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Renal Environments

Saúl called it the *baño ecológico*, which translates to something like "nature's bathroom."

The baño ecológico is always available to men in Nicaragua, for whom it is not a particularly egregious etiquette violation to discretely micturate behind a gas station, under a tree, or perhaps a few feet into a stand of sugarcane. For me, the baño ecológico encompassed all these places. Saúl and I spent a lot of time in the Hyundai driving back and forth across the Montelimar landscape, and I did my best to keep myself hydrated, which meant that I peed, a lot. Nothing testifies to white male gringo privilege quite like a crystal-clear stream of urine absorbed without argument by a desiccated tree trunk. In a pinch, public urination seems moderately acceptable because urine is relatively inert. Unlike stool, its brown, putrid neighbor, urine is a modest, if slightly salty, emulsion. Small amounts can always be diluted. Indeed, after a short while, and presuming that

the person doing the urination remains out of sight of potential onlookers, a little urine becomes undetectable.

Sort of like the way that toxic pesticides can become undetectable after they leach into the ground. Of all the fluids and solids human mammals produce—blood, semen, milk, stool, even sweat—urine occupies an odd place. Sociologically, consideration of urine tends to come alongside consideration of plumbing, infrastructure, and perhaps the gendered inequality of privacy. Men like me can easily avail ourselves of the baño ecológico. Women assume more personal risk if they venture outdoors to relieve themselves.[1] The idea behind the baño ecológico, that nature—a stand of trees, a creek, a bush—has the capacity to absorb human waste, makes sense in rural Nicaragua and other places where population densities are low (it helps if there are plenty of healthy trees and waterways). But when people urinate at scale, the baño ecológico gets overwhelmed. The trees become weak; the grasses die; the streams can no longer support fish, moss, algae, or other forms of life. But let's not presume that urination is always an act of alienation, or disavowal, or even shame. No one with kidney disease ever takes urination for granted. They recognize urination, and the renal processes that enable it, as a relationship, one that makes persons and environments simultaneously.[2]

Questions about waste and excess in the Anthropocene are, as the term *Anthropocene* implies, often posed in one direction. That is, they are questions about the nonhuman environment's capacity to absorb the excesses of human activity. A planetary health approach attempts to reverse that direction, asking how much excess human bodies can absorb. Urinary health and kidney function are apt places to look for answers to these questions. As filters for wastes both encountered in the environment and produced by the body during physical exertion, kidneys can be seen as the body's internal cleansing service. Lungs, skin, and eyes are points of immediate contact with the environment, but the kidneys' job is to do the actual work of adapting internal chemistry to external conditions. The result of that adaptation is urine.

Indeed, it is not too much to think of the contemporary Nicaraguan sugarcane zone as a renal environment. The flows of toxins, water, urine, and waste through rivers, irrigation systems, and bodies subvert any neat distinction that might be made between the renal system as a domain of bodily waste and water management and the ecosystem as a domain of transcorporeal, more-than-human waste and water management. Kidney disease sets in not just when bodies fail to properly render waste into liquid urine but when the wider flows of waste and water break down, when the fragile system that filters living from

nonliving matter, the excessive from the essential, breaks down. In this way, we can think of climate crisis itself as a crisis of renal health on a planetary scale.

Sugarcane companies in Nicaragua have been taking the measure of renal health at the scale of the individual human worker for more than two decades. Urinalysis plays a key part in a common origin story surrounding CKDnt, which says that the disease was discovered in the health clinic at NSEL. In 1996, NSEL's staff physician, Dr. Felix Zelaya, noticed a curious spike in kidney disease in the community surrounding the company's plantation. Zelaya began systematically testing the urine and blood of NSEL workers for abnormal kidney function biomarkers, particularly the presence of the protein creatinine.[3] Under normal conditions, creatinine is filtered out of the body by the kidney via urine, but when kidney function deteriorates, the protein leaks into the blood. Zelaya used creatinine counts and other data to calculate each worker's estimated glomerular filtration rate (eGFR). An eGFR that remains below 60 for a sustained period is an indication of chronic kidney disease. Over the course of the late 1990s, Zelaya and NSEL generated a database of some three thousand suspected kidney disease cases.[4] That work gave rise to both a new diagnostic category, CKDnt, and a new management practice. By 2005, workers at all four Nicaraguan sugarcane companies were undergoing routine urine and blood tests to measure kidney function during every harvest, and companies were refusing to employ anyone who showed signs of CKDnt.

While it was clear by the time my fieldwork began that workers were getting sick, the precise consequences of the complex liquid flows of water and sweat and urine and chemicals through the plantation landscape were difficult to know. Creatinine counts and eGFRs are, like many attempts to discern the inner workings of the body, momentary impressions. These numbers can rise and fall depending on what someone has had to eat, how much they have had to drink, and what they do for a living. They are snapshots that offer a glimpse into a complex, more-than-human metabolic process. But when they manifest as numbers, as they inevitably did on the laboratory reports received and annotated by doctors in that scraggly, stereotypically physicianesque chirography, they carry a great deal of weight. For thousands of people employed in the sugarcane zone, the results of those blood and urine tests meant the difference between a season of relatively well-paid work and a future of joblessness and debility. This kind of corporate collection of medical data extends the alienation of workers from their bodies beyond the space of actual field and factory labor. It also permits corporations to stay ahead of problems before they become matters of public concern. The existence of such data does little to assuage

uncertainty and doubt about the causes of disease. In fact, rumors about what kinds of medical knowledge the company possessed amplified latent concerns about the environmental conditions that led to the CKDnt epidemic, leading to the grievances we explored in chapter 1.[5] AMBED filed its grievance against Montelimar knowing that healthy urination depends on healthy kidneys, which depend on a healthy extrabodily environment. Its call for a recognition of the right to "a dignified life in a healthy environment" was thus not just a rhetorical flourish.[6] It was a suggestion that renal health and environmental health were inseparable.

The protein of primary concern at sugarcane mills, creatinine, is the product of the strenuous expenditure of energy, something like an emission in the atmosphere. Through the corporate testing regime at sugarcane mills like NSEL and Montelimar, waste proteins in the urine and the blood became proxies not just for the conditions of workers' bodies but for the quality of the relationship between their bodies and the surrounding environment. From its origins at the dawn of the Industrial Revolution, the science of occupational medicine has been a project of calibrating the human organism's ability to expend energy while absorbing and efficiently excreting waste, both the waste created by working muscles and the waste created by the tools of the trade: the heat emitted by a machine; the dust thrown up by a blade; the smoke pouring out of an exhaust pipe; the invisible, often odorless aerosolized excess of agrochemicals.[7] A body's fitness to work is measured by its ability to withstand exposure to these waste products.

This chapter describes how AMBED worked to reimagine the sugarcane zone as a renal environment. A renal environment is one where the flows of water and waste are regulated and contested. For CKDnt-affected residents, kidney function was always a social function—one that went beyond the body proper. The chapter spends time on the edges between the plantation and its outsides, where nonliving wastes accumulated and mingled and where they were examined for clues about the physiological condition of living organisms and ecosystems, from human communities to sugarcane monocultures. These spaces, what Elizabeth Povinelli calls *embankments*, are key elements of the renal environment. They are sites where forms of life strain against one another. Povinelli uses the term *embankment* to mark out "the sandbags or sand dunes that keep a flood at bay as long as they can keep themselves in place as they are assaulted by pounding and creeping waves; [the] mountains that contain the circulation of winds and trap pollutants until they crumble under their strain . . . the social identities that provide the conduits through which rights are circulated until they are twisted by these circulating rights and take on new

identities . . . the skin that protects the inner organs unless a cancer eats it away, having begun from outside contamination."[8] Violence occurs when the people and things positioned along the shifting soils and sands of embankment "are (mis)interpreted as autonomous insides and outsides."[9] The remainder of this chapter moves among various embankments, the edges where land, water, and concrete meet, and where the functionality of kidneys and socioecological systems meet.

Cachaza and Cleaning

Let's start on a familiar sort of embankment, the mouth of the Río Jesús, the largest of the several rivers that course through the Montelimar plantation. The Río Jesús meets the Pacific Ocean in a picturesque mangrove forest that gives way to a wide tan and white beach where fisherfolk in wooden launches punch through the swell each morning, and where faded signs warn less scrupulous would-be seafood harvesters to leave sea turtle nests undisturbed (sea turtle eggs, purported to have aphrodisiac properties, have long been among the local treats that coastal tourists in Nicaragua are invited to sample). The first time I visited the Río Jesús was in July 2017. I went along with Saúl and Don Alvaro Torres. Don Alvaro had brought us there after hearing from acquaintances who lived in villages near the mangroves, folks who made a living from the river and the sea when there was no work in the cane, that the estuary had become choked with a thick, vaguely molasses-smelling sludge. There was no doubt that this was effluent from the Montelimar mill, located just a mile or so upstream. The presence of the sludge was concerning enough for AMBED to file a complaint through the company's internal grievance mechanism. Sludge didn't have anything directly to do with kidney disease, but it signaled to the people living near the estuary that the company was ignoring its responsibility to manage its waste. This much mud was impossible to absorb.

By October of that year, the company had yet to respond, but at the end of that month, Tropical Storm Nate struck the area, flooding every ditch for miles and causing significant damage to houses and roads. I spent much of November 2017 with Don Alvaro, Saúl, and other AMBED members surveying the aftermath. The town of Masachapa, home to a few small hotels and restaurants serving tourists, as well as to a number of staff from both the Ingenio Montelimar and the Barceló Montelimar Beach resort, had sustained significant flood damage, as had many of the upland villages. But Don Alvaro was keen to visit the mouth of the Río Jesús. Getting there required driving the heavily storm-rutted dirt roads out of Masachapa and around the massive

and securely fenced-in beachfront property of the Barceló resort, as well as the massive and securely fenced-in compound of the Montelimar mill. Parking at the end of a lonely road on the edge of the mangroves, we walked the half mile down the beach to the river's mouth.

Don Alvaro set himself up on a spit of sand next to the river, with the smokestacks of the sugar mill in the background, and asked Saúl to begin recording a short video on his mobile phone. Within a few minutes, Don Alvaro's assessment of the situation would be posted on Facebook. "Today, we are in this place for the second time to verify its condition," he began, "and we're showing that the river looks clean . . . thanks to Tropical Storm Nate, which did a nice cleanup of this area. Where we're standing now is sand. It's not sludge [*cachaza*], as it was before. . . . So we want to follow up." Don Alvaro used the term *cachaza* advisedly. In Nicaragua, a more common term for "mud" might be *lodo*. *Cachaza* is a less-frequently used alternative, but it is also a reappropriation of a piece of sugarcane vocabulary. Some cocktail connoisseurs will know the Brazilian Portuguese cognate *cachaça*, a rum-like liquor derived from sugarcane. In Spanish, *cachaza* can be a synonym for molasses, or a metaphoric epithet for describing the movement of a person (or maybe a corporation) whose activity is as slow and laconic as the brown syrup that comes from raw sugarcane.

But Don Alvaro was not finished. He concluded by saying, "We're not against the Montelimar mill, but we think of this as a place for people to come to fish, to bathe. And we think that if the mill is contaminating the place, they could take more adequate measures to monitor this contamination, because . . . we can prove that the mill deposits lots of waste in this river." The statement was concise and would have seemed almost impromptu in its informality, but Don Alvaro's choices about vocabulary (*cachaza* instead of *lodo*) and the point he made about not being "against" the Montelimar Corporation showed a level of precision that cut through the amateur camerawork and the occasional stammer in his delivery. He was not there to catch the company in the act of polluting. As he said, he could already prove that they were dumping into the river. Rather, he was there to enlighten the company, to follow up, to monitor its activities. AMBED was mobilizing the corporation's internal grievance mechanism to appeal to it as an ethical ecological actor.

This was not the first time that Don Alvaro and his colleagues had called attention to the condition of waterways in the sugarcane zone. The hydraulic infrastructure of dams, irrigation ditches, rivers, and creeks that characterized the landscape and that kept sugarcane cultivation viable was impressive in its scale. Very little in the area between the Pacific beaches and the foothills of the Central American cordillera was *not* engineered in one way or another to bring

water to sugarcane. What Don Alvaro knew was that like a worker's kidney, this kind of complex industrially engineered system was inherently fragile.[10]

In the video, Don Alvaro pointedly gave credit to the tropical storm for "cleaning" an estuary that was being polluted by the sugar mill. In his telling, the storm was a sort of blessing, an unearned gift from above to both the guilty sugar mill and the fisherfolk who were being harmed by its actions. Don Alvaro knew that to clean an estuary was not to return it to some pristine state, but to prepare it to be damaged again. In the years I spent visiting and revisiting the communities of Montelimar with Don Alvaro, he consistently drew my eye to acts of cleaning, whether they were "natural" ones like the flood caused by the storm or "social" ones like the washing of laundry. Though he never said so explicitly, I think I understand why. The compromised quality of these cleaning processes (the river, like the clothes, would be soiled again) was linked to the compromised capacity of kidneys to perform *their* primary function, which is to cleanse blood of impurities. Don Alvaro was situating the kidney as a hydraulic cleaning and irrigation system, nested within a set of larger systems, from regional rainfall and river flows to hyperlocal modes of bodily and household maintenance. He was documenting the cracks that were forming in the material infrastructures that sustained the cane, and in the once-reliable figure of the able-bodied worker in the cane. By bringing attention to the watery worlds on the edge of the cane fields, Don Alvaro and AMBED were working to reframe the disease as a problem not just of economic productivity but of social reproduction.[11]

Economies of Laundry and Irrigation

The village of El Zapote, which we visited in the introduction, sits close to the Pacific coast, next to a river and just downstream from one of Montelimar's major irrigation dams. To get there, you have to drive down one of the deeply rutted plantation roads—roads designed for massive semitrucks rather than the Hyundai that Saúl used to get around the plantation with me and the AMBED leadership. In the dry season, the irrigation dam upstream of the village keeps the water level in the river so low that residents face the challenge of washing clothes in a waterway that is also the only place where cattle, horses, and pigs can bathe, defecate, urinate, and drink. Separating soiled from clean clothing is a matter of degree, rather than of absolutes. Water here is not only scarce but contaminated.

Our visits to El Zapote tended to take place around midday, when the sun was highest, and when, almost without fail, we would find Doña Elba washing clothes

in the river. She was always in the same spot, and it was evident as one peered up- and downstream that riverine laundry was a bit of a territorial thing. Each woman on this side of the village had a place, maybe sometimes shared with a daughter or sister, where she returned to do her family's washing. There were obvious advantages to getting a spot where the water was deep, and where the flow was good.

"The river doesn't belong to the company," Doña Elba told Don Alvaro Torres and me in 2017. "It belongs to the community." By common agreement among the users in the village, she had her claim to this slice of the embankment, but that claim stopped where the dry earth stopped. The scarcity and contamination of water occasioned by the presence of irrigation dams, in El Zapote and elsewhere, became the basis for another grievance brought to the mediation table by AMBED. As I explained in the previous chapter, CKDnt tends to be diagnosed more often in men than in women, and it tends to strike early—often when men are in their thirties and forties and in the prime of their working lives. When sugarcane companies tell them that they are too sick to seed, fumigate, or cut cane, these men wind up stuck at home. One outcome of the CAO-sponsored mediation process that AMBED's 2015 complaint initiated is that more and more men have qualified for disability pensions and access to dialysis, but it is often their wives, mothers, and sisters who must figure out how to make do with the resulting reduction in family income.[12]

Here is where washing and cleaning come into the picture. AMBED leaders like Don Alvaro Torres were always impeccably washed and coiffed, and the men who would hitch rides on mototaxis and horses up to the highway to take the bus to the dialysis clinics in Managua also made sure they showed up looking right. This theme has come up over and over again in my research on public health in Nicaragua—the way that aesthetic presentation of the self is much more than vanity or adherence to cultural norms. Dignity, manifested in bodily cleanliness, is constitutive of health itself.[13] In the context of a contested environmental illness like CKDnt, the aesthetic quality of the body cannot be set in opposition to that of the lived environment, especially in a plantation system in which, from the beginning, laboring bodies have been construed as fungible and less than human.[14] Going before the CAO mediators and suggesting that the World Bank had an obligation to defend people's ability to effectively hand-wash clothes might seem like an undignified thing to have to do, but it makes sense if we see kidney function as always dependent on extrabodily forms of life support. AMBED insisted on collecting evidence of how the difficulty of doing socially reproductive labor like cleaning was compounded by an epidemic of kidney disease that, it was confident, would in time

be definitively linked to the scarcity and contamination of water. Water thus condensed questions of reproduction, production, and health, but less in the functional sense that phrases like "water is life" might point us to and more in the associative sense in which the metaphysical becomes political.[15]

When AMBED presented the El Zapote villagers' grievance about the state of the river, the Montelimar Corporation's response was that it would of course be willing to "share" water with the community. At the mediation table, company engineers pledged to only irrigate the cane fields at night, leaving more water to flow to the community during the day. At one level, the water "sharing" plan seemed to redistribute a resource in a way that fit the model of corporate transparency we explored in chapter 1. It settled the accounts of villagers and the company. It ratified a belief in the fundamental commensurability of needs that drives the World Bank's mediation-based conflict resolution model, a belief that is echoed in many versions of applied planetary health. Fairer water distribution could act indirectly as an offset for the burden of kidney disease.[16]

But less than a mile away from El Zapote, in broad daylight, it was possible to see the company's irrigation systems in operation. I took pictures of them and proudly showed them around El Zapote on our next visit. The images were surprising to no one, and no one saw them as opportunities to secure more concessions from the company. When Don Alvaro brought evidence to the mediation table that the agreement was not being honored, the company would claim that what we had seen was little more than the result of poor decision-making by local field managers. It took time to change corporate culture, after all.

To me, this seemed like a cynical abuse of power on the company's part. Who, really, could stop it from irrigating? The company controlled the dams; it owned the pipes and pumps and hoses; and everyone depended in some way or other not just on the steady availability of water but on the continued viability of sugar. Certainly, the people of El Zapote had little appetite for direct confrontation. Like the Montelimar Corporation, the residents were in a double bind when it came to water scarcity. Company and residents depended on the very same scarce supply to make ends meet, but of course, they also depended on one another as management and labor. People in El Zapote who were healthy enough to work relied on the jobs that the company provided, including the job of operating and maintaining the irrigation system, even though those same jobs resulted in a situation in which they and their families would be more likely to be exposed to stagnant, contaminated drinking and bathing water.[17] Productive work like the cultivation of cane is frequently couched as dependent on unpaid reproductive work such as that of bathing

and cleaning. The "water sharing" deal brokered at the mediation table was in a real sense intended to recognize that dependency. What it failed to recognize was the tendency of monoculture to overwhelm and constrain the possibilities for social reproduction. Even though they knew that they were bound in many ways to the cane, people in villages like El Zapote were not asserting the right to reproduce simply because they needed to do so in order to go to work.

Water may have been a condensing symbol for residents' struggles, but it was not an infinitely divisible, shareable resource. Doña Elba told us quite plainly, more than once, that "the *river* belongs to the community." It was the viability of the embankment, not just the liquid, that mattered to her. With hindsight, I have come to understand her very public act of continuing to launder clothes in the contaminated stream as a form of what Manuel Tironi calls "intimate activism." Filing a grievance premised on the right to launder was a means not of stopping monoculture but of slowing it down.[18]

The complaint about the difficulty of doing laundry provoked consideration not just of how and why so many men were getting sick, but of how they and their families experienced the epidemic in ways that strained the sharp divide between the plantation and its outsides that the water use settlement was supposed to preserve. In her study of communities' relationships with a transnational mining company in Peru, Fabiana Li observed that the effects of mining on the quality of water and soil turned out to be as uncertain as the value mining added to the economy or deducted from nature.[19] She traces how the company attempted to replace polluted water in an irrigation canal used by farmers with water that was "clean" by regulatory standards, but this exchange of two kinds of water (and the assumption that they were "equivalent" in the first place) did not account for the ways in which extractive activity fundamentally altered people's relationship to canals and rivers, relationships that were enveloped in kinship idioms.[20] If life support only happens at the dialysis machine, or if it is only represented in an economic equivalence between different forms of water usage, then something gets missed.

Canals and Community

Riverbeds were far from the only sites of intimate activism. Residents of many plantation villages routinely drew water directly from irrigation canals. The extensive network of gravity irrigation that kept sugarcane nourished is qualitatively and legally distinct from riverbeds, and it would have been difficult for residents to claim the embankments along the canals as community property in the way that the women in El Zapote had claimed the river's embankment.

FIGURE 3.1 Maintaining the embankment on an irrigation canal. Photo by the author.

Irrigation canals were most prominent in upland communities like El Muñeco, a settlement on the far southern end of the Montelimar Corporation's holdings. In these communities, concrete irrigation works are often the only means of doing the reproductive work of washing and cleaning.

But this system, too, is fragile. Canals crumble and decay, and much of the company's capital is dedicated to maintaining them. Villagers who depend on the waters running through irrigation canals end up becoming unpaid participants in that maintenance work: clearing topsoil and brush to prevent erosion, for example. Villagers also fuse the hardware of social reproduction directly to the irrigation system. In the center of figure 3.1 is a pair of concrete slabs, bleached white from repeated use as a surface for laundering clothes.

A few years before my fieldwork began, the Montelimar Corporation heavily publicized its construction of communal water pumps across the district. These pumps were designed to provide villagers with their own supply of washing and drinking water. Drawn directly from the ground rather than routed through the irrigation works, they served to spatially and socially

FIGURE 3.2 A tube well installed by the Montelimar Corporation. Photo by the author.

segregate the water of cane production from the water of social reproduction. Around the same time, rumors began to circulate around villages like the one where the pump depicted in figure 3.2 is located that the concrete irrigation canals would soon be "modernized" and enclosed. The open watercourses would be converted into sealed tubes, protecting the water that the company used from evaporation, as well as what it considered theft. In the name of a constitutional right to water that applies in Nicaragua to both private companies and small landholders, the construction of the communal wells created a new hydraulic boundary between industrial irrigation, geared toward the support of the life of cane plants, and domestic water usage.[21]

This attempt to disentangle productive industrial water use and reproductive domestic use, however, has been persistently undone by the corporation's other major liquid activity: the spraying of agrochemicals from helicopters. While some villagers I met did drink the water from the communal wells, many chose not to for fear of poisoning. One man I interviewed put it plainly: "Our well is in the center of the cane fields. All that poison ends up there in the

earth. Then when rain falls, what does it do? [It becomes] the same water that we drink. . . . How could it not? . . . That's why we have so many diseases here."

The potential of pesticides to leak through the water table and into domestic supplies was accepted as fact by nearly everyone who lived in the area. Getting information about the extent of this contamination, however, proved a chronic challenge. One of the renewed promises of the final agreement that AMBED reached in 2023 with the Montelimar Corporation was that the company would finance routine water quality tests across the zone. The company might still contest claims that the CKDnt epidemic had anything to do with its use of agrochemicals, but the tests were seen as a sign of good faith. When these tests began, the company specified that they only be carried out during the dry season, which happened to be when runoff between the fields and villages was least likely. Just as Tropical Storm Nate had "naturally" cleaned out the contamination of the Río Jesús, the company relied on the "natural" cycles of rainy and dry seasons to maintain what villagers saw as the artificial distinction between productive and reproductive life.

The women who lived in lowland communities like El Zapote insisted that what was at stake in their conflict over the scarcity of water was not water itself, but a river. In upland communities like El Muñeco, the situation was different. Irrigation canals were absolutely the property of the company, but the status of the water inside them was ambivalent. As Julie Livingston has written, the "classic critique" of a situation like this—the installation of a communal well of dubious quality to offset access to a private canal—would be to flag "the inadequacy of technocratic approaches to what are ultimately problems of maldistribution." "But," Livingston asks, "what happens when the technology itself is a redistributive one [like a canal, well, or dam]? . . . What happens when the [water] to be redistributed is disappearing? . . . Or if its quality is questionable in the first place?"[22]

Gestures to community responsibility like the communal wells notwithstanding, the equitable distribution of water is not, legally speaking, the purview of corporations like Montelimar. Regulating distribution is the job of Nicaragua's state water authority. Still, for villagers, the obvious source of power was not the government but the sugar company. Ecology and health in this landscape remained in large part moral economic matters, which meant that the corporation's efforts to disentangle itself from responsibility for, or even direct material connection to, the reproductive struggles of local residents were always doomed to fail.[23] The quality of water—both its material contents and its tendency to become laden with multiple meanings, from the economic to the ethical—placed limits on the capacity of the company to use infrastructure to

insulate itself from its social surroundings. What was violent here was not that the company was successful in that disentanglement but that its efforts to insulate itself were so easily undone. It is more-than-capitalist relations, rather than just relations of labor to capital, that give form to environmental degradation.[24]

Though they are clearly built rather than natural features of the environment, the miles and miles of irrigation canals are nearly all older than most Montelimar residents. The failure of these old canals and the newer wells to settle abiding concerns about pesticides underscores how embankments are sites of what Povinelli calls "strainings" between forms of life. These strainings produce material and social excesses, the "tailings" of productive and reproductive life.[25] The term *tailings* normally refers to industrial effluents—like pesticide runoff or cachaza—but in Povinelli's reading, tailings can be the material traces left by any attempt to sharply bifurcate forms of life. For people confronting CKDnt, that straining and tailing became palpable in acts like bathing and washing in a concrete stream, replanting a damaged garden, or, indeed, faithfully adhering to hemodialysis treatment.

Dams and Dialysis

If you had a slender enough boat, you could navigate the Montelimar plantation, and just about any other sugar plantation in Nicaragua, by water. At high tide, you could slip through the mouth of a river like the Río Jesús and work your way inland. It would be hard going, especially in the dry season when the sugarcane was being planted. No matter what the water level, though, the big challenge would be the dams. These rivers and creeks are worked over with dams. The dates on their faded concrete cornerstones archive a century of sugarcane cultivation in this area. Some of them were built as far back as the 1960s by Nicaragua's then dictator, Anastasio Somoza Debayle, who owned a part of what is now the Montelimar plantation. When the Somoza dynasty consolidated control over land along Nicaragua's Pacific coast during the middle part of the twentieth century, as we saw in the last chapter, it also normalized the capture of water resources by industrial agricultural interests. (Somoza was so obsessed with irrigation that he is even said to have seeded clouds to make it rain over the arid landscape that is now the sugarcane zone.)

The dams divert the flow of rivers and creeks into the open gravity-irrigation canals. Aided by pumps, these canals provide life support to hectare upon hectare of sugarcane. Once you start to notice it beneath the canopy of trees (the few trees that remain tend to cluster around people, who tend to cluster around rivers and creeks), the sheer scale of this industrial engineering project

becomes staggering. The situation in western Nicaragua, a water supply that disproportionately supports commercial crops over people, leaving its outsides denuded and dry, is one that recurs over and over again in the story of sugarcane.[26] While Nicaragua is a relative latecomer to the global sugarcane trade, what has happened in places like Montelimar is resonant with what has happened in other parts of the sugarcane-producing world over the past five hundred years or so. Tracts of food and textile crops have supplanted small farms and forests, causing soil erosion, displacement of people, rises in mean annual temperatures, and new diseases.

The construction and reconstruction of dams at Montelimar are both typical of the *longue durée* of sugarcane cultivation and of what Sarah Vaughn calls the "regional experience" of climate change. Dams are key extensions of anthropogenic environmental alteration, but they are also tools for mitigating the worst effects of projects like the development of sugarcane monocultures. Dams serve multiple uses. They can perpetuate the expansion of crops like sugarcane, but they can also support other forms of life. They are tools of capture but also of distribution. As Vaughn explains, in Guyana—a sugarcane colony—mid-twentieth-century dam projects, backed by capital and international development aid, "espoused" dominant, market-based "economic models for . . . regional development, thereby normalizing place-based climatic risks."[27]

One place-based climatic risk in the Nicaraguan sugarcane zone is intense tropical storms, like Nate, the one that swept through the area and "cleaned" the Río Jesús. Nate also flooded the Río Tecolapa, a few dozen kilometers south of Masachapa, in an isolated part of Montelimar's landholdings. The Tecolapa gorge is particularly steep around the village of El Sesteo. There is little doubt that the impact of the flood around El Sesteo was worsened by the presence of the irrigation dam and pump works just a half mile downstream. The system here, installed in April 1979, mere months before Somoza was deposed by the Sandinista popular revolution, is probably still the most impressive piece of industrial hardware at Montelimar, aside from the sugar-processing factory itself. The dam is some fifty feet high, and it pulls water from the Tecolapa into a series of hydraulic pumps that lift it more than a hundred additional feet up the gorge, where it spills into the concrete courses used by sugarcane irrigators and clothes washers.

The Montelimar Corporation did help with the cleanup of the riverside community after the flooding caused by Tropical Storm Nate, but the disaster amplified a long-standing grievance among the locals, one that AMBED had turned into yet another formal water-related complaint by Christmas 2017. Getting in and out of El Sesteo is always a challenge, and for those late-stage

CKDnt patients in the village who needed to reach the bus to the Managua dialysis clinic, more than an hour's walk away, it was particularly arduous, not least because they would have to cross the Tecolapa just above the irrigation dam. When the water was low, they could use a makeshift footbridge made of sandbags, but when the rains got heavy, the silt-choked dam could never open wide enough. When the high water swallowed the sandbags, patients in El Sesteo would have to strip off their trousers and shoes, hold them overhead, and ferry across.

Dialysis treatment happens three days a week, so behind AMBED's grievance about the Tecolapa dam was a point about the indignity of already-sick patients having to swim to access life-supporting treatment. AMBED counted it a victory when, more than a year after Tropical Storm Nate, the company agreed to create a notch, perhaps a dozen feet wide and as many deep, in the center of the dam. Under normal circumstances, the notch would allow a bit more water to flow out before being captured by the pump system, and in times of flooding, it might slow the water's rise. The precision of the cut makes an apt metaphor for the precise transactional trade-offs that tend to feature in corporate social responsibility efforts and climate mitigation measures. Whether an agreed-upon settlement like this restores bodily dignity is another matter. The silt beneath the surface remains.

On days when there was no dialysis, patients in El Sesteo and elsewhere would try to distract themselves as best they could. These were people who were used to working intensive shifts, and indolence was already something they tended to instinctively suspect. But as one man told me, dialysis made physical activity even more important. "I go walking because the doctors told us, 'Don't get lazy. If you get lazy, you'll be crippled,'" he explained. "So I go out in the morning, go down to the river and bathe . . . to exercise my body." In this account of the daily routine of caring for the body, in which the health benefit of exercise blended with the aesthetic benefit of cleaning, he routed us again through the unstable course of the dammed-up Tecolapa. It was important not only to get exercise but also, as the man explained, to sweat a bit.

As another hemodialysis patient told me, "We're drinking less water these days. For some people it's because of concerns about the quality, but for others it's because they can't. In [my] case, I can't drink too much. They told us in the hospital, 'You can only drink a half-liter of water [per day],' because the water accumulates in our bodies." He showed me his hand: "Look how it's swollen! Why? Because since Friday, last time I had the treatment, I drank water—Friday, Saturday, and today [Sunday]. So I'm full up!"

"I feel bloated," he continued, "because I don't urinate. It all disappears. . . . In three days, I urinate about one cc." In the recording, I can hear the shock I expressed at this, thinking back to how assiduously I worked to keep myself hydrated in the heat of the sugarcane zone, and how often I had to stop the car and ask Saúl and the others to wait for me while I looked for a suitable baño ecológico. Managing these internal flows was difficult, the man explained. "Sometimes you just want to have some *frito* [fried pork], and then you grab a glass of water." He made a chugging sound while he mimed drinking down his greasy, salty lunch. "Then after a while we have distended bellies because we can't get rid of the liquid until we get to the dialysis machine. The machine gets rid of that water."

Maybe it is not a surprise, then, that when I talked with people at Montelimar about CKDnt, our conversation seemed so often to get caught up in the subject of irrigation dams. Infrastructures like dams, as the environmental historian Richard White notes, have long been seen as tools for "[mixing] machine, nature, and society into a single metaphorical whole."[28] But perhaps it's not so metaphorical. Beaver dams—anthropology's prototypical example of more-than-human labor—are "natural" filters for the debris and waste tossed into waterways by humans.[29] The water below them is often cleaner than the water above. For this reason, beaver ponds have been rebranded by conservationists as "Earth's kidneys."[30] It is easy to imagine dialysis, too, as something that makes bodies metaphorically whole again, yet the challenge of keeping both outer body and inner blood free of impurities continued to be compounded by the realities of a plantation ecology in which rains and floods were ever more severe. Decades of deforestation and aggressive well drilling meant that the calculation that went into that notch in the Tecolapa dam must have included actuarial projections about the sugarcane crop's future water needs, set against the reality that—severe weather events aside—there was less water in Pacific Nicaragua with every passing year.

Dialysis, as any nephrology nurse will tell you, is a life-extending technology, not a cure. It does just enough to keep the organism functioning. It is not any more restorative than, say, the irrigation of a cash crop. It really isn't any wonder that at its clichéd extreme, a life support system (think of a ventilator or a heart-lung machine) turns a person into a "vegetable." But that is only an extreme. At a more ordinary level, on Nicaragua's plantations, to adopt a watery phrase from the anthropologist Kath Weston, the fragile architecture of dams and dialysis causes the kidney and the cane to "infiltrate each other's very substance."[31]

Consider once again the figure of the baño ecológico, and consider the fact that most of the people on dialysis in the sugarcane zone have trouble urinating at all. This means that all the inert wastes—the proteins and minerals and salts—that would normally flow out of their bodies have become trapped. Absorption of such wastes is not simply the work of a human body. A healthy renal and urinary system is always dependent on the absorptive capacity of the environment that surrounds it.[32] Long before CKDnt became a problem, for people living at Montelimar, that environment was built around cane. Questions about the contents of urine—the questions that sparked recognition of the epidemic in the first place—always must entail corollary inquiries about embankments: the silt building up in dammed rivers, the chemicals in communal wells, the creatinine building up in the blood, proteins building up in the urine, and the indignity of bathing and laundering in the same dried-up riverbeds used by pigs and horses.

One of the last AMBED events I attended took place in a ballroom of the Barceló resort, the beach hotel located on the grounds of Somoza's former palace, less than a mile as the crow flies from the Montelimar sugar mill. The general membership, including spouses and children, had been invited to hear an update from the Montelimar Corporation and a group of American scientists about the state of research on the epidemic. I spent most of the event standing on the side of the room. The place was full. Three or four buses had been rented to bring people to the event, which featured a catered lunch following the presentation. I placed myself on the outside of the crowd, taking a few pictures and wondering if my digital recorder would capture any usable audio from the echoes of the public-address system.

As I listened to the series of speeches, some scientifically substantive and others more in the key of public relations, my eye kept being drawn to the door of the lone bathroom in the ballroom. For the duration of the meeting, there was a line of AMBED members outside it. A weary-looking housekeeper stood at that door, and about every ten minutes, I would hear her quietly say "Perdón" to the next would-be user and let herself in to tidy it up, replace the paper, and wipe down the fixtures. Dozens of people used that toilet, and I do not think it is too much to interpret its popularity on that day as their attempt to extend the renal environment into the rarefied space of a luxury hotel, a subtle statement about their understanding of the inequities of water and waste management. There was as political a charge to the goings-on in the toilet as there was to those on the dais, where AMBED leaders like Don Alvaro Torres mingled uncomfortably with the engineers and managers who had once been their bosses.

The political ecology of sugarcane production and human health seems simple. Exploitation of natural resources like water compromises the bodies of those who work in the fields. It is both the cause of sickness and the cause of suffering after sickness sets in. Yet there is something about this that I find less than satisfying. This sort of explanation reproduces the very same artificial distinctions between life and nonlife, human and nonhuman, production and reproduction, nature and culture, inside and outside that give rise to problems like CKDnt in the first place. Questioning these divisions was precisely what I think AMBED's attention to the unstable embankments where the kidneys met the cane was all about. AMBED's work amounted to a dispersed effort to question what Povinelli calls the toxicity inherent to late liberalism. What was toxic was not just the haunting presence of agrochemicals in bodies and soils and waters but the premise that community concerns could be allayed by a more precise timing of irrigation activities, or a new water pump, or a twelve-foot notch in a forty-year-old dam.[33] Don Alvaro and his colleagues had kept taking me back to embankments like the edges of dams and canals, and sites like the mouth of the Río Jesús, to shed light on a problem that went beyond their bodies, to conjure a renal environment.

In a related way, the bathroom users at Barceló were using mass urination to push back against the efforts of the company and the dictatorships, past and present, that it represented, to disavow them.[34] It was not enough for the attendees to be counted, one by one, to receive their meal tickets, and feel the tide of abandonment turn. They also had to acknowledge their awareness of the fallacy behind the idea of the baño ecológico: that hydration, irrigation, urination, absorption, filtration had never been natural. The little bathroom in the five-star resort was just as "ecological" as any other.

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