist and function (ontology). What you do not know depends on your situation. It depends on historical processes. Not knowing comes about in different ways.

Processes of creating ignorance are political. That means they depend on a specific politics around how knowledge is produced, organized, and circulated. For example, Scott Frickel and M. Bess Vincent point out that after Hurricane Katrina, testing protocols used by the EPA and Louisiana Department of Environmental Quality only measured certain chemicals and certain sites, a process that overlooked other chemicals and other sites. "Tests will do only what they are designed to do, and nothing more," Frickel and Vincent note.[34] As such, the scientifically "appropriate" approach did not sample soil from sites that were historically home to industrial production, nor did they—due to legal restrictions—test private property.[35] By limiting what chemicals scientists tested for, and where those tests were done, testing allowed politicians and experts to declare the whole city safe, even if portions were

not. At the same time, the tests themselves limit what can be known, a process that Michelle Murphy labels as "regimes of perception"—the governance processes that shape what can even be known.[36]

Regimes of perception not only shape what can be known, they also shape values. Max Liboiron points out that the approaches to regulating pollution developed over the twentieth century—which permit pollutants to be dispersed into the environment as long as they fall under certain historically defined thresholds—codify an assumption that *it is okay* for bodies to be burdened with the need to assimilate some level of pollution.[37] That codification, Liboiron argues, makes it easy to assume "that's just how it is" rather than take action to undo the "bad relations of a scientific theory that allow some amount of pollution to occur."[38] Once systems of perception become naturalized, it can be hard to recognize that the practices we use to make knowledge could be otherwise.

Not knowing includes practices of conceptualizing relationships between place, inhabitants' bodies, and pollution. When used by a dominant culture such practices can, as Hi'ilei Hobart argues, erase important historical or religious aspects of a place. Hobart points out that "discourses of absence" portraying Mauna Kea mountaintop in Hawai'i as "a place without humans, spirituality, nation, or even atmosphere" allowed settlers to develop the mountaintop despite native Hawaiian opposition.[39] This erasure, like the physiological burden on bodies who ingest pollutants that fall below legally or instrumentally recognizable limits, enacts its own form of violence.[40] Taken together, Frickel's, Vincent's, Liboiron's, and Hobart's work demonstrates that not knowing can inculcate and perpetuate harmful practices across generations.[41]

When it comes to foods, not knowing is also unevenly distributed. The notorious complexity of food systems, which draw together local, national, and transnational legal structures, values, weather patterns, monetary systems, and tastes (and that is just the beginning!),