Supply-Chain Urbanism: Constructing and Contesting the Logistics City

Martin Danyluk
School of Geography
University of Nottingham

Abstract
With the development of global logistical systems to coordinate the movement of goods, cities around the world are being reconceived as nodes in circuits of commodity capital. These efforts are reshaping urban environments and provoking novel forms of political resistance. They are also bringing distant places and subjects into new relations of interaction and interdependence. This article traces the web of urban change and contestation that has taken shape around the expansion of the Panama Canal, an infrastructure megaproject whose reverberations have been felt in port cities throughout the Americas. Drawing on research conducted in the Panama City, Los Angeles, and New York City areas, I examine efforts to remake urban space in the name of smooth, efficient circulation—what I call "supply-chain urbanism"—and the struggles that have ensued over land, labor, and environments. The concept of supply-chain urbanism calls attention to the life-damaging impacts of goods movement on communities and workers, impacts that are unevenly distributed across space, race, and class. Crucially, it also underscores the connections between seemingly disparate episodes of urban change and resistance. Beyond shedding light on emerging forms of logistics-based urbanization, the article illustrates the value of relational methodologies for the study of networked urban dynamics. In disclosing the wider forces, processes, and flows that connect far-flung experiences of urban transformation and struggle, such approaches can apprehend the interlinked character of contemporary urbanization processes in ways that purely local perspectives cannot.

Keywords
Environmental racism, logistics, relational comparison, urbanization

Introduction

Dockworkers' strikes in Piraeus, Greece; pipeline blockades in Vancouver, Canada; antigovernment protests in Umm Qasr, Iraq—recent years have witnessed a wave of urban uprisings targeting the circulation of commodities through global supply chains. In one sense, conflicts of this sort are not new. Cities located at crossroads of trade, and port cities in particular,

have always been liminal spaces, shaped by tensions between the local and the global, fixity and flow (Sekula 2002; Desfor and Laidley 2011). Yet those contradictions have sharpened in recent decades, fueled by the development of vast logistical systems to coordinate the movement of goods and materials (Cowen 2014; Chua et al. 2018). As cargo flows increase in volume and velocity, urban spaces around the world are being refashioned as conduits in global circuits of commodity capital.

In this article, I ask how efforts to remake the city in the name of smooth, efficient circulation are altering urban environments, urban politics, and urban life. I gather these spatial strategies under the term "supply-chain urbanism." Anna Tsing (2009) has proposed "supply chain capitalism" as a model for understanding the complex spatial and scalar configurations of contemporary capitalism, in which distant and heterogeneous economic subjects are brought into new relations of interaction and interdependence. I adapt her term here to show that logistics is transforming the urban condition in similar ways. Supply-chain urbanism names the rise of a distinctive paradigm of urbanization: the production of urban space to facilitate the circulation of commodities. It calls attention to the life-damaging impacts of goods movement on communities and workers—impacts that are unevenly distributed across space, race, and class—as well as the popular resistance they have provoked. Crucially, the term also underscores the relationships between far-flung processes of urban change that are often treated as distinct. A growing body of research on "logistics cities" (Cowen 2014, 163), "logistical cities" (Rossiter 2012, 26), and "just-in-time urbanization" (De Lara 2018a, 33) has shed much-needed light on the relationship between urbanization and commodity flows, revealing the production of logistical space to be a violent and conflictual process. Whereas previous studies have tended to focus on individual cities and regions, here I foreground the relational character of logistics-oriented urbanization, examining the connections through which places and people within the supply chain shape one another.

I do so through a multisite study centered on one of the most important logistics developments of the past decade, the expansion of the Panama Canal. In the lead-up to its completion in June 2016, the canal project sparked a flurry of infrastructure investment throughout the Western Hemisphere as numerous port cities vied to attract the gigantic "neo-Panamax" cargo ships that would soon be able to transit the waterway. The article traces the web of urban change that has taken shape around the Panama Canal expansion, focusing on three dispersed but interrelated episodes of transformation and struggle: (1) the eviction of the community of Coco Solo in Colón, Panama, to make way for the extension of a neighboring container port; (2) the proposal to widen the Long Beach Freeway in Southern California, a major artery in the U.S. goods-movement network; and (3) the community- and worker-led campaign for clean trucks at the Port of New York and New Jersey. It draws on over a year of research in the Panama City, Los Angeles, and New York City areas, including interviews with industry, government, and community stakeholders; participant observation within community organizations contending with the local impacts of goods movement; and nonparticipant observation at industry conferences, public meetings, and trade fairs.

The article makes two contributions to geographical scholarship. First, it stresses the interconnected nature of urbanization processes unfolding at different points in the logistics network. The three episodes examined here are linked together by the Panama Canal expansion, which served in each instance as a key motive for local infrastructure development. This emphasis on networked transformations affords new insights into the ways global commodity flows are reshaping urban environments and everyday life. Previous research has pointed, for example, to the role of environmental racism in the production of logistical space, as the urban landscape is reorganized in ways that shift the costs of goods movement onto racialized, precarious workers and low-income communities of color (Bonacich and Wilson 2008; Hricko et al. 2014; De Lara 2018a, 2018b). These groups subsidize cheap shipping through insecure housing, unsafe employment, forced displacement, stolen wages, and toxic air pollution. As I show here, however, the harms associated with logistics are distributed at scales beyond the neighborhood, city, or region: they travel and multiply throughout the wider network as cargo flows seek out the path of least resistance. The notion of supply-chain urbanism thus calls attention to the broader constellations of racialized and class dispossession and exploitation that underpin the accumulation of capital across the circulatory system as a whole. The same can be said about the distinctive forms of political resistance that have emerged to challenge this form of urbanization. Each of the struggles examined here, while ostensibly a response to local developments, can also be understood as an outgrowth of infrastructural expansion in Panama. These movements, furthermore, may exert an influence on one another insofar as they are able to redirect the flow of commodities through the shipping network. On occasion, they may even coalesce into wider networks of solidarity and resistance that mirror the geographies of logistical capitalism against which they are ranged. In these ways, the construction and contestation of the logistics city bring distant urban subjects into new relations mediated by capitalist commodity chains. Supply-chain urbanism offers a lens for apprehending the uneven production of logistical space, and the political struggle that surrounds it, across the networked geographies of global circulation.

The study's second contribution, related to the first, is methodological. In disclosing the wider forces, processes, and flows that connect seemingly disparate experiences of urban transformation and contestation, the article illustrates the value of relational approaches to the study of networked urban dynamics. My methodology is informed by the relational-comparative approach elaborated by Hart (2002, 2006, 2018; see also Ward 2010), which seeks to reveal how seemingly abstract global processes are constituted—and negotiated, resisted, and circumvented—through historically and geographically situated practices. Hart distinguishes this schema from "impact models" of globalization, in which individual people and places are reduced to passive objects of inexorable global forces (Hart 2002, 14), and from approaches that posit local "cases" as particular variants of some general phenomenon (Hart 2006). With relational comparison, "instead of comparing pre-existing objects, events, places, or identities, the focus is on *how* they are constituted in relation to one another through power-laden practices in the multiple, interconnected arenas of everyday life" (Hart 2006, 996).

Taking seriously the *relational* in relational comparison, I would suggest, means going beyond the observation that cities are shaped by processes originating outside their boundaries. It entails following those lines of connection to the "global elsewheres" (Miraftab 2016, 10)—the concrete other places—from which the specific features, meanings, and trajectories of local change can be better detected. It follows that multisite research is especially well suited to the relational character of supply-chain urbanism. Multisite strategies can apprehend the interlinked character of contemporary urban dynamics, and grasp the potential force of nascent social movements, in ways that purely local perspectives cannot. Accordingly, the three port cities examined here are conceptualized not as "bounded enclosed spaces" (Massey 1994, 168) to be directly compared with one another but as interconnected nodes in a dynamic web of interaction.[1]

The article proceeds as follows. In the first section, I bring together scholarship on logistics, urbanization, and environmental racism to reconsider the dialectical relation between fixity and flow in light of the concrete forms it is assuming in today's logistics cities. The following section begins with a brief overview of the Panama Canal expansion project; it then turns to the three study regions, detailing how logistics-based development is reworking urban life on the ground. Finally, before the article's brief conclusion, I consider the relational aspect of supply-chain urbanism in greater depth, underscoring the interconnections among dispersed logistical landscapes as well as the political formations that are taking shape to contest them.

Logistics, Urbanization, and Environmental Racism

As logistics has revolutionized the ways commodities are made, moved, and sold, it has become an area of considerable interest among critical scholars. Geographers and others have called into question the mainstream view of logistics as an apolitical science of management, emphasizing the field's implication in structures of capitalist and colonial exploitation, dispossession, and war (Cowen 2010, 2014; Chua et al. 2018; Attewell 2018; Pasternak and Dafnos 2018). A significant strand of this literature focuses on the implications of the logistics revolution for labor. Research shows that transportation and distribution workers who toil in the pathways of supply-chain capitalism face insecure, poorly remunerated, and often dangerous employment (Bonacich and Wilson 2008; Alimahomed and Ness 2018). But the violence of logistics is not confined to the workplace; it spills over into the spaces of dwelling and social reproduction. Residents living near major freight corridors are exposed to multiple harms associated with goods movement, including air pollution, noise, congestion, road and rail accidents, and displacement (Matsuoka et al. 2011). In Fraser's (2018) terms, the

1. While this approach brings to the fore certain aspects of the phenomena under study, like all methods it requires de-emphasizing others. In this case, the interweaving of three vignettes means that some of the detail and complexity of the individual episodes must necessarily be left out.

exploitation of logistics workers in the labor process is paralleled, and facilitated, by the *expropriation* of communities living in the arteries of trade.

A critical engagement with the geographies of logistics, then, must also consider the distinctive modes of urbanization that are emerging in the wake of the logistics revolution. Existing research has considered this relationship from several perspectives. Studies in urban geography and transportation geography have explored the changing roles of cities within global freight networks (Negrey, Osgood, and Goetzke 2011; Hesse 2013) and the rise of intercity competition for cargo traffic (Jaffee 2015; Danyluk 2019). At a finer grain, scholars have investigated how new patterns of goods movement are reshaping urban land markets and built forms (Hesse 2004; Hall and Hesse 2012; Vormann 2015; LeCavalier 2016), including through the production of specialized logistics zones (Graham and Marvin 2001; Easterling 2014). Others have stressed that the spaces where commodities concentrate and circulate tend to be flash points for social conflict. Rossiter (2012), Cowen (2014), and Hepworth (2014), in different ways, all highlight the tensions between the logistician's drive to rationalize the flow of goods and the unruly sociality of urban life. Perhaps most notable is De Lara's (2018a, 2018b) research on the logistics-based development regime that has remade Southern California since the 1980s. De Lara weaves together global commodity flows, regional economic restructuring, and the local geographies of race and class to develop a multiscalar analysis that is attuned to intersecting structures of power. These inquiries into individual logistics cities show that global supply chains are reshaping urban geographies in powerful and contested ways.

The political conflict that attends urban freight movement can be understood as one expression of a more general dialectic of fixity and flow. These two terms are *internally* and *contradictorily* related. On the one hand, urban agglomeration and long-distance trade are mutually constitutive: each fuels the development of the other. Today's metropolitan regions depend for their growth and sustenance on complex systems of provision capable of assembling specific combinations of matter and energy in specific places at specific times. For Toscano (2011), this makes the growth of the city inseparable from the rise of logistics. "The organisational and energetic resources required to reproduce the metropolis are formidable," he writes. "The metropolis has the intensification and expansion of supply lines as its precondition, and logistics becomes its primary concern, its foremost product, and the basic determinant of its power." On the other hand, urban agglomeration and goods movement frequently have contradictory requirements with respect to the organization of space. The city—dense, congested, unpredictable, and stubbornly immobile—poses "a major obstacle to circulation" (Cowen 2014, 187), as urban delivery and logistics companies are well aware. By the same token, strategies to promote the efficient flow of goods through the urban environment often entail the displacement of existing residents and the disruption of established ways of life. In these ways the tensions between fixity and flow give rise to political struggles around the production of space. By increasing the volume of commodities in circulation and putting greater emphasis on timeliness and reliability (Danyluk 2018), the logistics revolution has raised the stakes in those struggles and multiplied the points of conflict.

This dialectic of fixity and flow has often been theorized at a high level of abstraction, notably by Marxist urban geographers seeking to explain the dynamics of uneven spatial development under capitalism (e.g., Harvey 2006; Smith 2008). In practice, though, it does not unfold everywhere in the same way: the contradictions between agglomeration and circulation tend to flare up in particular places and threaten harm to particular populations. A growing body of research shows that the environmental, social, and health impacts of urban freight movement are disproportionately borne by low-income people of color (Bonacich and Wilson 2008; Matsuoka et al. 2011; Hricko et al. 2014). As cities pursue new development strategies premised on attracting cargo traffic and value-added logistics activities, the principle of flow is inscribed into the urban landscape in ways that reflect and reinforce disparities of race and class.[2] The circulation of goods through the built environment is thus implicated in a politics of violence and premature death whose overall sociospatial configuration cannot be explained by the logic of capitalism alone. Rather, making sense of supply-chain urbanism requires attention to the ways class and race interact in the production of urban space.

Invaluable here is Pulido's (2000, 2016, 2017) work on environmental racism. Pulido draws on Robinson ([1983] 2000) and others in the black radical tradition to argue that the abstract, color-blind categories of Marxist political economy fail to account for the thoroughly racial character of capitalism's development. Her analysis enables us to identify several means by which the dynamics of capitalism and racism intertwine in processes of logistics-based urbanization. Perhaps most obvious is the spatial concentration of noxious industrial facilities, such as warehouses and rail yards, in poor communities of color. Such geographic patterns are only explicable given the prevalence of a racist ideology that marks certain groups as disposable. For Pulido (2016), that racial logic is crucial to the expansion of corporate profits and elite power: the devaluation of black and brown bodies enables capital and the state to pursue life-damaging practices by foisting the costs of those activities onto populations construed as expendable.

As Pulido insists, however, grasping the full extent of environmental racism requires looking beyond deliberate, individual acts of discrimination to a range of systemic processes and institutional practices that may not necessarily be malicious in their intent but are nonetheless discriminatory and injurious in their effects. This way of thinking also underpins Gilmore's (2007, 28) oft-quoted definition of racism as "the state-sanctioned or extralegal production and exploitation of group-differentiated vulnerability to premature death." Such an expansive conceptualization of racism points to the role played by more structural forms of discrimination in the production of differentiated urban landscapes. Pulido (2000) documents how white privilege has enabled white residents of Southern California to secure relatively clean environments while disproportionately exposing black and Latinx communities

2. "Flow" is an imperfect metaphor for goods movement, suggesting a smoothness and continuity that are seldom realized in practice. As critical scholars of logistics have stressed, the physical circulation of commodities is often intermittent, uneven, and prone to numerous forms of disruption (Chua et al. 2018).

to life-threatening air pollution. Histories like this, of course, must be read in light of the thorough entanglement of race and class in American society. That relationship is perpetuated and reinforced in part through the normal functioning of capitalist markets, which tend to allocate resources to those who already have them (Clegg 2016). In this way urban land markets weave racial disparities into the very fabric of the city.

To summarize, struggles over urban goods movement can be understood as manifestations of an underlying tension between fixity and flow. Those conflicts are not distributed evenly but instead cluster around particular places and populations construed as disposable. In the landscapes of supply-chain urbanism, the ideology of race interacts with the profit-maximizing practices of corporations, the discriminatory actions of state agencies, and the normal operation of urban land markets to perpetuate what Nixon (2011) calls the "slow violence" of environmental racism—a gradual and often invisible accretion of life-curtailing harms on poor communities of color. As the next section shows, that violence is apportioned and contested not only within individual neighborhoods and cities but across larger urban systems mediated by global distribution networks.

Nodes in a Shifting Network

On 26 June 2016, after almost a decade of construction, Panamanian authorities unveiled the first major expansion to the Panama Canal since its inauguration in 1914. The $5.25 billion project involved outfitting the canal with a third set of locks and wider, deeper navigation channels. The Panama Canal Authority, the government agency responsible for the waterway, had argued that the upgrade was needed to ensure the canal's continued relevance as a strategic route for global trade (ACP 2006). A key motivating factor was the rapid growth since the 1990s in the size of commercial ships. As a growing share of the world's freight was being carried on "post-Panamax" vessels—so named because they are too big to fit through the canal's original locks—the Central American waterway faced mounting competition from alternative routes, including the North American railroad system and the wider, deeper Suez Canal. The Panama Canal's new locks doubled the route's capacity and, crucially, opened it to massive cargo ships capable of carrying more than 14,000 containers.

Outside Panama, anticipation around the canal expansion was most pronounced in the United States, whose economy accounts for more than two-thirds of the freight moving through the waterway. The project was hailed as a "game changer" for U.S. supply chains (O'Reilly 2012, 60); industry analysts predicted that the widening of the Panama Canal would result in significant shifts in cargo traffic as post-Panamax ships that had previously unloaded on the U.S. West Coast were diverted through the canal to ports on the East and Gulf Coasts (DSCA 2008). Especially for retailers and manufacturers moving Asian goods to the eastern United States, the canal expansion promised to reduce the need for costly overland transport and make it easier to circumvent the strict environmental regulations, frequent bottlenecks, and powerful labor unions at West Coast ports.

As a result, the project prompted a wave of infrastructural expansion in port cities around the continent. Competition was especially fierce along the U.S. East Coast, where the Panama Canal expansion triggered what was called a "battle of the ports" (Spivak 2011). Anticipating a surge in container ship traffic through the new canal, nearly every major port along the Eastern Seaboard announced plans to dredge harbors, enlarge terminals, or improve road and rail connections. Their counterparts on the Pacific, threatened by a loss of market share, responded with competitive strategies of their own. West Coast ports undertook ambitious terminal expansion and modernization projects, while railroads laid thousands of kilometers of new track and made major investments in on-dock rail facilities and inland intermodal terminals.

The wide-ranging reverberations of the Panama Canal expansion illustrate the linkages among cities in the global logistics system, making the project a revealing window onto the relational character of supply-chain urbanism. The three episodes that follow also underscore the dynamics of environmental racism and political struggle that accompany the production of logistical landscapes. In each region, industry and state efforts to facilitate the circulation of goods have been met with organized resistance from community, labor, and/or environmental groups opposing the ills of this form of urban development.

Panama

At the central node in this network, the Isthmus of Panama, logistics-oriented development has contributed to one of the highest levels of inequality in the Americas. For over five hundred years Panama has served as a crossroads of world trade as imperial powers have vied for control over its strategic geographic location at the shortest crossing between the Pacific and Atlantic Oceans. Within the country, this history has resulted in a highly uneven form of sociospatial development—labeled "transitism" by Panamanian scholars (Porras [1953] 2008, 58; Castillero Calvo 1974)—characterized by, on the one hand, a heavily urbanized "transit zone" oriented toward the production of services for international commerce and, on the other, an underdeveloped rural hinterland that supplies that transit zone with energy, food, materials, and labor. This basic pattern has remained in place since the mid-sixteenth century, even as the technology used to transport people and goods between the oceans has changed. Caravans of mules, employed by Spanish colonial merchants to transport silver across the isthmus, were replaced by a transcontinental railway, opened by an American company in 1855, and then by the canal, a project initiated by France in the late nineteenth century and completed by the United States in 1914.

The transportation orientation of Panama's economy has also shaped racial disparities within the country. Over five centuries, the isthmus received several waves of African and Afro-Caribbean workers as Spanish, French, and American colonial elites made use of slave and migrant labor for the construction and operation of interoceanic transport routes (Conniff 1998; Castro 2008). In 1904, administrators in the U.S.-controlled Panama Canal Zone

implemented an extensive system of segregation by race and nationality, which was not officially dismantled until the 1950s (Greene 2009). That racial hierarchy continues to inform social and geographic disparities in Panama today, particularly between the country's two coasts. On the Pacific, Panama City, the capital, has been transformed by rapid economic growth since the repatriation of the canal in 1999. The city boasts hundreds of new skyscrapers and Central America's first subway system; tourists and well-heeled locals flock to wine bars and upscale restaurants. But at the other end of the canal, the city of Colón, a busy Caribbean seaport with a large Afro-Panamanian population, has suffered from decades of disinvestment and decay. Its historic architecture and infrastructure are crumbling, and thousands of buildings have become uninhabitable, creating a serious housing shortage.

The combination of virulent racism, capital flight, and housing crisis in Colón created the conditions for the severe immiseration of one community living on the urban periphery—conditions that were exacerbated by the response of local logistics industry actors to the Panama Canal expansion. Beginning in the 1990s, a series of fires and structural collapses forced authorities to condemn several residential buildings in Colón's historic center. Many of the evacuated households were relocated to Coco Solo, a former U.S. Navy base on the outskirts of the city. Officials from Panama's Ministry of Housing assured the displaced residents that these living arrangements were temporary and pledged to build them new homes elsewhere. Over the years, as more families moved into Coco Solo, one government after another failed to deliver on this promise. Gabriel, a former resident of the community, described the pattern of neglect in an interview:[3]

> Those shelters were temporary shelters that became permanent because no government ever did anything. They moved people out there: "It's temporary." Next government: "Temporary." Third government: "Temporary." Every government says, "Temporary." . . . Every four years. It's incredible, the apathy. They never did anything.

When the Ministry of Housing failed to maintain the Coco Solo site, buildings and infrastructure in the community fell into disrepair. Phone and electricity companies regarded the occupants as illegal squatters and refused to provide them with services. By 2010, Coco Solo was home to some three hundred families, almost all of them black, living in dilapidated concrete structures without access to running water, sanitation services, or reliable transportation.

Meanwhile, following the 2006 decision to enlarge the Panama Canal, government officials and business leaders began working to capitalize on the expected surge in vessel traffic by promoting Colón as a shipping and distribution hub for Central America and the Caribbean. Logistics was to be the new motor of urban growth (Martínez Rivas 2014). For the people of Coco Solo, this development model brought dramatic changes to the urban envi-

3. Quotes have been translated from the Spanish where applicable. The names of some informants have been changed or withheld to protect anonymity.

ronment and everyday life. Colón's three container ports pursued aggressive expansion projects, while plans were announced for two more port terminals outside the city. The nearby Colon Free Zone, the world's second-largest free-trade area, saw its business triple in a decade. A former U.S. Air Force base was reopened as an international passenger and cargo airport. As Colón's urban fabric was refashioned to cater to global merchants and shipping lines, the community of Coco Solo found itself encircled by container ports, logistics parks, and fuel storage tanks. Over the years, residents lost their access to the waterfront, and buses stopped serving the neighborhood.

In interviews, Coco Solo residents said that port and logistics projects had resulted in the destruction of hundreds of hectares of mangroves and wetlands around the community—sometimes on national holidays, when work crews were less likely to attract attention. These ecological alterations had destroyed the area's natural drainage system, giving rise to frequent flooding and pools of stagnant water in Coco Solo. One former resident, Daniel, explained that the environmental impacts of this development activity made locals concerned about their health:

> The environment, what's around me, isn't good. It's very dirty. There's a lot of dirty water. I can't live in a community that has dirty water that makes me itch, gives me spots on my skin, gives me, I don't know, little bumps. . . . I don't want to live in a place like that. I want a healthy place for my children.

As work proceeded on the expanded Panama Canal, community members continued to press the Ministry of Housing to deliver the homes they had been promised for over a decade. According to residents, though, officials were motivated more by the mounting commercial interest in Coco Solo's prime waterfront location. In 2009, the national government awarded a neighboring container port a twenty-year concession to use the site for a new logistics park (Jordán S. 2009). In exchange, the port, owned by the Taiwan-based Evergreen Group, paid the government $11.3 million, the majority of which was earmarked for the construction of three hundred new homes for Coco Solo residents who would be displaced by the port expansion.

When the new houses were still not forthcoming, the people of Coco Solo grew increasingly indignant. In 2012, frustrated with their dire living conditions, their ongoing mistreatment by the state, and their continued exclusion from the material wealth accumulating around them, community members blocked the road into the neighborhood—which is also the only access route for trucks serving two of Panama's busiest ports. As one former resident explained, Coco Solo's proximity to major international shipping facilities and the billions of dollars' worth of goods passing through them every day was the community's only bargaining chip:

> The only thing the government pays attention to is when they shut down the street. And that street, shutting it down is millions in losses for the ports. Because if we shut it down, the ship leaves. The ship doesn't wait for anybody. The ship has to leave on time.

In this way, corporations' need for fast, reliable logistics became a leverage point for Coco Solo residents opposing the damaging effects of that same logic on their everyday lives. As the urban environment around them was reconfigured to suit the requirements of global commodity flows, community members consciously disrupted those flows in protest.

The actions had mixed results. According to informants, the blockades helped to pressure the Ministry of Housing to finally deliver on its promise of permanent housing for Coco Solo residents. Many households accepted the government's offer of relocation to Buena Vista, a small town about an hour away. As before, though, the timing of authorities' actions seemed to be informed less by the needs of the community itself than by the just-in-time itineraries of global logistics. On 22 June 2016—just four days before the opening of the Panama Canal's new locks—bulldozers began demolishing what remained of Coco Solo's sixteen concrete buildings. Not long thereafter, advertisements appeared for warehouse space in the new Colon Logistics Park, now under construction.

The story of Coco Solo highlights the tensions between fixity and flow, urbanization and circulation, that permeate the contemporary logistics city: the community's very existence posed an obstacle to the smooth flow of commodities through global supply chains. The devaluation of the neighborhood's inhabitants, overwhelmingly poor and black, enabled officials to pursue a strategy of systematic neglect for years, until the land those residents occupied became too valuable to ignore.

Southern California

The impacts of the Panama Canal expansion on urban life and politics have not been confined to Panama itself. While in Coco Solo the canal project has set in motion port-expansion efforts that have intensified struggles around housing, over 4,500 kilometers away, in Southern California, it has fueled conflicts over air quality and public health. Many of the big ships that Panamanian officials hoped to attract through the widened Panama Canal previously unloaded their cargoes at the sprawling Ports of Los Angeles and Long Beach, which together handle about 40 percent of U.S. imports from Asia. Beginning in the 1990s, Southern California business leaders and policy makers seeking an antidote to deindustrialization and unemployment turned their sights to the ports, working to promote trade and logistics as an engine of economic growth and job creation (De Lara 2018a, 2018b). In 2010, industry, government, and labor groups even launched a campaign called Beat the Canal, a direct response to the looming threat of cargo diversion through the expanded Panama Canal (Danyluk 2019). The alliance pushed aggressively to expedite the development of logistics-related infrastructure projects throughout the region.

Probably the most important of those initiatives was the widening of the Long Beach Freeway, or I-710, which runs twenty-nine kilometers between the ports and East Los Angeles. In 2012, the California Department of Transportation (Caltrans), in partnership with the Los Angeles County Metropolitan Transportation Authority (Metro), the two ports, and three regional governance bodies, announced plans to add as many as eight lanes to the

freeway. The I-710 is the principal route for trucks calling at the ports and a vital artery in the U.S. freight system, connecting the nation's largest import gateway with rail yards where containers are forwarded across the country. Project proponents claimed that the freeway expansion was needed to accommodate a projected tripling in port cargo traffic between 2008 and 2035; their proposal called for the displacement of up to 945 residents and important community services along the route, including a seniors' home and a center for homeless people (Caltrans and Metro 2012). The plan met with fierce resistance from residents and city councils along the I-710 corridor, who expressed alarm about the project's implications for air quality, public health, and environmental justice. A key concern centered on the health effects of diesel exhaust from increased truck traffic on the freeway, which sees 36,000 truck trips a day. Opposition was also voiced by members of the state legislature, several federal government agencies, and communities north of the I-710 corridor that were concerned about increased traffic (Metro, n.d.).

The freeway proposal was especially contentious in view of the wider context of goods movement and environmental racism in the greater Los Angeles area. As logistics-based development has thoroughly altered Southern California's urban landscape—from the ports and rail yards to the vast warehouse complexes of the Inland Empire—much of the infrastructure that enables the circulation of commodities through the region has been sited in low-income communities of color. Several cities along the I-710 corridor are located in what environmental activists call the "diesel death zone," an area of elevated cancer risk associated with emissions from freight movement (see SCAQMD 2015).

The city of Commerce, a heavily Latinx community near the north end of the I-710, offers a stark illustration of the environmental harms that attach to supply-chain urbanism. Residents of Commerce are exposed to multiple sources of pollution from logistics activities, including the freeway, two rail yards, a waste incinerator, and large numbers of idling trucks. These hazards are systematically kept out of wealthier, whiter cities like nearby South Pasadena, where residents have succeeded in blocking a proposed northern extension of the I-710 for over fifty years. "You have cities like Commerce so that you can have cities like LA," explained Isella Ramirez, a former executive director of the Commerce-based East Yard Communities for Environmental Justice, in an interview. "There are all these cities that . . . are happy to bend their back to get a little teeny tiny bit of the pie." Yet local efforts to promote logistics development have done little to improve the economic fortunes of Commerce residents. In recent years, the city's unemployment rate has consistently exceeded county and state levels, peaking at 23.3 percent in 2010 (GCCOG 2012). These racial and class disparities exemplify the uneven geographies of exploitation and dispossession that underpin the circulation of products through global supply chains. Capitalist commodity flows seek out the path of least resistance, coursing through communities construed as disposable on account of race and poverty.

In 2012, in response to the freeway proposal, a coalition of environmental justice organizations, community groups, and nonprofit lawyers in southeast Los Angeles put forward an alternative vision for the I-710 corridor. Instead of a widened freeway, their proposal called

for improved public transit, comprehensive pedestrian and cycling infrastructure, the renaturalization of the Los Angeles River, a targeted hiring program for low-income local residents, and the retrofitting of schools with air and noise filters, as well as a dedicated zero-emission freight corridor that would use electric trucks to move cargo to and from the ports (CEHAJ 2012). This vision aimed at improving environmental, health, and safety conditions along the I-710 route while reducing reliance on single-occupancy vehicles and reconnecting neighborhoods that had been divided by the freeway's construction in the 1950s and 1960s (see Estrada 2014). Key elements of the proposal, notably the zero-emission freight corridor, enjoyed widespread support, including from the federal Environmental Protection Agency, the South Coast Air Quality Management District, and the Port of Los Angeles (Metro, n.d.).

Planning for the I-710 expansion has now been underway for two decades. The decision-making structure for the project involves no fewer than five committees and eight working groups, ostensibly to encourage stakeholder participation; but ultimate authority over the project rests with Caltrans, which has been resistant to the community's proposals. Jonathan Heller, codirector of a consulting firm that conducted a study of the project's health impacts, described how the flawed cargo forecasts underpinning the freeway proposal circumscribed the outcomes from the start:

> The environmental impact assessment process, to some extent, was rigged. Because the assumption they made was that the port would triple in size by 2035. . . . And so the question then becomes, What do you do with all that throughput at the port, and how can you accommodate it on the roads? . . . The assumptions that they made within the 710 process made expanding the freeway, in some ways, the only thing that made sense.

Recognizing the challenges posed by this decision-making framework, coalition members have used broad-based community organizing, vocal participation in the planning process, and vigorous pressure on local and state representatives to promulgate their vision for the freeway corridor. The intensity and breadth of opposition delayed the project by years, forcing planners to discard earlier proposals and release a revised environmental impact study outlining a new set of alternatives for the corridor. In March 2018, in a major win for organizers, Metro's board of directors voted to shelve the majority of the $6 billion project and proceed with only minor improvements to the freeway. Community and environmental groups in southeast Los Angeles continue to mobilize around demands for zero emissions and no displacement.

New York–New Jersey

Grassroots social movements have played an influential role in shaping the geographies of goods movement in Southern California. As the third and final episode shows, however, those seemingly local struggles have also had repercussions on the other side of the continent. Opposition to port expansion in Los Angeles has been a key motive for logistics-related transformations in the New York City area, where port leaders have pursued aggressive

expansion plans in a bid to attract the neo-Panamax ships transiting the new Panama Canal. To accommodate the deeper vessels and their towering stacks of containers, the Port Authority of New York and New Jersey spent years dredging shipping channels and raising the deck of the Bayonne Bridge, which connects Staten Island with Bayonne, New Jersey.

As elsewhere, logistics-based development in and around New York City has altered the urban environment in uneven ways. Some of the most pronounced impacts have been felt in the working-class Ironbound district of Newark, New Jersey. Made infamous by "race riots" in 1967, Newark has long been a hub for toxic industries and critical infrastructures that whiter, more affluent parts of the region have been able to keep at bay. Since the mid-twentieth century, chemical producers, refineries, and foundries have given way to an international airport, a sewage treatment facility, a solid-waste incinerator, and a fat-rendering plant. For the Ironbound community, though, perhaps the greatest danger is the nearby Port Newark Container Terminal, one of the busiest marine facilities on the U.S. East Coast. Residents of the Ironbound are exposed to life-threatening air pollution from idling cargo ships, port equipment, trains, and the thousands of heavy-duty trucks that traverse the neighborhood's streets each day. Partly as a result of port-related activities, Newark has the second-highest risk of cancer in the country, and one in four school-age children in the city suffers from asthma (CWA 2016). Yet, as community organizers explained in interviews, many Ironbound residents have little awareness of their proximity to the port and the health risks it poses:

> You don't see it. And you probably hear it, but it's so easy to get used to noise, from people walking upstairs to the freeway. But . . . our bodies, they're never going to get used to having all that diesel exhaust. (Isella Ramirez, environmental justice program manager, Ironbound Community Corporation)

The inconspicuousness of the terminal in the urban landscape has allowed the port authority to carry out ambitious growth plans. Port Newark Container Terminal recently underwent a $500 million expansion that nearly doubled its capacity—a key component of the region's strategy to handle bigger ships.

Some of the greatest costs of that strategy are paid by the port truck drivers who haul containers from the docks to warehouses and rail yards throughout the region. Since the 1980s, containerization and deregulation have transformed the U.S. trucking industry, leading to dramatic declines in pay and union density (Bonacich and Wilson 2008). Today about 85 percent of the nine thousand truckers serving the Port of New York and New Jersey are classified as independent contractors (Morley 2018). As such, they are paid by the load, barred from unionizing, and not entitled to social security, medical coverage, or overtime pay. Many drivers have to cover their own maintenance, insurance, and fuel costs. Some U.S. trucking companies also require drivers to finance their own vehicles, often through debts they cannot afford, which they then use as leverage to extract forced labor and trap truckers in highly exploitative jobs (Murphy 2017). A 2009 study found that New Jersey port drivers

worked an average of 58.5 hours a week and had a median annual income of $30,000 after expenses; nearly 80 percent were black or Latino men (Bensman and Bromberg 2009).

It is not only drivers who pay the costs of this trucking system. As local community and environmental organizers have insisted, the working conditions of port truckers intersect with the living conditions of Newark residents. Many drivers, because they are required to finance their vehicles themselves, can only afford to operate old, heavily polluting diesel trucks that are kept in poor repair. In this way the owner-operator model of trucking not only depresses wages and working conditions for drivers; by forcing truckers into dirty, unsafe vehicles, it also degrades air quality, public health, and traffic safety in port-adjacent neighborhoods. This point was vividly expressed by Ana Baptista, former executive director of the Ironbound Community Corporation, in an interview:

> You get to fly in and out of Newark Airport. You get to buy your shoes at Target. You get to flush your toilet. And all that, all the by-products of that and all the pollution associated with those services and those things that you consume, are borne by this community that lives right against it. And people don't think about where their garbage goes or where their sewage goes or how the sneaker ended up in the store. But here it is. This is what it looks like. And if you just paid one more penny for that pair of sneakers, these guys could make a living wage and feed their families and clean their trucks. But there's all these middle guys in between who are squeezing every penny they can for their own profit. And we suffer for that.

Baptista's words underscore the simultaneity of exploitation and expropriation within the circuits of logistical capitalism. The mistreatment of port truckers combines with the poisoning of communities to shore up the profitability of retailers, manufacturers, and logistics companies moving goods through the region.

As the Port Authority of New York and New Jersey has enlarged and modernized its facilities to handle bigger ships and bigger volumes of cargo, it has repeatedly refused to adopt measures that would substantially alter business practices in the trucking sector. Indeed, the unique governance structure of the port authority—a bistate agency whose commissioners are unelected and meet in private—insulates it from political pressure in the communities where it does business. The neo-Panamax ships that began calling at the port in 2016 were expected to generate thousands of additional truck trips each year, multiplying the economic, environmental, and health impacts of this system. As one union organizer explained, those problems are unlikely to be addressed as long as they can be foisted onto precarious workers and vulnerable communities:

> The turn time to get in and out of these ports can be two hours, four hours, six hours. Sometimes they crash, and you can't get in at all. Now, if you're an independent contractor and you get paid by the load, if you don't get your load, you don't get paid. . . . Which is why, in my opinion, there *is* congestion. Because if somebody up top was paying, everything would be moving just fine.

The same organizer described the region's port-trucking model as "an exceptionally broken system." From the perspective of companies seeking to minimize distribution costs, however, that business model makes New York and New Jersey an attractive location for their logistics operations. Shippers moving goods through the port are subsidized by cheap trucking, in turn made possible by underpaid drivers and dirty trucks. Other costs are transferred to poor and racialized communities in the form of cancer and respiratory disease. American retailers have actively defended this business model, paying federal lobbyists to fight bills that would have held trucking companies liable or granted drivers a minimum wage and other protections (Murphy 2017).

As in Panama and Los Angeles, supply-chain urbanism in New York and New Jersey has spawned its own currents of resistance. Since 2012, the International Brotherhood of Teamsters has been working with labor and community groups around the country to end the misclassification of port truckers. Their campaign, Justice for Port Drivers, has targeted individual companies through petitions, rotating strikes at the ports, and the leafleting of customers at retail stores. By applying pressure at multiple points along the supply chain, these actions help build solidarities between logistics workers and consumers. Drivers have also filed complaints and lawsuits with state and federal regulatory agencies over misclassification. The overwhelming majority of cases have resulted in determinations that the drivers in question are indeed employees; companies have been ordered to repay hundreds of thousands of dollars in stolen wages and illegal deductions (Smith, Marvy, and Zerolnick 2014). Other organizing efforts in New York and New Jersey have focused on the place-based impacts of logistics activity. For example, the overlapping struggles of workers and residents have motivated the formation of the Coalition for Healthy Ports, a regional alliance that brings together labor unions like the Teamsters with community, faith-based, and environmental justice organizations (CWA 2019). Recognizing the shared interests of truck drivers and Newark residents, the coalition has made reforming the port-trucking industry one of its strategic priorities.

Connecting the Threads

Each of the episodes examined here illuminates a different facet of the violence of supply-chain urbanism. In Panama, port development degrades living environments and jeopardizes residents' housing security; in Southern California, freeway expansion threatens to further contaminate air and harm residents; in New York–New Jersey, a highly exploitative trucking system shifts the costs of goods transport onto precariously employed drivers and working-class communities. Despite their differences, the three episodes reveal important similarities in the ways commodity flows are altering urban space and everyday life. In each instance, residents subsidize cheap goods movement in the form of negative health impacts or premature death, burdens foisted on them through transformations to the built environment. In each instance the affected groups are disproportionately poor people of color: logistics space is shaped by hierarchies of race and class even as it actively reproduces them. In each case,

the benefits of cheap shipping are captured by corporations and political elites who manage goods flows from a distance and, at a further remove, by the consumers who purchase those goods. Finally, the grassroots struggles highlighted in each region are a reminder that supply-chain urbanism entrains its own form of political resistance—a manifestation of deeper tensions between fixity and flow.

A relational methodology of the kind employed here, however, makes it possible to go beyond differences and similarities to identify causal processes that arise by virtue of the connections and flows between the three regions. What insights emerge from considering these episodes in their interrelations? Most evident is the constitutively networked nature of supply-chain urbanism: logistical landscapes are shaped, in a fundamental sense, through connections with other places, and changes at one point in the network may exert an important influence on outcomes elsewhere. The Panama Canal widening served as a catalyst for each of the urban transformations examined here, albeit in differing ways: in Panama and New York City, state and industry actors have pursued local infrastructure expansions in hopes of capitalizing on ship traffic through the enlarged canal, while in Los Angeles elites have assumed a defensive posture, seeking to prevent cargo diversion. Developments in Southern California and New York–New Jersey have also influenced *each other* insofar as West and East Coast ports are in competition for cargo traffic. And these are hardly the only urban regions caught in this web of change: notably, the amount spent on capital investments by U.S. port authorities in the lead-up to the canal expansion dwarfed the cost of the canal project itself (AAPA 2012). One implication of cities' growing embrace of logistics-based development, then, is that a single infrastructure investment at a strategic point can have multiplier effects throughout the wider network. A similar point can be made about the popular resistance provoked by supply-chain urbanism. As I have argued, seemingly local currents of opposition to logistics-oriented development can alter the pattern of goods flows on a national or continental scale, with important implications for everyday life and political struggle in other places. By tracing the interconnections between distant experiences of urban change, relational approaches make it possible to map the complex spatial and scalar formations of supply-chain urbanism, capturing both the extent of dispossession and the proliferation of resistance.

This last point—resistance—merits further discussion. What prospects does supply-chain urbanism open up for movements for racial, economic, and environmental justice? On the one hand, the networked geographies of global logistics pose a challenge to these causes. The ease with which industry actors can divert shipments around disruptions means that opposition to logistics development in one location may simply result in cargo being shifted elsewhere. For example, insofar as environmental and community activists in Southern California continue to obstruct local freeway expansion efforts, their success may in fact inflame tensions in New York and New Jersey as shippers opt to reroute cargo to the East Coast by way of the expanded Panama Canal. Complicating idealized accounts of logistical resistance, the global circulatory system haunts its antagonists by virtue of its capacities for adaptation and regeneration.

At the same time, the networked geographies of supply-chain urbanism create opportunities for new forms of political organization. Workers and communities separated by considerable distances are building translocal networks of solidarity that mimic the weblike configuration of capitalist commodity networks. Just as the logistics revolution of the late twentieth century has given firms an end-to-end view of the supply chain, activists are turning to new models and scales of political organizing that span the sites of production, distribution, and consumption. In an interview, Sheheryar Kaoosji, an organizer at Los Angeles Alliance for a New Economy, explained how Southern California warehouse workers have allied with distribution and retail workers in New Jersey and Chicago and factory workers in South Asia:

> In early, nascent ways, we're making those connections. With the warehouse project, we for years were tied to workers who are organizing the Walmart stores, and we did a lot of connecting with workers in this Walmart supply chain globally. And so when the issues happened in Bangladesh around Rana Plaza and the Tazreen fire in '11, '12, '13, we made contact and had conversations and actually were part of the solidarity tours that workers from those facilities were making. Because they were both talking about being subcontractors to Walmart . . . but also the policies that were being advocated for in Bangladesh around responsible contracting were very similar to what we were talking about here. . . . And that was a really important moment.

Similarly, the pilots who guide ships through the Panama Canal voted in 2011 to affiliate with the International Longshore and Warehouse Union, which represents dockworkers on the West Coast of North America (ILWU 2011). Transcending social difference and geographic distance, their alliance builds common cause among workers who might otherwise regard themselves as being in competition.

Not only workers are embracing this networked organizing model. Other political formations have arisen in direct response to the urban transformations elicited by global logistics activities. Supply-chain urbanism defines the very content and orientation of these movements: the violence being opposed is the violence of circulation itself. In the United States, community and environmental groups contending with the impacts of goods movement have joined together to form the Moving Forward Network, a nationwide alliance that seeks to enhance local logistics struggles through federal policy campaigns and by sharing information and advocacy tools. While this is an aspirational vision, the network is young and the level of coordination remains limited. Isella Ramirez, now working in Newark, described the need to balance local organizing efforts with attention to national-scale issues:

> Things are happening in LA. Things are happening in Texas. Things are happening in Kansas City and New York and New Jersey. To not work together is ridiculous. . . . You have to address your local needs, but you cannot rely on [yourself alone]. You have to use tactics and strategies that other folks in other areas are using, but then also focus in on a national target, so that we're putting pressure on both ends.

This two-pronged organizing strategy reflects, in part, the multiscalar nature of state involvement in the U.S. logistics sector: urban infrastructure projects and economic development strategy typically involve coordination among local and regional agencies, while trade policy and environmental regulations are set at the federal and state levels. In forging such long-distance solidarities—even in embryonic form—workers and communities are turning the networked configuration of the supply chain against itself, harnessing its relational geographies to open up new possibilities for resistance.

Conclusion

This article has proposed the concept of supply-chain urbanism in order to emphasize the ways urban spaces are being refashioned to promote the smooth circulation of goods. I have developed this concept in ways that heed not only the unevenly distributed harms that permeate today's logistical landscapes but also their fundamentally intertwined character. Furthermore, as the three episodes examined here make clear, the circuits of commodity capital have to be actively *made*: the production of logistics space, like the movement of goods itself, is a deeply contested process. A wide range of actors—multinational shipping corporations, governments at various levels, transportation workers, community and environmental organizations—make claims on the logistics city, and the conflicts among them are constitutive of the geographies that result.

Such conclusions call for a critical reappraisal of the mainstream view of logistics as a progressive and sustainable pathway to urban economic development. The stories told here reveal urban goods movement to be undergirded by violent experiences of residential dispossession, ecological degradation, and labor exploitation. They also shed new light on the social and environmental impacts of globalization. While geographers and others have yielded valuable insights into the places where commodities are *produced* in the global capitalist economy, the spaces of *circulation* have been comparatively unexplored. This article suggests that as logistics becomes increasingly vital to the operations of capitalism, the movement of goods exacts a growing toll on those who live and work in the arteries of global trade. In this sense, friction, disruption, and upheaval are not exogenous threats to the supply chain but integral to its everyday operation.

There is hope, I would offer, in relationality as both a method of inquiry and a model of political praxis. In stressing the relational nature of supply-chain urbanism, the article has shown how seemingly disconnected struggles over land, labor, and environments—and the subjects who wage them—are linked together through global commodity chains. Relational methodologies can help geographers grasp the common logics that underpin such disparate processes and experiences. They can also reveal how seemingly abstract global forces, such as interurban competition and shifting patterns of container flows, are themselves constituted through concrete, situated practices. As for praxis, I have suggested that as logistics-based development exploits and exacerbates existing patterns of inequality, it is also sparking new models of networked resistance whose full potential is still coming to light. These

movements mirror the weblike form of capitalist distribution systems as they seek to enact alternative relations rooted in democracy and justice. To the extent that these struggles have the power to alter the shape of global supply chains, the networked geographies of logistics open up an expansive terrain of political action.

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Author Biography

MARTIN DANYLUK is an assistant professor in the School of Geography at the University of Nottingham, Nottingham, UK, NG7 2RD. Email: martin.danyluk@nottingham.ac.uk. His research focuses on urban change and inequality in the context of globalization.

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