imn

NUMBER TEN | CHOKEPOINTS

LIMN NUMBER TEN **CHOKEPOINTS**

Edited by Ashley Carse, Jason Cons, and Townsend Middleton

Preface

MIGRANTS GATHER IN "JUNGLES" at the mouth of the Chunnel; Somali pirates attack ships queuing up at the Bab-el-Mandeb strait; a flash crash in the stock market triggers a digital "circuit breaker" that instantly shuts off trading; transcontinental internet connectivity is interrupted when a ship anchor severs undersea cables. These events highlight the vital importance of chokepoints—sites where the flows upon which contemporary life depends are constricted or "choked."

Because they are difficult to bypass, one obvious way to think about chokepoints is as *obstacles*—logistical problems to be navigated, worked around, or otherwise resolved. But chokepoints can also be sites of *opportunity*. More than that, they are nodes where sociopolitical, financial, and ecological concerns are negotiated and power dynamics turn expectations upside down. Useful for enacting governmental or economic control, chokepoints are also sites where the dominant become vulnerable, connectivity becomes a liability, and marginalized voices and forms of agency are amplified. The longshore union that shuts down a port can send shock waves through the economy. A small community or social movement that blockades a key road grabs the attention of an otherwise inattentive government. What happens in and around chokepoints, then, is as critical as what circulates through them.

Limn 10 seeks to engage—and potentially upset—some taken-for-granted understandings about flow, function, and disruption. Approaching chokepoints as simultaneously geographical and deeply social phenomena, we find them at the heart of a range of contemporary challenges, from the distribution of energy, information, and cargo to debates about migration and climate change. Given that these problems are often described with reference to flows, networks, and systems, it is not surprising that the concept of chokepoints—and the threats to global order that they imply—is invoked to describe and reshape political and economic possibilities. Within this conjuncture, the chokepoint emerges as a useful analytical entry point for understanding how networked geographies are conceptualized, governed, and "worked" to a variety of ends.

To examine chokepoints in this way is to interrogate networks and systems through their points of most acute vitality and vulnerability. Chokepoints, in this regard, are not simply discrete nodes along networks or components of systems. They can present obstacles or opportunities—often both at the same time—depending on which actors and concerns are foregrounded. For the city planner, traffic congestion is a problem. But for the smuggler, it is camouflage. And, for the roadside vendor, it creates a captive market. Constriction can be a mechanism of accumulation (for actors who control bridges, canals, and tunnels) but also surveillance (for regimes looking to regulate the movement of populations, resources, and information). Examining these critical points of passage, *Limn* 10 asks: To what overt, covert, and unexpected dynamics do chokepoints give rise? How are they—and might they be—conceptualized?

The term *chokepoint* seems to have originated in engineering around a century ago, where it was initially used to describe locations in a mechanical system where fluid could be controlled or choked. However, the English word "choke"—as in impeding respiration—is far older. Fittingly, given its functional (and life-threatening) connotations, the term was adopted into military use in the 20th century, particularly in the context of the World Wars and concomitant advent of the science of logistics (Cowen 2014). In military parlance, *chokepoints* came to denote vulnerable links in supply chains and key geographic locations where small numbers of men and machines could control access to broader territories. Today, however, the term has taken on a life far beyond its engineering and military roots. As modern life has become dependent on a multitude of flows that are vulnerable to disruption, the concept of the chokepoint has come to describe everything from megaports and pipelines to criminal justice operations. Consider

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a 2013 initiative by the US Department of Justice called "Operation Choke Point" that sought to regulate FDIC-insured bank loans to high-risk businesses, such as firearms dealers, payday loan sharks, and pornographers. Here, the term described choking the flow of federally insured cash to risky, illicit, and possibly illegal activities. In September 2017, *The Washington Post* gave the term a presidential dimension, describing Chief of Staff John Kelly as the "choke point" of the Trump administration—the regulator of information flows both to and from an increasingly erratic commander in chief.

The proliferation of chokepoints has coincided with the rise of a way of understanding modern life as dependent on the functioning of vital systems—themselves susceptible to catastrophic disruption (Collier and Lakoff 2015). The chokepoint thus crystallizes both the kinetic materialities of contemporary life and the anxieties that attend widespread connectivity. The imagination of the world as rife with potential blockages has brought into being a range of opportunities and challenges. On the one hand, governments, militaries, and firms remain intensely concerned with classical chokepoints such as straits, ports, and corridors. At once vital yet vulnerable, these sites render global systems susceptible to myriad forms of disruption. Because a malfunction, blockage, or takeover at, say, the Panama Canal or the Lincoln Tunnel would have widespread ripple effects, such passages elicit no shortage of scrutiny, security, and anxiety.

But emerging chokepoint formations are also giving rise to new obstacles and opportunities. Climate change opens up shipping channels previously choked with polar ice. A patent limits the delivery of cheap medicines to populations in need. An oil refinery's workers go on strike, disrupting overseas markets. Battery capacity remains the x-factor impeding the shift to alternative energy systems. Some of these phenomena have been recognized as chokepoints; others have not. Like sites immediately recognizable as chokepoints, these emergent formations and the dynamics they engender are sources of imminent concern. Yet many provocatively exceed the concepts at our disposal for understanding their operations, long-distance effects, and stakes. Chokepoints of all kinds consequently figure as a critical problem—and challenge.

Limn 10 brings together anthropologists, geographers, photographers, media scholars, sociologists, ecologists, and historians to think about the chokepoint as a site of inquiry and an analytic tool. Marshaling diverse conceptual and visual techniques of analysis, we want to explore—and perhaps rethink—what chokepoints are and what they do. As sites where big projects and systems turn on tight spaces, chokepoints are useful analytical entry points for making sense of extensive networks and global assemblages, yet their layered social dynamics and ripple effects also deserve scrutiny. Writ large and writ small, chokepoints demand that we pay closer attention to their form, their function, and the kinds of life to which they give rise.

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strangling the Internet

Every network has its chokepoints. **Nicole Starosielski** brings us under the ocean to explore the hidden ones along the information superhighway.

A CHOKEPOINT IS A NARROW CORRIDOR, a structural feature that restricts flow. Chokepoints are parts of a system that threaten to become a site of congestion or blockage, where movement might be stopped with very little effort. The network is often imagined as a form that routes around or bypasses chokepoints, but all networked systems still have at least one chokepoint. In most cases, they contain many bottlenecks, pressure points, and points of failure. This is true even for apparently distributed systems like the internet.

Our undersea cable system forms the backbone of the global internet. The most frequently discussed and debated chokepoints in this system are *geopolitical chokepoints*. For example, if one looks at the map of the undersea cable system (see fig. 1), it's easy to locate where cable routes funnel through narrow geographic zones. These include the Strait of Malacca (between Malaysia, Singapore, and Indonesia), the Strait of Luzon (between Taiwan and the Philippines), and the crossing of Egypt and the Red Sea. At each of these points, cable traffic is rendered vulnerable not only because of geographic constraints (e.g. a canal,

submarine topography), but also political constraints (including both national, territorial, and oceanic politics) that make it difficult to route elsewhere. Forced along a narrow path, cables often are subject to an increased threat of anchors, subsea movements, and nations and companies that control the space.

The potential effects of these chokepoints on the internet are enormous. As one influential study reported in 2010, "There are several geopolitical chokepoints that funnel … critical cable paths together. A single disaster in such an area could cause catastrophic loss of regional and global connectivity" (Rauscher 2010: 24). The most significant of the cable chokepoints is in Egypt. Sunil Tagare, CEO of OpenCables Inc., points out, "Egypt is the biggest single-point failure in the world." He estimates that if "Egypt goes down, at least one third of the global Internet will go down." Narrow routes give the advantage, of course, to those who control the chokepoints. As Tagare elaborates, "Telecom Egypt, well aware of its monopoly, is milking the situation to its extreme advantage … The cost of IP Transit to that part of the world has increased by an order of magnitude just because of the Egypt monopoly and choke point" (personal communication, September 19, 2017). It's perhaps not surprising that many geopolitical chokepoints are shared between networks: the Suez Canal and Strait of Malacca long have been critical maritime chokepoints, and in turn, chokepoints in the shipment of oil.

While geopolitical chokepoints emerge because cables are unable to route elsewhere, perhaps due to the contours of land and water, the composition of the seafloor, or political tensions, *topological chokepoints* are formed because traffic tends to cluster at particular nodes. These narrow routes are formed not according to the logic of avoidance but, by and large, due to the laws of attraction. Topological chokepoints also are visible in network maps. Take, for example, the intense concentration of cables in Miami or in Fortaleza, Brazil. In these cases, there's no clear environmental or territorial reason that all the cable lines converge at a single point or set of points—it is a matter of path dependence. Cables *could* stop in many places on the United States' and the Brazilian coast, but it's much easier to interconnect with everyone else in a single common zone. If a node has extensive infrastructure, it often doesn't seem to be a chokepoint at all—it simply appears as a hub of the global internet.

No matter how quickly and smoothly traffic routes through network hubs, they also are vulnerable sites, especially if there hasn't been an economic incentive to create multiple, autonomous nodes. If Fortaleza were shut down, all data traffic that flows north and south through the cable station would come to a halt—it is a single point of failure for all undersea cables from Brazil to the United States (Makris et al. 2010). Artist and scholar Ruy Cézar Campos has been tracking Fortaleza's declaration of the neighborhood around the cable station as a Technological and Creative Park, with tax incentives to build more stations. "In contrast to this interest," he writes, "is the fact that this neighborhood is one the most violent in this city and that it has one of the highest salt densities in the world … fostering unwelcoming precarities to high security technological buildings and installations" (personal communication, September 21, 2017). The landing points themselves—the zones where cables cross beaches and connect cable

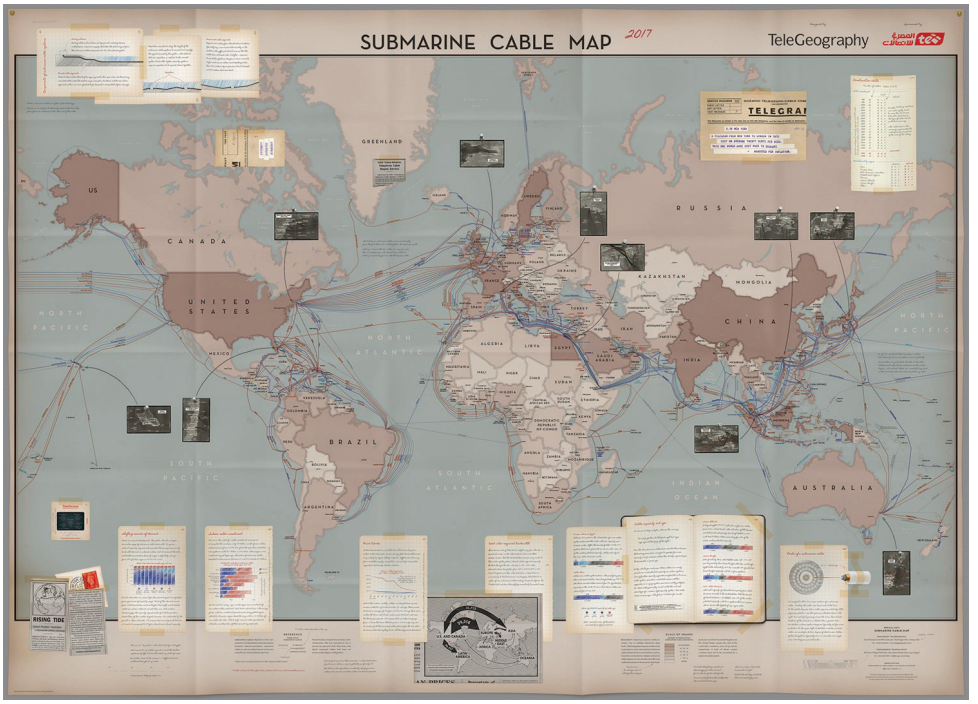

FIGURE 1.
Submarine cable map, 2017.

stations to the ocean—also can become congested. In Fortaleza, the heavy concentration of cables on one part of the coast means that new systems must establish new routes through offshore seamounts: even if the node is a hub, it still faces geological challenges specific to its location (Wopschall et. al. 2013). A single location might, at different scales, be a site of both asymmetrical geopolitical and topological relationships.

Although cable stations and network nodes are some of the more obvious chokepoints, there are also places where a single cable is a chokepoint. In many countries, where only a few (or even one) cable connects to the rest of the world, all international traffic is funneled through a single link—chokepoints can emerge both in conditions of excess and in conditions of scarcity. Plus, not all chokepoints are visible on the network map. Chokepoints might be caused by a concentration of routes, not in space but in ownership. In some countries, a single telecommunications carrier controls all potential pathways between points. A single company might even control all traffic into and out of the country. Dyn Research has been tracking critical outages and national blackouts for years: in Syria, Iraq, Ethiopia, Gabon, Cameroon, and others. They have shown that having only one or two providers puts countries at severe risk for a national outage (Cowie 2012). When there are chokepoints in ownership, flow is easily restricted or blocked, regardless of how many geographic routes or network hubs exist.

Another form of invisible chokepoint is the *regulatory chokepoint*, where national or international laws and regulations slow and even block internet traffic. A key example of a regulatory chokepoint exists in Indonesia, which in 2011 required that only Indonesian ships with an Indonesian crew would be allowed to repair cables that broke in the country's territorial waters. However, there were no such ships at that time—existing cable ships, in order to be exempt temporarily from these requirements, would have to complete an extensive permitting process. That created a significant delay in repair time for internet cables and, combined with a high fault rate, as Keith Ford-Ramsden and Douglas R. Burnett observe, this "has made Indonesia a choke point in international communications" (2014: 171). The effects of such regulatory chokepoints are not limited to prolonging Indonesian internet outages but to the many countries in Southeast Asia, Australia, and beyond that depend on cables that route through Indonesian waters. Sunil Tagare points out that extreme regulations in India are causing similar problems: these

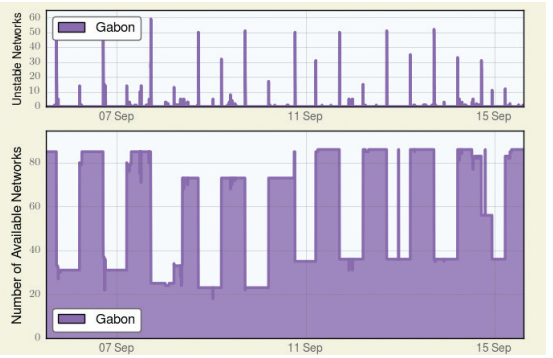

FIGURE 2.
Internet curfew established in Gabon in 2016.
DYN RESEARCH IN (KOEBLER 2016).

include laws about cable ships in Indian waters and requirements to install monitoring equipment for bandwidth terminating in India—the high cost of this, he argues, "makes it prohibitively expensive and laden with regulatory gray areas for carriers to conduct business."

The regulations in India and Indonesia point to another potential site of failure—the inability to secure labor to sustain a system. Every network depends on a set of workers. And workers that are integral to network operations can constitute a *chokepoint in labor*. Although the history of dock workers and union labor might be a more familiar example of how bodies can thwart a system's operation, the internet and its cables are heavily dependent on a small set of specialized workers. There's not a strong tradition of union organizing in the cable world, but there are shortages of experienced and capable cable workers in many places, often in companies and countries new to the cable industry.

Systems depend on other systems. As a result, chokepoints cascade. Undersea cables, and their varied chokepoints, constitute the weak link of other networks: air transportation, shipping, and global financial networks. Take as an example the recent APEC Supply Chain Connectivity Framework Action Plan, which identified "underdeveloped" multimodal connectivity, including the frequently disrupted cable systems in the Asia Pacific region, as a key chokepoint in the area's supply chains. What might seem to be a minor chokepoint in one system can become a more significant chokepoint in a system that depends on it. We might describe this as a *chokepoint of dependency*: the bottleneck created when a network relies on a single system to fulfill a particular function.

One of the distinct features of contemporary global systems is that almost all of them rely on the undersea cable network for international communications. The cable system is a chokepoint of dependency for global finance, transportation, supply chains, and the multitude of other networks of international exchange. However small they might seem—bound to particular cities, bodies, or seas—the failures of the cable network easily can cascade to compromise all who depend on it. These chokepoints are not only the sites where the internet can be strangled, they are the places where the internet—long seen as that which enables and connects—can unravel many other forms of global circulation. ■

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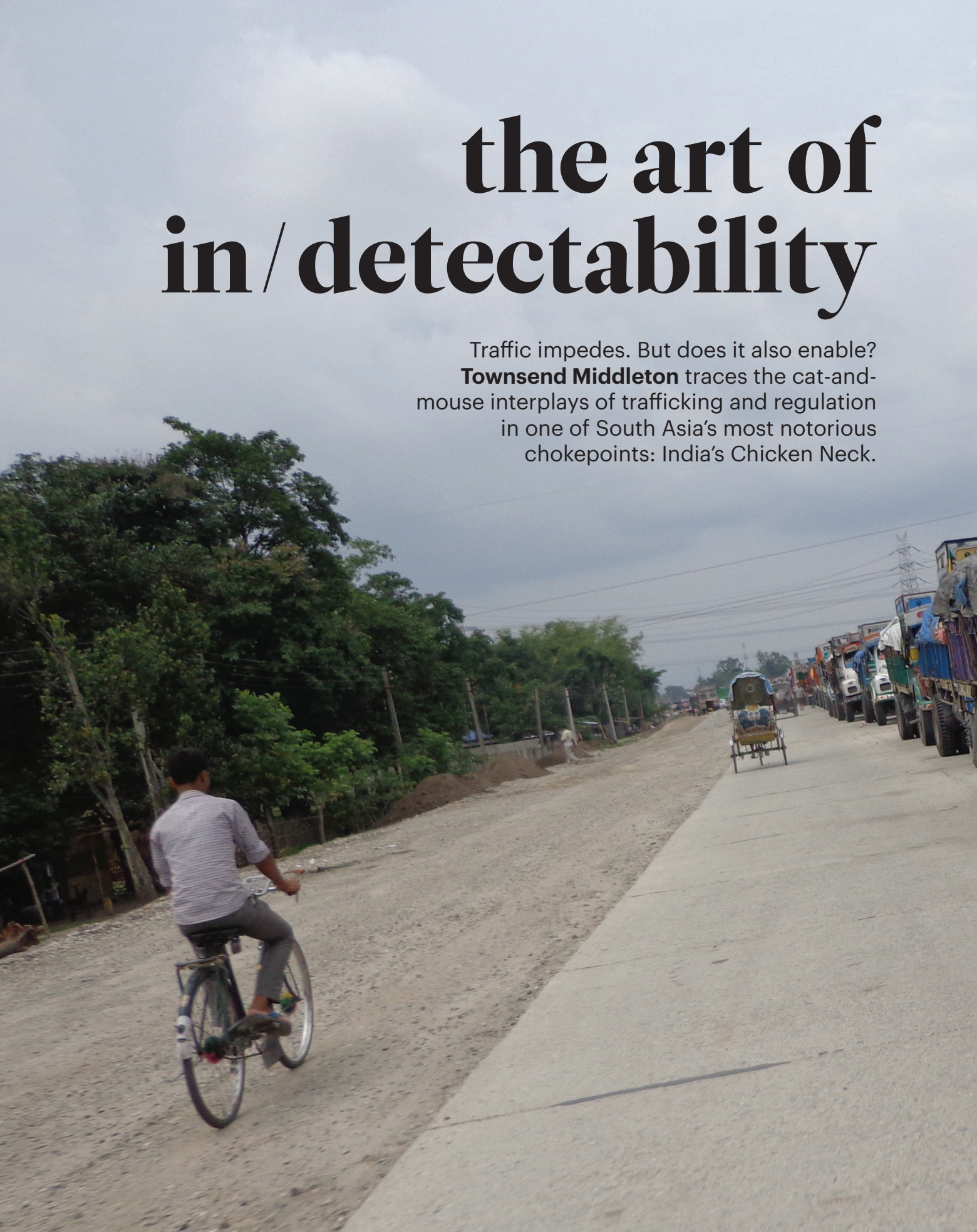
the art of in/detectability

Traffic impedes. But does it also enable? **Townsend Middleton** traces the cat-and-mouse interplays of trafficking and regulation in one of South Asia's most notorious chokepoints: India's Chicken Neck.

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SPEED

In the summer of 2017, Indian and Chinese troops found themselves face-to-face in their most intense border dispute since the 1960s. The standoff was triggered by Chinese road construction into the contested territory of Bhutan's Doklam Plateau—a southward incursion that India deemed unacceptable. The hostilities had little to do with the barren plateau, per se. The concern instead was what it overlooked: the Siliguri Corridor (or "Chicken Neck"), a precarious sliver of territory connecting India's "mainland" to its northeast.

Military strategists long have feared a Chinese takeover of the corridor—a lethal strike that would sever India in two and instantly realign the geopolitics of much of Asia. So when Chinese bulldozers moved into Doklam on June 16, India detected something dangerous moving toward this critical chokepoint. Tensions quickly mounted.

The crisis highlighted the geopolitical stakes of India's Chicken Neck—a vulnerability matched only by its vitality. The corridor funnels myriad goods and bodies between India, Nepal, Bhutan, Bangladesh, China, and onward to Myanmar and Southeast Asia. Oil pipelines, rail lines, military convoys, humanitarian aid, trucks, smugglers, and scores of people all compete for passage through this congested artery. With overland transport to India's northeast and Southeast Asia routing through the corridor, Prime Minister Narendra Modi's Look/Act East economic policy has focused expressly on speeding up movement through the chokepoint (by building new highways) and/or bypassing it altogether (by developing alternative land and sea routes). For now, the Siliguri Corridor remains a burr in Modi's dreams of a seamless logistical future.

Geopolitical and economic designs notwithstanding, efforts to control this site meet with considerable difficulty. In this congested space, the techno-formal domains of security and modern logistics (Cowen 2014) converge, interpenetrate, and blur with a range of informal, often-illicit, mechanisms of passage. For every documented migrant crossing the corridor's multiple borders, there are countless undocumented, untraced others. For every sealed cargo container, there's an overloaded truck groaning its way through the chokepoint with loads unknown, its passage preemptively bought through special, off-the-record "truckers' cards" guaranteeing no hassle from local inspectors. For every border post, every police checkpoint, every inspection station, there's a racket to circumvent it and allow vehicles, people, and the goods they carry safe, easy passage. The corridor's frenetic traffic

FIGURE 1. India's Siliguri Corridor.
MAP PREPARED BY KAITLYN BRETZ & PHILIP MCDANIEL (UNC LIBRARIES)

FIGURE 2. Inspecting trucks.
PHOTOGRAPHY BY T. MIDDLETON

puts tremendous strain on local infrastructure, not to mention those tasked with securing and regulating this unruly space. Along with licit actors, the Chicken Neck attracts insurgents, human traffickers, and smugglers, who similarly depend on passage through the chokepoint yet can strategically hide amid its overwhelming traffic. Amid these cat-and-mouse interplays of circulation and regulation, in/detectability has emerged as a distinctive problem—and art—of chokepoint life.

How do regulators—specifically, customs agents and anti-human traffickers—manage the challenges of in/detectability in their everyday work? This inquiry invites exploration of an inherent paradox: the imperative of circulation through chokepoints categorically hinders the possibility of their securitization and regulation. In practice, the geopolitical impulse to control chokepoints frequently stands at odds with economic desires to maximize flow through them. This paradox is especially acute in chaotic chokepoints like the Siliguri Corridor, where bewildering traffic affords convenient cover for getting things and people through—undetected. The threshold of detectability—to borrow a forensic term from Eyal Weizman (2017)—therein figures as both a regulatory-security challenge and a source of imminent possibility for licit and illicit actors. At India's Chicken Neck, indeed, it is a threshold where lives and livelihoods are made on a daily basis.

To understand in/detectability's generative capacities, one must reckon with the corridor's peculiar character. At roughly a hundred miles long and less than twenty miles across at its narrowest, this is a relatively large chokepoint, crisscrossed by multiple forms of transit (including rails, roads, and footpaths). Movement through the corridor isn't the steady procession of ships crossing Panama, but a helter-skelter of vectors moving domestically through and internationally across the chokepoint. The volume and congestion is stunning. A Deputy Commissioner of Police quoted to me a recent traffic study reporting that between 20,000 and 25,000 vehicles ply the busiest intersections in a single hour. Complicating matters further is the fact that in the middle of the corridor sits the city of Siliguri, a rapidly expanding metropolitan area of more than one million residents, plus what some officials estimate as hundreds of thousands passing through daily. As one can imagine, these conditions profoundly structure the forms of circulation, regulation, and in/detectability that inhere this site—along with the prospects of those who work it.

SPACE

The Central Excise, Customs and Service Tax

FIGURE 3. A lorry awaits inspection. PHOTOGRAPHY BY T. MIDDLETON

FIGURE 4. Scanning for victims. PHOTOGRAPHY BY T. MIDDLETON

Commissionerate (hereafter "Customs") monitors the movement and taxation of goods traversing the corridor. Along with roaming patrol units and intelligence wings, Customs operates checkpoints at the corridor's border crossings, where agents inspect trucks, vehicles, and foot traffic for illegal cargo. It is tedious, boring work. Figure 2 depicts a sealed Chinese container that has passed via the port of Kolkata through the corridor to Nepal's border.

Courtesy of the logistics revolution (Cowen 2014), this sealed container effectively has never set foot on Indian territory. With its seal unbroken, the contents—whatever they were—were not Indian Custom's problem. So they let it pass.

Other trucks pose more difficulty. Open-topped lorries like those in Figure 3 carry goods of all kinds across India. What's in the back of these colorful behemoths is anyone's guess. Customs agents occasionally climb aboard and scoop a handful of material for "scientific" sample, but they readily admit that anything could be buried deeper in the lorries' hold. AK-47s, drugs, and gold frequently are mentioned as possibilities. My Customs friends talked of X-ray technology coming to the corridor, but none has arrived. They further conceded that their checkpost could be circumvented simply by walking across the border up-river. Once in the corridor, smuggled goods and people essentially vanish in its erratic traffic. Amid these conditions, Customs agents readily admit the impossibility of regulating the corridor. Taking an "if you can't beat them, join them" approach, Customs now has redefined its duty as "facilitating trade." "The time of inspecting trucks is passed," the Chief of Customs confessed. "We only inspect the trucks we have to." This regulatory shift prompts an alternate reading of the boring border work mentioned earlier. Performing truck inspections figures as just that: a performance of modern statecraft—particularly now as Customs and India have realigned with that sublime object of neoliberalism: circulation.

Not all regulators can afford such abdication. Just down the road, an anti-human trafficking booth has its sights trained on a different form of circulation. Every day, from 7 a.m. to 10 p.m., NGO workers stare out from barred windows evaluating the thousands of children, adolescents, and young women passing into the corridor.

Like Customs agents, their job is fraught. But making interventions here, at the entranceways of the corridor, is vital. If victims reach the bus depots, train stations, and safe houses of Siliguri, it will be too late. Extending the chicken-neck metaphor, one anti-trafficker described these spaces as "mouths" that fed

into the neck, where victims would be swallowed whole, digested, and processed.

Similar to the Doklam Plateau crisis (in which India mobilized to stop the Chinese before they got anywhere near the corridor), Customs agents, police, border-security forces, and immigration officers echo this logic. If regulation is to happen, it must happen at the chokepoint's deltas or "mouths." Once in the snarling traffic of Siliguri, the chokepoint's urban, spatial character provides impenetrable cover for those moving people and things through the corridor.

PACE

The prospects of in/detectability are tied equally to the temporality of chokepoints. Corridor traffic moves in staccato-like fits, blockages, surges, and chokepoints within chokepoints. For truckers, this start-stop movement can be maddening. For smugglers, it's operative. For regulators, it's crippling. Amid these fits and starts, ascertaining who belongs, who's passing through, who's hopping borders, and who's holing up is virtually impossible. This irregular pacing reflects the temporal quality of the hiding at hand—a camouflage in movement itself.

To provide a participatory example: We're on the platform at Siliguri's NJP station, a critical node of human trafficking. Several trains have just arrived, and I am hurriedly in pursuit of Nikhil and Suresh—two NGO workers I am shadowing for the day. We have exactly twenty minutes to walk these trains, searching for victims. Pushing through the crush of passengers, hawkers, janitors, and security, Nikhil and Suresh sometimes stop to interrogate suspicious "families" through the windows. Sometimes they navigate the train's cramped interiors, surveilling for something amiss: a child that doesn't look like his parents, young women travelling alone, etc. They are making thousands of snap judgements, each of which could change a life. Thus we carry on, clambering from car to car, evaluating face after face—looking for what, I don't know. We barely finish the second train before the whistle blows and it chugs out of the station, leaving us on the platform, our shirts soaked in sweat, with nothing to show. It's been days without a rescue.

FIGURE 5.
Train departing the station
PHOTOGRAPHY BY T. MIDDLETON

In these cat-and-mouse dynamics, pace matters. One might have a better shot at sorting through the epistemological conundrums of traffic were one to stop the proverbial train for more than twenty minutes. Likewise, one could pull over every truck and inspect it "properly." But that would defeat the corridor's circulatory function. If chokepoints stop moving, there is no point. Therein lies the regulatory rub, and the fundamental condition of life in the transit zone.

POSSIBILITY

These paradoxes of circulation/regulation pose both difficulties and opportunities. At the threshold of in/detectability, the possibilities can be tempting. Several months after walking the trains, a scandal rocked Siliguri's anti-trafficking community. Police uncovered an adoption racket in which Local District Child Protection Officers were using forged documents and their control of the system to route rescued orphans through children's homes scattered across the corridor and into the custody of paying parents. Effectively, the racket short-circuited India's legal adoption mechanisms by intentionally "losing" children in the corridor's physical and documentational traffic. Doing so, this case of protectors-turned-traffickers cast the problem of in/detectability anew—namely, by undermining the very subject-object relationship upon which detectability is predicated.

This is hardly the only example of regulators becoming circulators. One afternoon, when sitting in a truck-yard *dhaba* (restaurant), I asked a trucker about the difficulties of getting his rig through Siliguri, and in particular how the corridor's many checkpoints impeded his work. Devouring his lunch, he brushed aside my question, casually mentioning that he had a "card" to deal with pesky inspectors. This piqued my curiosity. The "card" is something like a trucker's get-out-of-jail-free pass. It's part of a massive racket involving police, vehicle inspectors, ustoms officers, and others, which allows truckers to preemptively bribe their way through various jurisdictions of the "inspector Raj." Here's how it works: You purchase a card, good for one month, from a local broker. When you get pulled over, you show the card. Maybe a phone call is made, maybe not, and you're free to go. No papers? No problem. Your

FIGURE 6.
Truckers' cards.
PHOTOGRAPHY BY T. MIDDLETON

load overweight? No problem. Intrigued by this racket, I decided to get one of these cards. One shady contact led to another and what I got was a blank business card, with a scribbled contact and a nearly illegible date. At first, I thought I had been had. That is, until other truckers showed me their cards. Equally unimpressive.

The "card" tell us something important about chokepoints and in/detectability. At one level, it's a simple business card, bearing a name and number to get you moving when the proverbial Man tries to slow your roll. At another level, this humble piece of cardboard testifies to the operative bleeds of circulation and regulation that shape life and livelihoods in these transit zones. Understood as an artifact of a deeper set of spatial, temporal, and socio-political relations, this is how chokepoints like the Chicken Neck work—and, ultimately, how people work them.

It's worth noting that similar cards may be found on other stretches of road. And such rackets, involving the precious and pernicious among us, in other domains of life. Yet—as sites of heightened vulnerability, vitality, and possibility—chokepoints amplify opportunities that might otherwise go unexplored, and make visible dynamics that might otherwise go unseen. In/detectability consequently figures as a problem—and art—of not only chokepoint life but also the understanding thereof. Engaged accordingly, chokepoints like the Chicken Neck offer sites—and thresholds—then for rethinking circulation, regulation, and related dynamics in other, less notable, spaces of contemporary life. ■

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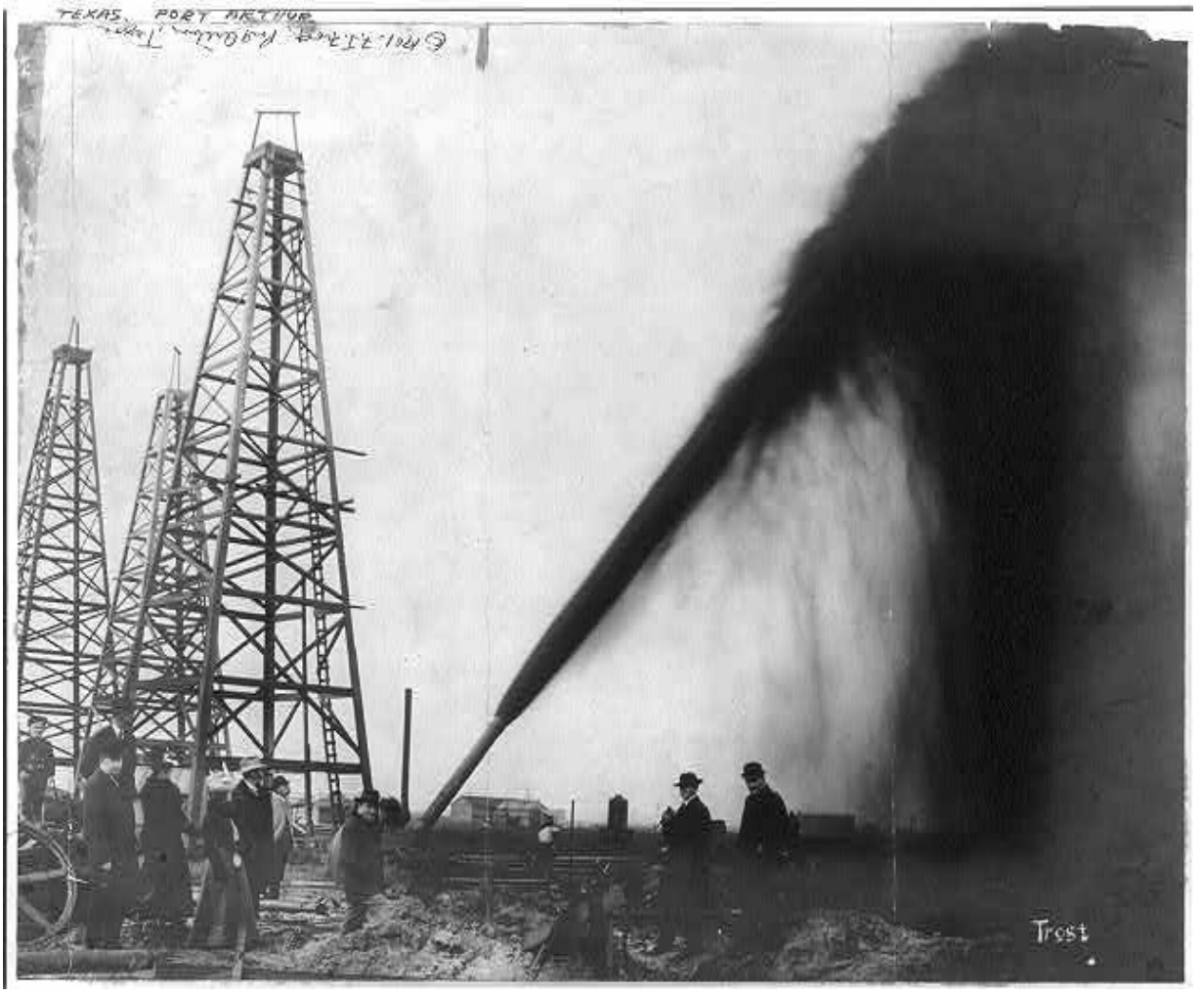


how pipelines constrict oil flows

Christopher Jones explores how oilmen have used conduits as weapons to crush competitors, maintain industry dominance, and rake in huge profits.

CUSHING, OKLAHOMA, is a town with fewer than 10,000 residents. Despite its modest population, the self-proclaimed "Pipeline Crossroads of the World" holds an outsized importance in the oil industry. As the gathering point for much of the oil produced in the Continental United States, Cushing is served by a host of major pipelines (including branches of the Keystone Pipeline built in 2011 and 2014 before the proposal of the controversial Keystone XL Pipeline) and possesses a combined storage capacity of nearly 100 million barrels. But even with its elaborate pipeline network, increases in supply, or a softening of demand for oil can turn Cushing into a bottleneck that traps petroleum at the source of its production.

Pipelines can facilitate the flow of oil to markets, but they can also serve as chokepoints that prevent it from flowing. In some cases, such as an oversupply in Cushing, the reason for a stoppage is based in limits of physical capacity: too much oil, too little pipe. Yet in many cases, such chokepoints are deliberate rather than accidental. Throughout history, oilmen have frequently used the construction—and just as importantly, the deliberate non-construction—of pipelines to advance their own interests. Real money and power in the oil industry has historically been generated not only from delivering a product to market, but, just as crucially, from preventing others from doing the same.

To understand why, it is helpful to remember two interconnected features of the oil industry since its inception in the mid-19th century: abundance and low cost. While episodes of skyrocketing prices draw headlines, the reality is that petroleum has been a remarkably cheap commodity for most of the last century and a half. High prices have been an exception rather than the norm. While low prices usually benefit consumers, they are the bane of producers, as they reduce profit margins.

As a result, limiting the amount of petroleum reaching markets has long been a preoccupation of major players in the industry. Within oil circles, anodyne phrases such as "balancing supply with demand" or "market optimization strategies" provide an anaesthetized view of this process. More provocatively, Timothy Mitchell has recently labeled this practice "sabotage," noting that "the goal of oil companies was to place themselves in control of the conduits, processing points and bottlenecks through which oil had to flow, to restrict the development of rival channels … and to use this command of obligatory passage points to convert the flow of oil into profits." For major oil companies,

Pipeline Monument, Cushing, Oklahoma.
PHOTO: ROY.LUCK

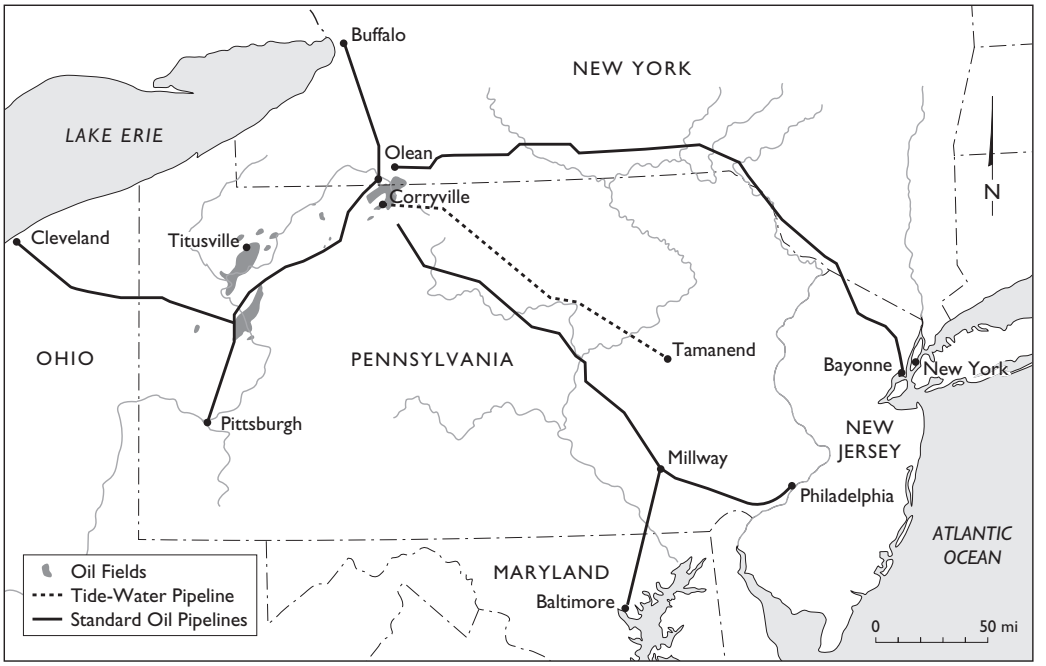
the "paramount aim was to impede the flow of energy and increase its cost" (Mitchell 2011: 40, 45).

The creation of OPEC (Organization of Petroleum Exporting Countries) in 1960—a cartel seeking to curtail output in order to raise prices—is perhaps the most famous example of oil producers organizing to limit production. But they were not the first. In the 19th century, John D. Rockefeller recognized that governing the transport and refining of oil would enable him to restrict the flow of oil to markets, thereby increasing the profitability of his Standard Oil Company. Then as now, pipelines were one of the most effective weapons in this effort.

Consider the world's first long-distance pipeline, which was completed in Pennsylvania in 1879. Before its construction, oil was transported overland by railroads. At the time, there was no notable shortage of capacity nor were the transport costs too high for consumers: kerosene refined from crude petroleum and used for lighting was already far cheaper than alternatives such as whale oil or camphene. Yet there was a chokepoint, just not a physical one: Standard Oil's industry dominance of railroad transport.

For observers of America's booming oil industry following the first successful drilling for petroleum in 1859, the rise of Rockefeller's empire elicited mixed feelings of awe and indignation. Starting with a small refinery in Cleveland in the early 1860s, Standard Oil had obtained control of more than 90 percent of America's oil-refining capacity less than two decades later. Unique advantages in railroad transport played an essential role in this rise. Using his large volume of oil shipments as leverage, Rockefeller negotiated bulk discounts with railroad carriers, threatening to take his business to another railroad if they refused to comply. These lower transport costs helped Standard Oil outperform its competitors, thereby increasing the company's share of the trade. This generated a self-reinforcing cycle: ever-increasing shipments generated ever-greater savings on transport costs, which further enhanced Standard Oil's competitive advantage. Ultimately, Rockefeller possessed such a large share of the market that he not only received large rebates, he also forced railroads to give him drawbacks on other companies' oil shipments to retain his business. Detested and illegal (though rarely proven or enforced), drawbacks meant that when a competitor shipped a barrel of oil, part of the money they paid to the railroad was forwarded to Standard Oil. Oilmen from other companies were understandably outraged that their attempts to ship oil subsidized their major competitor.

Choked off from fair access to markets, a group of oilmen attempted an audacious undertaking: the construction of the world's first long-distance pipeline. The Tide-Water



Map of the Tide Water Pipeline.
PHOTO: C. JONES.

pipeline would extend east over a hundred miles, starting in western Pennsylvania and crossing over rugged mountains to the center of the state where it would connect with the Reading Railroad, one of the only major lines not in cahoots with Rockefeller. Tide-Water employees faced numerous technical challenges including developing pumps powerful enough to lift oil without tearing apart the pipes and creating tools capable of connecting 18-foot pipe lengths that weighed more than 300 pounds each. The greater difficulties lay in the underhanded tactics of rough-and-tumble 19th-century capitalism. Both Standard Oil and railroad companies did all they could to stop the pipeline, including ripping up pipes laid under tracks, buying up strips of land to block rights-of-way, and even engaging in industrial espionage: a "bum" that often sat outside the pipeline company's telegraph office was later discovered to be a Standard Oil employee listening to the click-clack of the telegraph and relaying messages to his supervisors. With a combination of perseverance, engineering acumen, and luck, the pipeline was completed in May 1879 and began shipping oil to markets.

Competitors of Standard Oil hailed the pipeline's opening as marking a new stage for the industry. Yet their hope that a chokepoint had been alleviated soon turned out to be a pyrrhic fantasy. While the Tide-Water initiated a switch from rail to pipe for oil transport, it did not transform the industry's competitive dynamics or unlock new flows of oil. Standard Oil quickly appropriated the new technology, built its own pipeline network, and used its strengthened hold of transport to block oil from getting to market. Understanding why this happened illustrates key features of pipelines that help explain why they can serve as chokepoints as well as facilitators.

Once the Tide-Water pipeline proved the viability of the new technology, Standard Oil rapidly built its own network of pipelines. In tackling this project, Rockefeller had unique advantages no other party could match. One was financial—pipelines cost a great deal of money, and Standard Oil had the deepest pockets in the industry. But a more important advantage lay in Rockefeller's preferential access to rights-of-way. At this time, there were no laws granting eminent domain privileges to pipeline companies seeking rights-of-way, which was in part a product of Standard Oil's political influence in blocking such legislative proposals. This meant an organization either had to buy an unbroken line of property hundreds of miles in length—which the Tide-Water company only accomplished by building across mountainous stretches of Pennsylvania on land that was poorly suited for agriculture and therefore available—or use someone else's rights-of-way. In the late 19thcentury, the railroad companies possessed nearly all the relevant transport

corridors. Because Rockefeller had a cozy relationship with them, he was able to negotiate exclusive access to use their rights-of-way in exchange for modest payments and a guarantee of shipments of kerosene from his refineries. With these deals in place, Standard Oil's pipelines paralleled railroad tracks. No other party had sufficient clout to obtain such rights of way.

For Standard Oil, then, pipelines were an effective means to restrict oil flows. When an independent company built a short pipeline to Buffalo in 1881, Rockefeller ordered a second pipeline built next to it and offered extremely low shipping rates, giving his competitor what he liked to call "a good sweating" (Yergin 1991: 42). The other pipeline company soon went into financial straits and sold out to Standard Oil. Recognizing the dangers of permitting too much oil to reach markets, Rockefeller then had one of the pipelines removed and restored shipping rates to their previous levels. Too much pipeline capacity, Rockefeller knew, undercut profitability. Limiting the capacity of pipelines offered a surer strategy for success.

Tide-Water officials also recognized the value of collaboration to control oil flows. In 1883, they negotiated a settlement with Standard Oil that guaranteed them a set allocation of oil flows in exchange for agreeing not to expand their pipeline. While a *New York Times* writer bemoaned Tide-Water "fall[ing] under the control of that despotic, unscrupulous, and lawless organization" the company's founders knew collaborating to curtail oil flows was in their own economic interest (October 17, 1883 article quoted in Jones 2014: 139).

By 1884, more than three-quarters of American oil production flowed to markets in pipelines, and all of it was subject to Rockefeller's dictates. Having no desire to let too much oil depress market prices, Rockefeller carefully controlled the amount released. As oil producers continued to drill more wells, that extra capacity was put into storage tanks in western Pennsylvania rather than shipping it through pipelines. While in the early 1870s, nearly all oil brought out of the ground was sent to market, the situation changed radically once pipelines were established. During the industry's first 18 years (up to 1877) a total of about 3 million barrels were put in storage. In the five years oil pipelines were first introduced (1879-1883), the total jumped to 36 million barrels (*Derrick's Handbook* 1898). Building enough pipeline capacity to serve their markets—but no more—garnered enormous profits for Standard Oil.

This historical pattern has persisted in the development of pipelines. For industry magnates, the goal has always been to get one's own oil to market while restricting competing flows. With their high costs and daunting barriers to entry, pipelines have often been an effective tool because they are only profitable if they operate at or near full capacity. In most cases, this means that only a single pipeline along a given route can be economically viable. When there is competition from multiple lines, all operators may take losses until a winner emerges. Pipelines thereby contribute to a centralized and monopolistic structure in the oil industry rather than an open and decentralized one.

Pipelines represent not just the facilitated construction of oil flows from one place to another but also paths not taken. As Rockefeller's empire suggested, a successful pipeline signifies blueprints abandoned and potential oil flows thwarted. The conventional view of pipelines thus requires a more nuanced perspective. Pipelines are not passive conduits between places; instead, they are always selective in *where* they deliver oil, *whose* oil gets preferential access to markets, and *how much* oil is allowed to reach markets.

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CALLING
No Nation
Free
Syria

In 2016, French authorities bulldozed the migrant camp known as 'the Jungle' at the mouth of the Chunnel. In 2017, migrants returned. Photographer **Eric Leleu** and anthropologist **Vincent Joos** combine images and words to humanize this chokepoint and counter its infrastructures of invisibility.

THE INVISIBLE 'JUNGLE' OF CALAIS

CALAIS' INVISIBLE JUNGLE

On October 25, 2016, French riot police evicted thousands of migrants who had settled in an abandoned landfill adjacent to the port of Calais. They were gathered there hoping to cross the English Channel by any means necessary: stowing away on boats or hiding in the trains, trucks, and buses plying the "Chunnel" linking France to Britain. Hundreds of makeshift houses and tents of the so-called "Calais Jungle" were bulldozed or burned while the police forced migrants to board buses taking them to asylum centers scattered through the French countryside.

Paradoxically, the effort to wipe the camp off the map thrust the Jungle to the fore of international attention. In time, the demolition came to be seen as emblematic of the "European migration crisis" writ large. Yet this was hardly the first effort to control—and render invisible—the persistent rush of humanity seeking illicit passage through the Chunnel. Since the 1990s, migrant communities gathered in and around Calais have been met with a steadily evolving array of infrastructure, technologies, and security apparatuses. These anti-intrusion measures, however, have not prevented migrants from coming to Calais in hopes of rebuilding their lives in the United Kingdom. Indeed, by 2017, migrants were back in Calais and facing increasingly violent treatment, with police reportedly pouring tear gas into potable water sources to render the area uninhabitable (Beatrice D 2017).

A COUNTER-OPTICS

This photo essay explores these attempts to control migration and the persistence of migrant encampments in the face of them. Countering the technologies of invisibility deployed to remove migrants from Calais, we combine word and image to expose—and render visible—the infrastructural forms and lifeforms that converge at this critical chokepoint. The tensions arising between these representations, we hope, may lead to more humanized ends than the demolitions of 2016.

ABOVE: Satellite view of the Calais Jungle, Google Earth, accessed December 29, 2017.
GOOGLE EARTH

LEFT: Calais, as seen by Google.
GOOGLE EARTH

PAGE 50: Bansky mural depicting Steve Jobs as a migrant defaced with "London Calling" graffiti.
PHOTO BY E. LELEU

THE MAKINGS OF A CHOKEPOINT

On November 14, 1994, Eurostar high-speed trains started to link Paris and Brussels to London using the tunnel dug beneath the Strait of Dover. It took six years, eleven boring machines, and more than 15,000 workers to link Calais, France, and Folkestone, England.

Every year, approximately 10 million people cross the 23.5-mile "Chunnel." Almost 1.6 million trucks are carried through the Chunnel's rail-transport shuttle alone. The ferry traffic is even more intense: an estimated 4 million trucks and 14 million passengers cross the Strait of Dover by sea every year, making the English Channel the most congested maritime route in the world (Shurmer-Smith and Turbout 2017; Mambra 2017).

FROM CHUNNEL TO "JUNGLE"

As the number of migrants in Calais escalated, the French government in 1999 asked the French Red Cross to open a transit center in a warehouse in Sangatte, a small countryside town. At its peak activity, the center sheltered more than 1,500 people (Kremer 2002). Countless more eventually gathered outside these formal infrastructures, waiting for their opportunity to slip undetected through the chokepoint to Britain.

IN/VISIBLE LIFE

Over the past fifteen years, security infrastructure and police presence have been the main responses to these attempted crossings. The French and British authorities placed cameras at the entrance of the tunnel, surrounded the port with fences, and ramped up X-ray searches of trucks. The French government reinforced police presence by sending the *Gendarmerie Mobile* and the notoriously brutal *Compagnies Républicaines de Sécurité*—France's riot police, the majority of whom support the extreme right party Front National and have a long history of racial profiling and violence (Piccolo and Debuis 2017; Childers 2016: 116). Since going to Sangatte often would mean being denied asylum by France and being deported, migrants had no choices but to hide and live in the woods of the northern French coast while waiting for a chance to cross the channel.

THE SUCTION THEORY

In 2002, then-Minister of Interior Affairs Nicolas Sarkozy ordered the closing of the Sangatte center after it sheltered more than 70,000 people in three years. The humanitarian camp, according to Sarkozy, created a suction effect—"*un appel d'air*"—and supposedly increased clandestine immigration in France. Now ubiquitous in French politics, the "suction theory" has translated into ever-increasing police brutality against migrants and expansion of security infrastructure.

Since 1999, the French government repeatedly has opened shelters and day camps away from Calais, cutting off migrants from the solidarity networks that long have existed in this city. As activists of Calais Migrant Solidarity put it, "What we are witnessing is the creation of a racial ghetto under the guise of liberal humanitarian concern" (CMS 2015). Migrants' allies are seldom allowed to visit the camp, while people sheltered there are warned that venturing back to Calais would mean certain starvation and state-mandated violence. With the recurrent opening and closing of these official camps, multiple "jungles" have continually appeared in and around Calais.

French police have tracked and brutalized migrants camping in the woods or "jungles." In the meantime, legal authorities have sentenced activists and drastically reduced the margins of action for humanitarian NGOs and local organizations. In 2009, the right-wing Interior Ministry ordered the bulldozing of the Calais Jungle while a thousand migrants lived there. The camp soon was rebuilt. The recent migration surge towards Europe led France's Interior Ministry to order the 2016 bulldozing. An estimated 6,000 migrants lived there at the time. Since then, the rhetoric only has escalated. In 2017, center-left-wing Interior Minister, Gérard Collomb, sustained the call for the eradication of jungles, which he depicted as places where "encysted migrants" lived in "fixation abscesses" that need to be "treated" (Mouillard 2017). Pathologizing migration, Collomb also offered a medieval solution: bursting the abscess by accruing police presence and scattering migrants in new camps that will open in the countryside (AFP 2017).

PREVENTATIVE INFRASTRUCTURES

The borders and jurisdictions around Calais are blurry. In 2003, for instance, British border control officers gained the right to perform checks in Brussels and Calais. Moreover, in 2016, the British authorities financed and constructed a 30 million-dollar anti-intrusion barrier that runs a kilometer along the entrance road to the Calais port. Cosmeticized with vegetation, the "Great Wall of Calais" is made of smooth concrete to impede climbing.

Groupe Eurotunnel SE, meanwhile, deforested more than a thousand square feet of land around the Chunnel entrance and flooded the entire area to prevent migrants from entering the tunnel. This intervention into infrastructure meant to reverse the migration "suction effect"—that is, to scatter migrants away from the chokepoint—stands in telling contrast to the ever-increasing legal flows of goods and people crossing the strait on state-of-the-art transportation devices. In their stark materiality, preventative infrastructures such as the wall and the flooding draw sharp lines between the licit and illicit movements—and lives—that animate this chokepoint.

TOWARD OTHER ENDS

Rendering migration invisible through repression, security infrastructure and the establishment of camps doesn't mask the need for new immigration politics in Europe. If intensifying traffic between Britain and France was thought as a logistical issue in the 1980s, the human dynamics of the Calais chokepoint are an integral part of the lawful and unlawful traffic between Britain and continental Europe. "Jungles," solidarity networks between locals and migrants, interactions between state actors, businesses, and other stakeholders do not simply shape mobility; they transform chokepoint space into inhabited places, both vital and vulnerable. These converging forces imbue chokepoint life with a resiliency that cannot be regulated through violence and forced displacement. A counter-optics that renders chokepoint lives visible may accordingly point the way to different means for managing life and movement at these critical passageways.

Envisioning more humane means and ends, it's clear there is no need for a wall if migration policy is built around the humanity and political agency of migrants. Offering them a clear path to equal citizenship and the power to decide where they can live and work would be a way for the European Union to regain some dignity after its catastrophic mismanagement of the migration surge at its Mediterranean borders. To rethink migration in this way would be to draw a new line of policy—a new line of humanity—linking chokepoints in Libya, Turkey, Sicily, Calais, and beyond. It is to imagine a world without 'jungles' and their attended forms of invisibility. ■

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Chokepoint sovereignty

Jatin Dua reveals why Djibouti's history, geography, and precarious present make it a site where national sovereignty and chokepoint dynamics are intimately tied.

AT THE STRATEGIC INTERSECTION OF THE RED SEA and the Indian Ocean, occupying the northern "door" of the Bab-el-Mandeb, the tiny nation-state of Djibouti hosts one of the largest ports in Africa and numerous military bases from countries as diverse as France, the United States, China, and Saudi Arabia. This mix of trade and security exemplifies a central aspect of what I call *chokepoint sovereignty*. Sovereignty as a "tentative and always emergent form of authority grounded in violence" (Hansen and Stepputat 2006) has, since Foucault, been tied to political claims over populations or territories that may or may not correspond to the framework of states. In contrast, chokepoint sovereignty is a form of authority that emerges from the power to channel and re-channel various kinds of global circulations. Instead of territory or population, Djibouti's sovereignty rests on transforming its privileged location into an infrastructural and security hub—transforming the strait into a chokepoint.

This work of channeling and rechanneling is a process dependent as much on branding and regulation as on any inherent location. This is a world of glossy marketing brochures about vessel turnaround times and technologically advanced container terminals. This is a space constituted through the protection of lurking naval vessels and an Indian Ocean-wide surveillance network. It's a place of mundane arrivals of those seeking refuge and return. Finally, chokepoint sovereignty is fragile. Built often on the rubble of historical attempts to transform location into resource, contemporary chokepoints are constantly threatened by rival claims of channeling.

LEFT: Sailors return to the Port of Djibouti after completing a security patrol escort. PHOTO: U.S. NAVY ENGINEMAN 2ND CLASS CARLOS MONSALVE.

INSIDE THE CHOKEPOINT

"*Zone interdite!*" (restricted zone). A uniformed port security officer had suddenly appeared in front of our car. "*Zone interdite*," he repeated, this time holding his hand up and gesturing for us to stop. We had been snaking our way through the Port of Djibouti on a hot day in June 2016 with the marketing manager of the port. Earlier, at his office, the manager had thrust in my hand a shiny pamphlet that noted the locational advantage of the port as the gateway to Asia and Africa, and listed the steady increase in tonnage and number of vessels that used Djibouti as a port of call. After visiting the special area reserved for the shipment of goods to and from Ethiopia, we were heading towards the container terminal when the security officer suddenly halted our tour.

"We have a boat from Yemen," the officer explained. Waiting behind an ambulance and two police vehicles, I watched a buzz of activity fill this otherwise quiet corner of the port. A Yemeni family had just arrived in a small car-ferry repurposed to transport a family of six and all sorts of household items, from fans to kitchen appliances, across the Bab-el-Mandeb, the narrow strait located between the Arabian Peninsula and the Horn of Africa. "Those who have some money or family," the manager explained, "they come straight to the port of Djibouti, they get processed here and then rent a house. The ones without contacts or money they go to Obock and stay in tents in the middle of the desert," referring to the small port town situated on the northern shore of the Gulf of Tajoura.

After a few minutes, as the port police and

immigration officials filled out some paperwork, the family made their way into the waiting ambulance and headed away. As we drove past the car-ferry and its assorted cargo, I noticed it was docked next to a Yemeni coastguard boat. "These boats arrived from Aden in July [2015] when the Houthi forces took over," the manager explained as we sped past, continuing our tour. "The Saudis and UAE have a base here now from where they support the Yemeni forces trying to take back Aden.

"Next stop, Doraleh container terminal—it's the most technologically advanced container terminal on the African continent," he remarked with no small hint of pride.

CHOKEPOINT HISTORIES

If these portside arrivals and the glimmering cranes of the Doraleh terminal illustrate the mix of violence and trade that constitute contemporary chokepoints, an old ramshackle building on the wide Boulevard de la Republique, which runs parallel to the coast in Djibouti city, is the place to understand the long histories of chokepoint sovereignty. A faded sign says "*La Gare*" indicating this was the terminus of the Chemin de Fer Franco-Éthiopien (CFE), the nineteenth-century, French-built railway line connecting Addis Ababa to the Red Sea. Depending on who's around, it is possible to get a peek inside and walk amid the old ticket counters and waiting rooms before emerging on the platform. Here, you see the old narrow-gauge railway cars, rusting heaps of iron standing ghostlike on the tracks.

The French were relative latecomers when they arrived on the shores of northern Somaliland in order to exert influence over the Red Sea. From 1883 to 1887, French emissaries established a presence on the coast by signing a series of treaties with local Somali and Afar groups. Central to French ambitions in Somalia was the establishment of a railway line that connected Addis Ababa to the coast. In the early decades of the twentieth century, France invested heavily in the construction of the CFE and in developing the port facilities in Djibouti. However, unlike other colonial infrastructural projects throughout the continent, the bulk of the CFE ran through the ostensibly independent Ethiopian Empire creating a precarious position of imposing infrastructural control without political control. The railway line emerged as a mechanism of exploiting Ethiopia as a colony without assuming any of the responsibilities of colonialism. The railway line overlaid the old caravan paths that traversed the hinterland and the coast. From the 10thcentury onwards,

A Map of the region around Djibouti.

the caravan trade was central to commercial and social life in the region. The establishment of the CFE railway sought to interrupt this flow through re-channeling these goods onto train carriages.

Today, another rechanneling is underway. As we stood under the crumbling awning, my guide remarked that "the Chinese are building a new railway, and they've built a new station near the airport." In October 2016, with much fanfare, the Chinese-built Addis-Djibouti train service began functioning on a trial basis. Once completed, electric trains will connect passengers and cargo from land-locked Ethiopia to the newly built station near Djibouti City's airport. From here, cargo will continue on diesel trains to the Doraleh terminal and onto waiting ships.

The inauguration of the railway line soon was followed by news of the opening of a Chinese naval base—the first overseas military base of the People's Liberation Army Navy (PLAN)—adjacent to port. In combining trains and navy ships, the Chinese were continuing the nineteenth-century French model of combining trade and raid. In addition, the Chinese rhetoric of non-interference mirrors the French attempt at extraction without the responsibilities of colonialism.

These temporal echoes are central to the story of chokepoint sovereignty. Consider the rise of Djibouti Port, a process of port-making that emerged during the building of the CFE. The railway line sought to re-channel trade, often through force, away from the caravan route onto lumbering locomotives and—through this—shifting the coastal locus from Zeila (which was

Djibouti Port.
PHOTO: J. DUA

under British control) in the south and Obock in the north to the port of Djibouti. In the early twentieth century, the port of Djibouti emerged from a small ramshackle set of settlements into one of the most significant ports in the region, acting as a bottleneck for the mobility of goods and people across the Red Sea.

Through these projects of re-channeling thus was created a chokepoint—a bottleneck place—of slowdown and then speeding up. This mode of re-channeling also entailed a transformation of regulatory authority. Lighthouses, military and naval patrols, the use of ship identification papers, and various decrees that regularized the flows of ship traffic—including the establishment of quarantines near the Djibouti port—all were central in the emergence of Djibouti as port, as military base, as colony, and eventually as sovereign state.

PORT-MAKING AS STATE-MAKING

The intertwining of state-making and port-making—of commerce and violence that began with the CFE—continued with the transition to Djibouti independence in 1977. Alongside the port, military bases emerged. Initially these were French, but in a post-9/11 and post-Somali piracy world the United States, the European Union, China, and Japan have become the main sources of revenue and the *raison d'état* of Djibouti. All these projects have foregrounded the country's location on the Bab-el-Mandeb as central to the building of this trade and security infrastructure.

This emphasis on location was repeated numerous times while I was doing research in Djiobuti in 2016. That summer, in the small bustling office of the Djibouti Ports Authority, an energetic team of young marketing graduates was hard at work. "We're branding the port as the crossroads of Asia and Africa," explained Fatima, the chief of marketing for the port and the one responsible for producing the glossy brochures I had been given. Over the next few weeks, I observed Fatima and her team sell berthing space at the port to clients from around the world in addition to arranging tours of the port for a variety of visitors.

"Location is what makes Djibouti," she said. "We're a small piece of land otherwise. It helps us that we're surrounded by war on all sides." She smiled as she uttered the last sentence. Then, perhaps recognizing that she might be coming across as a bit callous, she clarified, "I mean, strictly from a business sense. War is obviously not something to wish on one's neighbors, but it's good for business!"

In Djibouti, location transforms into a form of sovereign branding. With respect to the Djibouti port, it is the promise of a regulated space legible within a world of international standards and technologies. As the port manager in Djibouti explained in 2015, "What you get when you choose Djibouti is both access to Ethiopia and East Africa but also a port that has all the standards of a global port. In fact, we are launching a green initiative and plan to be one of Africa's first green ports."

This aspect of branding also was central when the port of Djibouti created a partnership with Dubai Port World. Inaugurated with much fanfare in 2000, the partnership between Djibouti and the Dubai-based DP World was meant to solidify Djibouti's claim as the main port of call on the Bab-el-Mandeb, eclipsing Aden across the Strait. In addition to establishing a container terminal in Doraleh adjacent to the old Djibouti Port, DP World also constructed a dry port and special economic zone modeled after the Jebel Ali Free Zone in Dubai. DP World was a signifier of regulatory stability, a transnational guarantor of chokepoint sovereignty

AMBIGUITY OF LOCATION

Location, though, is a fickle friend. Ports wax and wane, appear and disappear. New bottlenecks form, along with new possibilities of profits and power. In the summer of 2016, Djibouti woke to this possibility.

By 2014, shipping and transportation accounted for one third of Djibouti's GDP, and the container port in Doraleh was scheduled to process more than 3 million containers per year. In the midst of this revenue boom, the government

LEFT: 19th century Chemin de Fer Franco-Éthiopien (CFE) railway line in Djibouti City.
PHOTO: J. DUA

RIGHT: Tadjourah port construction in Northern Djibouti.
PHOTO: J. DUA

of Djiobuti canceled the contract with DP World and began arbitration proceedings against it in the United Kingdom. In 2016, DP World negotiated a deal in Berbera, Somaliland, to develop a "new Djibouti" on the Red Sea. Berbera's closer proximity to Ethiopia always was acknowledged by port officials in Djibouti as a potential impediment to Djibouti's hegemony over the Ethiopia trade. DP World's investment plans were viewed as a direct attack on Djibouti, an attempt at unmaking its chokepoint sovereignty through re-channeling trade further south on the Red Sea. In another setback to Djibouti, Britain's High Court dismissed the arbitration case in early 2016.

But an unlikely ally for Djibouti emerged when the new president of Somalia, Mohamed Abdullahi Mohamed Farmaajo, during his first official state visit to Saudi Arabia in February 2017 stated that he would seek Saudi intervention against the UAE's plans to open a military and counter-piracy base in Somaliland as well as DP World's port-expansion plans. Citing Somaliland's non-recognition of sovereignty, Farmaajo's regime has challenged Somaliland's ability to make contracts, a power that legally falls under the purview of the central government in Mogadishu. In these dramas of recognition, ports become sites to articulate and litigate the spectral and real figures of sovereignty, and the coming battle between Djibouti, Berbera, and Mogadishu will seek to redraw the maps of mobility—of goods, people, and capital that determine the rhythms of life around the chokepoint.

Chokepoint sovereignty emphasizes the dynamic ways in which the ability to channel and re-channel is central in claiming political authority and profits from practices of global mobility. Built on the debris of longer histories, this process, as the case of Djibouti highlights, interweaves trade, violence, and regulation, thus transforming location into spaces of possibility and encounter. ■

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Shipping corridors through the Inuit homeland

Claudio Aporta,
Stephanie C. Kane,
and **Aldo Chircop**

explore the conceptual and lived tensions around ice in Arctic straits. They show how one group's obstacle can be another group's means of connection.

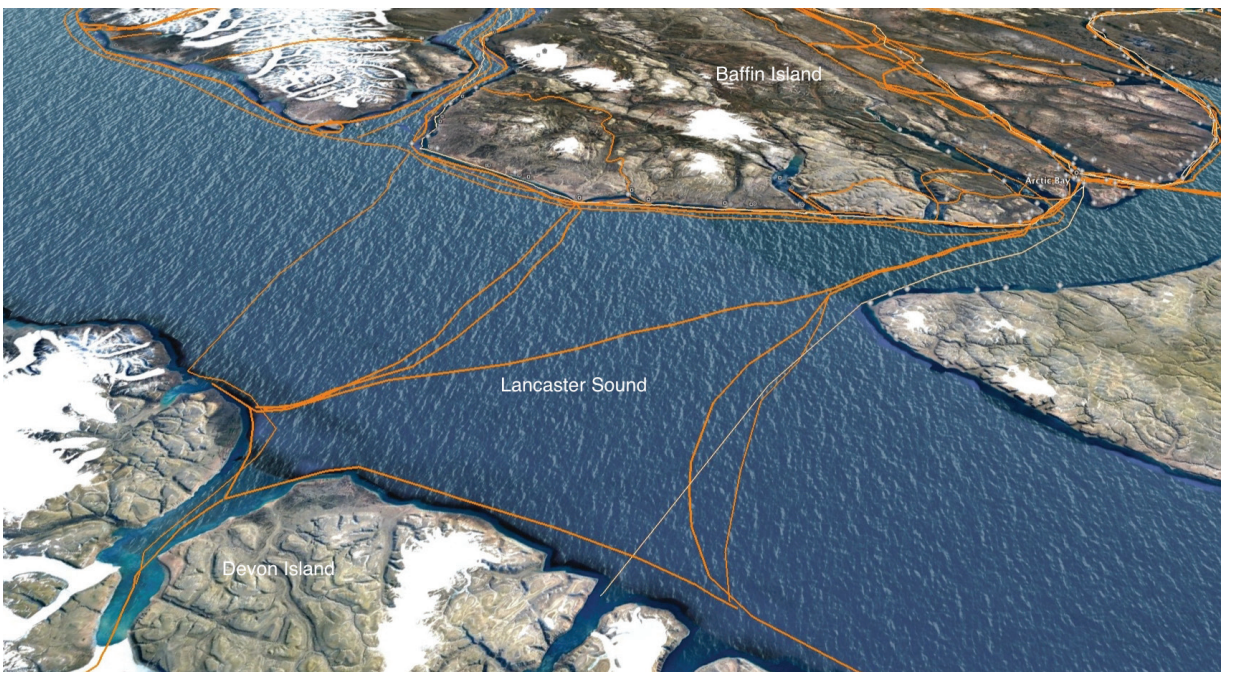
LONG BEFORE THE WATERS AND SHORES OF WHAT is known today as Canada's Arctic archipelago were explored and surveyed, Europeans imagined a waterway connecting the Atlantic and Pacific oceans through or near the North Pole. But the archipelago shuttered hopes of easy passage. Its islands created conditions for longer sea-ice seasons and, together with continental shorelines, led to ice-clogged straits well into summer. Although the early European imagination lost out to geophysical reality, sea-ice melt accompanying 21st-century climate change has rekindled the prospect of navigation through the Northwest Passage. Projections indicate thinning ice in summer, sparking hopes for shorter inter-oceanic routes for cargo and new resource frontiers for mining, fishing, and the cruise-ship industry. Maritime administrators in the Canadian government have begun identifying corridors where shipping traffic may be directed, as well as areas and times where icebreaking would be necessary. However, this often has occurred without taking sufficient account of Inuit uses and understanding of these marine spaces. To embrace these worldviews is to fundamentally rethink the "frozen" nature of the Arctic archipelago and its many chokepoints.

Unlike the shipping industry, which approaches sea ice as an obstacle and ice-prone straits as maritime chokepoints, Inuit and their predecessors have welcomed the presence of ice in narrow waterways as a surface that connects people, animals, land, and sea. The islands and the intricacies of the continental shorelines create conditions for most of Canada's 23 polynyas (formations of open water surrounded by sea ice through the winter), as well as smaller but equally significant openings such as ice leads and cracks. Important to Inuit ways of life is the fact that open-water features surrounded by ice, such as polynyas, are biologically productive places where marine mammals who remain in the Arctic congregate throughout winter. As spaces of livelihood, Inuit have accessed these formations from camps and settlements on nearby shores, as well as by traveling and often living on landfast ice.

FIGURE 1 (OPENING PAGE): Igloolik hunters on the sea ice off the coast of Repulse Bay. PHOTO BY C. APORTA

Ice-prone straits reveal radically different understandings of the Arctic. Here we explore how shipping industry and Inuit conceptions of sea ice relate and what their convergence might mean for governance. Conceptual tensions have manifested as two major developments in international law: one, the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), particularly Article 3 (the right to self-determination); and, two, the growing international regulation of Arctic shipping by the International Maritime Organization, especially the International Code for Ships Operating in Polar Waters, effective January 2017. In the context of a changing planet, these two developments will guide changes in Arctic governance. Acutely aware of warming signs in the Arctic climate at least since the late 1970s, Inuit (and Inupiak) have been preparing for this historical moment by demanding their territorial rights to decision-

FIGURE 2: Sled trails between land and sea, and across Lancaster Sound. Trails documented by Aporta between 2006 and 2011, using GPS and participatory mapping. PHOTO BY C. APORTA



making powers across legal arenas (Dorough 2017). Governmental agencies and shipping corporations now are challenged to honor and respect Inuit knowledge and ways of being. It remains to be seen, however, whether Inuit rights will help reshape shipping and navigational practices that have evolved largely on open, not icy, waters. Insofar as climate change creates opportunities for ships to navigate routes that they never could sail before, arctic chokepoints become sites for the negotiation of difference—particularly as global shipping routes converge on seasonally unfrozen spaces that Inuit use for hunting, fishing, and transport.

INHABITING THE SEA: SHORES AS CONNECTORS

Inuit terminology reveals a profoundly relational view of what ocean law experts would call "chokepoints" (Alexander 1992). Terms for sea-ice features, such as cracks and leads, often encode relative position to shores and floe edges, revealing an entanglement of sea and land in the core definition of sea ice. Traditional trails through the archipelago also reveal deep connections of land and sea in Inuit life (Aporta 2009). For example, sled trails transition between snow-covered land and sea several times over (figure 2). Meanwhile, summer walking trails and boat routes are intrinsically linked.

Riverine watersheds mediate sea-land connections. The fresh-salt water relationship is critical to Inuit, who often establish camps at river mouths and who routinely travel across the frozen links offered by bays and fiords, creeks and rivers. Inuit elders in the community of Pond Inlet related how, in summer, they could tell their positions within Baffin Island's interior by the direction the rivers flowed. Those flows structured spatial perception and identity, as rivers flowing west were considered part of Inuit Igloolik territory. The watershed allows anadromous fish (e.g., arctic char) to migrate between fresh water and sea, and also allows people to travel. Land and sea are both understood to be part of Inuit territory, unsurprisingly, since landfast ice becomes an extension of land for most of the year in most areas.

To Inuit, shores connect more than divide. A quick analysis of Inuit place names between present-day settlements of Arctic Bay and Pond Inlet, located on the north edge of Baffin Island along the southern shore of Lancaster Sound (see figure 3) illustrates the complex dynamics between land, sea, animals, weather, and people. All the place names on the map represent coastal features, and their meanings are associated with events, animals, and activities denoting interactions between land and ocean.

Marine salt-water spaces are defined less in terms of shoreline boundaries and more in relation to geophysical dynamics. While it is not uncommon for Inuit to name a stretch of sea in relation to a place name on shore (e.g., Salliarusiup Kangiqqlua refers to the Bay of Salliarusiq's raised beaches), emphasis is placed on physical features relevant to mobility such as ice formation and breakup, currents, winds, topography of landfast ice, and presence and dynamics of open water. More than a bounded space open or closed to transit, for the Inuit the sea is a living environment in three significant ways: (a) it changes dramatically through the seasons; (b) it allows

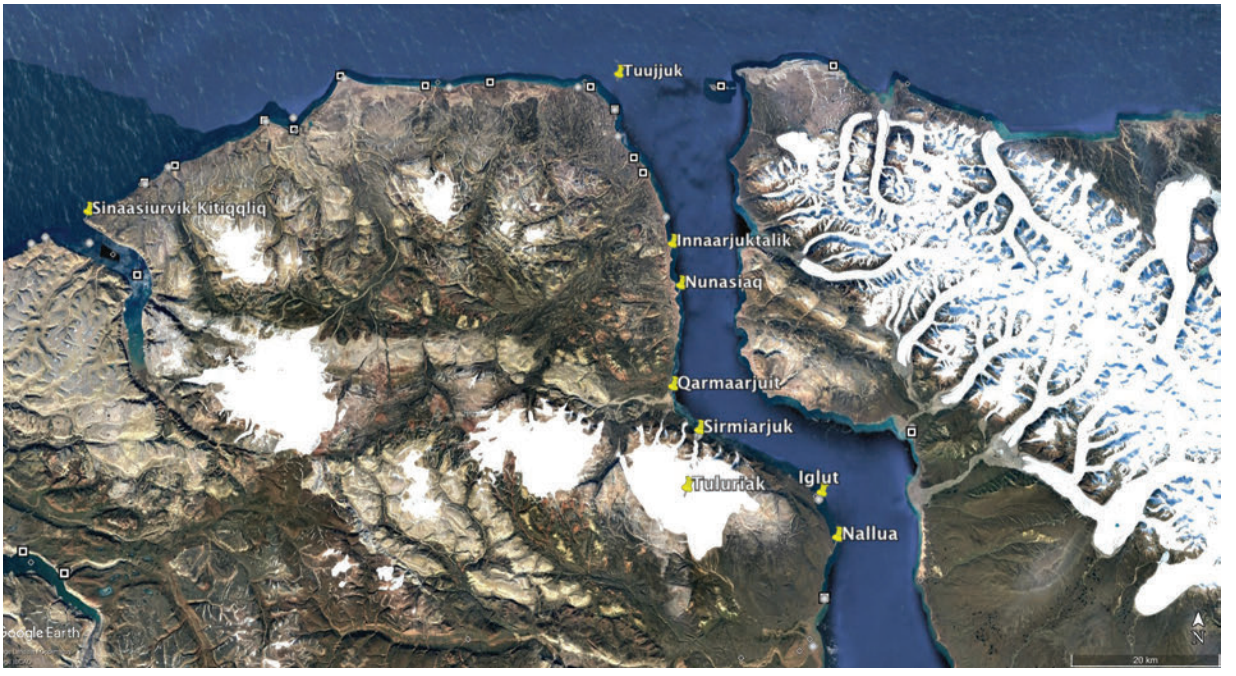


FIGURE 3: Selection of place names on the southern shore of Lancaster Sound. APORTA AND INUIT HERITAGE TRUST.

animals to thrive; and (c) if properly understood, it allows them both commerce and travel.

Seasonality is a crucial component of Inuit residence patterns. Facing Lancaster Sound, the place name Tuujjuk refers to a small island campsite where the surrounding ice "keeps moving and hitting the shores" creating some open water where walrus, narwhal, and seals can be hunted. Caribou herds cross the sea ice in fall, while bird eggs are gathered from nests in summer when glaciers input fresh water into the sea. The land–sea interface is part of a continuum: coastal place names, camping sites, and well-established routes are connected strongly to Inuit uses of marine spaces, all of which change with the season. At once fluctuating and substantive, the sea-ice-land continuum is integral to the Inuit worldview. As such, it demands both recognition and protection as per the stipulations of UNDRIP and the Polar Codes.

SHIPPING PERSPECTIVES ON ARCTIC SEA ICE AND MARITIME GEOGRAPHY

For mariners in the shipping industry, sea ice constitutes a barrier to mobility that threatens boat safety. Narrow straits and channels spatially constrain vessels bringing them into closer proximity to the coast and each other. In busy waters, the danger of collision is real (COLREGS, 1972). Many areas in the Arctic are not charted according to modern hydrographic standards and as a result there have been several groundings (Arctic Council 2009)—stark reminders of the dangers of navigating Arctic waters.

Polar shipping is highly regulated (Polar Code 2015; Chircop 2016). Regulations govern a ship's relation to sea ice in various ways. International Polar Class rules prescribe construction standards for ships, as well as equipment and crewing requirements needed to navigate different ice conditions safely (Polar Code 2015). Canada has divided Arctic waters into 16 shipping-safety control zones, each subject to different Polar Class and ice conditions (SSCZ 2010). There is nomenclature for ice, such as concentration of sea ice and type of ice (e.g., ice fields, icebergs, and growlers, all of which present unique hazards) (Canadian Coast Guard 2012). Safe navigation frequently involves some ice-breaking; icebreakers may be called in to open channels. Weather information services include reporting on ice conditions in real time.

Shipping relies on distinctive knowledge, skill, and information. Both Canadian and international rules govern training of polar seafarers (STCW 1978). Ships entering Canadian Arctic waters are required to have an experienced ice navigator on board. They also must have access to meteorological and ice forecasts, all relevant charts, notices that update charts and navigational conditions, publications concerning ice navigation in Canadian Arctic waters, etc. (CCG 2012). These regulations for safe navigation establish technological requirements (including radar, electronic chart display information system and VHF communications from monitoring authorities such as NORDREG Canada). Rules also require maintenance of a proper lookout and safe speed in all visibility conditions as a matter of good seamanship (COLREGS 1972).

Despite their dramatically different orientations to sea ice, the mobilities of the shipping industry and Inuit both depend on ice conditions that change seasonally. While shipping routes increasingly are navigable in summer, the shoulder seasons tend to be unpredictable. To compensate, vessel operators rely on notices to shipping, as well as ice and weather forecasts. At the beginning of every annual navigation season, the Canadian Coast Guard inspects navigation aids and usually has to place or reposition navigation buoys and other aids, as those left from the previous season likely will have shifted positions. Indeed, when the small cruise vessel Hanseatic ran aground in 1996, the captain's mistake was relying on the location of a navigation buoy from the previous season (TSBC 1996).

CONCLUSION

The Canadian Coast Guard recently has proposed a new focus on services dedicated to polar shipping, including icebreaking, within designated corridors in order to better utilize limited resources by concentrating the growing numbers of transiting ships (CCG 2014). This initiative spotlights the critical importance of understanding the conceptual tension we have highlighted here. While maritime regulators and ship operators approach narrow straits and channels as spatially constrained and potentially hazardous chokepoints, Inuit experience them as parts of a sea-ice-land continuum that defines their territories and lives. At present, Inuit communities and organizations are being involved gradually in conversations regarding Arctic shipping, but this engagement typically takes the form of community consultation rather than active participation in shipping governance. Nevertheless, spaces of conversation are being opened, as regulators attempt to align with Canada's commitment to respecting indigenous rights as delineated in the UNDRIP.

For example, on April 20, 2017, regulators, mariners, and Inuit leaders met at Dalhousie University to discuss issues related to shipping governance at an event convened jointly by the Company of Master Mariners of Canada and the Ice Law Project. The speakers reflected vastly different perspectives on Arctic waters, but also some commonalities. Both ship operators and Inuit understand that use of dynamic, fluid spaces depend on seasonally recurring events, as well as on yearly variations. Both groups utilize the space in summer, and open-water navigation involves ice avoidance for both.

On the other hand, Inuit use of marine space is not

FIGURE 4: Initiating dialogue across the conceptual divide: a workshop that brought together Inuit speakers and participants from the maritime community (Ice Law Project 2017). PHOTO BY S. KANE

dependent on the absence of ice. The presence and constitution of ice only defines how space is used. Inuit conceive marine space always in connection to life and to events on land. The shores that define the Canadian Arctic archipelago are not the margins of the marine/land space; on the contrary, they are the connectors between marine and land realms within which people and animals share a living. Inuit worldviews, in this regard, challenge conventional understandings of chokepoints.

The lesson is clear: what is a chokepoint for some can be something very different for others. Looking ahead, the political, security, and economic significance of the Canadian Arctic archipelago will remain high. Yet the contemporary governance of Arctic shipping does not reflect fair recognition and accommodation of fundamental Inuit rights. To avoid or manage conflict between shipping and Inuit, tensions must be recognized and addressed. The concept of Arctic homeland is reflected in everyday Inuit life and in their political struggle to be recognized as players in the governance of Arctic waters. With infrastructural investment and political recognition, Arctic chokepoints (diversely conceived) can provide physical and conceptual spaces where indigenous rights and ship safety may perhaps find a more harmonious relationship in the Canadian Arctic. ■

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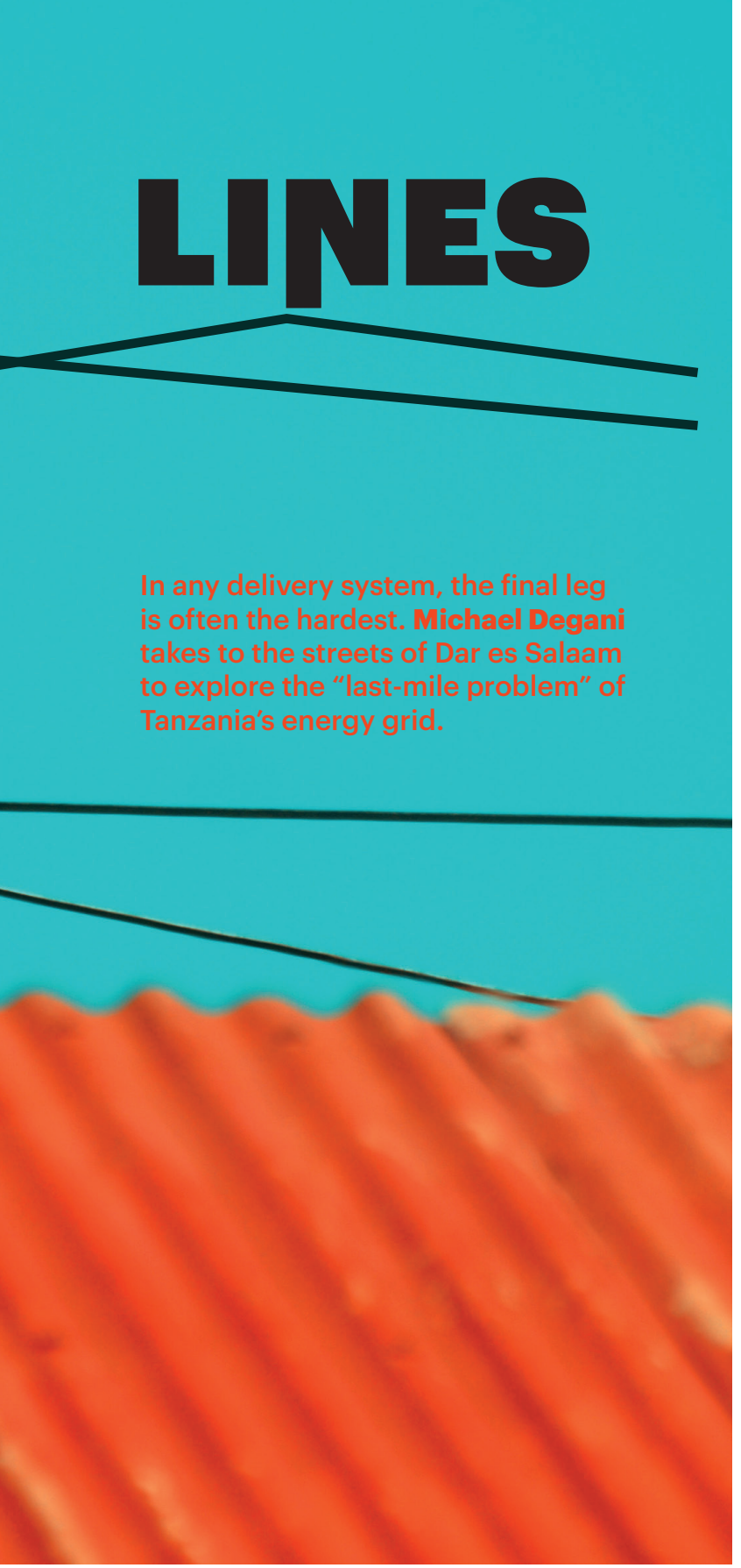
DISSERVICE

LINES

In any delivery system, the final leg is often the hardest. **Michael Degani** takes to the streets of Dar es Salaam to explore the "last-mile problem" of Tanzania's energy grid.



SABINA: *Listen to me brother! My end is straight. I'm just the messenger, I've just been sent—*
MAN: *No, your end isn't straight! You hassle people … When you cut a person's power, remember that he does business. It causes damage and losses that come from you and, at the end of the day, you're responsible!*

LIKE MANY UNPLANNED SETTLEMENTS in Dar es Salaam, Tanzania, the neighborhood of Kibo is a network of winding dirt roads mottled by houses, kiosks, butchers, and grain threshers. As part of my ethnographic fieldwork on Dar's municipal power grid, I had been walking around Kibo with a "disconnection team" dispatched by the national electrical utility, Tanesco. After a company truck had dropped us off that morning, the team split into groups of twos and threes and began trudging through the neighborhood, inspecting households for technical irregularities and tracking down unpaid accounts. Around 10:30 a.m., ready to break for tea, we converged with the other half of the team working the area. We found Sabina at the counter of a cramped pharmacy in front of a residential compound. A meter's missing security seal—a thin loop of wire with plastic serial number tags that lock the casement—had drawn her suspicions, and an argumentative crowd.

The tenants protested that they had never seen any security seals. Originally, the compound had a conventional meter, but the tenants had lobbied the landlord to replace it with a prepaid model. The landlord was "too busy" with his affairs and delegated this task to the proprietor of the pharmacy who was elsewhere that day and unable to give an account. To the crowd's increasing displeasure, there was nothing to do but cut the power. But as Sabina prepared to write out the disconnection report, she continued to argue:

An employee of the Tanzania Electric Supply Company Limited (TANESCO) at work on a wooden utility pole in a suburb within the Mbezi Juu ward of Dar es Salaam.
PHOTO BY PETER OGILLO

The tone here isn't right. Wait—let me finish. The TONE HERE ISN'T RIGHT! Listen to me. First, even a meter arriving in a ship container already has seals, understand? If your meter doesn't have a seal, we will assume you are a thief. Why do we assume that you are a thief? Because with that meter you can directly connect the line. You can set yourself up however you want and then afterwards reconnect. And that's why when we install meters we install them with a seal. You were just accusing me, saying, '[You] want money, you like ripping us off,'—well, we are well-accustomed to these curses.

The service line assemblage.
PHOTO BY FAISAL SHABAN

Such arguments were not uncommon on Tanesco field patrols. The national power utility has suffered two difficult decades. Austerity reforms, corruption scandals, and rising consumer demand all have stressed the technical efficiency and fiscal health of its daily operations. While economic liberalization has flooded the city with fans, televisions, refrigerators, and other accoutrements of global modernity, the electricity required to power these devices remains expensive and unreliable. Hence in both dramatic and mundane ways, electrification channels the promises and problems of urban life in the aftermath of a morally charged African socialism.

These promises and problems converge at one of the grid's key chokepoints—its service lines. Service lines illustrate the "last mile problem" in infrastructural networks (Graham and Marvin 2001: 316). As logistics experts well know, the final leg of a journey—the Amazon package landing on your porch, guiding the ship into harbor, etc.—tends to account for a disproportionate amount of expense or inefficiency relative to the system as a whole. The problem is inherent to the structure of dendritic networks, in which high-volume, collective distribution hubs must interface with a bristling mass of individual end points. As we saw with Sabina and the disconnection team, "last miles" are vulnerable to congestion and stoppage, and, in turn, fertile ground for argument and innovation.

THE TECHNICAL LAST MILE

While the power "grid" often evokes a flat, interconnected square, its topology is in key respects dendritic. At any given moment, 900–1,500 megawatts of Tanzanian-generated electricity is dispersed to approximately 900,000 separate residences and businesses (80 percent of which are located in Dar es Salaam). Consumers send money back through digital prepaid or analog postpaid metering systems, and these payments are recorded at local branch offices and, ultimately, at Tanesco's national headquarters. In short, electrical current moves "down" to the decentralized, street-level branches of the network as currency moves "up" to the centralized offices (*ofisini*). The linchpin of this double movement is the service line—that assemblage of utility pole, transformer, cable, bracket, and meter. The service line both ferries power across a socio-legal threshold and quantifies that power in kilowatt hours. It is the critical social and technical connection point linking public network to private consumer.

Spanning the public and private sides of the network, service lines are host to various frictions and vulnerabilities. The first kind of friction is technical. Most power infrastructure is at a spatial remove from consumers, elevated across transmission towers and utility poles along public roads. But the service line is an extension of state property that must pass into local neighborhoods and articulate with its buildings. As the network tapers down to the population of individual lines, it becomes entangled—sometimes literally—in the lifeworlds of local neighborhoods. Cables catch in branches or droop precariously over metal roofs. Utility poles can be knocked by cars or buses; meters and the copper wiring are vulnerable to theft; oil is siphoned out of transformers and used for cooking.

When these various frictions choke off a service-line connection, consumers' asymmetrical dependence on Tanesco comes to the fore. Like air travel or road networks, the power grid's interconnectors generally allow for multiple routes to a destination, thereby preventing an entire network shutdown. But there is

Service line wires dangle precariously over a secluded corner of Kibo. PHOTO BY MICHAEL DEGANI

no way to reroute a journey if the destination itself is blocked—a truth familiar to anyone who has waited helplessly for the arrival of the cable guy or the city snowplow. Tanesco consumers similarly are cut off when their local utility poles fall over, their wires strip, or their meters are ripped off the wall. They must endure service delays that are long, economically damaging, and often dangerous. In such moments, the structural vulnerability of the "last mile" becomes clear. It is simultaneously too localized (warped by specific conditions) and not localized enough (dependent on logistical coordination from the center). In response, residents develop contingency plans around the service line. They purchase solar-powered backup systems and generators, solicit unofficial repairs by *vishoka*—a mixture of moonlighting Tanesco employees and freelance "street electricians"—and offer bribes to expedite maintenance.

THE SOCIAL LAST MILE

If the flow of electricity "down" the last mile involves technical friction, the flow of money back "up" involves a host of social frictions, as well. As current passes through the meter, it is measured in kilowatt hours, which is the first step in the billing and payment process that channels currency upward towards the centralized Tanesco offices. However, kilowatt hours are a rather imperfect expression of consumption because a "household" is a misleadingly standardized abstraction. The postpaid billing system assumes that a household corresponds to a set social unit, has clearly delineated roles concerning payment, and has the means to afford that payment. Yet, as the scene at Kibo suggests, households in Dar es Salaam often comprise complex webs of distributed responsibility. "Swahili"-style homes, for example, comprise multiple rooms that surround a single courtyard, often shared by multiple families. Commercial activities such as kiosks, artisanal workspaces, or indeed pharmacies agglomerate onto these structures, as well. An overlapping network of owners, renters, extended kin, and employees thus traverse what from the perspective of the meter is a single social space; hence households fall behind on bills, dispute their responsibility for them, or abscond before paying them. Experienced residents learn to inquire into any existing electricity debt on the meter before renting a new room or house, lest they unwittingly inherit the financial burden.

While busted service lines dramatize consumers' dependence on an overcentralized utility, unpaid debts point to Tanesco's dependence on an undisciplined periphery. As one Tanesco manager put it to me: "Our efficiency as Tanesco depends on the society. Our customers, we can't even identify their names, how do we transact? One day a customer comes in and says his name is this, tomorrow he'll change his name. You are dealing with nobody. Who are your customers?" The inability of meters to capture this social complexity manifests as debt. Disconnection teams also express this structural friction; they are the utility's "reply" to nonpayment. Residents can protest, curse or plead, but in the end the teams can only "follow the disconnection sheet" and forcibly reset communication between the household and the meter.

At a certain point, however, these diametric social and technical breakdowns can feed back and blur into a vicious cycle. Excessive disrepair frays trust and further disinclines residents to participate in the formal system of billing. Consumer distrust, conversely, can manifest itself through physical tampering of the line. As mentioned above, *vishoka* earn income negotiating the technical chokepoints in repair and installation, and this extends to the social chokepoints in billing and payment: they can bypass meters, surreptitiously reconnect them, or slow down their recording mechanisms. In this context, something as ordinary as a missing seal becomes ambiguous as to what it signifies. Did it index Tanesco oversight or, as Sabina seemed to suspect, consumer tampering? Because both of these possibilities grow along the vexing final mile of the service line, the missing seal became a site of recrimination, a place where one could feel, affectively, the entire structural vulnerabilities of the network in one small artifact.

CONCLUSION

Animated by a widespread managerial obsession with speed and efficiency, smoothing out

the last-mile problem and its chokepoints is the stuff of capitalist invention and ideological investment. It was reported recently that the California startup Zipline plans to begin using drones in Tanzania to deliver medicine from its distribution centers to rural villages, thereby bypassing the difficult mountainous terrain (Landhuis 2017). As opposed to the relatively rough space of land, the relatively smooth space of air reduces the structural distance between the two geographical points. Conversely, the growing popularity of prepaid meters in Africa simplifies the frictions of payment by eliminating the very possibility of debt. This practice reflects the Nobel Prize-winning insights of "nudge theory," in which efficiency gains and behavioral control lie in properly smoothing out the "choice architecture" of citizen-consumers (Thaler 2009). In prepayment, power is off until purchased, and this default setting disciplines people to consume in ways the network more easily recognizes.

Such technical nudges belie the inherent politics of infrastructure (Von Schnitzler 2016). Pathways privilege certain features of their destinations (e.g. reachable by air) at the expense of others (e.g. reachable by land). In some basic sense, pathways *format* their destinations. They force destinations—to greater or lesser degree—to orient themselves to the pathway's features: postpaid meters create consumers that *can* pay their bills on time, whereas prepaid meters create consumers that *must* pay their bills on time. But the actual complexity of destinations can obstruct pathways in return, forcing them to adapt or reroute. Following disconnection teams underscored the way the power network becomes hopelessly entangled in the physical distribution of neighborhoods, their social relations, and their cultural expectations. In particular, service lines emerged as the chokepoints linking Tanesco's centralized infrastructure to its decentralized destinations, the "last mile" where the network's underlying logics are both felt and negotiated. ■

A member of the disconnection team (left) and the author's research assistant examine a suspicious looking meter. PHOTO BY MICHAEL DEGANI

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Janell Rothenberg explores a transshipment port complex along the Strait of Gibraltar. While transshipped cargo is never supposed to enter Morocco beyond the port, its movement ultimately depends on local mediation.

"WORLD-WORLD" LOGISTICS IN TANGIER, MOROCCO

"The Strait as Maritime Bridge" (Le détroit comme pont maritime) in the TanMed Port Authority visitors center.

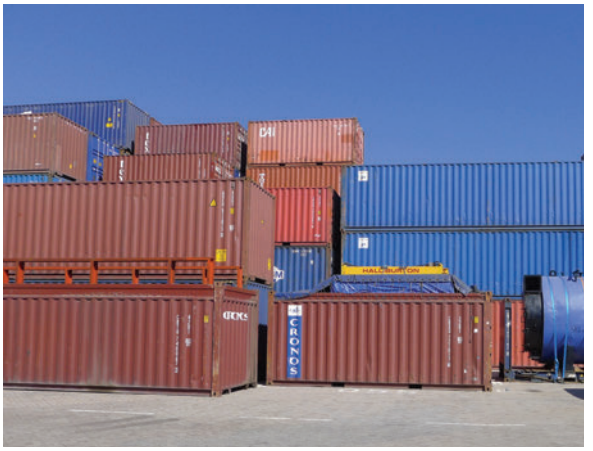
Spain and the Mediterranean viewed from the edge of a container terminal at TanMed. PHOTOS BY JANELL ROTHENBERG

ON ANY WORLD MAP, the Strait of Gibraltar is so narrow that Europe may appear to touch Africa where the Mediterranean Sea meets the Atlantic Ocean. Only nine miles across, the strait has long been a chokepoint for seaborne trade. It offers some of the earliest evidence of efforts to create common ways of containing maritime cargo in the archaeological record (Bevan 2014). Historically, ports along the strait were primarily gateways to local markets. This was the case in Tangier, which overlooks the ancient chokepoint. Here, the word "strait" conveys worldliness and appears in various local business names as the Arabic boughaz, French détroit, or Spanish estrecho. Tangier's historical gateway function continued even as new terminal infrastructures emerged in the latter half of the twentieth century to service the new, standardized steel shipping container and its vessels. Since 2007, however, TanMed—a hub port complex (short for "Tangier Mediterranean")—has reoriented cargo flow through the strait and introduced new types of chokepoints.

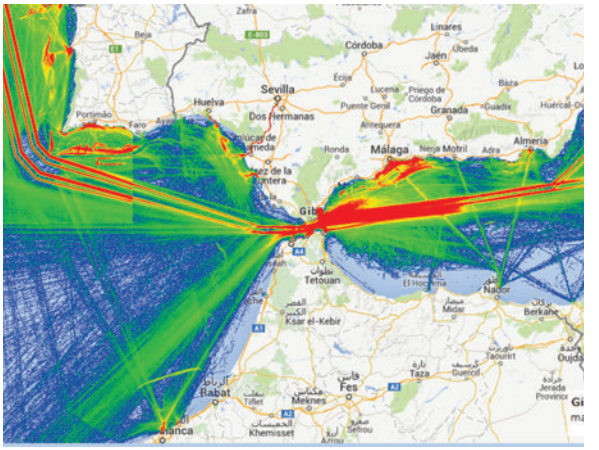
While conducting research on the transformation of Tangier's logistics industry, I heard port administrators describe TanMed using the phrase "world-world." Rather than a "local" gateway port into or out of Moroccan markets, the "world-world" hub port is bridging global maritime routes and elevating Morocco to a truly global scale of logistics. TanMed is designed to take advantage of the strait's status as a maritime chokepoint linking East-West and North-South routes by offering global shipping lines a platform for transferring cargo between vessels going in different directions. In particular, TanMed has become an important intermediary point for transshipment between the large-scale vessels of East-West routes carrying consumer goods from Asia and the feeder vessels of North-South routes serving West African consumer markets. These long-distance routes of East-West trade increasingly depend on large container ships both too large and costly to stop at all but a few highly connected hub ports for transshipment, like TanMed, where containers are transferred to or from smaller, feeder vessels serving a wider range of destinations (Rodrigue et al 2017). However, despite administrators' visions of the port as a seamless bridge for flow, bridges are chokepoints too. That is, the very act of facilitating connection and flow produces its own set of lags, bottlenecks, and other logistical complications. Indeed, Moroccan cargo flow coordinators revealed the "world-world" connection to me in relation to their everyday problems of mediating other chokepoints at the port: the mundane frictions between intersecting forms of information, material, and territory. Rather than a product of only discrete geographies and infrastructures, they reveal how chokepoints in maritime logistics can be found throughout the scales of supply-chain work.

While interviewing the then-port director Mohammed in 2008[1], I glimpsed the strait out his office window as he described how the port's chokepoint location made it an ideal platform for transshipment. He expressed with pride that TanMed is not just a typical

1 Except when a matter of public record, names of people and companies have been changed to protect anonymity.



Transshipment containers stacked close to the docks at TanMed terminal. PHOTO BY JANELL ROTHENBERG



Screen shot of ship traffic through the Strait of Gibraltar, past the TanMed port. MARINEVESSELTRAFFIC.COM

Moroccan port, "captive to local flows," but is instead a hub with "world-world connectivity." However, hub ports must also become chokepoints themselves as well-connected and indispensable platforms within larger transshipment networks. Mohammed referenced this need when telling me that they planned on "joining the map" of the most connected ports in the world. When the port welcomed the world's largest existing containership in 2012,[2] Rachid Houari, one of Mohammed's successors, was quoted as saying, "this event symbolizes the top-notch, international scope of this port and logistics hub, which places Morocco among the top eighteen countries in the world in terms of maritime connections" (Tanja24 2012).[3] As a result of these changes, the TanMed Port is recognized by logistics scholars as having played a critical role in transforming the Strait of Gibraltar from "an obligatory passage point" to "an important transshipment nexus" (Rodrigue et al 2017; Rodrigue 2016). Port administrators thus echo this chokepoint-as-nexus discourse. However, while the world-world traffic of transshipment is meant never to enter Moroccan territory beyond the zones of the port, this traffic still depends on local Moroccan services of chokepoint mediation.

Since 2007, the transformation of the strait from a gateway to a hub at TanMed has happened with the help of the first generation of Moroccan cargo flow coordinators. Working for the Tangier agency of a global shipping line, Noura and her colleague Youssef are part of a rising middle class of young Moroccans in the region who moved north to participate in Tangier's emerging logistics industry. However, anxious to facilitate the world-world traffic of transshipment through the port, they were frustrated with the pace and "mindsets" of the older generation of transportation workers, veterans of a time when imports and exports dominated regional trade infrastructure. If Noura and Youssef represent a new generation attuned to logistics and what it takes to move cargo between local and world-world scales, their experiences do not map onto those of port administrators. Rather, these coordinators experience the port's world-world mission as an everyday problem of mediating across different kinds of chokepoints.

Noura's work revealed chokepoints between various forms of digital and paper information and their local, national, and transnational sources. Her daily work would start with receiving worksheets from the company's central office indicating what containers were to be discharged from which vessel. Ensuring that the terminal is notified accurately required that Noura keep a constant lookout for seemingly minor, informational discrepancies that could prevent containers from being discharged at TanMed and thus interrupting their complex, world-world routes. These discrepancies can emerge in different formats of information between the central office and the local, terminal operator, or between codes for ports and correct locations in the terminal yards. In mediating these discrepancies, Noura's work follows a virtual map of information chokepoints between her company's home office, its vessels, and the terminals at TanMed. Because every physical movement in logistics depends on a prior movement of

2 This ship, the Marco Polo, is an "Ultra Large Container Vessel," vessels with a minimum capacity of 14,501 twenty-foot equivalent container units (TEUs). Such ships will be unable to pass the 13,000 TEU ship limit for the expanded Panama Canal. Since 2012, larger ships with greater capacity have come online. Many have stopped at TanMed.

3 Since the time that TanMed opened in 2007, Morocco has risen rapidly in the UN's Liner Shipping Connectivity Index (LSCI) annual ranking of countries by number of maritime connections. While in 82nd place on this ranking in 2007, Morocco was 16th as of 2014 (UNCTAD 2014). It remains between the 16th and 18th most connected.

information, her concern over mediating these chokepoints went beyond these particular forms and sources of information. She told me that "you have to respect" every step of logistics because "as soon as you miss an aspect from logistics, a step from logistics, that's it. The whole chain gets messed up." Noura's mediation work thus was necessary to avoid the creation of further chokepoints in world-world logistics.

Youssef's work objective is "the greatest reuse of containers" by ensuring that transshipped containers do not stay too long in TanMed's terminals. However, he has learned that containers become immobile and damaged in many ways. Damage can include a refrigerated container that leaks or a poorly packed one that risks spoilage. These damaged containers cannot be loaded onto a vessel, but staying in the container yard racks up fees. Youssef has faced a Moroccan Customs Authority that "does not understand" that damaged, transshipped containers must be repaired outside the terminal. When world-world cargo needs to be fixed locally, Youssef says that the authority will respond saying that the port "is a free zone, we do not intervene" or that "the Moroccan state does not accept garbage." In working with immobilized containers and cargo, he is confronted with how containers themselves can interrupt plans for cargo flow. The chokepoint that emerges between the borders of the port's free zone and Moroccan customs territory is nested within others: between old and new forms of cargo traffic, regulation, ways of work, and scopes of action. Despite the promise of world-world connection, Youssef's transshipped cargo must sometimes move through national chokepoints.

The rise of transshipment hubs as critical, momentary stops for world-world cargo means these ports are also vulnerable to any disruption. Much has been written about the portside disruptions of strikes, terror, and piracy (Cowen 2014). Yet cargo flow coordinators face other chokepoint challenges that are often just as critical, though far more banal. Port administrators like Mohammed imagined the port as a frictionless bridge across a chokepoint. Cargo flow coordinators like Noura and Youssef, by contrast, experienced the port in terms of more mundane chokepoints that can still, as Noura said, "mess up the chain." Seen in this way, logistics coordination is an ongoing project of mediating between virtual and territorial borders and between the alternating potential of chokepoints to stop and support cargo flow. As planned or emergent sites for mediation at multiple scales, chokepoints in global logistics can thus be found at every boundary between information, things, and spaces. In going behind port hub promises for world-world connections, inquiry into how chokepoints are actually mediated can reveal the challenges of trying to jump scales from national to global forms of logistics. ■

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REMITTANCE CHANNELS AND REGULATORY CHOKEPOINTS

Since 2008, new financial regulations have reformatted the channels of global remittances. **Ivan Small** examines how the Vietnamese diaspora is navigating this landscape of regulatory chokepoints.

The bells jingled on the door as I entered a small store tucked in a New England shopping center.

Specializing in transactions between the United States and Vietnam, the store is representative of many small operations providing travel and financial services, including plane tickets, visas, box shipping, and remittances. Discussing her business, the owner Kelly gestured to a wall covered with children's pictures. She explained they were extra passport photos of her customers' kids, many of whom were now grown up and customers themselves—a testament to the store's enduring role in facilitating transnational ties for the Vietnamese American community.

Yet when our discussion turned specifically to remittances, Kelly lamented that it was becoming more difficult for small businesses like hers to compete. In the past, she handled remittance transfers herself, via a bank account. Now, according to her, "banks don't allow it." As an informal remittance service provider operating in a gray area to facilitate small transfers, her company had become visible to the expanding reach of the formal financial world—most notably, as a potential "black market" operation. Kelly recently contracted financial-transfer services to an external provider but noted that, at $1.25 per transaction, "It's hardly worth it anymore. Nonetheless, our customers need to send money and expect us to do it for them, so we continue as long as we can."

The informal money-transfer sector has been integral to the Vietnamese community in the United States, but during the past ten years its share of the U.S.-Vietnam remittance market has fallen from one-half to one-third. Kelly's operation was one of many affected by remittance oversight regulations put in place after the 2008 financial crisis. Specifically, regulations associated with Dodd-Frank require low-value transfers of more than $15 to comply with disclosure, consumer protection, and error-resolution rules requiring more steps and paperwork for remittance providers. Such regulations were emerging as a problematic chokepoint, disrupting and diverting the long-standing channels of her financial-transfer services. Kelly experienced this regulatory chokepoint as a slow but significant shift, pressuring her to diversify from remittances to other services. Writ large, "not being allowed to do it anymore" signaled a significant shift in the financial infrastructures linking diasporas and homelands—Vietnamese and otherwise.

Reforms of international remittance infrastructures since 2008 have impacted transnational banking, financialization, and payments. By highlighting these transitions—as well as the stories and histories of money-transfer operators like Kelly, who facilitate not only financial connections between Vietnam and the United States but also other material and bodily mobilities—we gain insight into how emerging chokepoints in the international financial system are experienced and navigated. Doing so draws attention to the practical, technical, and affective value of such services in framing and maintaining economic and social relations.

CHANNELS

It is striking to compare current U.S.-Vietnam remittance flows (estimated at over 12 billion dollars annually) to the immediate post-Vietnam War period, when most remittances largely took the form of boxes of material goods that were sent by post. Some of these commodities were meant for sale on the Vietnamese black market. Others might have cash or even gold and jewelry strategically hidden within them. In the late 1970s and 1980s, informal markets featuring commodities remitted from

Material "remittances" accompany diasporic returns. Ho Chi Minh City.

"Ethnic" Vietnamese remittance service provider, California.

the West began to appear in cities in southern Vietnam. They were attended as often by browsers as buyers, as Vietnamese citizens under the new socialist economy gazed with nostalgia at consumer luxuries from a capitalist fantasyland now beyond reach.

Following Vietnam's Đổi Mới (Renovation) economic reforms in 1986, the end of the Cold War in 1991, and the restoration of political and economic relations with the United States in 1995 and 2001, respectively, Vietnamese reintegration with the capitalist global economy gained momentum. Monetary remittances rapidly rose, particularly after 2002 when the Vietnamese government permitted more financial institutions to deliver them. Material-remittance patterns continue but also have transitioned to boxes personally carried on airplanes as diasporic Vietnamese increasingly returned for visits—more than half a million annually in recent years.

The 2008 global financial crisis had a rippling but not crippling effect on remittance flows. For Vietnam, the quantitative impact came in 2009 when remittances declined for the first time in their recorded history. Nonetheless, the decline was brief, and remittances were on the rise again by 2009, with recent years showing gains up to 15 percent annually (World Bank 2016). More significantly, the 2008 crisis impacted the channels by which remittances are sent. By making compliance more legally complex and labor intensive, regulatory measures since the crisis have pushed remittances from the informal to the formal sector, which is why thinly staffed services such as Kelly's are feeling pressure. They now compete not only with banks but money-transfer companies such as Western Union and Money Gram that benefit from legal teams and economies of scale. Many of these large companies view the regulatory changes as an opportunity to actively and aggressively grow market share.

REGULATORY CHOKEPOINTS

The financial and legal infrastructure for international remittances sent from the United States—the largest remittance-sending country in the world—has transformed significantly since the Dodd-Frank Wall Street Reform and Consumer Protection Act became law in 2010. The act was intended to increase stability, accountability, and transparency in the financial system. Yet it has also become a regulatory chokepoint that has reoriented and reassembled the market. Managers of money-transfer operations note that since the crisis, and 2013 in particular, a new remittance market is emerging, in large part due to a 2013 amendment of the Dodd-Frank act (Section 1073) that makes it difficult for small remittance services to afford to stay in business. This includes oversight and regulatory measures meant to increase transparency and protection for customers, as well as due-diligence/Know Your Customer (KYC) requirements meant to prevent money laundering. Compliance, however, can be bureaucratically and legally complicated, not to mention costly.

The new regulations have squeezed out many of the informal channels through which remittances previously moved. It seems ironic that KYC requirements are making it difficult for the very services that have known their loyal customer base intimately for years. Of the channels that remain, mainstream formal Money Transfer Operators (MTO) and banks are trying to take advantage of the changing legal and business climate to tap into the informal channels of the U.S.-Southeast Asia remittance corridor. One MTO consultant shared with me a particular market-expansion strategy focusing on the nail salon industry, from which workers send back to Vietnam a high proportion of their earnings. In another case, a major bank offered free first-time remittance services connected to personal accounts, with a marketing focus on California where more than a third of Vietnamese Americans live. With new

regulations creating leverage and buoying confidence, the formal remittance sector slowly is closing off and appropriating informal remittance channels—precipitating a mainstreaming of remittance exchange. Big banks and MTOs laud the security, speed, and legitimacy of formal channels; for others, such chokepoints become challenges to navigate.

HOT TRANSFERS AND OTHER GRAY ARTS

Nonetheless, small "ethnic" money-transfer services such as Kelly's continue to be popular. While fees for Western Union are around 5 percent, Vietnamese remittance services offer rates of about 1 percent to urban areas and 3 percent to rural areas, with added benefits like 24-hour home delivery, personalized messages, and gift add-ons. Many of the U.S. ethnic Vietnamese services have been considered a historically "gray" market. Officially licensed in their respective states, they operate within the law but without strict federal oversight, allowing them to sometimes cut corners and save money. New Anti Money Laundering (AML) regulations, however, are potentially redesignating such operations from gray to black.

Beyond storefronts like Kelly's, the informal remittance sector consists of a creative collage of ethnic money-transfer businesses, jewelry shops, courier services, family networks, and "hot transfer" or hawala operations. Hot transfers—which use creative bookkeeping techniques across transnational business and trade operations to transfer value without physically transferring any money—have been particularly popular and cost-effective. Capital controls and restrictions make it difficult and expensive for Vietnamese who want to get their money out of the country, and many Vietnamese working in the informal cash economy in the United States also prefer to keep their money below the tax radar. Hot transfer providers offer creative accounting and invoicing methods that essentially swap incoming remittances with outgoing investments and payments, circumventing costly financial governance and oversight measures.

The innovative collage of "ethnic" remittance channels that faithfully have transferred money, gifts, and messages across transnational kin, social, and business networks for the last 40 years are tried and trusted. The ethnic "mom and pop" segment of the remittance business, however, is aging. Literally. Many of these family-run businesses continue to be run by founders well past retirement age—only now, these owners find themselves competing with much larger, more savvy, and more resourced financial institutions, technologies, and service providers. There is an air of change in the financial worlds of Vietnam, its diaspora, and the international remittance sector more broadly. As one informant working in the remittance business scene in Orange County California's Little Saigon related to me, "It's definitely harder to operate in this business now. There's more oversight since the financial crisis, and you can get in trouble for accounting practices that were previously commonplace." A number of small-scale remittance company agents say that perhaps the long-term goal is not to keep the business running in the same way as in the past but to adapt to a new market. Now the big banks can provide services more effectively, but as one agent emphasized, "We still have the customer base and those customers trust us."

While some informal services are shifting toward the formal market, other financial players are aspiring to tap remittance consumers through service and technological innovations—from remittance service add-ons to prepaid gift cards, as well as emerging and anticipated upload, transfer, and payment technologies such as online and electronic purchase kiosks, mobile money, and even Bitcoin on the immediate horizon. Taking a page from the mom-and-pop playbook, these big players increasingly are attuning their services to cultural sentiments in order to sway customers. These include Western Union offering recipient-incentive gifts during the lunar New Year in Vietnam, Wells Fargo sponsoring diasporic community festivals in California, and numerous other cultural marketing strategies.

The traditional meanings and symbols of remittances as gifts and kin obligations appear to be shifting as new payment and transfer

Money transfer and banking remittance marketing incentives, Vietnam.

"Wall of customers" passport photos, Vietnamese American remittance shop.

platforms compete for customers. Whether such platforms are as attuned to the transnational socio-financial landscape of the Vietnamese community remains to be seen. Central to all of this is the capacity of the diaspora to maintain meaningful economic, cultural, and emotional ties to families and communities in Vietnam.

For now, the shifting channels of U.S.-Vietnam remittances demonstrate how regulations like Dodd-Frank can become chokepoints with far-ranging effects that reshape socio-financial landscapes. For informal-sector actors like Kelly, these regulations have contributed to a formalization and mainstreaming of remittance transfers as smaller informal channels have been closed off or appropriated by big banks and MTOs. Yet while much policy attention is directed to the expansion of formal banking technologies and services, it is also important to consider the informal financial practices that preceded them and still persist. Community-based ethnic remittance service providers have been working to facilitate and maintain kin and community relations across transnational corridors such as the United States and Vietnam, and many others, for a long time. As the wall of cherished customer photos in Kelly's shop attests, the service of financial channeling is infrastructural but also affective. Likewise, as hot transfers and other gray financial arts attest, remittance economies are as resilient as they are innovative. We would do well to attend to the histories of informal sector remittance services and the effects of regulations governing them. Notably, this should include the creative and affective labor of channeling value through and around the chokepoints of the international financial system. Amid the shifting financial and regulatory landscapes of the present, there is, after all, more than money on the move and at stake. ■

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MARE

the funnel effect

In the docks of Sicily, surveillance and humanitarianism mingle with traces of lives and deaths beyond the point of entry. Cristiana Giordano explores what happens when migrants rescued at sea arrive at Europe's shores.

Since 2015, Italian newspapers, political actors, and humanitarian representatives often have used the expression "the funnel effect of immigration" to describe the drastic increase in numbers of people arriving in Italy from Northern and sub-Saharan Africa, turning the peninsula into the main gateway to Europe and a place where people often get stuck waiting for documents to be issued. This expression also points to the contradictions at the heart of current European Union decisions about how to manage the increased numbers of incoming foreigners. While fostering liberal inclusion and multiculturalism, various EU member states advocate for stricter border control by not accepting any quota of migrants. In this context, the Italian government and civil society have played a frontline role in managing the so called "refugee crisis" in the Mediterranean.

According to the International Organization for Migration (IOM), since the beginning of 2017, 103,175 people have crossed the Mediterranean into Europe; of those, 86,121 have landed on Italian shores, and the rest at Greek (9,723), Spanish (6,973), and Cypriote ports (358) (IOM 2017). The discrepancy in numbers is partly due to the closure of French and Spanish ports and of some European countries' borders. Italy remains the easiest entry point into the continent both for its geopolitical position and for its immigration laws. Moreover, according to the Dublin III Regulation (2014), an undocumented person entering Europe must apply for asylum or humanitarian protection in the country of first arrival. Once people arrive in Italy, they must apply for legal status and go through the bureaucratic phases leading to obtaining a visa. The Italian asylum process,

ABOVE: Lampedusa, Italy, cemetery of boats. PHOTO: C. GIORDANO **RIGHT:** Porto Palo, Italy, cemetery of boats. PHOTO: C. GIORDANO

often stretched out by appeals, can take more than two years, thus creating a clog in the various institutional structures aimed at receiving and maintaining asylum seekers.

SCENES OF ARRIVAL

In the summer of 2016, I joined a group of doctors from an Italian humanitarian NGO who, among other services, provide primary care in Sicily to people rescued at sea. On an early morning in July, I left Siracusa with the NGO team to drive to the commercial port where their mobile clinic was stationed. They had called me late the night before saying: "Domani c'è sbarco, incontriamoci presto" (Tomorrow there is a disembarkation, let us meet early). We drove half an hour to reach the entrance of the port, where two policemen checked our badges. The team was composed of two doctors, a nurse, a psychologist, a cultural mediator, and a freelance photojournalist documenting procedures at the port.

The morning sun was unforgiving. When we arrived, the mercantile boat that had rescued several rickety boats at sea the night before was already there. Those rescued sat on the boat, out in the sun. We stood on the quay waiting for the disembarkation process to start for nearly four hours. Rumors placed 600 people on the boat; we later learned from a Cameroonian man among them that six small boats had been rescued the night before. From where I stood, I could observe the standard procedures of disembarkation—or what local actors call *sbarco*.

> **FROM FIELD NOTES: PROCEDURE** *The doctors of the USMAF (Ufficio della Salute Marittima Aerea e di Frontiera, or Health Ministry Office of Areal and Borders Maritime Health), dressed in white uniforms and wearing masks over their mouths, were on the boat conducting a first round of medical triage, making sure no one needed immediate attention. On the quay, waiting for people to disembark, were members of governmental organizations (the Local*

Health Care Agency – ASL, the Immigration Office, Protezione Civile), international agencies (UNHCR, Save the Children, Terres des Hommes, Unicef, IOM, the Red Cross), local NGOs, police forces (Carabinieri, Coast Guard, Frontex, municipal police), TV and radio channels, and newspapers.

People finally started to get off the boat in one line, one by one. As soon as they touched the ground, they were asked to take their shoes off and they were given a pair of fake crocs. Crocs of all eye-catching colors: orange, green, red, blue, pink. The man handing them out was shouting the shoe size as he saw the next person in line approaching from a distance: "46!" "43!" I was standing right behind him. He turned to me, and proudly said: "I know all their shoe sizes! I have done this for 3 years and got used to guessing!" People also wore an orange bracelet with a number that was assigned to them at sea, right after being rescued.

The boat was full of African men, a small number of families and African women, and many young boys, presumably minors. They disembarked the men first, the rest later, to keep them out of the sun, we guessed. After disembarking, people were asked to form a line and, one by one, to go through another medical triage under the Red Cross tent. They were then asked to sit on the ground on the quay until everyone was disembarked, forming a rectangle, encircled by policemen who kept the group in place. Once disembarkation was over, everybody stood up and marched outside the protected area of the port passing through the narrow gate that separates it from where all the organizations and institutions had their tents. Everyone was asked to sit on the ground forming another rectangle in front of the Immigration Office stand. People were identified by giving their name, date of birth, and nationality; they were photographed and finger printed. At this point, everyone was given another number on a piece of paper. They were now channeled to the big tents where camp beds were lined one next to the other, and people could rest. At around 1 p.m., volunteers from local NGOs pushed supermarket carts overflowing with small white plastic lunch bags near the tents. Lunch consisted in one apple, a cheese sandwich, and water. People took showers; soap, shampoo, and some clean clothes were distributed. Some did laundry and hung their clothes at the tents or on the fences surrounding the port. After lunch, UNHCR officials gathered small groups under the tents to discuss the different laws and procedures to apply for asylum or other statuses. Those who needed medical assistance went to the NGO clinic; those in critical conditions were transferred to the nearest hospital. In the late afternoon, people formed a long line in front of a supermarket cart, and another food bag was distributed with the same meal for dinner.

RIGHT: Museo dei sogni frantumati" by Ramzi Harrabi, Siracusa, Italy. PHOTO: C. GIORDANO

Even as it plays host to these formal procedures of *sbarco*, the port itself is not just a physical site of reception, identification, care, and control. It is, in the words of one of the doctors, a "non-place" which marks a line of demarcation between the sea and the land, international and national borders, lawlessness and legality. It is a physical harbor that operates as a set of practices that different actors refer to as *sbarco*, but it also occupies an imaginary line between friend and enemy, the familiar and the stranger. In Italian, the word *porto* (port) shares the same root with the word *porta* (door); it refers to a passage through which people and objects move, crossing a blurred zone of categorization. In this context, the s*barco* comes to signify a complex and layered process of medical, bureaucratic, legal, military, and humanitarian screening and evaluation. It involves numerous actors and institutions, and it offers a very compartmentalized approach to reception. There was something literal about the port functioning as a funnel that channels bodies through various phases of identification and recognition (Giordano 2014) and regulates the flows of people, stories, fingerprints, numbers, and documents.

While the *sbarco* provides a space of governmental and humanitarian surveillance that moves people through techniques of care and control, it also allows for undetected practices to occur. Some people refuse to be fingerprinted, or find ways to escape from the port and go off the radar of institutional gazes; others get identified at the port, are transported to shelters, and disappear shortly after to travel north. I was struck by how well the figure of the funnel describes a spatial configuration of bodies moving through narrow zones of identification to be inserted into the register of the law. Yet this figure only partially captures the complexity of the *sbarco*. In the non-place of the port, the *sbarco* also presents the opportunity to pass through the fence that separates the port from the fields and to go unnoticed, undocumented, and undetected. Many of the people entering Europe under the paradigm of humanitarian emergency become part of a growing unrecognized workforce in the seasonal agricultural industry throughout Italy. They enter into a parallel lawless system of exploitation, which also provides shelter from the inquisitive gaze of the state. As a chokepoint—rather than a funnel—the *sbarco* simultaneously enables forms of legal identification that can lead to papers and access to rights, and forms of escape into alternative undocumented forms of life.


INRI

TRACES

Later that summer, my friends and collaborators Ramzi, a Tunisian artist and social worker, and Antonino, an Italian retired coast guard, invited me to join them to the old port of Porto Palo an hour from Siracusa. They wanted to show me where many of the rickety vessels used to cross the Mediterranean that had been confiscated by the state ended up—a cemetery of boats. In the early 1990s, people fleeing Africa and the Maghreb used to arrive directly at small ports like Porto Palo. There were no bureaucratic or medical procedures to follow. As Antonino explained, people in the village would come out and open the ovens to bake bread and other goodies for the newcomers. All the identification processes happened at police offices and hospitals.

On that windy morning, we went hunting for the objects and fragments of boats abandoned at the cemetery. Many material things cross the sea with humans and sneak onto the shores of Europe, otherwise leaking out of the screening procedures of the *sbarco*. Ramzi had been collecting objects that once belonged to those who crossed, organizing them into an art installation in an empty, deconsecrated Church in Ortigia, the old part of Siracusa. Entitled "Uprooted," the exhibit displayed artwork by various local artists related to movement and borders. His installation, "Museo dei sogni frantumati" (Museum of the fractured dreams), was made of shoes, belts, hats, water bottles, photos, books, empty cans, faded documents, backpacks, etc.—all objects recovered from ports, on beaches, and at boat cemeteries. He also collected remnants of the boats themselves: rusted nails, slats of rotted wood, engine parts, and life jackets. His resulting installation performed the fragmented nature of the journey by bearing witness to the traces of the crossing. It displayed that which cannot be funneled through the official channels, yet which finds a form of care in the curation of Ramzi's exhibit. These traces were generated by everything that didn't make it through the chokepoints of the port and the *sbarco*, and that created a different kind of presence in the form of undetected fragments.

Michel de Certeau understood traces as the leftover of histories (1992), things that don't fit into an official master-narrative of the present (Napolitano 2015). The installation consigns to another order of presence the traces of those who survived the crossing or died. It allows lost and unpaired objects to bear witness to those whose stories of life and death are not documented in the state archive, which translates experience into categories of recognition and erases the traces of the shipwrecks. Ramzi's assemblage becomes a different kind of harbor, of point of arrival for the dead. Like the *sbarco*, the installation engages the political demarcation of friend/enemy. Unlike the *sbarco*, though, Ramzi's art consigns the lost objects to an order different from the law, reinscribing that which exceeds the funnel (the dead and the lawless) within the order of existence. ■

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ECOLOGICAL CHOKEPOINTS

What does keeping the lower Mississippi River open for shipping have to do with coastal land loss, regional ecological change, and a pile of rocks? **Joshua Lewis** explores the relationship between transportation and ecological chokepoints in Louisiana.

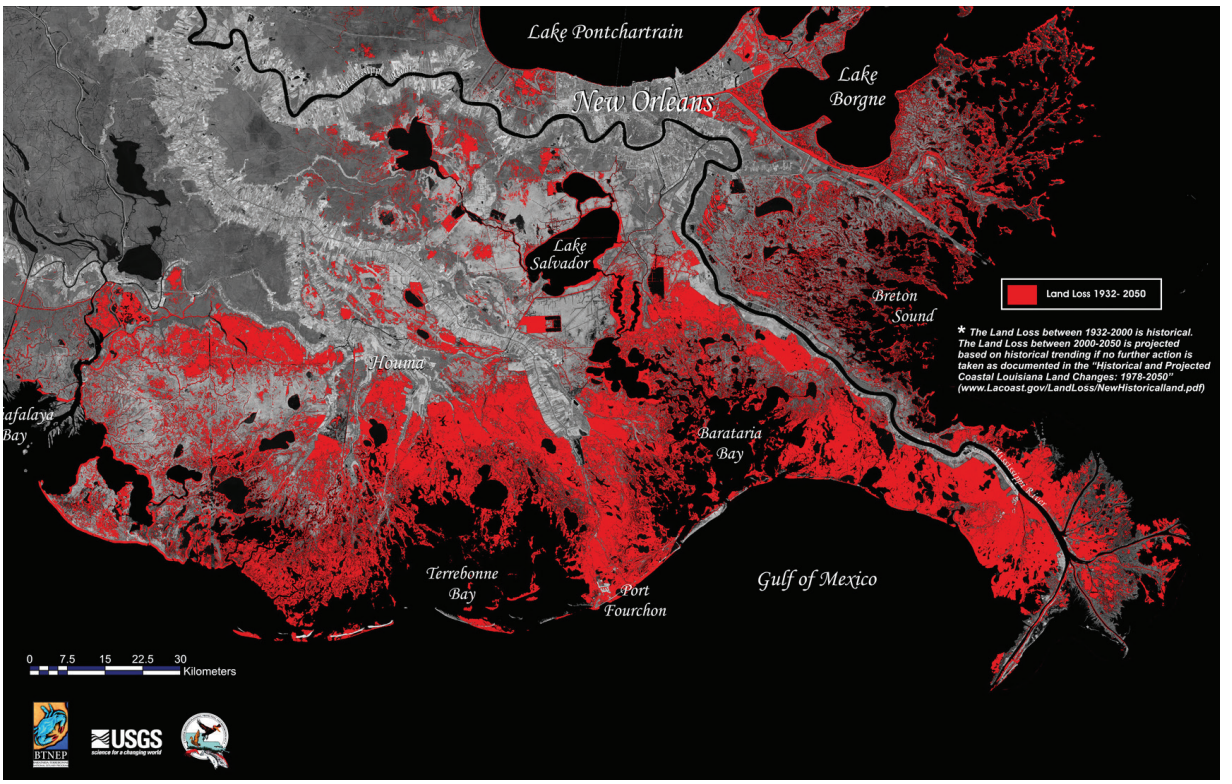
WE OFTEN THINK of maritime transportation chokepoints as locations where trade flows are constricted or obstructed: the Panama Canal, narrow straits, shallow river mouths, and the like. But the infrastructure projects built to facilitate transportation may generate *ecological chokepoints*. These are sites where human intervention inhibits or eliminates critical forms of ecological connectivity. By analyzing the dialectical relationship between transportation and ecological chokepoints (that is, how concerted efforts to overcome one can intensify the other) through three sites—a hulking river control structure, an ill-fated shipping canal, and a massive pile of rocks—we can consider how this chokepoint dialectic produces socioecological contradictions at a regional scale.

Transportation networks utilize waterways to move commodities like corn, soybeans, coal, oil, and automobiles in massive quantities. However, landforms and biophysical processes such as sandbars, shoals, land bridges, and isthmuses present barriers to circulation. Infrastructures like canals, locks, and dredging machines work to decouple transport systems from geographical constraints.

Similarly, coastal ecosystems like those of Mississippi River Delta depend on the river's capacity to transport and circulate fresh water, millions of tons of sediment and sand, seeds, and billions of animal eggs and

PREVIOUS PAGE:
A group of military and civilian leaders "break ground" on the Gulf Outlet by detonating dynamite in a coastal forest.

FIG. 1:
Historic and projected coastal land loss in Louisiana, 1932-2050.
ILLUSTRATION: US GEOLOGICAL SURVEY.



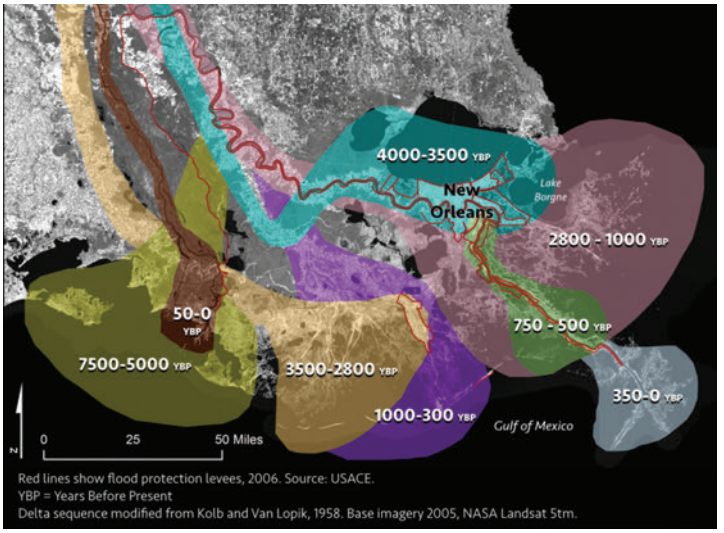


FIGURE 2: The Mississippi and Atchafalaya Rivers, and the Old River Control Structure
JOSH LEWIS; NASA/USGS.

FIGURE 3: Historic delta lobe formation in the Lower Mississippi River Delta.
MAP BY JOSH LEWIS

larvae. A sustainable delta requires multiple pathways to distribute water, nutrients, and sediments into its alluvial plain. When these circulation patterns break down, ecosystems undergo dramatic changes and the delta's landmass itself rapidly erodes. This catastrophe is currently unfolding in coastal Louisiana, placing its communities, its infrastructure, and its ecological bounty at risk (Figure 1).

The infrastructures meant to overcome maritime transportation chokepoints in the region create ecological connection and disconnection. Levees, for example, diminish the delta's porosity and connectivity across space. Canals, on the other hand, generate connectivity between fundamentally distinct ecosystems—bringing salt water into freshwater swamps or injecting fresh water into a salt marsh. When the landscape is modified for transportation purposes, a very specific configuration of connectivity is thus rendered—one intended to intensify the flow and circulation of commodities through the region's waterways. The dialectic between transportation and ecological chokepoints also gives rise to confounding politics. As maritime infrastructure and ecological flow became more entangled, complex political controversies have arisen between port agencies, water engineers, the fishing and oyster industries and delta communities. Zeroing in on these layered chokepoint effects reveals the contradictions now materially embedded in the socio-ecology of the region.

THE OLD RIVER CONTROL STRUCTURE

Establishing and maintaining a maritime transport system—not to mention a major urban center on the edge of a hazard-prone river delta—requires continuous infrastructural and ecological interventions. The mouth of the Mississippi River is an obligatory point of passage between Atlantic shipping lanes and the earth's busiest and most expansive inland navigation system. River engineers and their clients in the shipping industry have sought to capitalize on the geographic centrality and connectivity conferred by the Mississippi's massive network of tributaries and distributaries, while fighting against the troublesome consequences of this connectivity. The river deposits sediment near

its mouth, forming sandbars and shoals that threaten access for large ships. In the spring, the river swells with snowmelt and floodwater, periodically inundating the region with waters described in folk songs as "too thick to navigate, too thin to plow." Conversely, late-summer droughts can lower water levels in the river dramatically, stranding ships and barges and threatening municipal water intakes with saltwater intrusion.

Twentieth-century engineers concluded that the best way to float large ships through the ports along the river's lower reaches was to fix the river channel in its present course with levees, choking off the hundreds of waterways that formerly carried fresh water and sediment into the alluvial plain. One consequence of this practice is that the river's present distributary channel and delta lobe extends—narrow and serpentine—to the edge of the continental shelf (Figure 2). Nearly all of the sediments, nutrients, and freshwater that formerly nourished and sustained the delta is confined to a small area directly around the river's multi-mouthed terminus in the Gulf of Mexico. Other than a few flood control outlets, thousands of pathways that the river historically utilized have been eliminated. The delta is not as porous as it once was. This has transformed the basic ecological and geological processes of the landscape, bringing the ocean to New Orleans's doorstep.

The ecological chokepoints of the Lower Mississippi have an additional and potentially calamitous effect: by constricting the river's flow and forcing it to follow an inefficient pathway to the Gulf, the entire lower river becomes increasingly prone to avulsion. An avulsion occurs when a river becomes attracted to a pathway with a steeper slope to the sea and suddenly shifts its course, usually during a flooding event (Figure 3). John McPhee's essay, "Atchafalaya," recounts how the U.S. Army Corps of Engineers built the Old River Control Structure, designed to prevent the river's main channel from jumping to an alternate pathway (Figure 4). Such a shift would drop water levels on the Mississippi's present channel severely, rendering useless riverborne shipping and the massive port and petrochemical facilities it serves. New Orleans' position at a chokepoint in the global flow of goods and capital, its *raison d'être*, would be undermined fundamentally. Therefore, the Old River Control Structure is an ecological chokepoint that mediates the delta's most fundamental processes, affecting ecological flow and transportation across a 4,000 square mile area.

FIGURE 4 (TOP): The Old River Control Structure
PHOTO: JOSH LEWIS

FIGURE 5 (BOTTOM): Locations of interest in the southeast Louisiana.
PHOTO: NASA/USGS; MAP BY JOSH LEWIS

THE GULF OUTLET

Managing the river through a multitude of distributary chokepoints is only one strategy engineers have developed to counteract the chokepoint dynamic at the river's mouth. In the 1950s, the Port of New Orleans began implementing a long-simmering plan to bypass the lower river entirely. It was disastrous. The Mississippi River-Gulf Outlet (MRGO) channel was promoted by maritime interests as the ultimate panacea to the sandbars, shoals, fog, and dramatic changes in river levels that have long frustrated shipping firms. The Gulf Outlet was intended

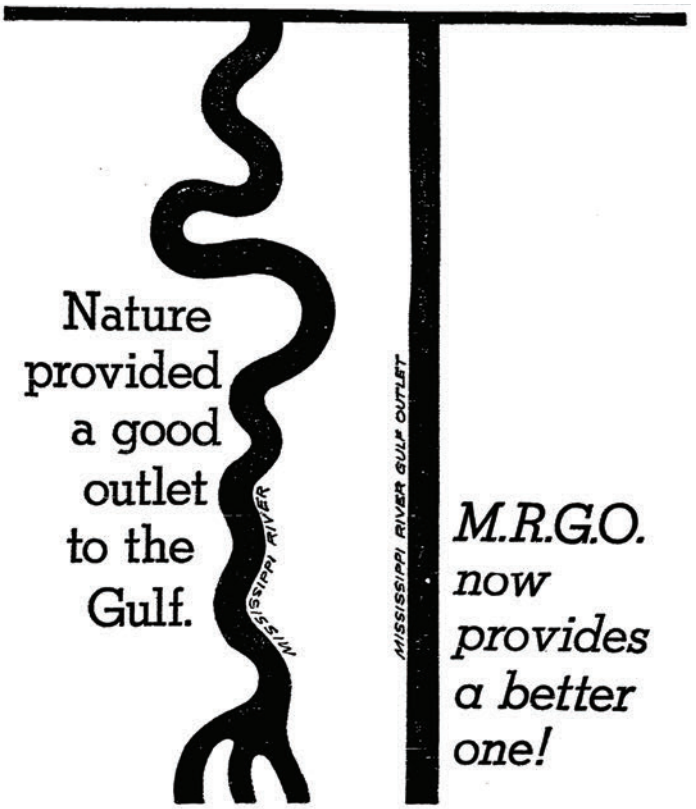


FIGURE 6: An ad hailing the construction of the Gulf Outlet canal. NEW ORLEANS TIMES-PICAYUNE, JULY 23 1963, PG 3. US ARMY CORPS OF ENGINEERS AND NEW ORLEANS TIMES-PICAYUNE

to bypass the lower 100 miles of the river, thereby enabling ships to enter the Port of New Orleans through a linear channel with consistent channel width and depth (Figure 5). The Corps of Engineers began dredging the 75-mile channel in 1958, detonating dynamite in a freshwater swamp forest just outside New Orleans (Figures 6.1 and 6.2).

Part of a wider plan to move the region's main port facilities into an inner harbor within the city limits of New Orleans, the Gulf Outlet was an economic failure and an ecological menace. The soil conditions in the area forced engineers to constantly dredge the waterway, adding costs to a project that was obsolete on delivery. In a ten-year period following the engineer's staged explosion, the Gulf Outlet transformed the average salinity in the surrounding estuary such that the cypress and tupelo trees visible in Figure 6.1 were no longer viable. Tens of thousands of acres of freshwater forests simply died. This was due in large part to the chokepoint effect the Gulf Outlet created on tides and storm surges. The flood protection levees along the Gulf Outlet concentrated storm surges, conveying them through landscapes adapted to fresher conditions. Hurricane Betsy in 1965 carried salty surge waters deep into the forests and into the city of New Orleans, catastrophically flooding many working-class neighborhoods. With the Mississippi's fresh water and sediment trapped behind a multitude of riverbank chokepoints, the eastern flank of New Orleans was transformed from densely forested wetlands to open water and patchy salt marsh. In this unfolding sequence of chokepoint effects, the infrastructural work intended to overcome a transportation chokepoint (mouth of the Mississippi) generated a hydro-ecological chokepoint, a funnel-shaped infrastructural topography that increased flooding vulnerability in New Orleans, and transformed ecosystems across the southeastern Mississippi Delta. But ecological chokepoint effects can emerge in more surprising ways, which defy common notions of "natural" systems and what "degradation" implies.

THE PILE OF ROCKS

The Bayou La Loutre ridge is a sinuous stretch of slightly elevated land just outside of New Orleans. The ridge is a slowly eroding vestige of an ancient course of the Mississippi, a landform that owes it existence to the river's historical tendency to move around—the sort of dynamic the Old River Control structure was built to prevent. The ridgeline extends eastward from the Mississippi's banks just downstream of the city, snaking through the marshes that fringe the lower course of the river (Figure 5). The Gulf Outlet canal severed this ridge in the 1960s, generating a deepwater connection between fresh and marine ecosystems. The outlet's ruinous effects came into full view when, during Hurricane Katrina, it funneled storm surge into New Orleans.

Afterward, the ancient ridgeline became an unlikely site for environmental conflict. It also became an ecological chokepoint. In 2009, the Corps of Engineers dumped more than 300,000 metric tons of rock into the Gulf Outlet at the site where the channel had cut through the La Loutre ridge (Figure 7). A year later, they began construction of the largest storm surge barrier in North America

FIGURE 7 (FAR LEFT): The rock dam across the Gulf Outlet at LaLoutre Ridge.
PHOTO: US ARMY CORPS OF ENGINEERS

FIGURE 8 (LEFT AND NEXT PAGE): New Orleans Inner Harbor Storm Surge Barrier.
PHOTO: US ARMY CORPS OF ENGINEERS

across the same channel (Figure 8). The Gulf Outlet allowed saline ocean water to creep into freshwater ecosystems that the ridge once protected (thus compounding the effects of these areas being choked off from the river's flows, as outlined above). In this sense, the rock dam was meant to create an ecological chokepoint to regulate water salinity (and thus ecological composition) over a vast territory. For the engineers, the pile of rocks promised to slow down coastal erosion in some areas and perhaps even help make coastal areas around New Orleans viable for the redevelopment of forests, which under certain conditions provide a buffer from storm surge for the city. Despite being a fairly minor topographical feature and despite the Gulf of Mexico's small tidal range, the restoration of this ridgeline with a pile of rocks had direct effects on water salinity up to 60 miles away.

The pile of rocks, despite its effect of restoring historic patterns of water salinity, received a mixed reception from local fishers. Soon after its completion, the dam itself became a fishing hotspot as speckled trout and redfish were pushed against the dam by the tide, constricting their ability to move up and down the channel that had existed for nearly 50 years. The fish were caught behind a chokepoint with no clear bypass. This abundance was also an ecological consequence of the Gulf Outlet. It just so happens that degrading saltmarshes tend to produce some of the most productive fisheries. But with the Gulf Outlet choked by rocks and salinity dropping in the area, fishers began to argue that marine species such as blue crabs, shrimp, red snapper, and speckled trout actually were becoming scarce. Some even demanded that the rock dam be removed, bypassed, or retrofitted to allow greater tidal and saline influence, despite the role of saltwater intrusion in accelerating coastal land loss.

CHOKEPOINTS, CONTRADICTIONS, AND THE FUTURE OF COASTAL LOUISIANA

The Old River Control Structure, the Gulf Outlet, and the pile of rocks show the array

of ecological and infrastructural forces that produce chokepoint effects in the Mississippi River delta. Engineers have worked for over a century to close off naturally occurring outlets of the Mississippi River. In resolving this maritime chokepoint problem, however, they blocked the flow of sediments and nutrients that had sustained the deltaic plain for millennia. Or, put another way, their interventions generated ecological chokepoints, which over time produced a contradiction: a major coastal land-loss crisis that is complexly intertwined with maritime shipping, coastal fisheries, and flood exposure for communities. The Gulf Outlet generated a chokepoint effect in tidal flow and storm surge in the nearby coastal estuary. This in turn transformed the estuary into a flood prone, salty, yet ecologically productive fishery. Fishing groups became dependent upon the new ecological baseline, and the politics of resolving these contradictions has become almost dizzyingly complex.

This brings us back to the rock dam outside of New Orleans. The most vocal opponents of the plan to reintroduce the Mississippi into the delta are the same fishers who, despite the contradictions, were pushing to remove the rock dam across the Gulf Outlet. The somewhat ironic ecological abundance of a degrading saltmarsh is being weighed politically against the survival of the region's major cities. How these cities, ships, fisheries, sediments, and salt particles are configured in coastal Louisiana hinges upon the negotiation of both maritime and ecological chokepoints and the contradictions that emerge in the process. The stubbornness of built infrastructure and the extreme dynamism of the delta environment converge at these dams, diversions, floodwalls, and sandbars: ecological chokepoints whose material forms and fraught politics will determine the future habitability—and indeed, existence—of the Mississippi River Delta.

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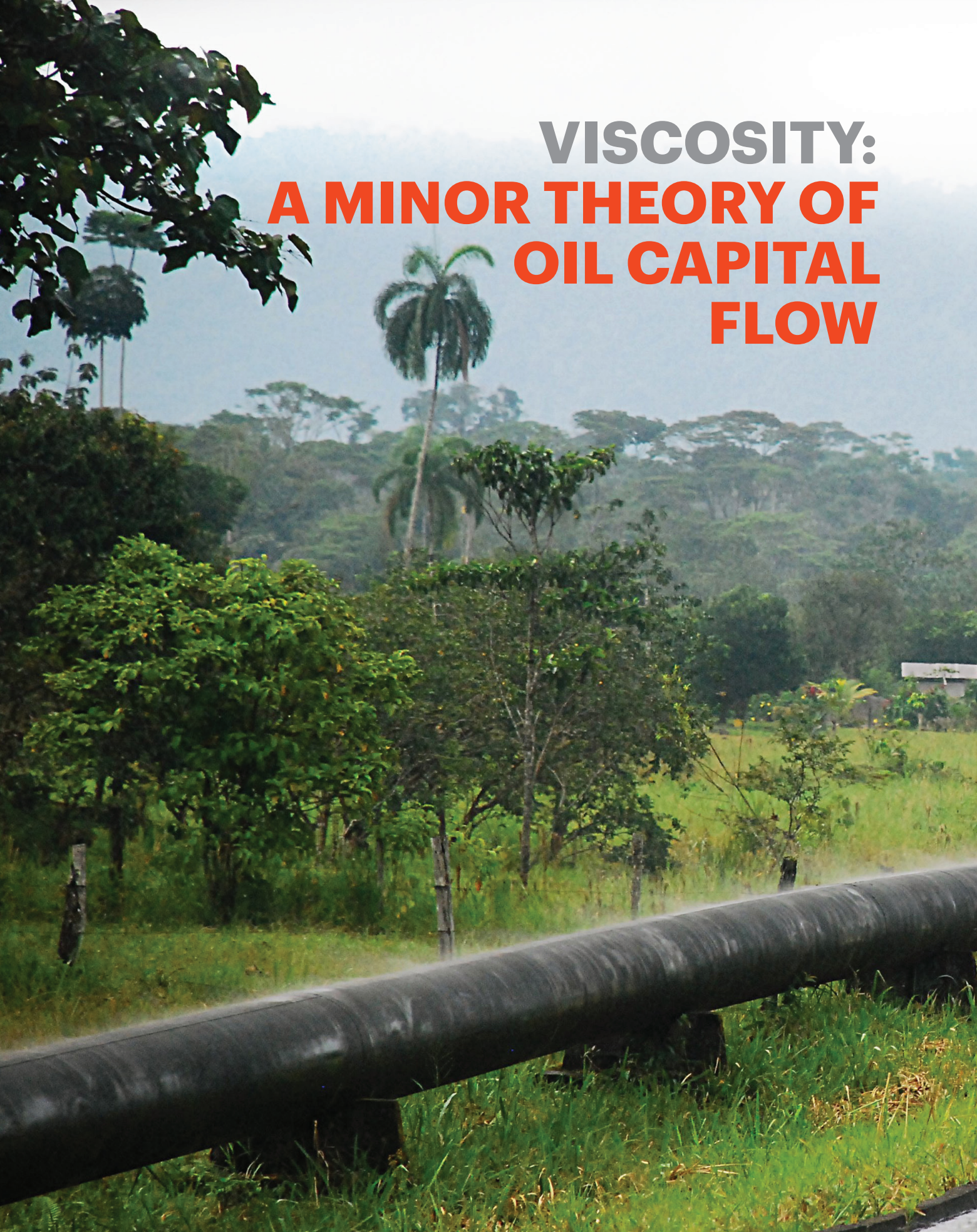
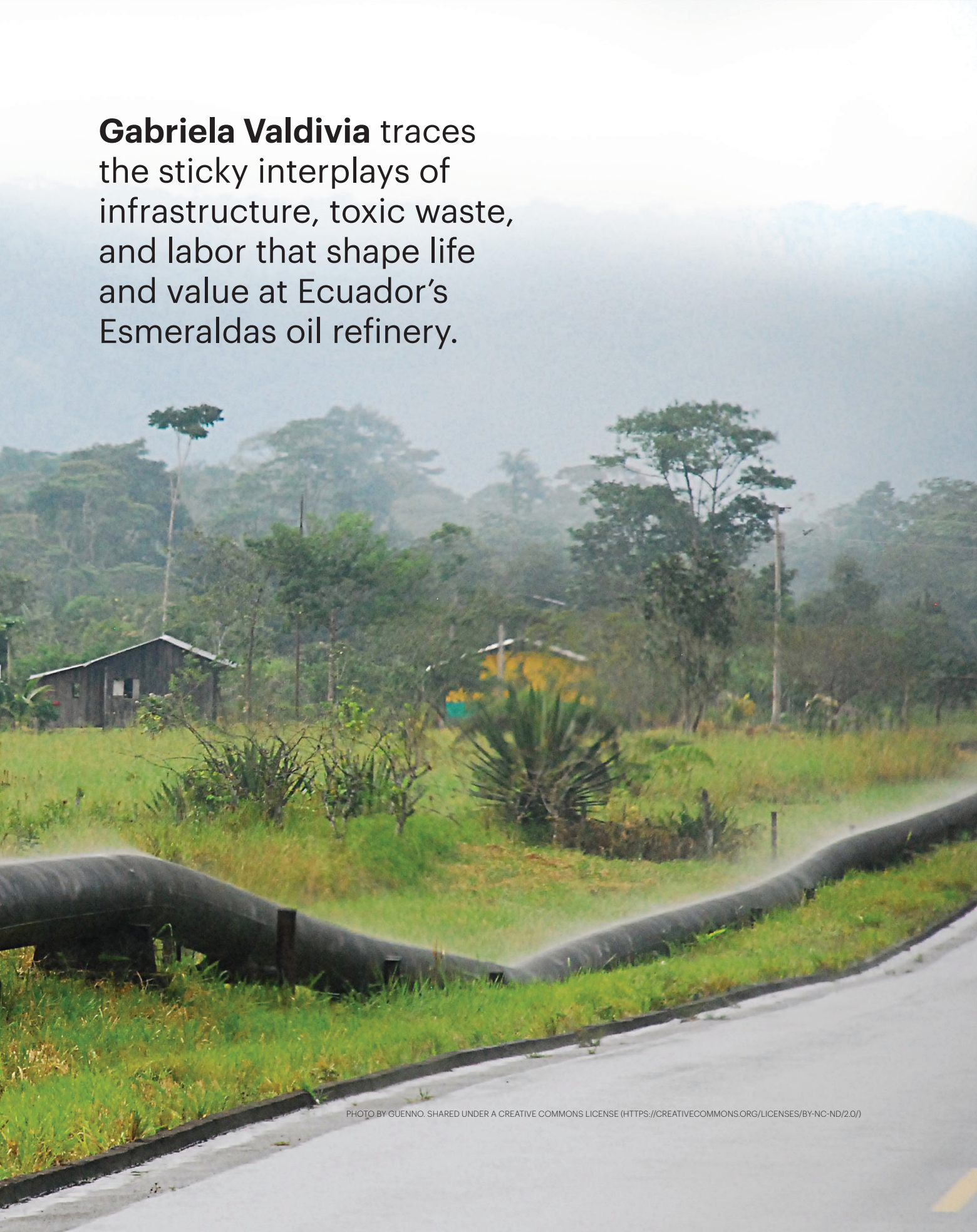


VISCOSITY: A MINOR THEORY OF OIL CAPITAL FLOW

Gabriela Valdivia traces the sticky interplays of infrastructure, toxic waste, and labor that shape life and value at Ecuador's Esmeraldas oil refinery.



OIL IS AN IDEAL

ENERGY SOURCE FOR INDUSTRIAL CAPITALISM. Once social, legal, and physical structures are in place, it is transported almost anywhere, swiftly expanding the range of market transactions globally. Despite its role in modern society, once its distribution is secure, oil's flow appears surprisingly unremarkable. It is hidden in plain sight: pressurized underground; commodified by pipelines, tankers, and processing facilities; and amalgamated into everyday derivatives. In fact, it appears livelier when it is transacted in future markets, where its price volatility, which can make or break economies, is followed obsessively by investors. Protecting this ethos of flow—and the wealth it generates—is imperative for industrial capital. Logistics optimization and preparedness regimes have proliferated to control potential disruptions such as strikes and pipeline malfunctions as much as possible, while simultaneously protecting oil-capital generation. But what if what appears to put oil's ordinariness at risk becomes a way to generate wealth? Can the operational chokepoints that increase interruptions, leaks, and inefficiency mediate surplus capital, too?

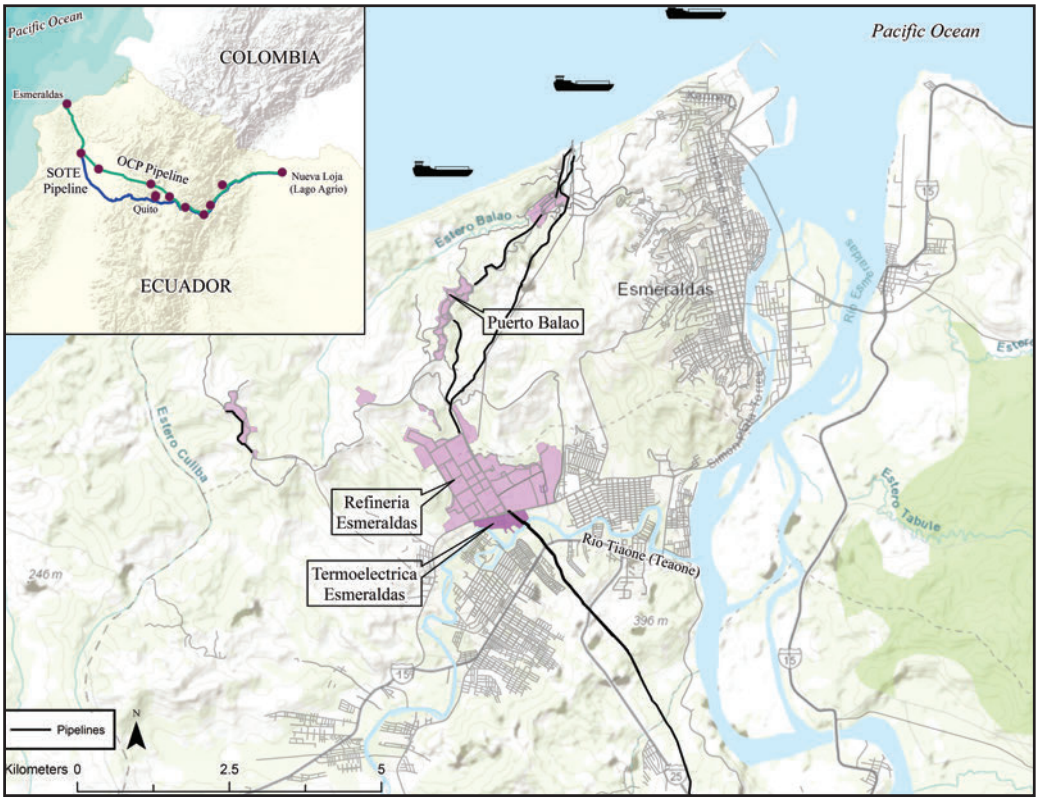
In the scientific world, viscosity is a measure of the internal resistance of a fluid to flow. Here, the concept of viscosity signals two things. First, viscosity is a methodological demand to

Oil tankers are an ordinary sight at Esmeraldas Beach, one of the city's premier tourism spots and the focus of urban development under the Correa administration. PHOTO: GABRIELA VALDIVIA

slow down our attention and acknowledge the *how* of oil movement: how the practices that move, transform, and waste oil; and the networks that facilitate oil flow, condition its rate and trajectory. Second, analytically, viscosity names what is hidden about oil flow and how it articulates with broader frames of actualization, such as nation formation. Bringing attention to the many forms of internal resistance to flow (e.g., leaks, ruptures, and interruptions) within these arrangements, viscosity reminds us that flow is not naturally inherent to oil—and neither is profit. A closer look at the refinery city of Esmeraldas, Ecuador, South America's fifth-largest oil producer, brings awareness to these "viscosities" of oil flow, challenging dominant narratives of frictionless oil movement in the midstream sector of industrial capitalism.

ESMERALDAS

The city of Esmeraldas moderates the passage of oil from Ecuadorian domestic fields to international markets. Located in the northwest coast of Ecuador, it is the convergence point for the end of the pipeline *Sistema de Oleoducto de Transporte Ecuatoriano* (SOTE), which crosses the Andes to connect Amazonian oilfields to the national refinery, as well as the maritime oil



Location of the Refinería Estatal Esmeraldas (REE) complex.
PHIL MCDANIEL AND KATLYN BRETZ

terminal Balao, which transfers oil into tankers, and the state-owned *Refinería Estatal Esmeraldas* (REE).

The REE transforms Ecuador's crude oil into a range of derivatives for domestic and export markets: about 65 percent of crude oil is refined into lighter derivatives (gas, gasoline, diesel, and kerosene) and 35 percent into heavier products (asphalt and fuel oil). The international sale of heavier derivatives account for 32.5 percent of Ecuador's total value of exports, about $5.4 billion (U.S.). Of the 549,000 barrels of oil produced daily in Ecuador in 2016, 414,700 were exported (OPEC 2017), mostly to refinery complexes in California, Alabama, and Texas, where oil is further refined for consumer markets. Ecuador does not have the necessary refining capacity to process a substantial portion of the heavy crude coming from the Amazon, so it exports heavier crudes and imports lighter crudes to meet domestic demand.

The viscosity of oil-capital flow in Esmeraldas becomes evident in the processing and movement of these diverse oil derivatives. The film *The First Barrel of Oil* documents the momentous arrival of the first barrel of oil extracted from the Ecuadorian Amazon to be loaded directly onto container ships in Balao on June 26, 1972. Transported by the 503-km SOTE, the occasion marked the birth of a "transcendental, titanic infrastructure and force" inserting Ecuador into the global trade of oil. "[U]nable to hold back their emotions," declared the film narrator, witnesses pushed closer to the first barrel, as if to join its line of flight, "their calloused hands, hardened by work, stained with the black gold that symbolizes their hope." The *Refinería Estatal Esmeraldas* (REE) emerged as a chokepoint of regulation in this network of oil flow. Following the inaugural barrel's celebration—and understanding how surplus value easily flowed with oil towards foreign sites—the Ecuadorian state sought to tighten oversight over oil by building the REE as a force that converges national interests and transnational oil flow.

MATERIAL-AFFECTIVE VISCOSITIES

The REE, which began operations in 1977, processing 55,615 barrels a day of crudes of 27.9-28.3 API (Petroecuador 2013), is a powerful node tying oil capital to national development. It has undergone three major updates (1987, 1997, and 2014-2015) to optimize performance, increasing the volume of oil flow (now 110,000 barrels/day) and refining power (heavier crudes of 24.3 API and higher sulfur content). These updates, however, are infamous for their failures to optimize flow. In 1997, new units were added to enhance Fluid Catalytic Cracking (FCC), which converts high-boiling, high-molecular weight hydrocarbon fractions into derivatives, and a new hydrodesulfurization (HDS) plant to remove sulfur (S) and enhance the market quality of derivatives (an additional, larger plant was installed in 1998 to increase desulfurization capacity but never operated). While flow quantity increased, quality did not. Stories about the labor dynamics of the refinery exemplify this point. Around the same time as the 1997 update, refinery operators sent notices to state administrators that a valve in the FCC unit had reached its useful lifetime and was expected to fail. Government officials denied a request for its replacement, considering it unnecessary—a small, expensive object, not included in yearly budgets and which did not generate significant networks of capital flow, such as the updates that required outsourcing. An engineer remembered seeing a similar valve in a pile of industrial waste from a previous update. He located the valve, cleaned it, and put it to work, hence securing the functioning of the REE.

This now-mythical valve signifies a moment when flow was secured by knowledge and technologies in the interstitial spaces of the commodity chain, not by its regime of optimization. Refinery operators remember this story with affection, as an example of their deep, intimate knowledge of the refinery, which they regularly contrast to that of government officials. Many of these operators began working in the REE in their early twenties and rooted their political consciousness of oil and nation during the nationalization of the industry in the 1970s. Operators are intimately familiar with

... their calloused hands, hardened by work, stained with the black gold that symbolizes their hope.

The REE flare stacks viewed from a nearby neighborhood. When the winds die down, refinery emissions are sensorially evident.
PHOTO: YARITA GILER

State-sponsored billboards linked oil revenue to the improvement of urban life in Esmeraldas during electoral campaigns. The board reads, "Oil improves your community," and states that neighborhoods affected by refinery activities also are benefitted by projects of water and sewage infrastructure sponsored by the national oil company. PHOTO: GABRIELA VALDIVIA

the rhythms of the REE: They can tell when the plant is burning excess crude or which units are not working properly by sounds and smells or by looking at the flame burning from the refinery flare stacks. Refinery operators can work in sixteen-hour shifts, sometimes more, spending more of their time at the REE than in their own homes. Their affective connections, often grounded in ethical relations of care and love for the national industry, enhance capital flow at the REE despite continuous state efforts to alienate operators from the labor process via privatization and union busting (Valdivia and Benavides 2012). In the REE, workers' historical resistance to industry privatization converges with the imperative of keeping the oil flowing.

WASTED COMMONS

The last REE update took place between 2014 and 2015. Then-President Rafael Correa described this "*repotencializacion*" (augmentation, strengthening) as an accomplishment of energy sovereignty that increased both the volume and quality of oil distilled by FCC to improve its marketability. However, the high cost of augmentation—exceeding $2.2 billion (U.S.)—has not fulfilled this promise. The range of oil derivatives distilled by the REE illustrates this point. Naphtha are highly volatile liquid mixtures, often used as solvents in gasoline, and the lightest-density derivatives obtained from the primary distillation of oil, tar, and coal. The naphtha currently produced by the REE contains 1,300 ppm of sulfur, which doubles the level permitted by the Ecuadorian Institute of Norms (*Instituto Ecuatoriano de Normalizacion*, or INEN). This excess sulfur renders the REE's naphtha unmarketable; it needs to be mixed with imported naphtha of lower sulfur content to meet consumption parameters. Similarly, the heaviest form of oil derivative produced by the REE, fuel oil (a substitute for coal in heaters, ships, and engines), exceeds the allowable level of sulfur by 15 times (Villavicencio 2017). This excess makes a high percentage of the fuel oil processed at the REE unfit for direct commercialization. As a result, 40,000 barrels a day of fuel oil are deemed waste that only can be processed by refineries elsewhere.

This excess sulfur in oil derivatives multiplies the exit vectors of oil and their distributed effects. Refinery operators often claim that the state-owned REE, intended to converge oil flow and national sovereignty, ultimately opened up doors for private parties to appropriate capital. They specifically refer to how the excess sulfur

(in both light and dense oil derivatives) renders a large portion of Ecuador's oil products unmarketable—a wasted commons. Because the levels of sulfur in Ecuadorian oil are codified as exceeding established norms, a significant portion of Ecuador's refined products have to be either "improved," by adding imported naphtha from international distributors, or shipped elsewhere (e.g., El Segundo, Calif., or Houston) to be market-ready, despite the fact that the REE has two sulfur plants that could reduce sulfur levels and increase marketability. In other words, despite the updates to strengthen sovereignty over oil capital, in reality surplus capital continues to be captured through the production of unmarketable oil sold to intermediaries at lower market value (e.g., Gunvor, Core Petroleum, and Petrochina), who then profit from its trade. Recent oil-trade reports indicate that while global oil production rates are decreasing, global oil-trade rates are growing; in 2016, global trade in crude oil grew by 3.7 percent (1.5 million barrels per day), reaching 42 million barrels per day, while growth in the trade of refined products was even greater, reaching 23 million barrels per day (BP Statistical Review 2017). The malfunctions and inefficiencies associated with the REE fit well in this global circuit of oil flow. Increasing REE desulfurization efficiency would make logistical sense for Ecuador's sovereign project to capture rents but not economic sense to Ecuadorian and foreign intermediaries who lobby to preserve and concentrate capital surplus within the existing system. Esmeraldas then emerges as a chokepoint that controls the flow of market-unfit oil to satisfy profit-seeking rather than needs-oriented regimes.

TOXIC CITIZENSHIP

The processing of market-unfit oil derivatives also has localized vectors of distribution and accumulation, in the form of leaked toxicities. In April 2014, Yolanda[1], who lives close to the refinery, shared the story below, along with a blurry picture of foam falling from the sky:

> I tell you this because I know that you are interested in these things. … Last night, around 9 p.m., white, soapy foam fell from the sky—like snowflakes. They were beautiful, soft. We were out on the street, walking home, and people came out to watch them fall. The children ran around, excited, sticking out their tongues to try to catch them. … It was exciting—beautiful. I also wanted the children to stop touching the flakes.

The sign indicating the underground presence of the OCP is the only indication of oil flow beneath roads and homes of this neighborhood nearby the REE. Close by, what appears to be a cement home actually houses a new water pump station for the OCP.
PHOTO: GABRIELA VALDIVIA

Some Esmeraldeños believe the "snowflakes" are residue from flushing refinery systems at night. Refinery operators suggest it might be REE emissions mixing with water vapor in the atmosphere, a precipitation effect. Yolanda, like other Esmeraldeños, is attuned to the chemosphere of the REE—hence her hesitation, expressed in her simultaneous enjoyment and distrust of the snowflakes. Esmeraldeños regularly suffer from skin rashes and chronic respiratory ailments such as sore throat, burning eyes, coughing (Valdivia 2017). Exposure to sulfur, confirmed in areas surrounding the REE (Jurado 2004), can irritate the nose, eyes, throat, lungs, and skin. Exposure to benzene, toluene, and xylene (BTX), commonly produced by refineries, also can cause these symptoms along with damage to the central nervous system, immune system, and reproductive capacity, possibly over several generations.

While attuned to the REE's chemosphere, Esmeraldeños tend to share more stories about precarity and unemployment than about chemically-afflicted bodies. In fact, the refinery is often seen as a "good neighbor." According to representatives of the *Empresa Pública Petroecuador* (EP), the state-owned

Last night, around 9 p.m., white, soapy foam fell from the sky—like snowflakes. They were beautiful, soft.

1 "Yolanda" is a pseudonym. I have interviewed Yolanda on several occasions between 2013 and 2017 about her life in the city.

oil company, Esmeraldas has received the most investment of any oil-afflicted community in Ecuador. Between 1997 and 2008, Petroecuador invested $20 million (U.S.) of oil rents in public works, health centers, schools, and community donations. Between 2008 and 2017, "social investment" increased to $140 million (U.S.), spent in public works—potable water and sewage systems, road paving, and sidewalks—for 28 different neighborhoods. This is yet another instance of convergence between oil flow and social worlds in Esmeraldas that reveals the hidden relations of oil-capital flow. The "chemical regime of living" (Murphy 2008) with the REE encompasses the social reproduction of bodies within its toxic chemosphere *and* their political economic milieu. For example, compensation programs to mitigate the effects of oil refining have generated "reproductive infrastructure" (Murphy 2017) attuned to citizens' hopes for a better life (e.g., schools and hospitals) in the impoverished Esmeraldas. But these infrastructures do not address the long-term chemical injuries, which extend over generations, associated with the REE's work as a node of global oil flow.

Bringing together the material-affective work of labor, waste, and toxic citizenship in Esmeraldas illustrates how viscosity helps secure oil-capital flow. These viscosities are the Other of oil flow: non-capitalist value forms, hidden from the master narrative of oil energy, that are continually tapped into to secure flow. Viscosities are often hidden—yet full of potentialities—in hegemonic narratives of global oil distribution. The minor figures of viscosity in the oil commodity chain—valves, sulfur, and compensation—at the Esmeraldas chokepoint offer a counter-reading of the logistics of oil-flow. Non-capitalist relations, valuable as personal, political, transformative, push beyond the primacy of security in our understanding of chains and chokepoints. Unruly relations and excesses of the supply chain—its viscosities—should provoke us to look into the entanglements of chains to find what enables their work, and at what cost and for whom. ■

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BOTTLENECKS: AN URBAN PHYSICS

From within the interminable traffic jams of Dakar, Senegal, **Caroline Melly** examines how bottlenecks—or *embouteillages*—have become a fixture of modern life and a window into local ideas about global im/mobility and future possibility.

As another electricity outage rolled through the northern reaches of Dakar, Lamane abandoned the computer modem with which he had been tinkering and sat beside me. It was April 2006, a time of great infrastructural upheaval in Senegal's peninsular capital city. Urban residents had become quite accustomed to making the most of these interruptions in daily routine. Perched on a wobbly desk next to me, Lamane shook his head as he surveyed his dimly lit cybercafé, where nearly a dozen second-hand computers slumbered, awaiting the return of electricity. Built with funds sent by a brother working abroad, Lamane's cybercafé was struggling and customers were few. As the blackout wore on, Lamane reflected on what had gone wrong with his enterprise: too many others in the city were investing money sent from the diaspora into cybercafés, he mused, which meant too much competition and too great a pressure on the city's already overburdened electrical infrastructures. Now, he was flirting with the idea of liquidating his computers and investing elsewhere. His dream was to start a fashion boutique, he confessed. To that end, he hoped to find work abroad, save some money, then import jeans and sneakers to get his business off the ground. But every attempt he had made to secure a visa or migrate through clandestine channels had failed. "There are too many people wanting visas, too many people sneaking across the desert or in boats," Lamane said, so international authorities had clamped down on routes out of Dakar. He resented being stuck in the city where roads were rife with traffic bottlenecks, electricity outages were frequent, and opportunities were few. Perhaps we could become business partners, he suggested after some thought, and I could help him secure an American visa.

Like Lamane, many residents of Dakar (Dakarois) linked their daily struggles to the inability of infrastructures—concrete overpasses, investment channels, or clandestine migratory routes—to accommodate the pressure placed on them. Increasingly, they described this state of infrastructural overload with the term embouteillage. A French word best translated as "bottling," it was used most frequently to refer to the traffic bottlenecks that plagued the city's narrow and overburdened roads. But urbanites also used the word in more inventive ways to describe many other sorts of impasse, from bureaucratic lags, unpaid salaries, and weak investment flows to resource shortages, internet failures, and overcrowded neighborhoods. Perhaps most illuminating for me—an ethnographer keenly interested in transnational migration and economic development—was that Dakarois would sometimes employ this concept to refer to their own or others' inability to migrate abroad amidst ever-shifting migration policies and heightened securitization of borders.

Experiences of impasse are not peculiar to 21st-century Dakar. The bottleneck has become a feature of everyday life around the world. It is a local, material manifestation of often quite abstract, global processes. In cities of all sizes throughout the world, people spend their days navigating traffic-clogged streets and tedious bureaucratic systems. Migrants continue to be routed into camps, detention centers, and various dead-ends, where life and movement are halted in an interminable state of liminality.

How, then, might the trope of the bottleneck help us make sense not only of Lamane's predicament but also of instances of impasse elsewhere in the world? How do people experience these moments of failed contact and deferred passage? And why do they persist in their efforts to move, engage, and connect? What the bottleneck offers, I suggest, is a revealing glimpse of a particular urban physics at work.

NAVIGATING LANDSCAPES

The word embouteillage became ubiquitous in early 2006, as a series of large-scale public works projects roared to life. These projects were financed primarily with foreign capital and overseen by the Senegalese state. Among the most ambitious and controversial of these schemes were two dazzling new highway projects, which aimed to facilitate movement within the densely populated peninsular city and to better connect it with the country's vast interior. Elected officials and bureaucrats insisted that sleek infrastructures and unfettered mobility would attract investors and bring opportunity to urban residents. In the short term, however, these projects only exacerbated problems as road closures, detours, and illicit passages came to dictate urban rhythms.

These public works projects were not experienced as isolated events. Creatively invoking the term embouteillage, urban residents situated these projects within a context of ongoing infrastructural change and breakdown. For Dakarois like Lamane, bottlenecked routes were both similar to other sorts of impasse and intrinsically connected to them. A bottleneck in one infrastructure would produce dispersion,

Infrastructures of mobility, 2006.
PHOTO: CAROLINE MELLY

and these new circulations would then produce new bottlenecks elsewhere. For instance, the road projects were aimed at generating flows of traffic, goods, and capital around and beyond the city. But the resultant gridlock only strained economic circumstances. Traffic jams made it harder to get to work, with much of the day wasted in transit. The cost of fuel skyrocketed. Buses broke down, and cab fares were out of reach for the average family. Small businesses and market vendors saw decreases in foot traffic. Urban residents struggled to adjust their daily schedules and household budgets to accommodate these sudden changes.

These sobering realities, in turn, only fueled people's desires to migrate abroad. Transnational migration had been an indispensable economic and social strategy in Senegal for generations. Indeed, a 2004 government survey estimated that an astonishing 76 percent of households in Dakar had at least one member working abroad (République du Sénégal 2004). Migrants' remittances have kept families and communities afloat in an era of deepening financial insecurity. But by 2006, urban residents like Lamane complained bitterly that the routes they relied upon for decades to get abroad, both legal and clandestine, had become tightened, highly monitored, or entirely cut off. In the wake of the "global war on terror," economic slowdowns in Europe and North America, and rising political nativism throughout the West, many Dakarois found their plans to migrate dashed. Undeterred, tens of thousands of hopeful migrants boarded rickety fishing boats at this same time and left Dakar's shores, hoping to reach the Spanish territory of Canary Islands; tens of thousands were apprehended en route, and many others lost their lives.

Such interplays of circulation and regulation produce a particular urban physics: moments of impasse give way to new flows, which in turn produce new points of pressure. For Dakarois like Lamane, life has become an entanglement of bottlenecks—in short, embouteillage.

OPPORTUNITY IN A BOTTLE

The trope of the bottleneck also offers important insights into why people persist despite the odds stacked against them. Why invest in building a cybercafé when internet and electricity infrastructures are so unreliable to begin with? Why risk one's life and savings to join a clandestine voyage that is nearly certain to end in repatriation or death? Why spend so much time pursuing migration as a social and economic strategy, when so many viable paths have been closed?

Dakar's traffic jams offer insight. Bottlenecks form when routes are narrowed or obstructed or when demand exceeds capacity. In these moments, however, traffic is never cut off entirely. As urban residents would point out, some people, some vehicles, and some migrants do manage to get through. Being mobile, then, is a matter of locating a viable point of passage, lawful or otherwise. Urban residents constantly carved new paths, engaged in economic exchange and bribery, forged strategic friendships, and crafted elaborate stories that might serve them in making it through moments of impasse. One's nationality, race, and economic class mattered, Dakarois repeatedly emphasized to me, but so did cunning, resourcefulness, and persistence. This point is well illustrated by my encounter with Lamane, who took advantage of a power outage to reevaluate his approach and establish a relationship that might eventually help him get abroad. Bottlenecks, then, are not only moments of blockage and impossibility; they also can become moments of connection and opportunity.

In a typical Dakar traffic jam, itinerant traders weave through cars and buses, peddling mobile phone credit, daily newspapers, drinking water, and imported Chinese goods to stranded motorists. American flags are popular

Building Senegal's future. PHOTO: CAROLINE MELLY

among cab drivers, who mount them on their dashboards and describe them as a symbol of their migrant hopes. Fueling imaginaries of a life in global motion, billboards advertise remittance transfer services and airfare promotions to Paris, Jeddah, Lisbon, and Washington, D.C. Paradoxically stuck in a mise en scene that proclaims mobility as a national value, many cab drivers make the most of traffic jams by studying English language manuals, hoping to repackage themselves as chauffeurs for tourists and, eventually, as eligible migrants. These are skills that will help them get them through, if not the traffic jam at hand, then the bottlenecks of the life ahead.

BOTTLENECKS UPON BOTTLENECKS

Bottlenecks are transitory phenomena. Traffic accumulates in one spot only to dissipate and gather elsewhere at another time. This produces a highly volatile and unpredictable landscape. Yet it also instills an expectation of renewed movement. By 2010, many of the controversial public works projects had been completed, and traffic generally moved with ease along sleek new highways. But the era of embouteillage, by no means, had ended. Moving away from the city's center onto congested and dilapidated side roads and into bustling neighborhoods, it quickly became clear that bottlenecks had formed elsewhere. While there was little talk about clandestine voyages to the Canary Islands in 2010, a worldwide economic recession recently had produced new interruptions in migratory flows. Rumors began circulating that Senegalese migrants living in Italy had lost their agricultural and factory jobs, and were now being supported with remittance monies sent to them from the wives they left behind in Dakar. The migrants, many undocumented, could not risk returning to Senegal and losing their place abroad. So their wives, who had once depended on remittance payments, were forced to find work to support their families and absent husbands. For those fortunate few who had passed through the bottlenecks of migration, new impasses on European soil were now, effectively, "backing up" into urban Dakar to reformat familial relations and economies.

At once intimate and transformative, these dynamics bespeak the landscapes of impasse and constricted flow that Dakarois have come to call embouteillage. Whether on the congested streets of Dakar or the transnational lives and aspirations of Dakarois themselves, bottlenecks in one place appear and disappear, only to engender flows and bottlenecks on other terrains. Contrary to what might one expect, however, bottlenecks are not merely sites of failure or impossibility. In Dakar, urban residents also engage with embouteillages as sites and signs of potential. For Dakarois navigating a global era of flow/impasse, where circulations of all sorts are relentlessly rerouted, halted, and surveilled, bottlenecks paradoxically contain the radical promise of future connection and renewed movement. Some, after all, do manage to get through. ■

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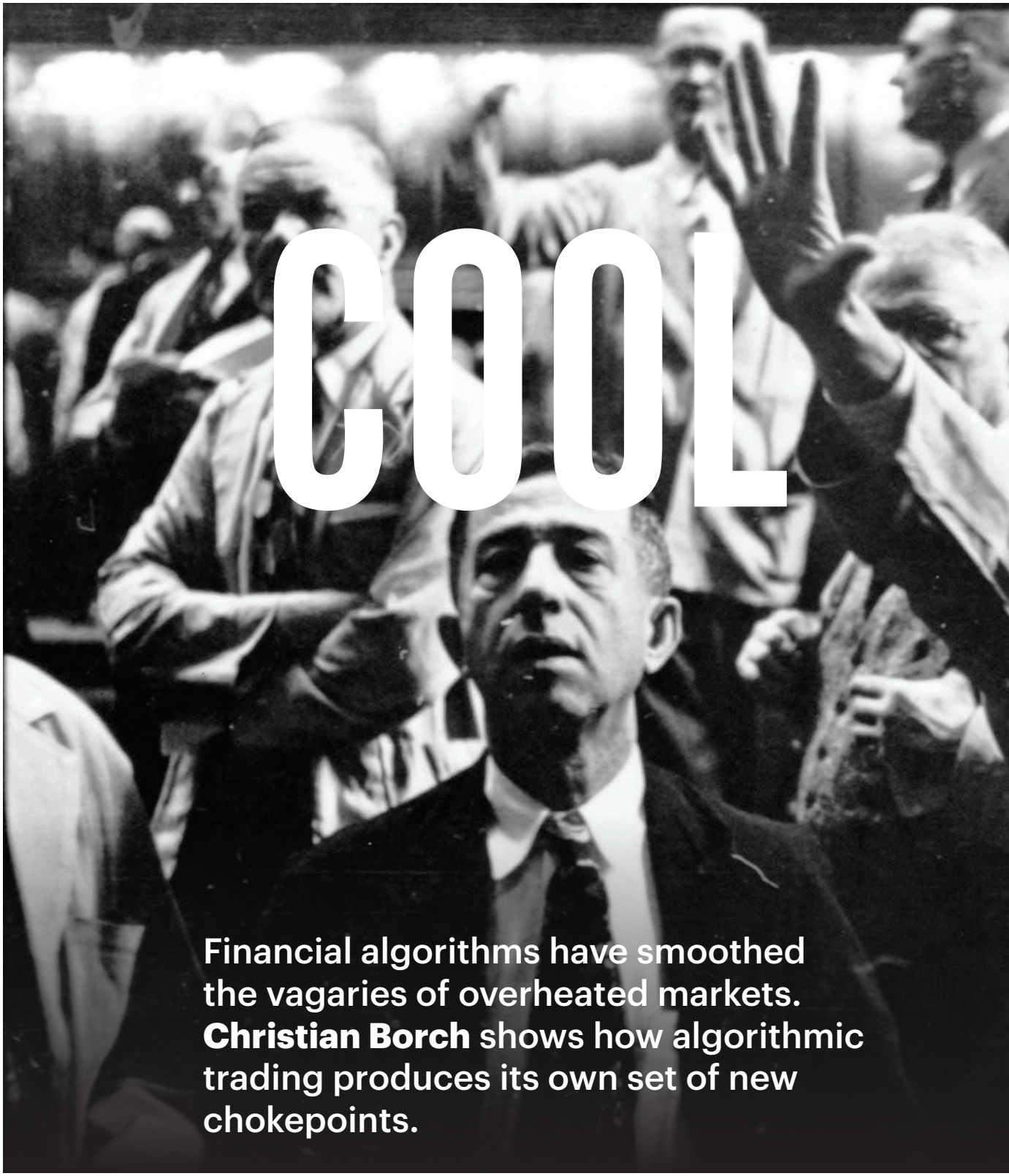


COOL

Financial algorithms have smoothed the vagaries of overheated markets. **Christian Borch** shows how algorithmic trading produces its own set of new chokepoints.

TRADING

In the 1983 movie *Trading Places*, starring Dan Aykroyd and Eddie Murphy, two people from differing social strata involuntarily swap roles in a story played out within the context of financial markets. When the protagonists seize their opportunity to settle a score against two conniving broker brothers, they do so on the bustling futures trading floor amid a crowd of traders in shouting, speculative frenzy. There are several reasons to dismiss *Trading Places* as being "so '80s." One of these is that present-day financial markets are markedly different from the trading scenes portrayed in the film. While human traders used to inhabit the "engine room" of financial markets, that space today is occupied by engines alone. During the past 10–15 years, fully automated computer algorithms have made considerable inroads into the practices of financial markets, so much so that in several markets these algorithms—not human traders—are behind the bulk of orders being placed.

Financial algorithms typically work by sending orders to the market in response to particular preset conditions. They do so without direct human involvement and can operate within a fraction of a second. This automation does not mean that human beings have been eliminated fully from financial markets. Humans still develop the algorithms. Humans test, refine, and monitor the algorithms. Obviously, humans also take home the profit and losses generated by the algorithms. But the actual trading act, including the interactions between the automated algorithms themselves, is increasingly in the hands of trading machines.

The automation of financial markets has affected the chokepoints that exist within them. In the previously dominant inter-human market configuration, market panic of the sort portrayed in *Trading Places* created a particular type of chokepoint. Specifically, to be efficient, financial markets depend on a steady flow of useful, reliable information (as contrasted with distracting noise or misleading information). But this flow of information was blocked when human traders were caught in a seemingly irrational frenzy of trading. In other words, once emotional excitement began to replace cool-headed calculations, this led to an informational chokepoint—a situation in which noise effectively blocked the circulation of information.

While the automation of markets gives rise to new forms of chokepoints—some of which are installed intentionally as fail-safe measures and others, such as the liquidity chokepoints, emerge through more contingent factors—these often revolve around the same difference between information and noise. Furthermore, this difference and its manifestation in algorithmic finance tends to be related to a concern with market temperature—and "cool algorithms" may not always serve as an antidote to "overheated" markets.

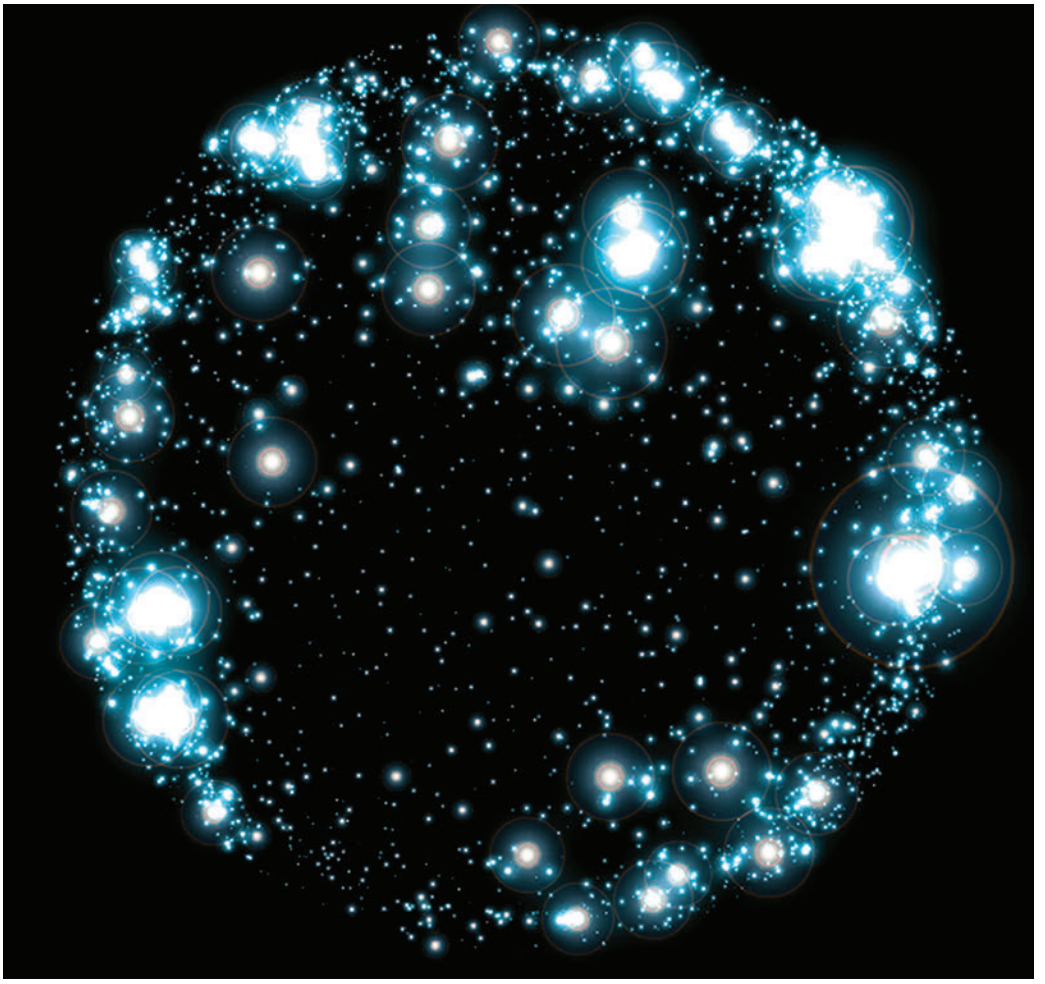
FLASH CRASH EVENTS

In financial markets, automation is often legitimized by a claim that it replaces a more volatile market climate—in which emotional human traders are prone to panic and herd behavior—with a system dominated by cool, forever-rational machines. However, the influx of computerized trading may not bring down the temperatures of financial markets. Much like the physical climate, the financial ecosystem is characterized by such frantic activity that overheating at times seems inevitable. In 2000, the U.S. securities market witnessed "on average about 5 million trades and quotes per *day*; in the fall of 2012, at peak times there were up to 5 million trades and quotes per *second*" (Malinova, Park, and Riordan 2013:1, original emphasis). This colossal growth is due to automated trading.

Skeptics of automated trading often point to the so-called Flash Crash of May 6, 2010, as an illustration of overheated markets. In this event, fully automated algorithms repeatedly bought and sold contracts to one another at high speed, a case of "hot potato" trading (CFTC-SEC 2010:15). This high-speed trading resulted in about one trillion dollars evaporating in just 30 minutes, with the majority of the losses taking place in less than five minutes. No less important, however, is that the algorithms also quickly restored the market almost to its pre-crash level.

In spite of this rapid recovery, the downward spiral of the Flash Crash gave rise to a rampant *liquidity chokepoint*: as prices rapidly dropped, many market participants—including many algorithms that usually provide liquidity—quickly left the scene. As a result, market circulation was brought to a halt. In the dramatic rendition of a former algorithmic trader who followed the events, "the market simply disappeared. For what felt like an eternity, but was more likely 30 seconds to a minute, there were no bids or offers displayed in the market for major stocks," i.e., no buy or sell interest (Lauer 2012:2).

A halt in trading that lasts less than a minute may seem no real problem, certainly not a crisis. However, given the immense activity that can take place on a sub-second level in algorithmic markets, a void lasting up to 60 seconds can seem very long. More importantly, the liquidity chokepoint generated by the Flash Crash



The First Stars in The Planetarium by Lise Autogena and Joshua Portway. Black Shoals; Dark Matter is a digital planetarium visualising the financial markets in real time. Stars in the planetarium represent companies on the world markets that move into constellations and galaxies depending on the movements on the markets. Trades happening on the stars produce light which provides food for an ecology of artificial life creatures that live and evolve within the starry sky link.
LISE AUTOGENA AND JOSHUA PORTWAY.

differs from the human-triggered informational chokepoints earlier described. The Flash Crash was not merely a matter of the flow of information being suspended in markets as emotions took over; rather, it was a matter of market participants withdrawing altogether. In other words, the market did not merely cease to exist as a place for information circulation because it was overloaded by noise. It ceased to exist because the players left the field.

Both regulators and market participants are keenly aware of the problems that might arise if trading algorithms collectively run for the exit. On the regulatory side, "circuit breakers" now can be activated to cool off overheated, excessively volatile markets. One set of these circuit breakers, the "limit up-limit down" mechanism, suspends trading if the price of an individual security moves beyond a particular range, which is calculated as a certain percentage deviation from the average price during the preceding five minutes of trading. Another set of circuit breakers takes a "market-wide" outlook. These are triggered by situations in which excessive volatility in one market may spill over into others and drain markets collectively for liquidity.

MEDDLING WITH THE FLOW OF INFORMATION

Circuit breakers may be a helpful tool to control trading when the flow of orders accelerates. In the May 2010 Flash Crash, the downward spiral reversed in the opposite direction only after a brief market suspension was activated—as if the algorithms that continued trading could escape from their panicking collapse only after the plug had been pulled on trading and, after an interval, restarted. However, there are other types of chokepoints that cannot be alleviated by these kinds of circuit breakers. For example, a shady strategy in algorithmic trading consists of

placing a large number of orders and then quickly cancelling them again before they are filled. The intended effect is to signal a strong market interest in a particular product and thereby lure other market participants into behaviors they would not otherwise contemplate.

To illustrate, suppose a trading algorithm has been activated to purchase 100 shares in a particular company and the buyer wants to sell them at the best possible price. By placing a large number of "bid" (buy) orders in the market, the algorithm sends a signal that demand is increasing and that the price should follow suit. By creating hype for the company via the "bid" orders, the selling price would be higher than could be obtained otherwise. After selling the shares, the algorithm then instantaneously would cancel the same "bid" orders. This algorithmic behavior can be carried out at extreme speed, in a fraction of a second. Since it can be difficult for regulators to determine whether the orders placed were intended to be filled or merely served as a smokescreen, it can be just as difficult to devise adequate regulation against such misrepresentation. Nevertheless, such strategies effectively block the circulation of "pure," reliable market information; they introduce into the information flow a lot of noise, which can be difficult to discern. To bring this noise down to a reasonable level, many trading venues have introduced so-called "order-to-cancel ratios," which stipulate how many orders may be cancelled per order actually filled.

MATERIAL CHOKEPOINTS

There are other ways in which chokepoints might be created intentionally. In an interview conducted by Ann-Christina Lange of Copenhagen Business School, a former CTO of a large firm specializing in high-speed algorithmic trading explained that he occasionally would pull the plug on trading machines (Borch, Hansen, and Lange 2015). This was done not to avoid particular algorithmic trading patterns but rather to assess how the human staff coped with technical breakdowns. This type of intra-firm experiment addresses a material level of present-day financial markets, which looks very different from the inter-human trading floors depicted in *Trading Places*.

Most notably, a veritable technological arms race has haunted algo-financial markets for a long time now, the aim of which has been to shave off crucial milliseconds in the transmission of financial data. The most famous example is the connection between the exchanges in Chicago and New York (or rather between their data centers). Utilizing a set of increasingly faster infrastructures, from fiber-optic cables to microwave and laser transmission to millimeter wave links, a group of algorithmic trading firms is trying to position their algorithms into the "fast lane" ahead of competitors. While this strategy might prevent them from being caught in the kind of information congestion where everyone is "chasing the same signals" (Brown 2010), data transmission through microwaves or other channels is exposed to other types of chokepoints. For example, Donald MacKenzie (2017) describes how weather conditions can affect microwave transmissions. Meteorological phenomena such as rain, storms, even sunrise and sunset can bring this sort of data transmission to a halt. With the advent of algorithmic finance, the circulation of market information is therefore not merely exposed to a market-internal climate, in which chokepoints may emerge when markets overheat. Market information also circulates within a physical climate that might impinge negatively on the efficiency of ever-so cool algorithms.

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Carwil Bjork-James explores the politics of blockades in Bolivia, a country where terrain, a scarcity of connecting roads, and a tradition of mass protest make it a land of chokepoints.

BLOCKADE: THE POWER OF INTERRUPTION

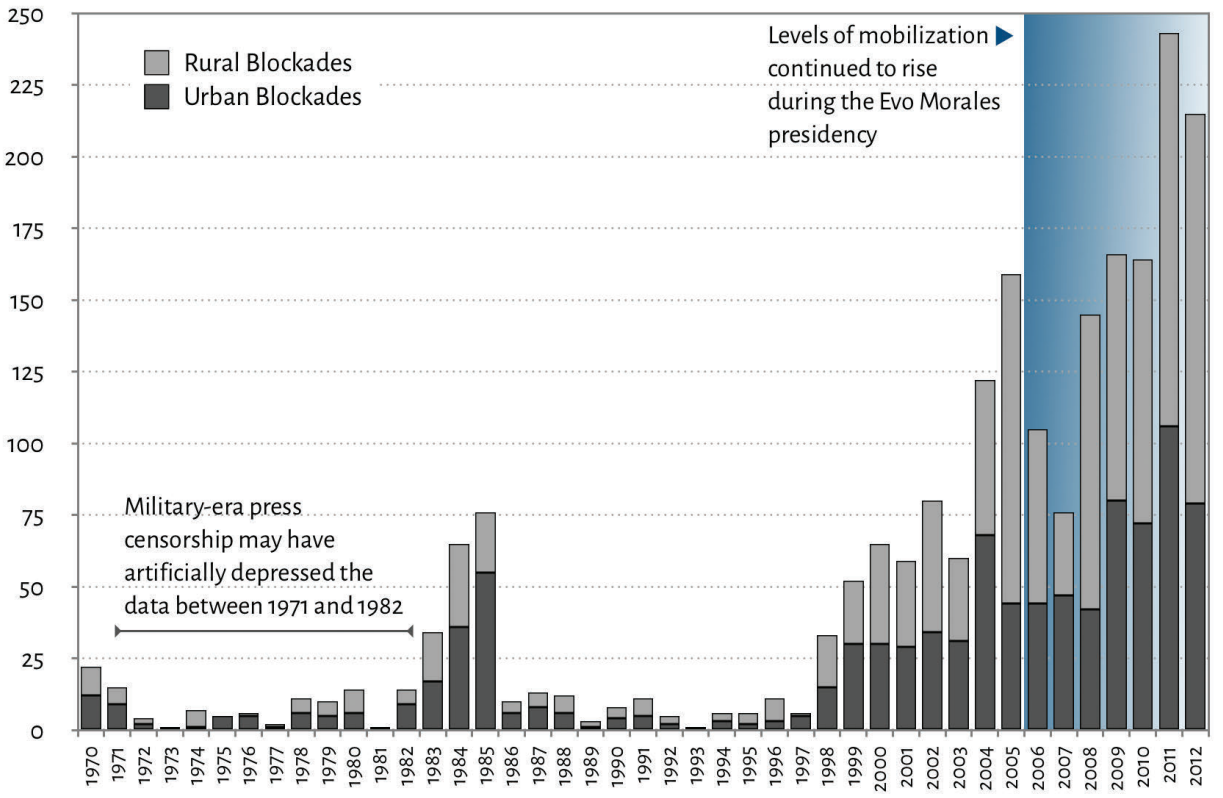
Rural community members from Achumani blockade the street in front of the Ministry of Justice demanding an investigation of a political murder.
PHOTO C. BJORK-JAMES

On June 23, 2008, three of us ascend an eerily empty highway from the tropical town of Coroico to Bolivia's capital, La Paz. Foreigners, we stare at the majestic valley below as we pass above the line where the tropical tree cover of the Yungas gives way to pure rock. The so-called Death Highway has been rebuilt on a more secure footing, but it is still marked by hairpin turns, intruded upon by fallen boulders of a terrifying scale, and undermined by landslides. Its predecessor, once calculated as the world's deadliest roadway, has been preserved as a downhill biking path

Bolivia's sparse road network.
MAP BY CIA

for tourists seeking "100 percent adrenaline." Where the road has fallen or washed out, drivers let their wheels dig tracks into the mud and gravel tracks, and peer over the edges of their vehicles to avoid falling off the side.

Today, however, both roads are nearly silent. None of the half dozen minibus unions are operating their vehicles, bike tours are cancelled, and the taxi we found cruises over empty roads and easily steers clear of both the rock faces and the treacherous edges. Once finally inside La Paz however, it comes to a stop



Urban and rural blockades in Bolivia, 1970—2012. CHART BY CARWIL JAMES-BJORK. DATA FROM CERES, *43 AÑOS DE CONFLICTOS SOCIALES EN BOLIVIA*, 2013.

at the cause of all the earlier silence: an urban road blockade. Residents of the northeastern District 13, organized through 46 neighborhood councils, have plugged the main arteries through their neighborhood with stones and their collective presence. They are calling on the municipality to meet an eight-point platform of demands concerning crime, public works, and water provision. Taxis like ours can approach the protest zone but only to discharge their passengers. Dozens of men and women walk—their goods stacked on their heads, bundled in fabric on their backs, or dragged along in suitcases—across the vehicle-free stretch of urban pavement, littered with stones and occupied by protesters who gather in the middle.

Every point along the road we have travelled is a potential chokepoint. Since the main road from La Paz to the Yungas passes through this district, a single blockade is enough to cut off all traffic to Coroico, the Yungas, Caranavi, and the northern Bolivian Amazon. Whether accomplished by simply sitting down in the street, dragging in boulders and tree limbs, or coordinating crowds of thousands to take over key thoroughfares, road blockades bring a sudden urgency to political protest. By blocking the circulation of people and goods, they ensure that the impacts of protest ripple across an entire region.

A LAND OF BLOCKADES

Landlocked Bolivia sits astride the Andean mountains, the middle of a continent that is a global hotspot for road blockades as a form of protest. In 2004 and 2008 Latin American Public Opinion Project surveys, around a third of Bolivians reported they had participated in a protest in the past twelve months; in less active years, the number hovers around one in seven. Monitors at the Center for Studies of the Economic and Social Reality (CERES) counted around fifty rural road blockades and forty urban blockades each year from 2000 to 2007. Evo Morales, the country's first indigenous president, was elected in 2005 after waves of protests using blockades caused two presidents to resign in 2003. To the surprise of many, protests increased in frequency in later years, as disruptive protest became an important form of political participation.

Most of the country's 11 million people live in one of the nine provincial capitals or adjacent cities. The high plateau called the Altiplano once housed the vast majority of Bolivians, but cities in the vast lowlands have mushroomed in

recent decades, spreading out the population over a country the size of California and Texas combined. The Altiplano roads are narrow tracks in a vast deserted plain, the northeastern Amazonian lowlands are plagued by washouts in the rainy season, and narrow winding roads span the rugged Valleys in between. Until the *doble vía* opened between La Paz and Oruro in 2011, no intercity route was wider than one lane in each direction. Less than one kilometer in nine of those roads is paved. With so little road connecting so much territory, Bolivia is rife with extant—and potential—chokepoints. Enter the blockade.

Avenida Blanco Galindo, Cochabamba. PHOTO C. BJORK-JAMES

Given this, the ability of a single La Paz district to cut off the city by land from the northern lowlands is far from exceptional. All of the country's highways integrate into the regular street grid upon their entrance into the cities. For example, Cochabamba's western highway connecting to La Paz, Oruro, and Potosí becomes the wide Blanco Galindo Avenue as it arrives in Quillacollo. When it's shut down, there is no alternate route for large truck and bus traffic. As a result, dedicated blockaders in Quillacollo or Colcapirhua can isolate the metropolis from the western third of the country. Blockades at two more chokepoints would be sufficient to isolate Cochabamba from the rest of Bolivia, cutting the paved portion of the national road network in half in the process.

That is just what happened when urban and rural Cochabambans collaborated to reverse the privatization of their municipal water company in a campaign that became known as the Water War. The first rumbles of that protest occurred outside the city, led by the Departmental Federation of Irrigation Farmers (called the Regantes). In November 1999, they blockaded the highways from Cochabamba to Oruro, the Chapare, and the Valle Alto. Using "tree trunks, branches, tires, stones, and vehicles," residents set up over twenty blockades from the midpoint of Blanco Galindo west to the small town of Parotani, an hour's drive away. Urban residents studied these tactics and replicated them in future waves of mobilization.

In January, urban and rural communities coordinated their efforts in the first of several regionwide blockades. Unions took charge of six bridges across the Rocha River into downtown Cochabamba, the Regantes maintained control of rural highways, and a new force emerged on the urban outskirts: neighborhood water committees. These organizations had been founded to do the logistical work of supplying water where the utility company didn't go: digging wells, managing cisterns, and sharing the costs and labor of laying water pipes. But, like the peasant unions outside the city, their assemblies proved useful for organizing a different kind of labor: mass participation in protest.

Activists held an unauthorized urban referendum in the streets on March 26; nearly fifty thousand people cast paper ballots rejecting the privatization contract. A week later, the movement launched a general blockade of the city and the region. A communiqué was sent out: "Supply yourselves with food, water, medicine, lanterns, radios, and all that will be necessary in accordance with the experiences of past struggles." Blockade committees met in all parts of the metropolis to prepare a total shutdown.

While a single blockade can shut down a major transport route, a carefully orchestrated constellation of blockades can shift the feel of urban space radically. Marcelo Rojas, one of the protest participants I interviewed in 2010 and 2011, remembers how a net of blockading crews carpeted the central city. "We began to create other groups on each corner"—his hands create a virtual map on the desk between us, working outwards from the central plaza. "We began to surround it, to make circles, as far as Aroma [Street] and the stadium. It was all these groups of people, and to enter the plaza you had to pass as many as ten groups." What impressed

Rural and Urban Teachers' Unions divide the work of blocking Heroínas Avenue near downtown Cochabamba in April 2011.
PHOTO C. BJORK-JAMES

Marcela Olivera was the desire to blockade absolutely everywhere: "For example, Quillacollo, on that avenue—I don't know if you've been to Urkupiña"—a massive religious festival that takes place every August 15. (I *have* been to it. That avenue floods with more than 200,000 dancers, pilgrims, and visitors honoring the Virgin Mary.) She continued, "*That* avenue was blockaded. Who wants to go to [the] Calvario [sanctuary] then, right? But there wasn't anything else to blockade, and so the people had blockaded that." The blockaded zone continued westward through Quillacollo, east through Sacaba, and throughout Cochabamba's Zona Sur. With broad enough participation extending across wide enough space, the blockade ceases to be something done *by* a mobilized few *to* the rest of the region, and "the entire city," "department," or "country" becomes part of the strike.

Major blockades don't just hit the pocketbooks of businessmen. More urgently, they hit the population through their stomachs. To explain the impact of the Water War, Christian Mamani started with vegetables: "We're talking about potatoes, ocas, all kinds of tubers, and even some … even corn and choclo." Food becomes the language through which economic pressure is exerted, felt, and remembered. "Even we ourselves felt this means of pressure," he continued, "And some neighbors needed to buy some vegetables, and so we loaned vegetables from one of us to the next, and we went to find the [rural] unions and see if someone might be able to sell us an onion, a tomato. And this is how we kept up this means of pressure, which was quite harsh."

The pressure worked, spectacularly. The national government not only rolled back the water privatization but also repealed the law designed to enable it. This victory, and the success of a simultaneous rural blockade on the Altiplano, opened the floodgates to hundreds of actions that followed.

FROM LOCAL PROTEST TO A NATIONAL UPRISING

In September and October 2000, highland peasants' unions, striking teachers' unions, and coca growers synchronized their protests into a national blockade campaign focused on the capital of La Paz, which sits in a topographic bowl just off the side of the overwhelmingly indigenous plateau called the Altiplano. As the blockade extended into its third week, food grew scarce in both working-class and elite neighborhoods; unexpectedly, though, the burden fell harder on wealthier neighborhoods. Middle-class Bolivians are accustomed to shopping in supermarkets and buying refrigerated goods every few days. Urban indigenous residents, on the other hand, relied on a different set of commodities in daily life. The tubers Mamani spoke of, as well as *chuño* (a freeze-dried potato), pasta, and quinoa are goods traded in large quantities and stored for slow and steady use. When the government tried to airlift in food, using the airport in La Paz's overwhelmingly-Aymara twin city El Alto, housewives blockaded the shipments and demanded the government negotiate. In the

end, the government was forced to sign agreements with the blockaders.

In 2003, movements across Bolivia began coordinated campaigns to renationalize the country's gas resources, support small farmers, and rewrite the constitution. Grocery store shelves emptied again in La Paz, and gasoline grew scarce. President Gonzalo Sánchez de Lozada's government banned blockades and sent in the army to break them up and escort fuel tankers through. But when protesters were killed—five in September and more than 60 in October—protesters only intensified their blockades, supplementing them with hunger strikes and the largest march Bolivia had ever seen. Deserted by his allies, Sánchez de Lozada resigned and fled to Miami. Congress repealed the law criminalizing blockades, and Bolivia's 2009 constitution promises strong protections for the right to strike.

BLOCKADES AS EVERYDAY FORMS OF PROTEST

On April 14, 2011, I sit with two striking teachers tending a barricade made of a few logs stretched across a street along Cochabamba's Rocha River. It is one of hundreds set up across Cochabamba at the crest of a national strike wave of public workers. On a normal school day, the 13-kilometer journey from their homes in Quillacollo is a struggle with bus transfers and long walks with their children in tow. But today there are blockades up and down Blanco Galindo Avenue complicating everything. "We were victims of our own struggle," they both say, laughing. "We suffer a lot with all this, strikes and blockades and all those things," Lubia Vargas Padilla tells me, but it works. "The only way that they listen to us is this, because we have no other way of saying *no*. … If we don't use a coercive method, we achieve nothing."

It is Bolivians themselves who give one another the right to strike. The men and women who drive the Highway of Death could have broken through the neighbors' line, but chose not to; like most Bolivians they respect the strike. It is precisely when transport unions cancel their scheduled routes, when bus drivers idle their motors on highway, when shopkeepers shutter their doors that a barricade in the streets becomes a building block towards a general strike. People defer to and accept these tactics because on another day, they might carry out a strike of their own. Each small group, from a neighborhood council to a primary-school teaching shift to an outlying neighborhood, can grasp the nearest chokepoint to demand what they need. In Bolivia, the combination of sparse roads and deep solidarity makes big changes possible. ■

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The **Dredge Research Collaborative** show how sediment management undergirds the social and economic life of the Great Lakes region. Dredging embodies a central fact of the Anthropocene: there is no away.

dredge dump dike

All Illustration by Dredge Research Collaborative

GREAT LAKES PORTS ARE CHOKING ON SEDIMENT. They are choking because they are located at the mouths of rivers draining watersheds of agricultural fields, forests, construction sites, and floodplains where erosion ceaselessly produces the sediment. The majority of the material deposited into the lakes near these river mouths will never leave. Thus, the Great Lakes are a giant sediment sink, slowly filling with the land that surrounds them.

A key response to the choking of these ports is dredging, the mechanized uplift and movement of underwater sediment to create and maintain shipping channels, remove contaminated sediments, and produce landscapes at the land-water interface. This is accomplished with drill-like cutterhead dredges, vacuum-like suction dredges, miles of metal piping, and specialized bulldozers and excavators mounted on pontoons. For cost reasons, dredged sediment is typically transported the shortest possible distance where it will also be out of the way. Yet this material can only be "out of the way" for so long. The placement of dredged material is slowly—and paradoxically—filling in river mouths around the Great Lakes Basin.

Erosion and sedimentation are not inherently problematic. In the Great Lakes region, ports and urbanization are concentrated around river mouths. It is this confluence of urbanization, water, and sediment that produces conflicts and makes sediment "problematic." For example, sediment clogs navigation channels, which forces shippers to lighten the load in their ships, reducing cargo volumes and raising shipping costs.

Great Lakes river mouths have become chokepoints of sediment that impedes the economic activity they support. The infrastructural responses to sedimentation have generated unintended impacts on adjacent ecological and social systems. While dredging enabled the spread of industrial commerce throughout the region, it also generated a disposal problem. Open-water dumping was the initial response; it put sediment out of sight and out of mind. But industrialization generated toxic sediment and, as environmental awareness grew, so did concern over the contamination of river mouths. The solution to this problem: constructing diked islands and peninsulas to store sediment—Confined Disposal Facilities (CDFs)—which facilitated the physical separation of contaminated sediment from the river mouths. Today, however, these facilities are filling up, causing ports to look for alternative methods of disposal and placement.

The following maps, diagrams, and photographs—researched and created by the Dredge Research Collaborative—visually describe the dynamics of dredging in the Great Lakes Basin.

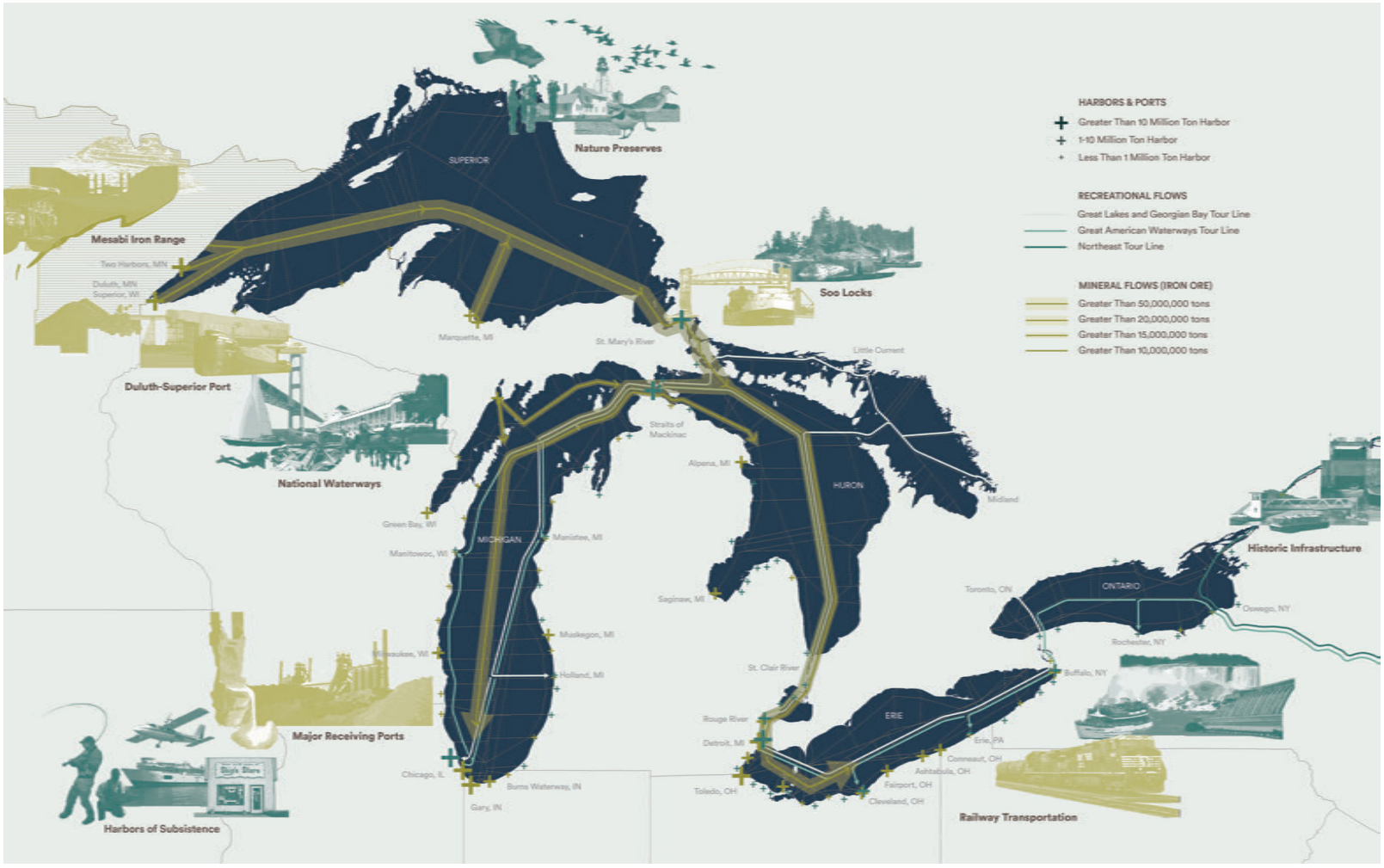

FIGURE 1. DEEP AND SHALLOW DRAFT ECONOMIES In the Great Lakes region, dredging is interwoven with local, regional, and global economies. Deep-draft dredging (shown in green) makes possible the movement of bulk commodities between inland sites, urban centers, and the Atlantic Ocean. Overlaid onto this larger, deeper, industrial network is a shallower, more localized dredging regime (shown in blue) that enables recreational uses ranging from day boating to shipwreck scuba dives. These two economies work in concert to animate socio-economic life along the lakeshore.

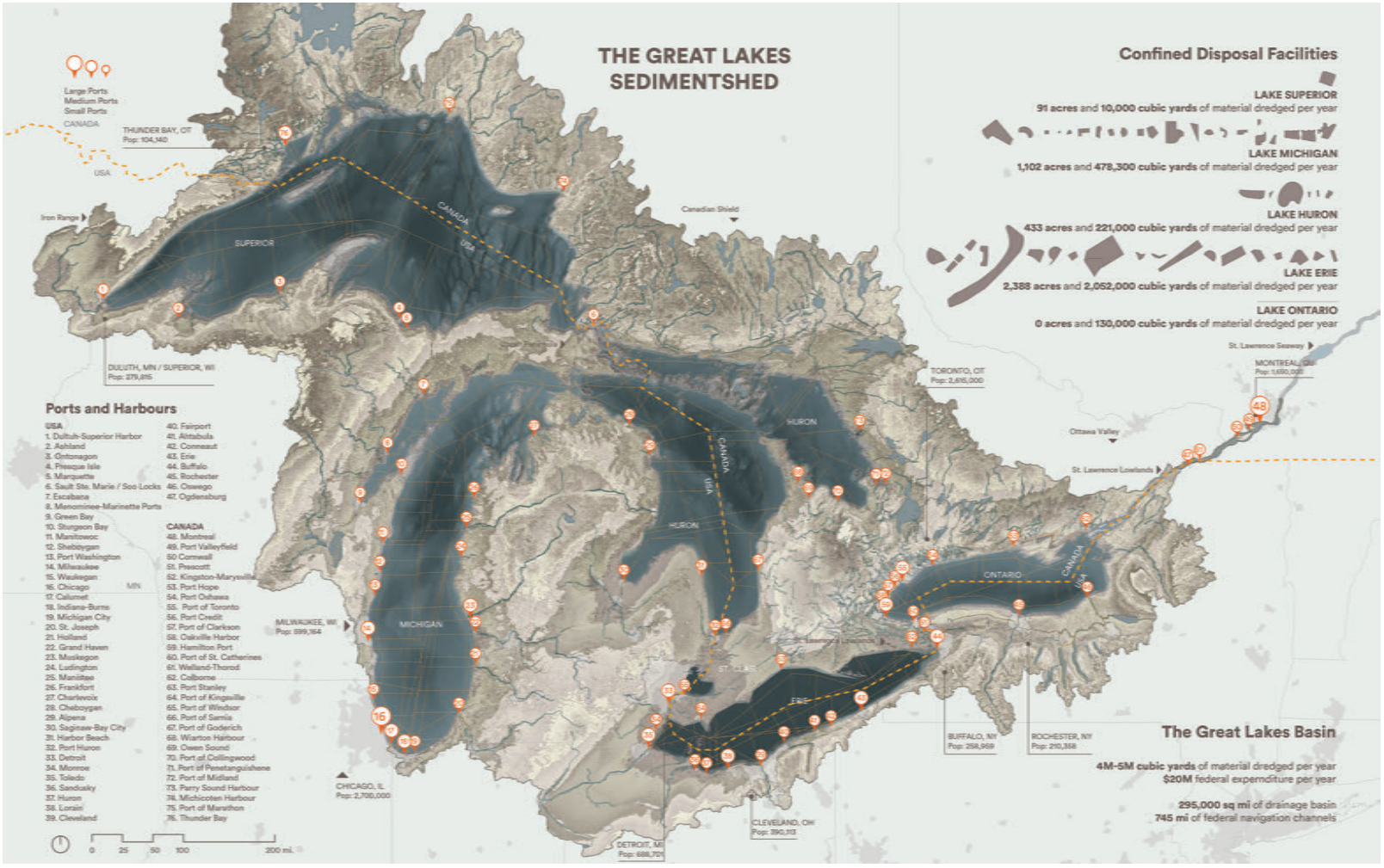

FIGURE 2. PORTS, HARBORS, AND CONFINED DISPOSAL FACILITIES (CDFS) IN THE GREAT LAKES BASIN Each year, 4 to 5 million cubic yards of bottom sediments are dredged from more than 100 commercial ports and harbors around the Great Lakes—enough to cover Central Park with sediment three feet thick. Finding somewhere to put it presents a serious logistical challenge, particularly when more than half the material annually dredged in the Great Lakes is contaminated enough to require placement in CDFs. Many of these facilities were constructed in the 1960s and 1970s with the assumption that sediment would be clean enough in 20 years to return to open water. This was not the case, however, and cost has restricted the construction of new facilities, driving experimentation with alternate disposal methods. Individual ports and private industry are developing strategies to sort, characterize, and commodify dredged sediment for use as soil amendments, concrete aggregate material, and fill. Smaller amounts are beneficially reused for beach nourishment, upland construction, or habitat creation.

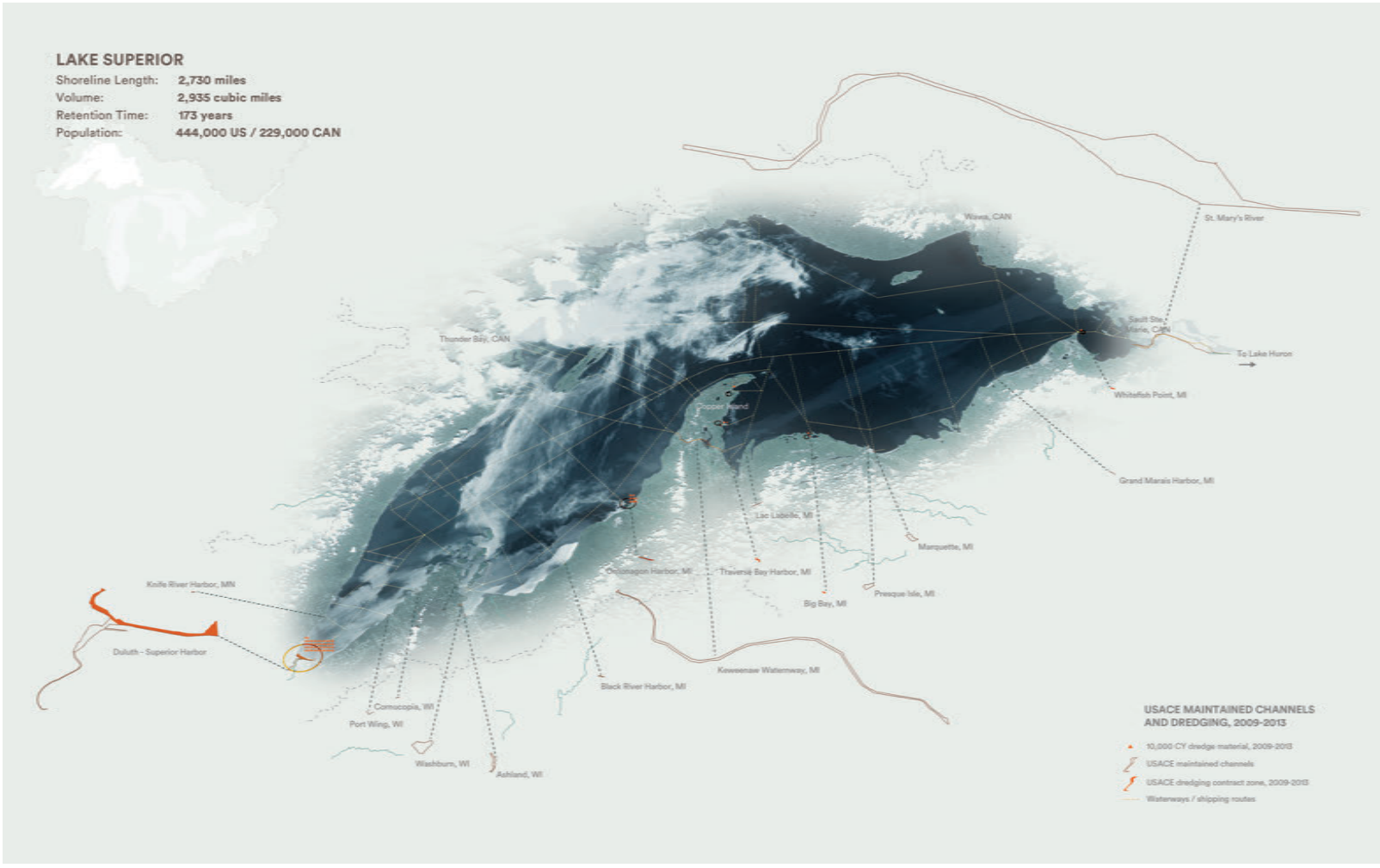

FIGURE 3. LAKE SUPERIOR Each of the Great Lakes poses its own challenges. Despite its sparse population, Lake Superior hosts the largest port by tonnage in the region: Duluth-Superior. This map (and those that follow for the other lakes) shows federal navigation channels maintained by the U.S. Army Corps of Engineers, dredged material volumes, ports, and the river mouths, where dredging is concentrated.

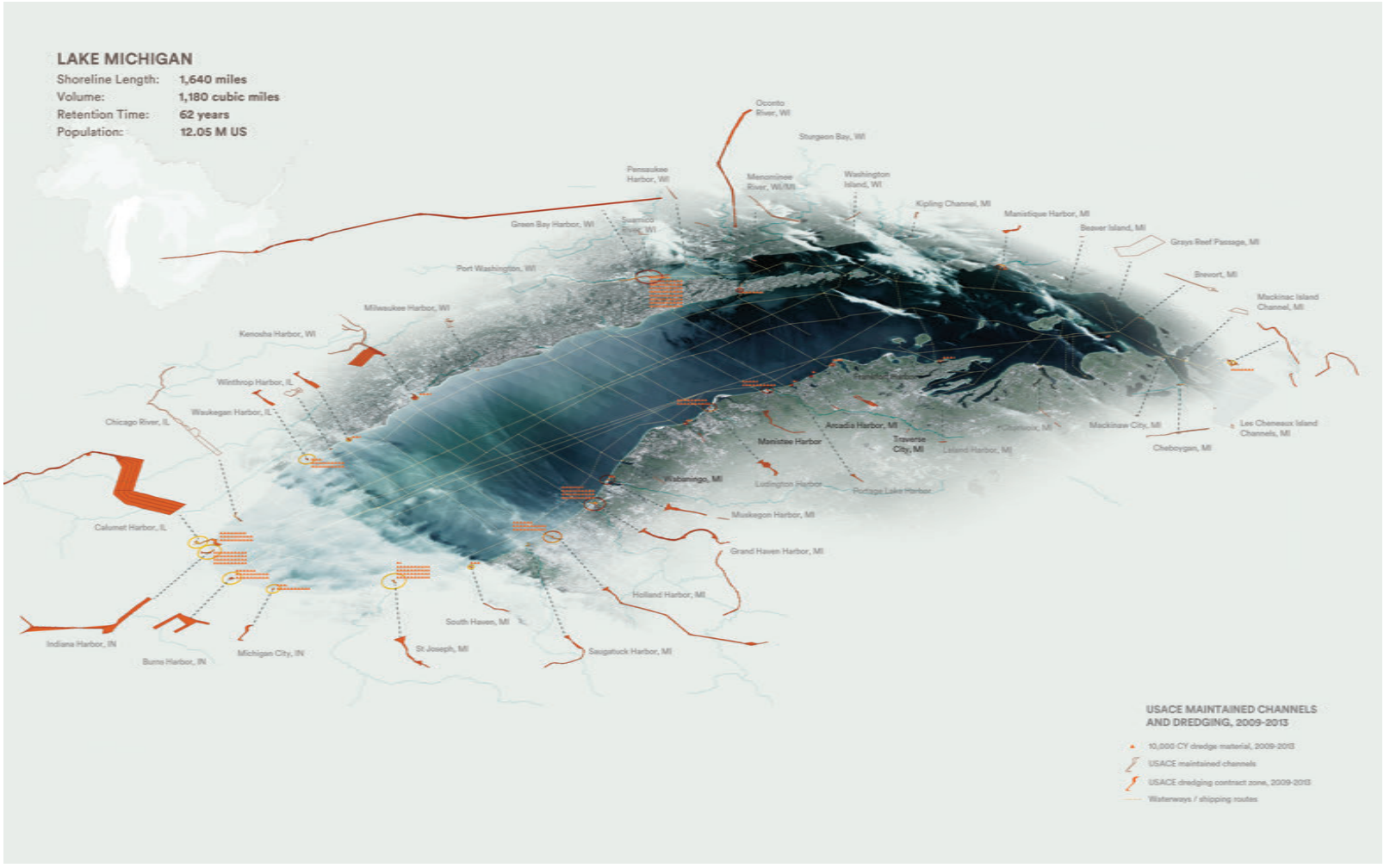

FIGURE 4. LAKE MICHIGAN Lake Michigan is the only Great Lake entirely within the United States. Navigation channels perforate its shoreline. The northern portion is colder, forested, and sparsely populated, while the southern part is temperate and urbanized. The lake's southern watersheds are more intensely farmed, leading to runoff rich in nutrients. While the other lakes all have a general west-east or north-south flow, with entry and exit point at opposite ends, Lake Michigan does not. Its connections to Lake Superior and Lake Huron are in the northern end (righthand side of image), producing a unique "cul-de-sac" circular pattern of water flow around the lake. This feeds a vast system of coastal sand dunes that provide some of the most unique habitat in the basin but also clog many coastal ports with sand.

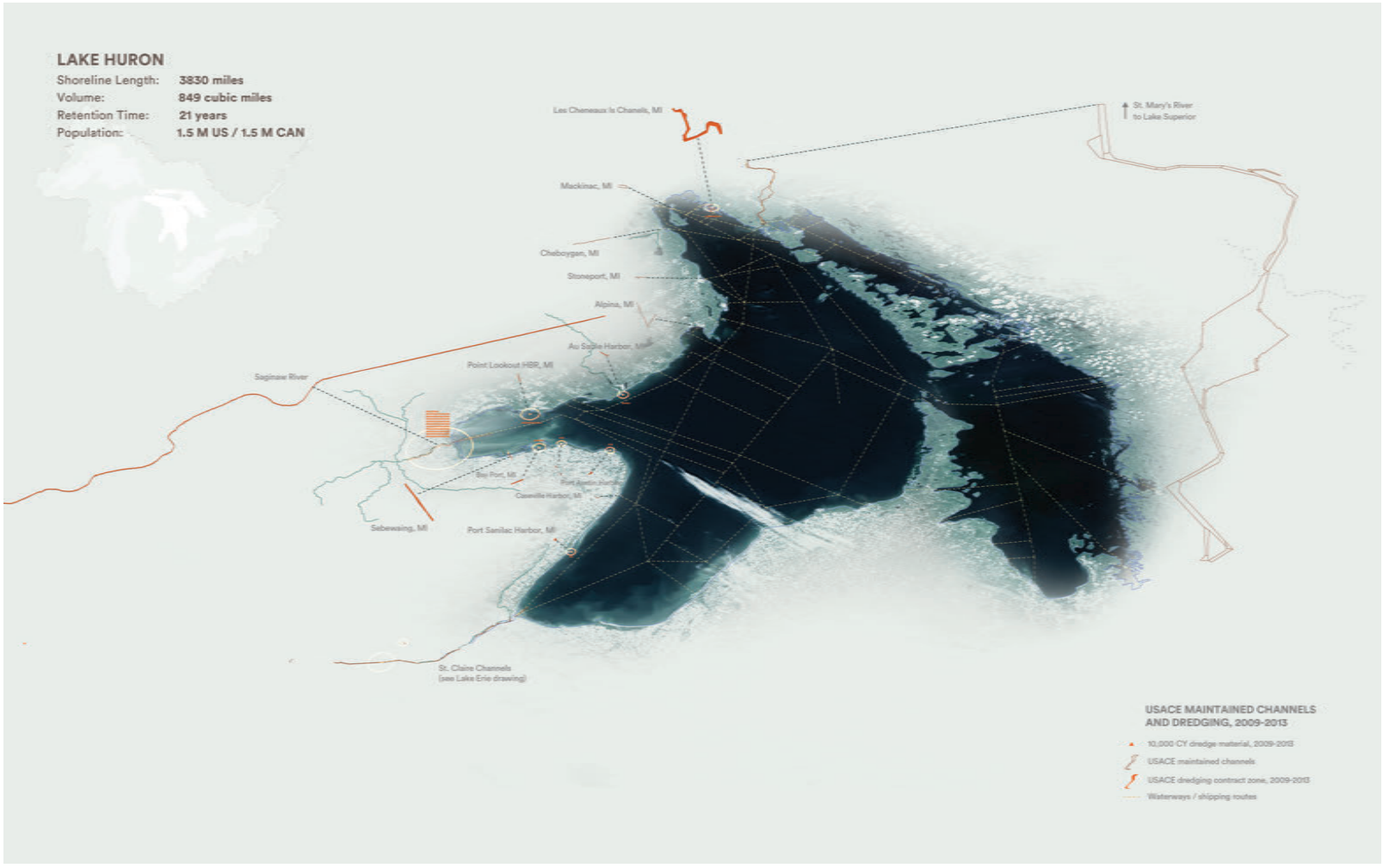

FIGURE 5. LAKE HURON Dredging in Lake Huron is relatively light compared to the rest of the basin. Lake Huron and Lake Michigan are a single lake hydrologically because their connection at Mackinac is through a strait rather than a true river. Near this connection at the northern end of the lake, a uniquely configured dredge channel services the "subsistence harbor" of the Les Cheneaux archipelago, the sole link to the mainland for this island home community. At the southern end, dredging of the St. Clair River maintains an important shipping connection for Detroit.

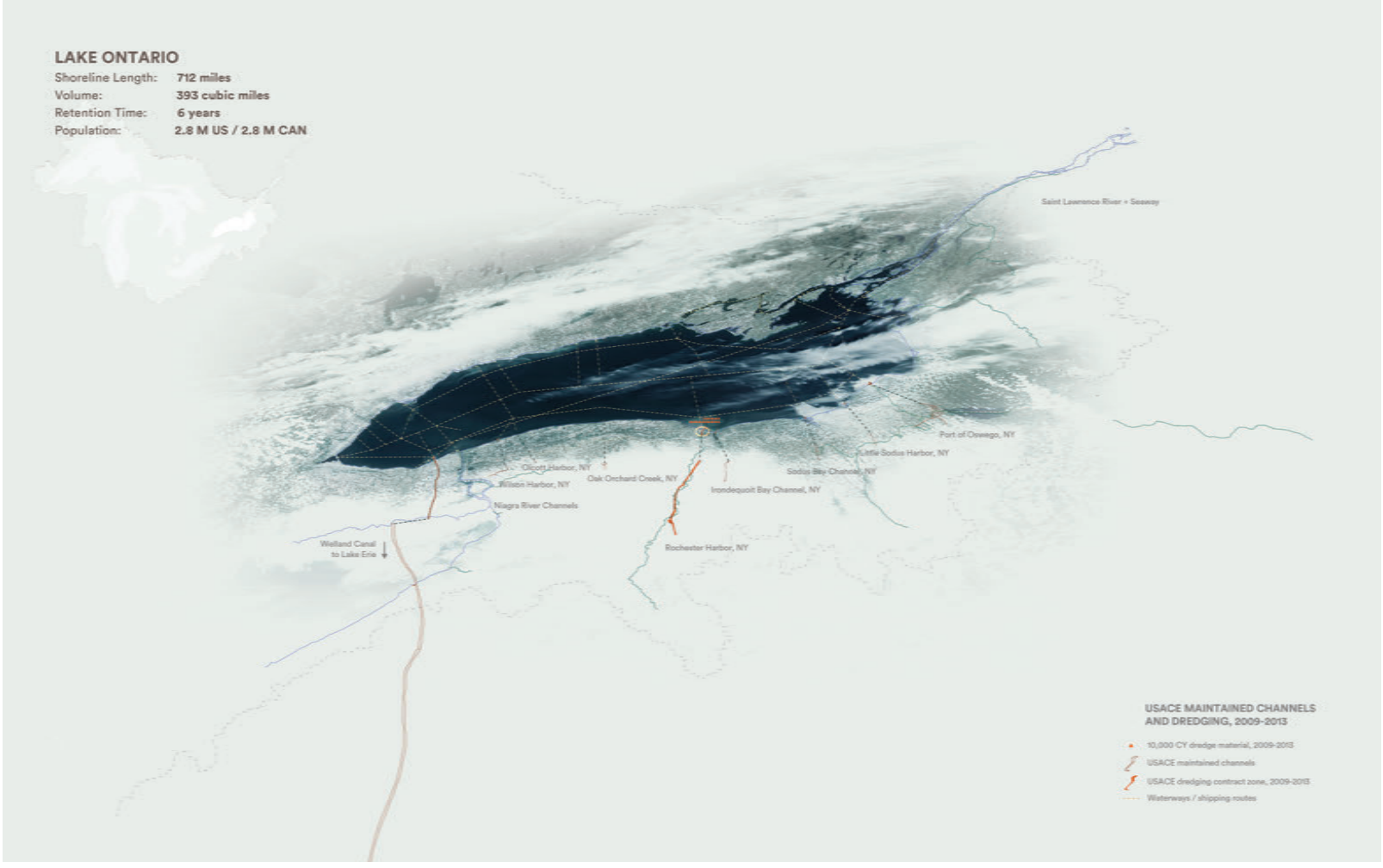

FIGURE 6. LAKE ONTARIO Less dredged and industrialized than its neighbors, Lake Ontario nonetheless provides a critical navigational link between the region and the Atlantic Ocean via the St. Lawrence River. Montreal, Quebec City, Toronto, and the industrial center of Hamilton are located along this stretch of water. Lake Ontario's water levels are a source of conflict between shipping interests advocating for steady, high lake levels; local residents, who see higher water levels as contributing to erosion and land loss; and environmentalists, who argue for seasonably variable levels to mimic the natural processes that created the lush wetlands and deep pools the lake is known for.

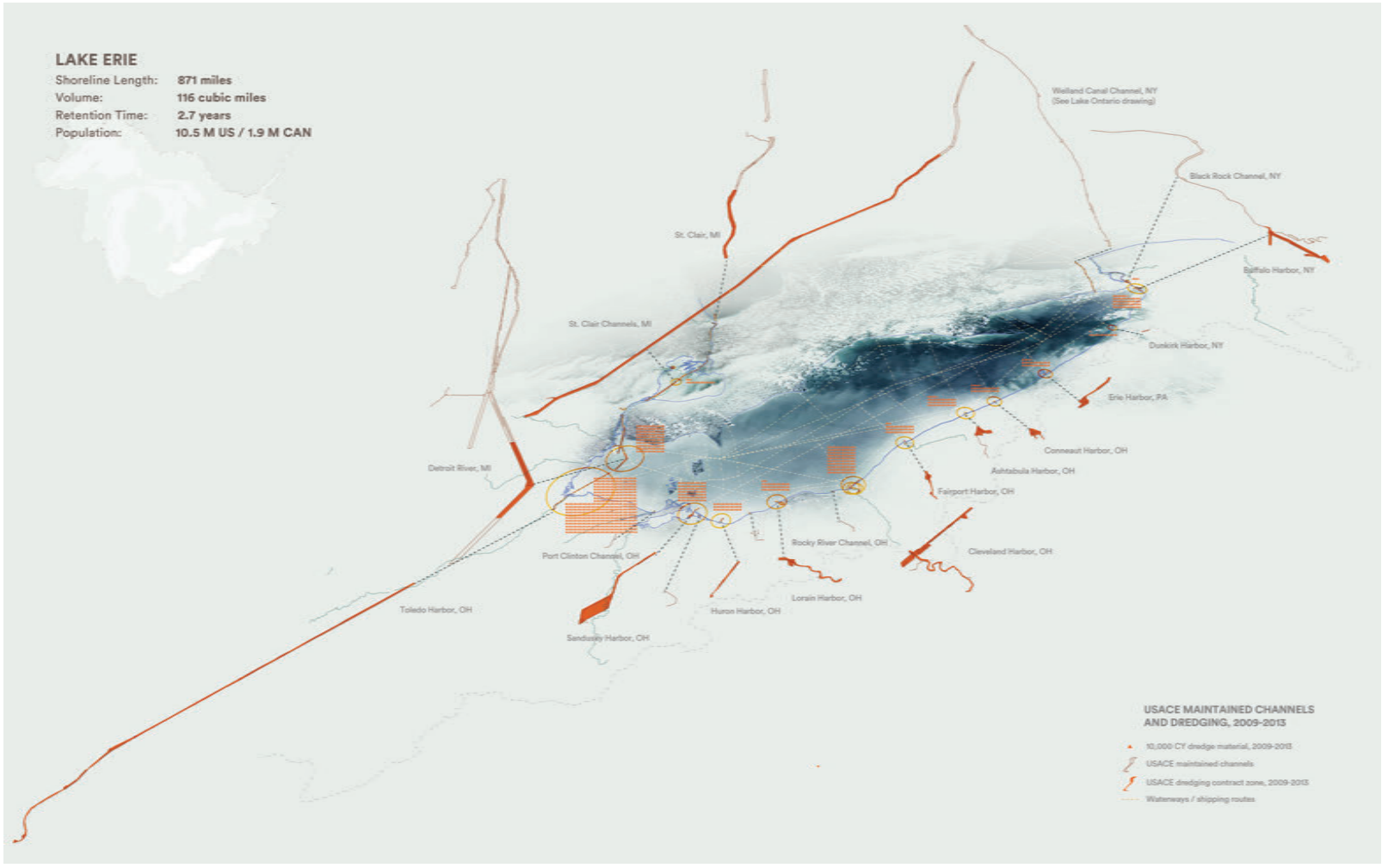

FIGURE 7. LAKE ERIE Lake Erie is the most dredged of the Great Lakes due to a combination of urbanization, industry, and shallowness. Dredging activity is concentrated around large commercial ports such as Detroit, Cleveland, and Toledo. One of the most biologically productive lakes, it is heavily industrialized, with ports that directly serve Rust Belt manufacturing. A majority of the watershed is urban or agricultural, and the lake suffers from polluted runoff and algal blooms that accompany high nutrient loads. As a result, Lake Erie exemplifies the tension between sediment management and ecological health. The most obvious evidence of this struggle is the many at-capacity CDFs that checker Erie's industrial shores.

FIGURE 8. THE FUTURE LIVES OF DREDGED SEDIMENTS Sediment management in the Great Lakes is changing. Of the 45 CDFs built since 1970, only 20 are totally active, and the system is 80-percent full. While actions such as harvesting sediments held within CDFs for other uses and raising the height of the dikes surrounding the outer edges of the CDFs are marginally increasing their lifespans, capital for creating new facilities is not typically available, indicating an end to the era of confined disposal. This raises the question of future placement options, but it also leaves open the question of what to do with closed CDFs. As CDFs mature, novel ecosystems have begun to emerge that serve as unintended habitats for native and non-native flora and fauna, and create recreational opportunities such as waterfowl hunting. Built in 1976, Site 3 (pictured above) expanded in 1994 to 397 acres and still serves as an active CDF for the Port of Toledo. It replaced Island 18, known as Grassy Island, which was built in 1960 and closed in 1978. Since its closure, Island 18, situated in the muddy mouth of the Maumee River, has served as a 150-acre wildlife area, attractive to coyotes, foxes, and deer.

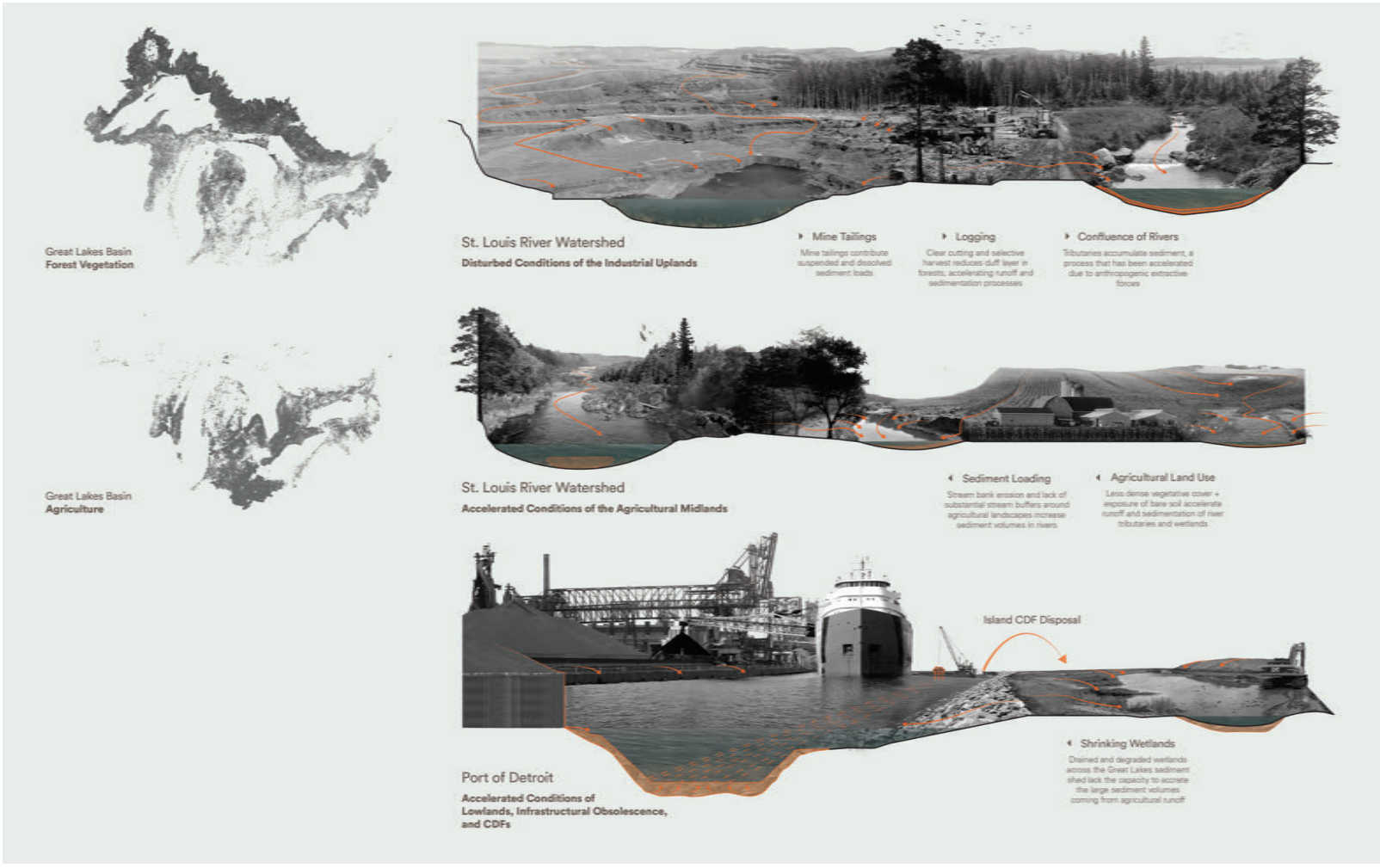

FIGURE 9. TOXIC LEGACIES Sediment contamination limits placement and reuse options for dredged material. Contamination is most often introduced to the Great Lakes along tributaries that feed directly into the lakes and from upstream watersheds, where industry and agriculture contaminate sediment moving to river mouths. Take, for example, the Great Lakes' largest port, Duluth. Located at the mouth of the St. Louis River, the Duluth port is the site of a toxic industrial legacy but also one of the largest and most successful Great Lakes cleanup efforts to date. The contamination of river mouth sediments is related directly to the industrial activities that sustain the port economically. Duluth is engaged primarily in exporting wood and iron ore. Tailings from the mines that produce iron ore contribute suspended and dissolved sediment loads. Clear-cutting upstream reduces forest humus, accelerating runoff and erosion. Agricultural production increases peak sediment and nutrient loads in tributaries, loads which make their way to the river mouth. Today, however, a comprehensive environmental cleanup effort is utilizing dredged sediment to reconstruct wetlands and publicly accessible recreation areas, cap contaminated areas, and restore river mouth habitat. This effort indicates how sediment management is progressing from excess as a problem toward excess as a remedy.

FIGURE 10. RETHINKING PLACEMENT The Cat Island Chain Dredged Materials Disposal Facility, located near the mouth of the Fox River in Green Bay, Wisconsin, demonstrates the shifting environmental sensibility of sediment management in the region. A 4.2-mile-long constructed squiggle serves as a wave barrier and armature for the re-creation of a series of historic islands, which eroded away during the 1970s. The islands disappeared because of hardened shorelines, poor water quality, deepened channels, and elevated water levels that impeded the depositional processes and vegetation to maintain the islands. The barrier protects what will ultimately be 1,225 acres of shallow water and wetland habitat created through the disposal of clean, dredged sediment. Likewise, it will protect wetlands near the mouth of Duck Creek at the southern tip of Green Bay.

For generations, dredged material was dumped directly in the open waters of the bay. Responding to concerns about environmental contamination, the first CDF for the Port of Green Bay was built in 1979 and filled by 1996. The Cat Islands facility provides a method of placement with multiple benefits. Each of its constructed islands is defined on three sides by dikes, which help contain material and protect it from waves. New habitat will accrete slowly along with the sediment during the next 25 years as the cells are filled in. Evidence of this ecological value is emerging as endangered species like the piping plover return. Refashioning life with sediments of the past, the history of dredge disposal in Green Bay signals a broader trajectory emerging across the Great Lakes. ■

The **DREDGE RESEARCH COLLABORATIVE (DRC)** *is an independent, 501(c)(3) nonprofit organization that aims to improve sediment management through design research, building public knowledge, and facilitating transdisciplinary conversation. The Dredge Research Collaborative is Sean Burkholder, Brian Davis, Rob Holmes, Justine Holzman, Tim Maly, Brett Milligan, and Gena Wirth.*

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Orit Halpern visits the blasted grounds of a Canadian gold-mine to understand how mines work as convergence points of speculation, engineering, information, and futures and derivatives trading.

Golden futures

Caterpillar trucks at Malartic Mine.
PHOTO: GARRETT LOCKHART

In the Northern Quebec region of Abitibi lies the Malartic gold mine, the largest open-pit gold mine in Canada. Standing at the edge of this 4km-wide hole in the earth, one can envision what it might mean to inhabit another planet. For this is an inorganic environment—a place where Earth is being literally turned inside out. We may speak of the planet in terms of care, life, and love, but in reality almost all the Earth (beneath the very thin strata of topsoil upon which the biosphere rests) is violently antipathetic to carbon-based life forms. At sites like Malartic, metals and minerals meet with life-sustaining substances such as water and air to create acids and poisons destructive to the biological environment. Yet if the mine is a place where gold is brought up from ancient and deadly underworlds, it is also the inception point for a world of technical assemblages, profit, and various bets on the future. As such, mines are more than just holes in the earth. They are chokepoints of both the subsurface and the surface, and of the past and the future: a narrow aperture between below-ground matters forged millions of years prior and above-ground dynamics constitutive of present and future life.

LOGISTICS

"Quebec is for mining what Switzerland is for banking … a free-trade zone," the geo-engineer in charge of monitoring hydrology and environmental toxicity confided to me. There are many mines along the Canadian Shield, a vast expense that stretches across

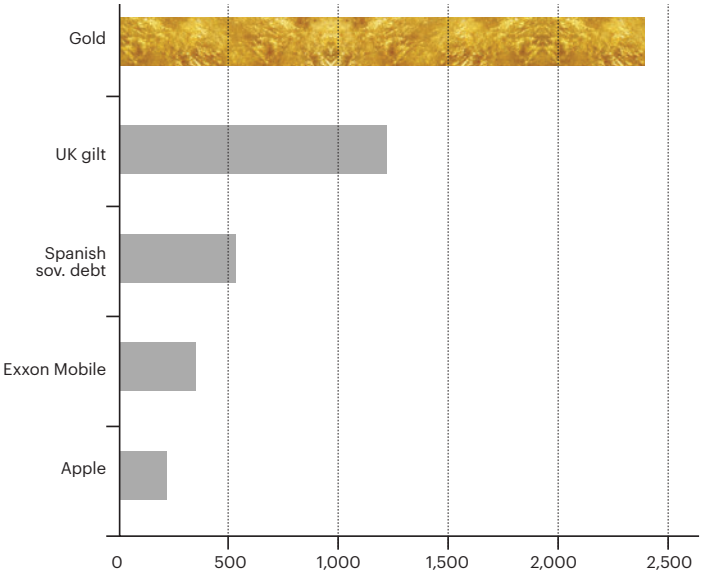
Tailing Ponds at the Malartic Mine.
PHOTO: ORIT HALPERN

To avoid immediately killing wildlife, water from the mine must be treated to raise its pH from 2-3 to 5-6. Here treated water is released into the boreal forest.
PHOTO: ORIT HALPERN

Canada up to the Arctic. Millions of years ago a glacier swept out the top levels of the earth, leaving minerals and metals exposed and ripe for picking. But the pickings are no longer quite so ripe. "There is no more easy mining on earth," a geologist at the site, Dr. Mostafa Benzaazoua, informed me. All the metals and energy sources on Earth will be depleted, he predicted, by 2155, even if we account for improvements in technology. While heat used to be used in extraction, mining corporations today have turned to chemistry—for gold, to cyanide—to bind with the ore and remove it from the waste rock. But this leaves dangerous residues that must be managed carefully through toxic tailings ponds that themselves become sites of new forms of speculation. All of this must happen within the relatively short time concessions last, driving a 24/7 effort to derive more value from a site. Amid this convergence of capital, machinery, information, and materials, chemistry and logistics are formative of an alchemy—turning rocks

into markets.[1]

The mine extracts 55,000 tons of rock a day. This rock is moved, tested, and then separated into ore rock and waste rock. The rock with ore will go to a processing plant that will remove the gold, while the rest is immediately laid to rest in, according to mine employees, the 20km of tailing ponds that lie behind the installation. Vast machines, choreographed by Caterpillar software, lumber through the space carrying their rocks in perfect time. Each truck costs $3 million, each tire is 11 feet high and costs $42,000 to replace. The tires last eight hours of driving. The mine has a short life. It is anticipated to only last another 15 years (making its lifespan 27 years). With concessions expiring and ore running out, such time scales are paltry in comparison to the geological formations the mine has unearthed, and the vast new territory it has produced.



2010: Total outstanding/market capitalisation of equities, bonds, and gold (in US$ billions).
SOURCES: SCHIFFGOLD.COM, BLOOMBERG, BIS, WORLD GOLD COUNCIL

DERIVATION

The biosphere might be in trouble, but it seems we are hedging our bets. More than 90 percent of what is mined at Malartic and globally will be replaced underground into bank vaults. These standing reserves of unused gold will serve as a hedge bet against more volatile derivative and futures markets. This becomes a way of subverting or diverting the finitude of gold in the earth. Such mining practices mirror the logic through which gold historically has been used to hedge bets. Gold markets as of 2010 were among the largest debt-hedging markets in the world. It is estimated that the derivative markets are betting on more than ten times the annual new mine supply, and by now far more then official reserves. The markets exceed the reality of production exponentially, setting prices and making bets far into the future.[2]

DATAFICATION

These Sisyphean wagers hinge on a literal connection between data mining and metal mining. The mine is covered by a network of information-gathering sensors that monitor water, humidity, temperature, winds, atmospheric conditions, geological stability, and topology. The datafication of this space represents the effort to monitor the location of ore, to secure the mine's structural integrity, and to guard the boreal forests, aquifers, and cities against the existential threat posed by the nearby mine. The mine's floor is lined with coring stations that attempt to unearth those locations where gold is in abundance. Abundance in this case is 1 ppm, which is to say one ton of rock is dug for 1 gram of gold. Such low amounts of ore demand constant blasting and excavation to produce anything worth selling. The mine produces approximately 580,000 ounces of gold a year (or 16.4 metric tons) and upwards of 230,000 metric tons of rock per year. By

1 I partook of this experience, as part of a research studio course I organized this past August through Concordia University in Montréal with Pierre-Louis Patoin from Sorbonne Nouvel 3. This material is taken from visits to Malartic from August 2-5, 2017. Dr. Mostafa Benzaazoua, from the University of Quebec at Abitibi in the Research Institute in Mining and Environment, a mine reclamation expert was our guide and collaborator. I am grateful to his assistance and that of his colleagues in doing this research. On August 4 we were given a tour by the mine staff, whose names are being withheld as a matter of privacy.

2 The difficulty in pricing metals (also oil) as a result of derivatives markets has even led to mines owned by AgnicoEagle to advertise that they do not sell futures. While the mine may "guarantee" the price of its gold, however, the owners of the gold clearly do not, as evidenced by the size of gold derivative and futures markets.
https://www.agnicoeagle.com/English/60th-anniversary/default.aspx
http://www.canadianmalartic.com/Apropos-partenariat-en.html

Sensors in the waste rock retention testing grounds.
PHOTO: ORIT HALPERN

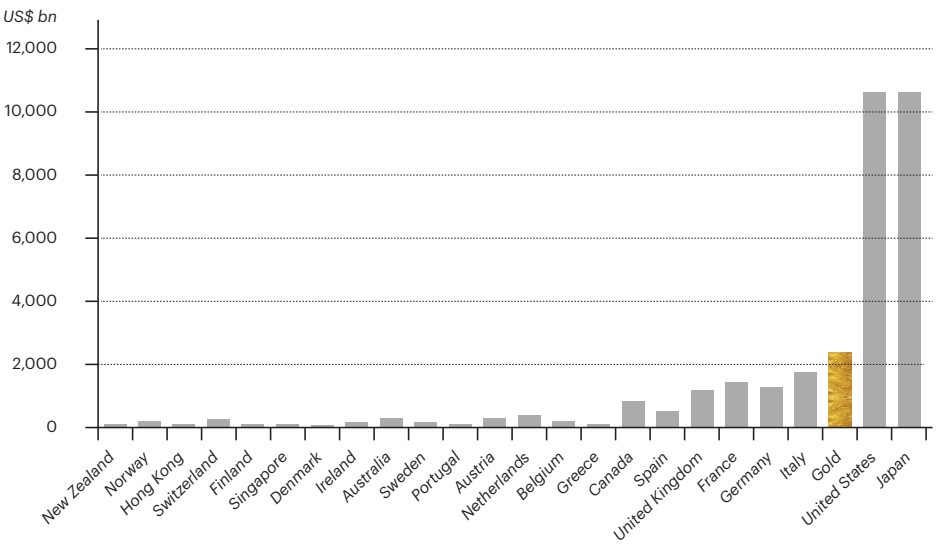
Wireless infrastructure for sensors and meteorology monitoring.
PHOTO: ORIT HALPERN

the end of the mine's life it may generate up to 700,000,000 tons of waste rock.

All the gold that has ever been mined in the world, I was told by the mining operatives, could fill two Olympic swimming pools. This drives a constant search for new veins of ore. First, airplanes and satellites utilize electromagnetic surveys, ground-penetrating radar, and satellite imagery to provide initial information on rock formations, structures, and features that might signal untapped resource fields. On the ground, there are sensors that monitor, survey, and assess every movement and shift of the earth. So much digging and blasting demands an array of sprinklers that constantly keep the site damp in an effort to control particles and dust from contaminating the air. The Malartic mine is unusual for being located literally within a city, and therefore its immediate impact on human health is of paramount concern. The mine also boasts

research stations where geo-engineers attempt, perhaps futilely, to figure out how to guard all this waste rock from water which will subsequently turn the sulfides and other minerals and metals in the rock into acid. This would be lethal to the surrounding ecosystem.

Among the geo-engineers I speak with, the discourse is medical and the practices are surgical. The skin of the earth that has been peeled back is to be covered by a new molt of electronic information, evaluating and managing the membranes between the mine and its world. The mine is a contaminating entity, whose worst effects will be contained through geo-surveying, the imaginaries of mine reclamation, and the omnipresence of capital.



Gold derivative debt markets as of 2010.
SOURCE: SCHIFFGOLD.COM, BIS JUNE 2010

SPECULATION

What futures are being envisioned through extraction and derivation? Since the 1980s when Canada began requiring some efforts at mine reclamation and environmental cleanup (simultaneously, major mining corporations were benefitting from structural readjustment and neoliberalism in the Global South) the design of mines has changed. In turn, mine design must now take into account both global supply chain and markets, in real time, as well as mines' impending death, collateral damages, and possible resurrections. To optimize value, mining companies today do everything from turning tailing ponds into new resources for construction materials to figuring out if the waste rock might yield different mineral or metal. As experts sort through the detritus in hope of turning "waste" into resource, evermore wastelands and industrial processing zones have merged.

Facing limits to planetary resources and maybe even life, we have turned to ubiquitous computing, geo-sensing, and algorithmic trading. To avoid these terminal thresholds of resources and toxins, the mine must conquer the limits of space by deriving value from the future. Enter derivatives. Derivatives are financial instruments that allow a certain amount of something (mortgages, minerals, oil, gold, etc.) to be traded at some point in the future at an agreed-upon price. One also can bet on the cancellation of an order or some other event changing the future price of the underlying commodity or security. The result is that the size of the derivatives markets far overshadows the actual world's gross domestic product, by now exceeding the world's GDP by 20 times. These markets have grown exponentially, by 25 percent per year over the last 25 years (Martin 2014).

Futures derivative markets make a double move. They bet change in value of some entity (you can even bet on the weather) between the present to some future point against another change in value of some other entity. But what makes the market interesting is that you can sell your bet *before* the event happens. In doing so, one "hedges" the future. Gold is the long-standing hedge bet. You can pull out when you make money irrespective of what the future might hold (Cooper 2010). Time no longer equals money but rather money derives from time=time, from bets on relations *between* times. One can swap the debt, for example, on a package of mortgages or of entire countries for gold futures without the homes being sold or the nations paying or defaulting on their loans. You are betting on temporalities of two different markets, looking to bet on fluctuations in price *between* the

two markets. The forms of time here are speculative, not predictive. One does not need to calculate the final risk of the action of investment; only manage the time of the action. Risk, which is calculable, now has become just raw uncertainty to be managed through algorithmic financial logics that mirror the big-data infrastructures of the extraction industries themselves.

Such understandings of time, of course, demand that we ask: what is the relationship between derivation and extraction? This logic is based in a discourse of reclamation, optimization, and "sustainability" that now dominates mining and energy industries. The value of the mine is being transformed constantly through changes in the mines' functions and extractions of value from what used to be waste. We are constantly panning our destruction of the environment in search of increments of changing future values to bet on. What is true of gold is also true of most other extraction industries, especially oil markets, which had become the second largest futures market and one of the largest derivatives markets by 2002 (EIA 2002). Our planet is now a hedged bet, where finitude in life is converted to surplus information for future speculation.

As future risk transforms into uncertainty through derivation, high technology—particularly "smart" and "ubiquitous" computing infrastructures—becomes the language *and* practice by which to imagine our future. The result is the development of forms of financial instrumentation and accounting that no longer (need to) engage with, alienate, or translate extraction from a historical, geological, or biological framework of value.

UNCERTAINTY

This situation may not be hopeful, but it need not lead to despair. We simply must find forms that do not match the vacant speculations of our present. Environmentalists and indigenous land and human rights activists in Canada, for example, seek change by attempting to change risk valuations on pipelines and other infrastructure projects by insurance companies in order to increase the interest rates and therefore the price of the project (Pasternak 2017). Increasingly, many recognize that transforming the nature, time, and regulation of the bet is the source of a difficult—but possible—alternative future. Despite being seemingly abstract and delinked from the present, derivatives also drive human actions. People build homes, take mortgages, build pipelines, and work in mines. They subsequently suffer when these markets move. By tying together disparate actions and objects into a single assembled bundle of reallocated risks to trade, derivatives make us more indebted both to each other and to the planet itself, which is often the literal matter of such exchanges (Martin 2014). The political and ethical question thus becomes how we might activate this increased indebtedness in new ways, ones that are less amenable to the strict market logics of neoliberal—perhaps now neoextractionary—economics. All futures are bets. Our task now is to open those risk assessments and extractionary hedge bets to the uncertainty that faces all life on earth. ■

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THE TIMES OF

Chokepoints are problems not only of space, but also of time. **Jason Cons** explores this temporality in Bangladesh's Sundarbans, a mangrove forest that has become a laboratory for fashioning the future in a warming world.

CHOKEPOINTS

At the mouth of the Bengal delta sits the Sundarbans, the world's largest remaining mangrove forest. The Sundarbans is a protean landscape, made up of a dense interlocking set of channels. It is a space where a range of fundamental distinctions—land/water, salt water/fresh water, human/animal, wet/dry, Muslim/Hindu, India/Bangladesh—begin to break down. Spanning the India-Bangladesh border, the Sundarbans is central to a range of imaginations of both the present and the future in South Asia and beyond. It sits at the heart not only of regional, but also—and especially—of global anxieties about climate change. Situated amidst catastrophic imaginations, promises of development, calls for conservation, anxieties about the future, and demands for critical infrastructure, the Sundarbans is a chokepoint in space and time.

Chokepoints typically are approached as spatial phenomena—delta-like zones where a range of things are funneled, constricted, and passed on. Temporality matters within chokepoints, but the time that matters most is transit time: how long it takes to move through them. In this understanding, time is framed as a function of space. The Sundarbans is rife with passages that themselves might be understood as chokepoints—dense shifting channels that connect through or dead-end within the vast mangrove forest. These provide transport for humans, animals, ships, and more. The degree to which they choke such flows changes with tide, season, and climate. Yet the Sundarbans is also is what we might think of as a chokepoint in time, or a temporal chokepoint—a zone where space is framed as a function of time.

A range of phenomena might be described as temporal chokepoints. These emerge in domains such as "just-in-time" manufacturing, where the ability to respond to shifting demand constrains production; evolutionary biology, where population bottlenecks constrict the flow of genetic material to future generations; and agriculture, where the ability to replenish soil nutrients constricts yield. In the Bengal delta, it is a flood of competing imaginations of the future that constrain the possibilities of bringing *any one* of these imaginations about. The Sundarbans has emerged as one space among many in which intense uncertainty combines with seemingly unbounded possibility—a space in which a range of incompatible visions of the future accumulate to transformative effect in the present. These imaginations, and the projects seeking to bring them into being, posit radically different ideas about conservation and development; contradictory imaginations of residents as footloose and fixed; and mutually exclusive conceptualizations of industrial growth and ecological infrastructure. That is, the Sundarbans is a site in which multiple and often incompatible imaginations of the future and the past accumulate, collide, and constrict. Moreover, they do so in ways that not only limit the possibility that *any* of these possible futures might be realized but also dramatically transform this space in the present.

Most immediately, the Sundarbans are a site for fashioning the future in a warming world. The region, extremely vulnerable to a host of projected effects of global warming, is regularly described as a "ground-zero" of climate change. Yet, a range of other future-oriented projects accumulate in this precarious eco-system, some of which imagine it as wasteland, some as opportunity. These competing visions of the future are themselves superimposed upon a set of imaginations that harken back to a moment of historic rupture: the Partition of Bengal in 1947 which split the Sundarbans region in two. Each of these visions imagines the Sundarbans region in distinct ways and through distinct temporalities. The contradictions inherent in these different imaginations accumulate, constrain, and choke—in ways that pose challenges for those who must navigate the space and times of the Bengal delta.

SUNDARBANS TEMPORALITIES

In 2005, while living in Kolkata, India, I began to notice a series of signs and billboards appearing

FIGURE 1. Billboard in Kolkata, 2005.
PHOTO: JASON CONS

FIGURE 2. Landsat 7 Image of the Sundarbans, released by NASA Earth Observatory.
PHOTO: NASA

throughout the city (fig. 1). Referencing the catastrophic 2004 "Boxing Day" Tsunami, which killed 230,000 and displaced as many as 1.75 million people across the Pacific Rim, the signs suggested a way of reading the Sundarbans beyond its status as a "natural wonder" and World Heritage site alone. Here, the Sundarbans were framed not only as a site deserving of saving as a public and environmental good in the present. The mangroves also were positioned as critical ecological infrastructure—a space providing security for urban life in coastal South Asia itself. In other words, the mangrove forest was a vital system protecting the future of urban South Asia. As such, it was in urgent need of management through a variety of "political technologies of preparedness" (see Lakoff and Collier 2010).

While the signs quickly were covered by the next round of advertisements for cement companies, soft drinks, and cellular providers, the implications of their message continue to resonate. The Sundarbans have emerged in recent years as a symbol of regional and planetary threat and anxiety. Some of this framing can be seen in the increasingly ubiquitous use of a now-iconic Landsat 7 image of the mangrove swamp in discussions of global ecology (fig. 2). The Landsat 7 image offers an abstracted god's-eye view that reduces this complex space to a single evocative representation. It shows the Sundarbans as a space with neat and well-defined boundaries marking a clear division between human and non-human landscapes. This boundary, visually deceptive in its stark partitioning of space, marks another division of imagination. The dark green of the Sundarbans marks a zone in need of saving. The space beyond, especially in Bangladesh, represents a zone of immanent crisis: a space already imagined, by some, as lost to the ravages of climate change.

The stakes in this vision of regional climate disaster are dramatically on display in a video from a 2014 New York Times story about climate change in Bangladesh's delta region titled, tellingly, "Borrowed Time on Disappearing Land." (Harris 2014). This video, which takes the Landsat image as its template, models what might happen to the coast in the context of a four-meter sea-level rise. It dramatizes the current imagination of the Sundarbans and the greater Sundarbans area as a space of climate fragility: as global warming spurs sea-level rise

FIGURE 3. Rampal power plant construction site, December 2016.
PHOTO: JASON CONS

inundating the coast, a concomitant human displacement triggers another flood—massive migration over the communally-defined border between India and Bangladesh. Here, these flows are represented as in crisis: under threat of catastrophic inundation disrupting ecological, national, and indeed global security. Against this backdrop of regional and global threat, conservation and climate change debates take on marked urgency. They contribute to a framing of the region as a space managed *as* and *in anticipation of* future crisis (Cons 2018).

The vision of the Sundarbans as a climate hot spot—a zone which must be conserved and saved in order to prevent future climate catastrophe (whether of tsunamis of water or tsunamis of migrants)—in need of urgent management through development and security interventions is only one set of imaginations of the mangroves' future. In it, the space is imagined as a nexus of geological time, accelerated to catastrophic rates. The means of addressing impending crisis is clear, if difficult to achieve. Preserving the Sundarbans as a means to stem the impacts of climate changes serves to protect the region from deforestation, cyclonic activity, massive human displacement, and more. If this vision of climate change sees the future in impending geological time, other visions frame the region as central to short- or medium-term economic growth—namely the Government of Bangladesh's vision of soon becoming a middle-income country. Within this shorter temporality, the Sundarbans emerges as a key site of industrial development and growth.

This vision is most dramatically articulated in the Rampal power plant. This large, coal-burning plant (the plant has a 900-acre footprint and will have a 1,320-megawatt capacity) is in the process of construction a mere 14 km north of the boundary of the Sundarbans biosphere preserve. Against the protests of environmental activists and organizations such as IUCN and UNESCO, the plant promises, once constructed, to have a range of potentially catastrophic downstream impacts on the Sundarbans' ecology.

Rampal is only the most visible example of industrial development in the region. Mongla Port, a "gateway" to the Sundarbans, has in recent years been transformed into a large-scale industrial site replete with designated special economic zones, massive new cement factories, and storage facilities for liquid natural gas. Moreover, the government of Bangladesh recently opened an initiative to allow industrial development in so-called "Ecologically Critical Areas" of the mangroves. This industrial growth relies on river transportation along a series of channels and passageways increasingly clogged with silt—due in part to the construction of upstream dams and barrages in India reducing downstream river flow. The choking of channels by silt is itself a dynamic that threatens not only industrial development but the fragile ecosystem of the Sundarbans at large. This threat was dramatically demonstrated by a December 9, 2014, oil spill on the Shela river that dumped 350,000 liters of toxic furnace oil into the mangroves. The tanker had been traveling in a minor canal outside of the main shipping lanes largely because one of the main shipping channels through the Sundarbans had become silted and impassable, forcing the tanker to follow a more precarious route in order to reach its destination.

Superimposed over all of these visions of the Sundarbans is another set of questions and temporalities—those of national security. The Sundarbans is a zone of cartographic anxiety, a space that is part of the unfinished project of forming distinct nation-states out of the 1947 partition. The Sundarbans, with the communally-drawn border running through it, historically has been, and remains, an ambiguous space. The mixing inherent in the shifting mangroves, the inability to easily patrol (and often even to locate) its internal and external boundaries, and the refusal of things—people, animals, goods, water, even the land itself—to "stay put" inside the forest trouble notions of fixity and territory. The forest has and continues to be a site for cross-border smuggling, piracy, and various forms of illegal extraction. It is a site not only of the future but also of the unfinished past. This vision of the Sundarbans as a dangerous, criminal, and ambiguous place sets another wave of

FIGURE 4. Canal dredging in the Sundarbans region. PHOTO: JASON CONS

interventions in play that have implications for both the present and future of the delta zone. The mangroves are sites of militarization, where armed representatives of the border-security forces, para-military groups, the navy, and forest rangers patrol the waterways. The mangrove forests are a place at once impossible yet critical to control, a sensitive space that must be regulated and brought firmly into the fold of Bangladeshi territory even as its geography and ecology denies such integration.

CHOKEPOINT TIMES

The Sundarbans is a complex articulation of a common problem in environmental politics—the inability to resolve a range of competing understandings and imaginations of what land can and should be. Thinking of this space as a temporal chokepoint—one where the possibility of achieving any single vision of the future is constrained by the volume of projects seeking to bring these visions about—provides a different way to frame debates over ecological change, conservation, and growth. The Sundarbans is a space that is *over*-imagined—one in which no single operative logic of planning wins out and where the contradictions of possible futures threaten to constrain each other in the present. One obvious example of this are the ways that the construction of the Rampal power plant sits uncomfortably and, perhaps, catastrophically alongside projects seeking to preserve the Sundarbans as a critical ecological infrastructure and habitat. Yet other and more immediate impacts of this clogging of temporalities abound. As often as not, these projects take local populations as their targets.

The borderlands around the mangroves are littered with quixotic projects seeking to actualize the future—climate-smart development projects seeking to stem migration, demonstration projects imagining the fraught delta as a staging ground for global responses to climate, new conservation policies seeking to regulate livelihoods based on small-scale extraction from the forests, and policing projects designed to crack down on piracy and criminal activity. This accumulation serves as a reminder that the choked temporalities within this zone yield more than a conceptual or future problem. The sedimentation of ideas and imaginations within the Sundarbans also has dramatic and often troubling implications for the present. ■

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Border Traffic at the San Ysidro Primary Port of Entry.
PHOTOGRAPHER: JOSH DENMARK

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