

and then disappeared; it was nothing to make medical decisions on. Within weeks, the artist would have her own family crisis to attend to. In the meantime, I had no job, no insurance, no real guarantees. The only arrangement I'd made was becoming a Colorado resident.

Dr. Oza listened calmly. When I finished, he smiled slightly. "What would you like me to do?" he asked.

In a sense, the decision had been made long ago, when I quit my life in Jackson. Yet even at this point, it felt like a decision, a choice after which my body would never be the same. I did not want a computer in me. I felt this with a spiritual certainty I could not explain. And I feared that after I got it, I wouldn't have access to the health-care systems that were supposed to take care of it. Nothing had changed in all this.

Yet I was also hungry for it. I was tired of being afraid, tired of putting my life on hold. The life I loved had fallen apart. Here, finally, was a way back to the world of the living.

I looked at Dr. Oza and was so afraid.

"Put it in," I said.

CAUSA MATERIALIS

CHAPTER 5

Moramanga, Madagascar
2014

Outside the boomtown of Moramanga, the hills pushed up like long, grassy shoulder blades. It was winter in the Southern Hemisphere, winter in the highlands of Madagascar. In the flat places at the base of the hills, rice paddies gleamed green. Above them, old men, barefoot, urged zebu up steep ridges. Women carried mahampy baskets on their heads. My guide, Anja, and I had met at the mining company's interpretive center in town, and now we drove up the long red road toward the nickel and cobalt pit in a jostling company truck. The clouds hung low and dark, light bursting between their cracks, a kind of chest-aching beautiful.

The mine was young. On the day I visited, it had been in production for only five months, although seven years had elapsed since construction began. Mineral exploration at the deposit dated back to 1960. Companies kept handing the project off to one another, until finally in 2006 the government finalized its environmental impact assessment and issued permits to Ambatovy—a joint venture between South Korean, Japanese, and Canadian mining companies and the largest-ever foreign investment on the island. Expected to produce 60,000 tonnes of refined nickel, 5,600 tonnes of cobalt, and 210,000 tonnes of ammonium sulfate (a fertilizer), the mine required the removal of a village and the dismantling of a forest ecosystem home to endangered species found nowhere else in the world.

I had cobalt in my battery, nickel in my microelectronics.

If it wasn't yet, this was about to be the largest lateritic nickel mine in the world. Lateritic, meaning: weathered rock. Meaning limestone, sandstone, or clay, leaching over time into the ground as water percolated, leaving behind what was less soluble: nickel, cobalt, iron, copper. The ore was soft, permeable. Two separate deposits draped across 1,600 hectares—nearly three thousand football fields—each twenty to one hundred meters deep. Bulldozers removed overburden with their swooped noses. Articulated haul trucks shuttled the red dirt to the Ore Preparation Plant. For every one thousand kilograms of red earth at this mine, there lay ten kilograms of nickel and a single kilogram of cobalt.

When it rained, the soft earth ran downhill off the road and clogged the rice paddies. The company knew a certain amount of this was inevitable. They paid the farmers when it happened. It was in the budget. To make a road cut was to release the earth: to make a wound that would not reliably stop leaking.

Some of the farmers were relocated because of the road, because of their ruined rice paddies. For others, the company held zebu sacrifices, where they drank rum together. It was in the budget. When I heard these stories, I wondered whom they sent, on behalf of the corporation, to bring the zebu. To drink the rum. To watch the gullet split.

The road climbed. Now greenery, tangled and tall, began to mount on the roadsides. Suddenly we had left the long silver hills for a dense wet world. Lemur bridges arced over the road. The canopy cut the light. Everything was splattered with red mud. The trucks, passing through all day, sent up titan clouds of dust, truck after truck after truck.

Company biologists counted the lemurs, Anja told me. They knew how many crossed the bridges. Sifakas, with their black faces and white fluffy heads; indris, with their tufted ears and fierce eyes and little opposable thumbs, some tagged with radio collars. The biologists tracked how many crossed the bridges and charted which tree hollows the lemurs used. They held the soft primates in their arms to bloodlet them, so they could monitor their health.

When the forest came down, they left it half chopped to give the animals time to leave. A compassionate pause. The machines cut, wait, cut, wait. Their engines a roar of warning. When the bulldozers finally came, the biologists "manually salvaged" any lemurs who had not left. To "manually salvage" was to knock at the tree like a houseguest, to scoop lemurs from the wreckage. They hoped the lemurs would use the bridges. They hoped the lemurs would use the protected forest corridor, which would deliver them to Andasibe-Mantadia National Park or the forest known as Ankerana, where they could find a new home.

In the company's plan there would be "no net loss."

A truck drove by spraying water. Dust control, Anja said. One cannot open the red heart of a mountain and expect it will not bleed.

It had taken me six months to find the mine I wanted to visit and another ten to raise the funds to go. Near my home in Arizona, I had peered over the edge at closed copper pits, marbled purple and pink, now fenced-off tourist attractions. I'd visited the old smelter up the highway—sentinelled by eroding walls of tailings—which used to finish copper anodes and send them by train to a refinery in Amarillo. On a road trip through Wyoming the summer after my shocks, I'd driven through the Rattlesnake Hills looking for a new gold mine reportedly in development, only to discover the whole center of the state a reclamation pit from when uranium boomed in the '70s. The reconstructed hills, chalky yellow-white, had been graded into shelves, with grass and erosion grooves in neat rows. What had grown there looked fake; makeup over a scar that had never healed. The earth was as pockmarked as the moon with our digging.

I didn't find the gold mine, but I did find the Rattlesnake Hills themselves: rimmed with stacks of rock like perfect disks, stumpy piñon pines, the orange stain of lichen. I left my car on the road and scrambled up. I ducked into a cave, the air sweet and cool despite the hot sun, and smelling sweetly of sage. I prayed the gold would not be, as the industry termed it, "economically recoverable."

By then, my research confirmed it: even if we ignored conflict minerals, there was a lot of bad news in mining. In Papua New

Guinea, security guards at a Barrick Gold Corporation mine gang-raped more than 130 local women. In South Africa, thirty-four miners striking at the Marikana platinum mine in protest of low wages (despite soaring profits) were shot by police in minutes. At the Grasberg copper mine in Indonesia, residents of Pasir Hitam abandoned their village because it was being eclipsed by mine waste. The Batu Hijau copper and gold mine, on the Indonesian island of Sumbawa, dumps forty million tons of mine waste containing heavy metals into the Senunu Bay of the Indian Ocean each year. And all over the world, women and children comb the slag piles outside the gates of industrial gold mines, hauling crushed ore into their homes, rolling mercury through the silt to separate out the gold, then heating the amalgam to disappear the mercury, leaving a tiny, pure gold bar. Day after day their homes fill with a mercurial vapor that causes tremors, body numbness, vomiting, irritability, lowered intelligence, even paralysis—damaging entire communities.

The stories came from all corners of the world and in every variety imaginable. I understood it would be impossible to learn what stories this precise ICD—the one in my body—carried. And even if I could, by the time I learned, I'd be on to the next device, subject to the buzz of low battery. It felt like the opposite of an acquittal: instead, each defibrillator, repository of so many minerals from around the world, could be implicated in so much. I wondered if I should view mining's bad news as inevitable, chalk it up to the involvement of human beings. After all, there isn't a corner of the planet where we're immune from corruption, depravity, desperation. Yet it seemed more complicated than that, as though extraction is uniquely connected to human pain. Perhaps because it's such hard work that exploiting human beings seems like a reasonable option: to ease your own load if you are a warlord, to keep costs down if you are a capitalist. Perhaps because of the way extraction tends to concentrate men in isolated camps where pressure builds, where drugs make long or painful shifts possible, where boredom begs to be eased. Perhaps because a lucrative mine gives repressive governments the cash cow they need to stay in power. Perhaps it's the way mining dangles a promise in vulnerable places—the way it leaves its scraps out for the most desperate to scramble over.

Was a defibrillator, lifesaving though it could be, a deal with a particular kind of devil? I found myself, in the year and a half of research between taking those shocks and landing in Madagascar, wondering whether a different story existed, whether through a hundred policies and procedures mining might be made more just.

That's how I found Ambatovy, one oppressively hot afternoon in Tucson, looking up mineral after mineral online trying to understand what it took to pull metal from the ground. Ambatovy seemed to be the rare mining project celebrated for its corporate social responsibility program, despite being located in one of the world's most cash-poor and biodiversity-rich countries. By the time I stumbled across the company's 2012 sustainability report, I'd read more than my fair share of the sleek brochures corporations produce to showcase their conscience and compliance. Too often, the documents featured celebratory pictures of sweaty people at a Fun Run, the corporate logo stamped on their T-shirts, raising money for a cause unrelated to the business. Or they focused on a new recycling initiative in the headquarters cafeteria—an action that looked good on paper but was peripheral to the real material impacts of the business.

At my table in a dim Tucson coffee shop, I read in Ambatovy's report about the Global Reporting Initiative, an international standards non-profit that has built a framework of inquiry to help organizations voluntarily identify the "risks and opportunities" of their projects. Businesses like Ambatovy track down the answers to specific questions about their environmental, social, human rights, and governance repercussions under the philosophy that "you can't manage what you don't measure." Instead of making money and then giving some away, GRI's concept of "materiality" demands that companies ask themselves how they make their money and use their resources to address impacts at that point.

Ambatovy was also a pilot project for the Business and Biodiversity Offsets Programme (BBOP)—initiated by an NGO called Forest Trends—which required following a "mitigation hierarchy" to manage the mark of carving into endemic jungle. The mitigation hierarchy mandated that they first avoid ecosystem impacts whenever possible; then minimize whatever was unavoidable; then restore whatever had been affected; then finally offset what couldn't be restored. So, too,

was Ambatovy obligated to follow the Equator Principles, a credit risk management framework required by ninety-six financial institutions in thirty-seven countries, including Citigroup, JPMorgan Chase, and Wells Fargo. The principles mandate, among other things, a “baseline of social and environmental conditions,” the “consideration of feasible environmentally and socially preferable alternatives,” and the “protection and conservation of biodiversity . . . including endangered species and sensitive ecosystems.” Because most big projects like Ambatovy draw on financing from global banks, financiers hold extraordinary power to attach conditions to their funding, shaping what mining projects look like.

The Equator Principles are not, in origin, moral statements. They are a way of managing risk. That the Equator Principles have become nearly ubiquitous is a reflection of how disruptive and expensive protests near a mine site can be and the extent to which consumer campaigns damage banks' reputations. They are the capitalist's response to powerful outcry.

If Ambatovy's report looked better than I expected, it seemed to come from these overlapping obligations, marks of a shifting industry. To help Madagascar harness more of the economic potential of its resources, Ambatovy was opening a refinery on the coast, shipping value-added products—nickel and cobalt briquettes—rather than raw ore to be processed elsewhere. They were opening training centers to upskill Malagasy workers so they could take jobs in welding, electricity, piping, and instrumentation. They'd committed to buying food from local producers for the cafeteria and having their uniforms made and repaired by Malagasy workers. An uptick in HIV occurred in many boomtowns, and Ambatovy frontloaded the problem with peer education training programs and easily available condoms. There were frog breeding centers intended to keep rare species alive until the land could be put back together. There were hectares of forest set aside for conservation, to offset their mining activity.

Scrolling through the report, I kept telling myself: no company is going to put out a report focusing on what is wrong. The report is not the same as what is happening on the ground. And besides, the mine has only just started production.

I knew in my body that the worst-case scenarios for mining were important. And yet here was my prayer: that maybe a mining project could nourish the people it came to rather than leave a trail of detritus. That a device we called lifesaving could enhance human lives all the way through its supply chain, long before it landed in a chest pocket.

From that moment, ten months of grant applications (and rejections) unfolded, overlapping with a few months of fevered crowdfunding.

Finally: I was going to see it for myself.

From the dripping jungle, Anja and I crested uphill, over some lip, and the trees fell away. We drove into the red heart of the mountain. We emerged into the valley of ore. What would have been the insides of a mountain gaped open, with lines of trucks crawling its edges.

On the ridges flanking the pit, some of the jungle was gone. Some of the jungle was bones. We drove past stands of dense growth, vined, and we drove past gray, ghostly ridges where the trunks had been taken. Stumps one foot tall, two feet tall had been left, the lop not always clean. At the road cuts, I could see the mat of roots, feet-deep, tangled. I saw where the black topsoil, an eon of jungle, turned to red. The roots appeared not to know their trees were gone. They had not yet had time to dry out, to shrivel, to rot into the earth.

A village, too, had been disappeared from this mine site, twenty-nine households moved elsewhere: the place once called Berano.

At the dozer edge, one mat of roots sat tipped up on end. “The roots will be compost,” Anja told me, following my gaze. “We will need lots of compost.” She was talking about reclamation, which she called restoration. For ten years this forest crawled with biologists inventorying species, establishing an amphibian breeding center, identifying scraps of azonal forest to leave intact. They hoped that the conservation buffer zone—forest typical for this area, located around the rim of the deposit—would hold species like a vault.

Madagascar is one of the few nations in the world where the real GDP per capita was lower in 2010 than it was in 1970; only the Democratic Republic of the Congo and Liberia, which suffered civil war, experienced more economic decline over that forty-year period.

In Madagascar's case, political crises in 2002 and 2009, in combination with repeated droughts, cyclones, and plagues, strained a country that struggled to attract investment from abroad because of its underdeveloped infrastructure. As of 2012, more than three-quarters of the population lived in extreme poverty. And yet it was also known for its biodiversity. Originally part of the supercontinent Gondwana, the island first broke away from Africa and then, eighty-eight million years ago, found itself left behind when India drifted north. The asteroid that hit the earth approximately sixty-five million years ago, marking the end of the dinosaurs' reign, seems also to have extinguished most animals on land. Madagascar's endemic species are thought to have evolved from "colonization events," in which tangles of vegetation broke off the Mozambiquan coast or floated down rivers to the sea and crossed the Mozambique Channel—a journey of around thirty days. This "rafting" favored animals that could cling to vegetation; the four mammalian groups that made it to Madagascar all live partially in trees, and reptiles who cannot bear salt water on their skin are rare in Madagascar.

Here, then, was the gamble: that the big investment of an extraction project could buoy the country's economy without destroying what was arguably its richest resource.

I was thinking about the difference between those words. A jungle might be reclaimed. But I could not imagine it restored.

The day before I flew to Madagascar, I found myself in the wide mouth of an Apple store in the largest mall in Illinois, twenty minutes from my parents' house. All those years I'd continued to use the same battered 2004-model flip phone, occasionally breaking one and ordering another online. By then I had received a significant number of garbled texts. Images arrived as a question mark. Uncertain of how I wanted to record interviews on the trip, unclear whether hauling my heavy laptop made sense, and in possession of a tiny, recently shattered iPod, I was considering whether I should purchase new technology: a new iPod, or maybe an iPad, or—at the Verizon store down the hallway—an iPhone with my long-overdue upgrade.

In the Apple store, an army of blue-shirted professionals gestured

at slim metal laptops on long white counters. The other people in the room looked like they were having fun, shiny paper bags tucked over their wrists, their children clenching cinnamon pretzel samples and not looking where they were going. I felt a heat rise into my face, a scrambled sort of confusion, as a very nice man walked me through the latest generation of iPod touches, which he boasted could do everything an iPhone could do except call. I realized I hadn't slept a full night, in my preparations, in a very long time. From a reporting perspective, it made the most sense to get an iPhone, so I could swap my SIM card for one that would work in Madagascar. And yet as I stood in the Apple store, I suddenly became overwhelmed by the amount of microelectronics in the room, found myself picturing the gleaming insides of each computer, each tablet, each phone checked by customers waiting in line. The cheerful way people around me swapped out electronics hardly a few years old seemed all at once delusional, even nauseating. I set my flip phone and my spider-webbed, slightly spastic, completely full 2010 iPod on the table and tried to square the factors at hand. Would I be that much safer in my traveling if I got an iPhone? By how much? What was that potential safety worth?

And then I laughed, a bark. For wasn't this, after all, the question at hand?

In the end, confused and frustrated and embarrassed, I burst into tears, and my parents and I left. I could make the decision according to what felt like everyone else's criteria—or I could make the decision in a way that reflected my work, this long line of questioning around my own defibrillator. That afternoon I wished furiously that I could just forget what a thing was made of. We live according to the rules of the world we inhabit. Yet it seemed absurd to me that my trip to the African continent to understand what it takes to make microelectronics could get wound up in an argument for purchasing more of them.

I was implicated—we all were—but that day, at least, I couldn't say yes.

Later that night, at a wine bar in downtown Arlington Heights, my mother told me about an article she'd read in the SADS newsletter,

about a family in which the older two kids died nine years apart and then the third went into cardiac arrest and made it. Only then were doctors able to look at her EKG and figure out what had killed the other two.

“Three out of three,” she said, her hand resting lightly on her glass of Zinfandel. “And two of them dead. So whatever you find on your journey,” she said, “it’s okay to have it in there. It’s okay to get the battery changed.” She nodded and nodded, her eyebrows up, looking me dead in the face. She was trying to be firm. What I heard was pleading.

The Ore Preparation Plant sat at the very top of the Ambatovy mine holding, nearly 3,300 feet above sea level. When the big beds of the articulated trucks dumped the ore, it got filtered through a screen that took out the big rocks and roots. What remained went up a conveyor belt and got sprayed with water to separate dust from rock. The rocks were spit out into a pile outside to be used in road maintenance; it was the dust the company wanted. In two cylinders with turning blades, the dust was combined with flocculents, thickening agents. The slurry needed a precise consistency in order to slide down the pipeline, which stretched more than two hundred kilometers from this ridge to the processing plant in Toamasina, by the sea. The pipe held a precise downward tilt, with no additional pumps after its beginnings here in the highlands.

The slurry was sent only when requested by the refinery, which paid attention to prices and orders. It took thirty-six hours for the slurry to pass those 22,000 lengths of pipe, to pass through mountains and beneath rivers. When it reached the refinery, it spouted into a tank, the solids left to settle. When the prices were low, they didn’t send it: slurry remained in a tank at the Ore Preparation Plant, poised, waiting. The company stockpiled the low-grade ore and ran the highest-quality first, to pay back investors faster. They processed just enough to pay their bills when prices were low.

There was no dynamite, but the sound of rocks cascading, thudding—the metal screech of machinery—was everywhere.

At the refinery in Toamasina, too, the villages had been removed:

off the plant site and off the tailings field. To make metal one must dismantle houses of wood and build new ones from concrete, with tin roofs and clean beige paint, according to the World Bank’s standards on involuntary resettlement and the International Finance Corporation’s guidelines for resettlement action plans. In the new villages, locals had access to a school, a health center, and arable land. I hadn’t gone to see them; I had bungled the logistics. But in Toamasina I had ridden Ambatovy’s shuttle past the places where daily village life used to unfold, now cluttered with ramps, storage tanks, lattices of metal, steaming stacks, fire, and lights. The refinery was visible from miles south as you came up from Brickaville.

Here the toxic alchemy of making nickel and cobalt briquettes began, the dissolution and decanting, the heating and spinning. A rock is a complicated thing; a crushed rock is full of surprises, compounds clinging to one another that must be separated. Some of the rock was worthless, Material of No Economic Value piped away to sit forever in the tailings field. Or as long as it remained untouched by wave, by storm, by wind. Where before there lay the tombs of humans—dug up and moved during resettlement—there now stretched a graveyard for mountains.

Think of the old alchemists, leaned over the flame, trying to make gold from base metals. At Ambatovy the work was clearer, the metals they forged purer. The refinery separated out residual iron, aluminum, copper, and silica through filtration, sedimentation, and extraction with organic solvents. Do not mistake this word *organic*: this was not a solution of water and vinegar from your grandmother’s kitchen. *Solvent*, from the Latin *solvo*, meaning, *I loosen, I untie, I solve*; solvents dissolve other things. Mixed with a solvent, gases or solids become solutions; the amount dissolved dictates the strength of the solution. Organic solvents, these powerful unmakers, are volatile, highly flammable. Solvent vapors, exposed to air, can explode.

Solvents are known carcinogens, neurotoxins, reproductive-system hazards. Spills and leaks would filter down through the ground, contaminate aquifers, establish long plumes, and trash human organs.

I learned: this is how we make metal. This is what it means to

make a briquette of cobalt, of nickel. To pack it in a drum, to send it by train to the port, to ship it across the Indian Ocean to Asia.

The alchemy of making pure metal is one of taking the world apart.

On the day before the mine tour, I'd met a driver in a rental-car lot at dawn in the port town of Toamasina. We'd followed Route Nationale 2 south through the coastal plains, where gently rolling grasses shone gold in the morning light. Then the highway veered west, and the mountains rose before us, the road tightening into hairpin turns as it wound its way up the 1,640-foot escarpment of the Malagasy highlands. The low clouds of the jungle darkened the sky; then came the first windshield strikes of rain.

Years earlier, I'd been a senior sociology major haunting the cowboy bars and coffee shops of Pinedale, Wyoming, trying to understand how the natural gas boom unfolding there—then the largest in the United States—was changing people's relationships to their homes. A new technology called hydraulic fracturing—"fracking"—had made it possible to extract natural gas from extremely tight sand formations, and so into the tiny town of Pinedale descended thousands of workers who lived in the new hotels springing up or in "man camps" at the edge of town. Just west of Pinedale lay the Wyoming Range, the chain of mountains that had brought me to myself on those high school backpacking trips—and for this reason, my thesis project was personal. Because the Range, too, was vulnerable to drilling as a result of Bush administration-era policies, I wanted to understand what it looked like on the other side of losing what you loved. I wanted to know why some people could take it all in stride—the trucks firing back and forth through town, the influx of men, the blazing lights that blotted out the stars, the sudden problems with air quality, the drilling rigs set up in critical mule deer, pronghorn, and sage grouse habitat—while some of us went to pieces, threatened at our very core by the changes in the place we loved.

It was Pinedale I couldn't stop thinking of as I arrived in Moramanga, another boomtown swollen with migrants in search of work, where on the edge of town those who'd landed coveted mining jobs felled trees and built two-story houses. In Moramanga, the population had

been around 37,000 in 2007; by my visit in 2014, it had ballooned to near 50,000. Trash services couldn't keep up with the influx. Traffic jammed on the road. On the highway huge trucks carrying shipping crates from Asia tipped dangerously over the middle line.

In Moramanga, I had a room at the Bezanozano, the big Chinese hotel with the chipping façade built for the mining company's executives when they came to town. As my ears, I'd hired the general manager of the hotel, a slender man named Olive. Olive wanted to be a Baptist missionary someday, which explained why his English was so good in a country where bilingual speakers generally knew Malagasy and French. Because I'd reported only a few stories in the States before I hopped a plane to the Red Island, it hadn't occurred to me to choose a mine in a former British colony, where every kid in a school uniform I met in the street would want to practice their English, as I'd experienced in Sierra Leone. Nor had I ever heard of "fixers"—the trusted locals journalists hire to help them set up the right interviews, get around, navigate regional politics, and interpret the language. My best idea was to e-mail the fanciest hotel in town, the one most likely to anticipate the needs of Americans.

Olive liked the American accent, and he liked America. On the day I checked into the hotel, he wore a Phoenix Suns jersey. He spoke with his eyes opened wide, nodding after each thing he said, adding, "Yes, yes," emphatically, as though I did not believe him.

Knowing that Olive was the general manager, I assumed he was responsible for the gold-edged *Testamenta Vaovao* in my nightstand drawer.

Half a block from my hotel was the place called the T: where the highway from the capital met the road to the coast. Over the course of three days people would tell me, again and again, about the women who worked the T. And should I have been surprised? It was a boomtown; this was what happened when a certain type of man got money. When Olive took me to visit his extended family one afternoon, they clustered on the sofas in the front room of their house to tell me about the girls, some just sixteen, who'd dropped out of school to sell sex. Neighbors hung in the open front window, listening, staring at the *vazaha*, white girl. Olive's family members were schoolteachers, which

is why they knew the problem intimately: the money was too good. In Moramanga, there wasn't much work for people with secondary degrees; you had to go to the capital to continue on to university, and then maybe you could come back. These girls, they made 15,000–80,000 ariary a night selling sex: the equivalent of \$5.70 to \$30.42.

Which was worth it; food had become so expensive since the mine went in. Now there were migrants buying food and Ambatovy buying for their cafeteria in the local market—wiping out stand after stand, driving up the prices.

The men who visited the sex workers were married, Olive's family told me. They had money because of their jobs at the mine. Somehow in Olive's living room I couldn't stop thinking of the mitigation report. I'd been so impressed. Later, I looked up the figures. By the time I spoke with Olive's family against the din of downtown Moramanga, Ambatovy's fifty-three peer educators had spoken to more than three thousand employees about HIV prevention and performed more than two thousand HIV tests.

It was, in a sense, still impressive. Despite workers arriving in Moramanga from across the country, from other parts of the world, there had been no HIV epidemic. Yet I was beginning to sense a more subterranean level of social problems, those it would be hard to touch with a program because they came about through a particular kind of free will, people adjusting to the world they lived in. In general, I honored people's ability to make a living however they could; in particular, I understood what it meant for young girls to drop out of school in favor of turning tricks. Should I consider these decisions, the way a person hustled food onto the table, as an extended consequence of the metal in my body? That this place now bred a certain set of conditions it hadn't before? Boomtowns and sex work have long gone hand in hand. So, too, the grief and disorientation of living in a place as it changes.

Yet all over the world we use our bodies as we can, to make it through another day.

Olive and I circled the mine. Or we circled its stories, as best we could, over the course of the three days I had in Moramanga.

In a hair salon, the coiffeur told us the mine hadn't been good for

the town, even though she did more hair now. In the market, beside heaping platforms of tomatoes and jute sacks of beans, a vendor in a red wrap skirt told us about the inflation, about how business had spiked and then dropped. In the office of the first assistant to the mayor of Moramanga Commune, an Ambatovy calendar hung on the wall, but the administrator was stern in his admonishments that the company should employ local businesses as its subcontractors rather than hiring cheaper teams from abroad. Fidgeting with the collar of his gray button-up, he told us about the committees that would decide what to do with the money—a new market? schools? roads?—when it finally came through from the Chamber of Mines. Ambatovy had so far been slow to pay, with all of civil society scrambling to make sure accountability measures were in place before the company transferred millions of dollars to the government.

In Ampitambe, one of the small villages near the turnoff to the mine road, we sat with women on long woven mahampy mats. One woman wound mahampy reed into a basket, carefully alternating the strips. The others watched the road, paved by Ambatovy, an exceptionally smooth piece of asphalt for Madagascar. People here were angry, Olive told me. At first, there had been construction jobs that any man could do. But that was over now. An older woman, wearing a brown felt hat and two twisted braids, gestured toward a man who'd walked up, who squatted against a house in a camouflage T-shirt and jeans. "This man wants to be working," Olive translated, "but all the jobs require degrees."

The problem, I knew, was common to industrial mining projects: always the construction boom, followed by the contraction. Technological advancements had turned mining into the work of machines. Once upon a time, having a mine in a community might have offered long-term economic stability; now many of the positions were technical, staffed in this case by engineers and geoscientists flown in from the capital or from Europe, where they'd been trained. Though Ambatovy employed more than 90 percent Malagasy, in a country with eighteen ethnic groups and jobs at such a premium, an out-of-town employee was still often viewed as not native enough.

I'd read that mining in the 1880s often led to innovation through ad hoc problem solving, technologies developing beside the pit that

had other applications—things like the steam engine, which enabled much of the furious growth Western countries benefited from during the Industrial Revolution. But discoveries couldn't be made all over again; any innovation in mining now was unlikely to cast echoes into other fields. It wasn't that mining didn't bring growth or opportunity to a place like this; it did. But the doctrine of mining as a game changer seemed to me inflated, tied to a past whose opportunities were not reproducible and to metal markets that were unpredictable.

Perhaps the corporate social responsibility report that had looked so good was just the latest artifact of a powerful mining mythos, the way industrialization captured our hopes and then—to varying degrees—let us down. Madagascar was a latecomer in a globalized world where economic niches had already been carved out. The goods and services needed for this project could be cheaply and easily provided by nonlocals, and as the train lines and ports and roads that brought them in were improved, imports would cheapen, forcing Moramanga vendors, previously isolated, to compete against products from across the globe—the common extractive-industry ill known as Dutch disease. There would be economic growth, yes, but the way it spidered across the economy might be less potent than it seemed.

There were these big ideas, these white papers and books I'd read, these analyses. And then there were the people sitting on the mahampy mat before me in the clear sweet winter sunlight. The little girl running up to me, squealing, running away. The woman with her hair in two neat buns, nursing a baby. A red chicken careening toward us, then darting away.

The people lived down here in the village, Olive said—picking a naked corn cob up off the ground, gesturing with it—but they'd always gone into the hills for what they needed. There was land for making rice, land for gathering firewood, land for hunting bush meat. It had always been this way, until it wasn't.

I understood that they knew their land in a way I had never known any place—in a way I couldn't. I was ecologically native to nowhere. A blur of genes from western Europe and Scandinavia, dragged through Tennessee and Texas on one side and straight to Chicagoland on the other, born of strip malls and sledding hills, camped, like

my ancestors, on stolen indigenous land. I'd moved every few years to a different patch of earth, inhabited only temporary communities and cosmologies. When I'd interviewed ranchers and farmers outside Pinedale for my sociology thesis, I felt a kind of ache under my breastbone at the way they talked about the land: bends in the rivers they knew by heart, the way the moose browsed in the haystacks on winter mornings. I'd had the sense then that I was behind, that it would take half a lifetime to begin to know those aspen and pine forests as deeply as I craved—and look how that had turned out.

I carried an old scar tissue around land: I was used to seeing it cleaved into pieces, some of it "sacrificed" to industry, some of it "saved." In Ampitambe, the wounds were still fresh, the construct foreign.

The mining project took all they had, Olive said. The government in Antananarivo gave permission without consulting them. The most fertile land was gone. They were paid, but not much—and unlike land, money went quickly.

Everyone used to work planting, the women told us, their faces tired, but this could no longer be. There was a job-skills training program no one from this village was chosen for—because of corruption, the women said. Though it was true that Ambatovy built a clinic, it only opened twice a week, and then only to fifteen or twenty people. And villagers wanted the school to no longer require fees, because they could not afford to pay them—not even in rice, now that they did not have fields.

At the very least, they thought, more people from their village should be hired.

One part of the forest still existed, but it was the conservation buffer zone. Even what was not dug up was off-limits. People had been arrested for going back. One man died after his time in prison, and the company took out a half-page ad in the country's major newspapers to clarify that his death was unrelated to his incarceration. He died neither in prison nor from an obviously related ailment, it said. The man and his companions, the company pointed out, had broken the law by crossing into the mining area.

In Vohitranivona, a village tucked off the road to the mine, a girl in a crisp white T-shirt and jeans, sitting on a long mahampy mat,

shrugged at me. She had a wide, open face and a short braid. Since Ambatovy had been there, she said, life had become very good for her. It had become easy to find money. Everyone had built a house. It was very safe there, with the new police station Ambatovy built. There were new water pumps, occasionally broken, but generally very good. Up the street we saw concrete house after concrete house, colorfully painted, with beautiful porches and balconies.

A quarter mile away in Ambohinierenana, at dusk, the air smelled of smoke, sweat. People were pissed. One of the *tangalamena*—or elders—stood with me in the middle of a rapidly growing crowd. He spoke for the village, and as he did, people crowded, pitched forward, hollered out. The kids jostled at my feet, more of them all the time, the village emptying into the square. These people had lost access to the forest. But Ambatovy did not build them clean water pumps, as it had for the residents of Vohitranivona. The people had to share clinic time. No one from this village got a job at the mine.

“The land can feed them during their entire life,” Olive said. “But not the money.”

The *tangalamena*, in a clean blue button-up, told us the company brought them saplings to take care of. The company said it would buy them back in three years. “But three years is too long to wait to feed the family,” said the elder. So the village sold the saplings as wood in Moramanga. The company also asked them to form a community association, to grow food crops the company could buy. Despite the company’s dedication to sourcing food locally, to strengthening the economy with its enormous purchasing power, it was hard to find a reliable supply. It fed one thousand employees and three hundred sub-contractors lunch at the mine site every day of the week. Community associations, growing crops to sell the company—this was not interesting to the villagers, Olive told me. They wanted their normal life back. “They have been here a long time. They cannot leave their own town.”

In the golden light of dusk the houses lining the square showed their wooden ribs, mud crumbling off their walls. I looked down. Nearly all the people clustered around me stood barefoot on the packed earth. I felt all of a sudden the weight of these stories, of the loss they were living. I had been drawn to Madagascar by complicity—the

metal in my body making me, by some measure, to blame for the grief around me. To the world of the internet these people did not exist, except as the mining company chose to portray them, and in this moment I too became the problematic custodian of their stories—capable of asking the wrong things, of misunderstanding, of bungling the translations. It was easy to think the power I held, as a white American who might someday be handed the microphone, could be used in their service, and yet that wasn’t how relationships of power usually played out. Across the road in Vohitranivona sat the artifacts of good intentions like mine, emblazoned with a logo. Some of the people drank cold water pumped from a well. Here, it seemed, there lived only heartbreak.

“They cannot say Ambatovy did not do anything,” Olive said, spreading his hands, “but they want more compared to the land they lost.”

“You can never, ever please everyone,” Anja said at the end of our mine tour, on the way down the hill, as we passed the security checkpoint, where men in safety vests smiled and waved us through. What she meant was that the people in the villages thought there must be a conspiracy if jobs existed and they did not get them. She meant there were many, many thousands of people in all these villages and Moramanga, and they could not all have jobs at the mine. Only twenty-one of the one thousand employees at the pit, she said, were expatriates. She told me that although the company ran technical training programs, offered scholarships, built wells and hospitals and schools, taught people to make foie gras to sell to restaurants that cater to the French, partnered with the government on major infrastructure projects, and reached out to villages through a grievance program—there was no way to reach everyone. The gestures always fell short.

“We are not a government,” she said. “We do what we can, but we have to get nickel and cobalt out of the ground.”

On my last morning in Moramanga, rain dumped from the sky. I packed my bags and went seventeen miles down the highway to Andasibe, a village bordering Andasibe-Mantadia National Park, to

talk to the biologists who'd inventoried species before the mine went in, who now ran the amphibian breeding center.

By noon, it had become my birthday on the other side of the world. I was twenty-nine. At the Vakona Forest Lodge down the road, I drank a cold glass of white wine, ordered a bowl of tomato soup, and ate a chocolate lava cake roll. Then I walked down the hill to meet the guide who would take me to Lemur Island.

The guide pushed a few bananas into my hands and peeled one more. "Put some in your pockets," he told me. "Now give me your camera."

"What?" I said, and then I understood: lemurs were landing on my head, leaping onto my shoulders, swinging from the trees, and falling in blurs. They perched on my neck and arms, angling to nab the smeary banana bits between my fingers. It went without saying that this was not best practice; I was feeding lemurs rescued from the captive animal trade the equivalent of candy, an empty treat of tourism. Yet from the moment they arrived I felt only joy, wild laughter bubbling up, as the silky fur of a black-and-white ruffed lemur pressed into my forehead, as the tiny hands of brown lemurs combed through my hair, as their animate, intelligent faces looked into mine.

We boarded a canoe and set off down the brown river, ducking thick vines, spatters of rain shaking down off high foliage. Where we climbed back ashore, a fluffy diademed sifaka with a golden belly perched across from me, trembling, nervous. I extended my hand to her, spoke softly, waited minutes. Finally she reached out. She placed her hand on my hand, as though to steady it. Her touch was leathery and cool. Slowly she leaned forward, eyes trained on mine, to lick the banana from my fingers. The guide's face a map of surprise: "I've never seen that one eat from anyone's hand before." The lemur did it again, quietly holding my hand, her little opposable thumb curled around my outstretched palm, leaning close. The soft scratch of her tongue on my fingers. My heart swelling. Her dark eyes testing me.

Later, after the final stop—where ring-tailed lemurs ran circles around my body—it would be the trembling sifaka I thought of as I climbed the hill back to where my driver napped. How the biologists had charted the lemur hollows and knocked. How they'd built those

bridges from tree to tree, to steer lemurs deeper into what forest remained. How the sifaka had looked at me cautiously, to see whether I was worthy of trust.

Out of Andasibe, the road twisted steeply downhill. Somewhere to the left of me, I knew, that pipeline punctured the mountains; once in a while, a slurry rushed down it. Now for the first time I saw it: all the red hillsides. Hillsides knit with elaborate maps of trees, knots of roots, bright flowers and quiet animals. I thought of Heidegger in "The Question Concerning Technology," his conclusion that modern technology had fundamentally altered the nature of the earth: "The earth now reveals itself as a coal mining district, the soil as a mineral deposit. The field that the peasant formerly cultivated and set in order . . . appears differently than it did when to set in order still meant to take care of and to maintain [rather than driving on to maximum yield at minimum expense]. . . . What the river is now, namely, a water power supplier, derives from out of the essence of the power station. . . . Everywhere everything is ordered to stand by, to be immediately at hand, indeed to stand there just so that it may be on call for a further ordering."

It was likely these hillsides contained only low concentrations of metal, if any at all, and yet to see the color there beneath so much life—so much overburden—stole my breath. That the world could be so dismantled for the right price. That it was no longer earth but ore. That I had told a doctor yes, to put the metal inside me.

I was supposed to believe my own life worth all this.

"No one is thinking about the ants," the biologist Jean-Noël Ndriamiary had quietly said during our interview that morning, as we sat together in the gently shifting forest. He meant that an intact ecosystem is too complicated to save piecemeal; we don't even know what all the pieces are.

A colony of ants is not a lemur, capable of looking a human in the eye. Yet in the biologist I detected grief. I could not forget now that every being in the ecosystem was ensouled and essential, the coppery trampled plants and the singing frogs and all the species of insects we hadn't yet named.

At night, the smell there was always one of beautiful, burning trees.