Article

Society and Space

EPD: Society and Space
0(0) 1–17


Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/0263775820938057
journals.sagepub.com/home/epd


Patchwork: Repair labor and the logic of infrastructure adaptation in Mexico City

Alejandro De Coss-Corzo
Durham University, UK

Abstract

This article introduces the concept of patchwork to understand how repair practices are carried out in Mexico City's networked hydraulic infrastructure.Drawing on data gathered through a one-year participatory ethnography, patchwork follows the Mexico City Water System (SACMEX) workers' descriptions of their own labor and how it relates to infrastructure in a context of structural austerity and rapid socio-material change. To do so, the article separates the analysis of repair practices from the logic of maintenance, challenging widely shared conceptions of how they relate to each other. Two distinct contributions are made possible by this move. On the one hand, it allows for a more detailed conceptualization of the work that repair labor does in relation to infrastructure and to other socio-material processes that are constantly shaping it. On the other, it enables an exploration of what I call the logic of adaptation, a form of infrastructure repair that is based not on returning objects and relations to a previously officially sanctioned order, but instead on fashioning normality as an ongoing process made possible through improvisational and incremental work. Exploring this logic, I argue that the endurance of urban infrastructure and of urban modernity requires the ad-hoc work of patchwork and of adaptive repair labor.

Keywords

Adaptation, infrastructure, labor, Mexico City, repair, urban modernity

Introduction

During the weekend, a leak had been flooding the parking lot of a corporate office building near a busy road intersection in an upscale Mexico City neighborhood. Building administrators had been making calls to senior engineers and politicians, and a couple of

Corresponding author:
Alejandro De Coss-Corzo, Department of Geography, Durham University, Durham, UK.
Email: julio.a.de-coss-corzo@durham.ac.uk

Mexico City Water System (*Sistema de Aguas de la Ciudad de México* – SACMEX) repair teams had been sent to fix the problem by Monday afternoon. There was already a big hole in the ground when I arrived there with one of these teams. Workers busily carried pavement, gravel, and dirt out, while curious passers-by peeked, and exasperated drivers honked repeatedly. Pickaxes and shovels were used to break the ground, helping workers, knee-deep in water, find the leak. No plans or maps were in sight. Instead, workers found the leak through memory, experience, and gut feeling. After having stopped water flow partially and momentarily, a worker they called Gallo jumped in only to realize the provisional fix he had prepared, a *brazalete* (bracelet), did not fit properly. The pipe was six inches wide and the bracelet was five. Without any other fix in sight, Gallo resorted to improvisation. He put a piece of scrap metal beneath the bracelet where it did not cover the pipe completely. Using the force given by nuts and bolts, he managed to bend the piece of metal enough to transform the five-inch bracelet into a six-inch one. The leak stopped, at least for the time being.

Gallo's bracelet is just one instance of a widespread form of carrying out repair within Mexico City's networked water infrastructures, which I documented widely during the one-year ethnographic fieldwork that informs and sustains the arguments presented here. These instances were described by workers and engineers at SACMEX, the public utility in charge of water supply and sanitation, as *parches* (patches). The word refers both to the material fixes that sustain the grid's operation and to the repair practices that workers carry out to make them. Amidst decaying budgets, precariously low wages, ongoing material ruination, the unpredictability of unwanted water flows, and a widespread lack of materials and tools, workers creatively repurpose discarded pieces, reassembling them into functional ones. Broken pumps are taken apart, their functioning parts stored for future use. Pipe sections are scaled up or down using improvised adaptors, transforming ill-fitting pieces into working ones. New tools are fashioned from scrap metal, allowing workers to carry out their labor beyond the previsions contained in planning documents and operation manuals.

In this article, I build upon the workers' description by introducing the concept of patchwork to explain how hydraulic infrastructures, and the relations they bring together, endure in Mexico City through adaptive repair labor. I define patchwork as a repair practice, enabled by workers' embodied expertise (Björkman, 2018) and practical knowledge (Scott, 1998); as a repair logic, adaptive and improvisational; and as a socio-material form, related both to the materiality of infrastructure and to the relations that are enabled through it. Each of these meanings builds upon and challenges current research on repair and maintenance in distinct ways. It follows findings that highlight the importance of repair and maintenance in upholding not only infrastructures but also numerous relations that constitute state power (Barnes, 2017), urban inequality (Alda-Vidal et al., 2018; Anand, 2017; Baptista, 2019), and urban life. However, patchwork allows for a conceptual move that expands the possibilities of this field of research. Namely, it proceeds by analytically separating the question of repair from that of maintenance. Instead of thinking them as an always joint practice and logic, patchwork stays with the question of repair as practice, and asks if other logics that exceed or transform that of maintenance might emerge.

Staying with repair as practice allows for a more careful consideration of how human labor works in and through infrastructure. Building on theorizations of repair and maintenance as improvisational and adaptive labor, driven by human ingenuity (Graham and Thrift, 2007), I push these arguments forward by considering how that work is learned, carried out, and how it emerges from the specific geohistorical context of the Mexico City's networked water system. Namely, I show how patchwork is a result of structural austerity, widespread (yet unequal and uneven) infrastructural decay, and of the changing flows of urban water and urban soil. Patchwork is an improvisational logic that enables the city to

endure not by returning "to a former, officially authorized state" (Barnes, 2017: 154), but by adapting the grid to changing conditions and breakdowns, both foreseen and unforeseen, in ways that exceed and challenge official narratives, rules, and practices. In staying with the question of repair, patchwork also stays with the moment of rupture, distinguishing between preventative logics of maintenance that seek to act before breakdown, and those of adaptation and improvisation that emerge as infrastructure fails.

Finally, patchwork contributes to our understanding of how formal networked infrastructures are materially produced in contexts of urban austerity and rapid socio-material change, and how these enable specific relations of power and difference. Building upon analyses of incrementalism in cities of the Global South (Silver, 2014), which focus on how marginalized urban dwellers convert diverse materials to configure new socio-material relations beyond the formal grid, here I expand these insights to interrogate the making of networked and formal systems. I find that incrementalism is also present in the networked system, and that it shapes not only its materiality but also the relations that it enables. These relate to questions of state power (Barnes, 2017) and urban inequality (Alda-Vidal et al., 2018), but also to notions of urban modernity and infrastructure (Gandy, 2014; Graham and Marvin, 2001). Namely, patchwork highlights how the endurance of modern ideals of networked supply is continuously achieved through patchwork as a practice and logic shaped by the materiality of water and infrastructure and enabled by the embodied expertise and practical knowledge of SACMEX workers.

The observations discussed here were gathered through a one-year ethnography at SACMEX. I focus particularly on the participant observation carried out with four SACMEX repair teams, each composed of 5–7 workers, with whom I worked full-time shifts two or three times per week. Two teams were part of the Lerma System Subdirectorate, based in Lerma, a periurban area in the state of Mexico, which supplies 12% of Mexico City's water (SACMEX, 2018). The other two were part of the Mexico City-based West Subdirectorate and worked in three Mexico City *alcaldías* (boroughs) and one state of Mexico municipality—Huixquilucan. My role within these teams shifted as time went by. At the beginning I limited myself to observing, documenting, and carrying out informal interviews with workers. After two months, I started to help carrying tools and materials. Toward the middle of my fieldwork, I began engaging in minor repair and maintenance activities, in particular with one team in Lerma. My analysis of workers' attitudes, resources, and practices when performing their labor comes from this embodied research experience as well. In all cases, their names have been changed, and locations have been made purposefully vague to ensure their anonymity.

This methodological approach had profound consequences for the theorization of patchwork. My immersion in the field led me to consider the role of repair as practice in a way that I had not foreseen before heading to Mexico City. While I expected that this often-unheralded work would be of the utmost importance for the networked pipe system, the ubiquity, complexity, and importance of patchwork far exceeded my expectations for causes that I hope this text makes clear. The rest of the article is structured around the three main contributions outlined before. First, I engage with the question of staying with repair as a practice. Building up on this question, I follow by analyzing the logic of adaptation. Finally, I elaborate on what improvisation, adaptation, and incrementalism mean for conceptions of formal networked hydraulic systems, and of urban modernity and infrastructure. I weave in theoretical discussions throughout the text, alongside methodological reflections. This has the goal of highlighting the relation between practice and theory, and the potential that ethnographic research has for conceptualizations of repair, maintenance, adaptation, infrastructure, and the relations that are enabled through these practices, logics, and objects.

Staying with repair

Current scholarship on infrastructure repair and maintenance has highlighted the role these practices and logics have in sustaining not only material objects, but also the relations that are enabled through them. Contributing to previous work that focused on how infrastructures shape urban space and urban life (Anand, 2017; Gandy, 2005, 2014); enable the urbanization of different resources (Kaika, 2005; Kaika and Swyngedouw, 2000; Silver, 2015; Swyngedouw, 2004); and constitute diverse techno-political relations both in the city and beyond (Anand, 2011; Barnes, 2014; Björkman, 2015; Meehan, 2014; Von Schnitzler, 2008), repair and maintenance studies show how these relations and process are not self-sustaining but require constant work. This labor sustains, amongst others, hydraulic (Alda-Vidal et al., 2018) and energy infrastructures (Schwenkel, 2015), transportation systems (Denis and Pontille, 2014; Ureta, 2014), and housing (Chu, 2014; Strebel, 2011). At the same time, repair and maintenance enable the reproduction of forms of power (Barnes, 2017), urban inequality, and numerous socio-material relations in the city and beyond (Carse, 2014; Graham and Thrift, 2007).

Despite the theoretical and empirical broadness of this field, there is a widespread conception of how repair and maintenance relate to each other. On these readings, the goal of repair is to ensure that a certain order, considered normal in specific geohistorical contexts, is maintained. This assertion often subordinates repair practices to maintenance logics or conflates practices of repair after breakdown with those of preventative action. Here, I want to critically interrogate this relation by staying with repair as a practice that is called upon in the moment of breakdown, distinguishing it from those that might be carried out before rupture takes place. I contend that this analytical distinction matters as it can surface how logics other than that of maintenance operate. This distinction implies separating practices such as the daily operation of hydraulic valves (Alda-Vidal et al., 2018; Anand, 2017); the protection of certain infrastructures in response to a future threat, such as theft (Baptista, 2019); or the annual maintenance that enables water flow (Barnes, 2017) from those that follow breakdown. Staying with repair brings to the fore the specific work that this requires, advances our knowledge of how embodied expertise (Björkman, 2018) works, and allows for a more careful consideration of how certain socio-material relations are made adaptive in face of failure.

Empirically, this requires considering how repair relates to breakdown in two different ways. The first one concerns what practices workers carry out when infrastructure fails, how they do them, and to what ends. The second one considers why breakdown occurred in the way it did, considering the materiality of the Mexico City's networked water grid, and how this same materiality shapes repair practices. The opening vignette, which briefly introduced Gallo's bracelet, can be a productive standpoint to interrogate this set of relations, as it makes visible the work of patchwork, and it positions it within SACMEX, the grid and their history. In what follows, I elaborate on Gallo's and his fellow workers' labor. I show how patchwork is shaped by workers' practical knowledge and embodied expertise. I also analyze how patchwork is shaped by the materiality of water, rust, soil, and austerity, and how the question of matter matters (Bakker and Bridge, 2006) when analyzing repair practices and their history. Afterwards, I highlight how these ways of knowing and doing are not shared equally amongst workers, how these differences matter in doing patchwork, and how they are part of a politics of repair in SACMEX.

Doing patchwork

As Gallo worked, I stood at the edge of the hole the workers had dug to find the leak. Notebook in hand, I tried to write down everything I could. I was surprised by what then

seemed like a paradox to me: that Gallo's patchwork fix seemed to be both improvised and thoroughly rehearsed at the same time. Before finding the leak, he and other workers had been trying to figure out just exactly where it was. They did this by observing the water's flow and by using their bodies to feel its pressure. The workers did not talk much as they pursued these clues. Instead they followed Gallo's lead, and moved with and against water's materiality. Tracing the leak was not done through deliberation but by deploying this form of embodied expertise. Recognized as crucial in mediating socio-political relations and imaginaries in and through infrastructure (Björkman, 2018), embodied expertise is also fundamental to the task of patchwork and the adaptation of hydraulic infrastructure and water flows in Mexico City. In the messiness of breakdown, embodied expertise allows workers to know where leaks and other problems are and enables them to patchily fix them.

This embodied expertise is a form of practical knowledge (Scott, 1998). It resides not on manuals or official documents. It is not formally codified, and teaching and learning it does not take place through a separation of theory and practice. Instead, patchwork, as a set of unwritten rules, practical dispositions, and ways of thinking, is developed through collective, iterative, and long-standing engagements with the diverse water infrastructures that make up the Mexico City's water network. It is a practice-driven way of mending infrastructures that relies on the ability to solve problems as they arise, drawing on previous practices of patchwork, and their success or failure. It is shared unequally amongst workers, as some have been able to develop these skills more than others, as a result of present and previous work experience, educational backgrounds, and other processes I discuss in the following section. It is also a form of work that is highly contingent on the materiality of each breakdown. No two patchwork fixes are identical, although many follow a similar logic and share numerous material characteristics.

Patchwork is a relational practice. It unfolds not by separating the workers from the site of breakdown, but through an ongoing consideration by the former of how the latter shapes their actions. In the Mexico City's networked water system, well beyond Gallo's fix, four socio-material relations are paramount: soil, water, rust, and austerity. Soil matters in various ways. It is that which workers first encounter when trying to find a reported leak that is still underground. While there are certainly some concrete breakers, excavators, and backhoe diggers in SACMEX, much of the work of breaking the ground, both pavement and beneath, requires human work. Pickaxes, shovels, and bare hands are all part of the removal of soil that enables to work on a leak or other forms of breakdown. Using these tools, as well as following water pressure and flow, calls for particular forms of embodied expertise that workers at SACMEX develop and use when doing patchwork. It is a way of doing and knowing that is shaped by soil, asphalt, and gravel, and that in turn shapes them.

Soil matters beyond this first encounter. Ground subsidence in Mexico City is a long-standing process, worsening unevenly across its territory. Driven by the exploitation of the underground aquifer, and by the geomorphological characteristics of the basin, soil sinks in the former lakebeds that make up much of the Mexican capital ground (Romero Lankao, 2010; Wester, 2009). The question of subsidence is particularly acute in the Historical Center, although it is increasingly more prevalent in the impoverished eastern borough of Iztapalapa (Cabral-Cano et al., 2008). Hydraulic infrastructures might breakdown as a result of subsidence and how this relates to other geophysical processes. In the aftermath of the 19 September 2017 earthquake, reports of broken-down pipes and aqueducts made the news (Aquino, 2017), and, according to engineers at SACMEX with whom I remain in contact with, also impacted their daily labor. Ground subsidence highlights how infrastructure, and the labor that allows it to function, are shaped relationally with other socio-material processes, and are in constant change and need of adaptation. As I will further

elaborate, patchwork allows for this adaptation to happen, and in doing so makes hydraulic infrastructure work in the specific geohistorical context of Mexico City.

Water and rust come to matter together. Most of the piped grid in Mexico City is at least 50 years old and made of metal. New polyethylene pipes are just now being rolled out, and journalistic reports affirm that only 10% of the grid operates on this kind of plastic (Cullell, 2019). During fieldwork, I never observed a repair carried out on polyethylene pipes. It was always a question of fixing leaks in metal ones, worn down by the constant flow of water and the rusting of joints, valves, and other pieces. Inside pipes, rust comes together with soil and other materials dragged by water, reducing the space through which water flows, and increasing the pressure in ways that might puncture them, leading to leaks. It is precisely in one of such occasions where Gallo's bracelet was called upon, as it allowed the leak to be contained without having to fully stop the flow of water and changing the piece altogether. This ideal solution, workers acknowledged, would be far more enduring that any single instance of patchwork, yet it was hard to achieve. This was not only because stopping water flow for an indeterminate amount of time was a difficult question to negotiate with neighbors and users, but also because rusty valves often cannot fully stop the flow of water. This was indeed the case when Gallo patchily carried out his fix, even if water kept steadily dripping.

The possibility of replacing these everyday pieces was further curtailed by the deepening austerity that SACMEX has faced over the course of at least three decades (De Alba, 2017). Workers identified 1997, the year when an opposition candidate was first elected as Mexico City mayor, as the moment in which funding became increasingly scarce (although De Alba suggests that this might have been ongoing since the early 1990s). For them, this was a consequence of a shift in the relations between the city and the federal government, and a way to pressure local authorities amidst a political struggle that had important consequences for their work and for urban life. Many workers recalled a previous time when materials had been abundant and more thorough fixes were possible. For others, austerity was all they had known. Crucially, austerity means not only less materials but also less staff being recruited, meager or inexistent wage increases, and lack of training for workers. Patchwork becomes more and more significant in this material context, as it enables the grid to function despite decreasing budgets, material lack, and deepening neglect. In 2019, SACMEX budget received a significant increase (Noticieros Televisa, 2019). Although this does not reverse decades of insufficient funding, it might still have important consequences for patchwork and the role it plays within the networked grid.

When Gallo jumped inside the hole, and began searching for the leak, all these material relations were at play. Soil had to be broken and maneuvered with. Water pressure was felt and followed.Rust impeded the full closure of the valve that controlled that pipe section. Austerity meant that those valves, as well as the pieces required for a more durable fix, were not available. Patchwork, as a repair practice enabled by workers' embodied forms of expertise and practical knowledge, is what allowed the leak to be fixed, and service provision to continue. Patchwork is also significant in many other sites of breakdown. Malfunctioning pumps, broken engines, and missing measurement devices can all be fixed by the creative use of discarded pieces, mismatching pipes made fitting through diverse material interventions, or the repurposing of materials that were not originally designed to be used within a networked pipe system, such as the scrap metal piece that Gallo used. Patchwork, as opposed to maintenance, sustains the working of the grid but does so not by returning it to a previously stable, officially sanctioned state, but by adapting the grid to changing material conditions through small-scale interventions (Furlong, 2011).

Repair politics

Repair practices, current scholarship shows, are always already political, entangled with the maintenance of relations of power and inequality across different scales and amongst different actors, including the state, informal neighborhoods, private providers, and international experts (Alda-Vidal et al., 2018; Anand, 2015; Baptista, 2019; Barnes, 2017). In what follows, I highlight three ways in which patchwork contributes to our understanding of repair politics. The first one concerns how skill, practical knowledge, and embodied expertise shape work team hierarchies, and how this in turn shapes how patchwork is carried out and the form that infrastructure takes. The second one concerns the position that manual workers occupy within SACMEX's institutional hierarchies, and how patchwork fleetingly upends official relations, highlighting the role and relevance of manual labor. The final one concerns how patchwork is shaped by the different forms of pressure (Anand, 2011) that urban dwellers are able to put on SACMEX and Mexico City government officials, and how this pressure is in turn shaped by the different relations that dwellers have with infrastructure and water supply.

Patchwork plays a fundamental role in structuring work teams. While all team members must do their part, what these are and what they mean for the practice of patchwork greatly differ. Newcomers are often engaged in the most extenuating and less creative practices. They carry pipes, load and unload trucks, and provide overall support for their teams (as I did during my time at SACMEX). This is certainly not always the case, as some new workers already have mechanical skills that allow them to carry out patchwork practices with more efficiency and dexterity. This division of labor often mirrors formal hierarchies and relations of authority within teams. The patchwork-related abilities and knowledges of some workers were often described by their peers as virtuous and were recognized as sources of prestige and distinction. These workers were usually appointed foremen, often elected by or in consultation with their peers. Skill differentials are related to workers' biographies, and to opportunities to develop skills that both include and precede their employment at SACMEX. Some workers had been employed in factories before or had had the opportunity to access technical education. Others had only been able to finish elementary school or had worked in entirely different activities before. The former not only had particular patchwork skills but were also able to move upwards within SACMEX, often remaining longer at their positions and developing their abilities even further.

I often observed heated discussions amongst members of the same work teams when deciding how to repair different breakdowns. Foremen and deputy foremen usually led, and the solutions they devised, such as making makeshift adaptors to connect mismatching pipes with pumps or putting together the working parts of two broken-down pumps to make a new functional one, were followed. At other times, foremen decided that a patchwork solution was not sufficient, as the specific problem encountered might be worsened if just patched and, for example, a malfunctioning electrical piece was not replaced. On one of such occasions, a worker challenged the decision made by his foreman. He said that he had called their boss, a mid-level engineer called Fernando, and he had recommended carrying out the patchy solution of merely rewiring a pump engine and not changing a whole piece, as the foreman intended. We later found out that the call never took place, but the episode highlights how decisions on how to carry patchwork are also political. They are related to hierarchies within teams and between them and SACMEX at large, to shared perceptions of others' skills, and to the capacity to imagine, improvise, and repair diverse breakdowns. These decisions matter as they mean that particular forms of patchwork come to shape the

grid, and often become prominent elements of the patchwork repertoires shared by workers across SACMEX.

There are still other inequalities at play within work teams. One of great importance is the question of income. While basic wages are similar, as all workers are officially employed as 'Operations Assistant in Urban Services', located at the very bottom of the SACMEX organizational chart, there are several contractual situations that might increase or decrease their income. If a worker misses a workday without explicit authorization from the office to which he is ascribed, penalties are issued which can result in monthly incomes of less than half of the $4500 pesos that workers earn on average, according to documents I observed during fieldwork. These workers often have more lucrative employment elsewhere, as taxi drivers, construction or factory workers, yet many of these side jobs do not provide the minimum social security (pension, health, and housing) that SACMEX positions do. However, some of these provisions are not readily accessible for all. A case in point is the question of overtime pay. While some workers do receive this additional income, others do not. This is related to the fact that workers might only become permanent following five years of continuous labor, after which they can become part of the negotiations that the local branch of the state workers union carry out with the central SACMEX administration. Overtime pay can double a worker's income, and therefore are the source of many disagreements, desires, and discussions.

Workers often reflect on the relevance of patchwork, and how its practice enables infrastructures to function despite ongoing deterioration and austerity. They claim a centrality to their work that I seek to echo in this article. Yet, despite its importance, they acknowledge it is a marginalized practice—something that is reflected in their low wages and their official position within SACMEX. In most everyday interactions, workers' practical knowledge is made to be secondary to that which engineers deploy through maps, other documents, formal knowledge, and ways of speaking and dressing (see Barnes, 2017 for a relevant discussion on this topic). Engineers have different relations to manual workers, but those in higher positions often consider their solutions and knowledge to be mere placeholders for future large-scale interventions that have so far failed to materialize. Even my interest of researching workers' practices was often greeted with puzzled looks, as senior engineers did not think there was much worth analyzing there. This contrasts greatly with workers' perceptions of this divide. They often complained that high-ranking officers and bureaucrats within SACMEX have never seen how everyday labor looks like, and therefore are unable to understand their work and what it does.

However, patchwork fixes enable the grid to function amidst decay and austerity. Field engineers know this and do not regularly stand in the way of patchwork. If anything, they call upon workers' practical knowledge and embodied expertise in moments in which hierarchies become flipped, even if they do so fleetingly. When facing a repair that cannot be solved according to the formal rules and manuals within SACMEX, engineers often delegate the responsibilities to manual workers. On many occasions, engineers are not present, as multiple breakdowns, and the patchwork that momentarily solves them, are not exceptions but part of the grid's everyday work. Additionally, practical knowledge is also resorted to when engaging with infrastructures that are not fully included in formal ways of knowing the system, such as logs, plans, or maps. For example, in the absence of accurate or updated plans, it is often said that a full water grid map only exists in their minds and memories. It is them who can pinpoint where valves are located or how pipes were rearranged in some previous repair process. Workers' practical knowledge makes up for the ways in which networked hydraulic infrastructures exceed top-down tools for describing and understanding infrastructures, their connections and breakdowns.

The moment of breakdown and its aftermath are also being shaped by other political relations. How quickly response takes place is related to how much pressure (Anand, 2011)

different groups of urban dwellers can exert on SACMEX and government officials. Often, this pressure travels not by official means but by diverse technologies, such as instant messaging tools. These same technologies are used to transmit orders to workers, who then might solve any given breakdown through patchwork. The flow of water in Mexico City is often enabled by these non-formal, non-official ways of doing, even if they take place within the publicly owned, networked system. At the same time, patchwork is called upon differently by the pressure that any unwanted flow might have on the rest of the grid. Breakdowns on distribution pipes or in those that affect water distribution tanks, pumps, or engines are often prioritized over those that take place in the margins of the grid. This material pressure often coincides with spatial inequalities, which are in turn related to the kinds of pressure different groups, companies, and neighborhoods can exert. Patchwork responds to socio-material pressure, enabling both the grid and officials to fulfil their functions and sustain urban flows.

After Gallo's bracelet was put in place, I sat down at a nearby curb with several workers. They were curious about my presence, made even more evident by my frantic notetaking. I told them I was doing research on how they kept the grid working, and that I was keen to understand what they thought was relevant. They reflected on the strenuousness of their work and on its punctured temporality. Patchwork was called upon at moments when breakdown disrupted flow in such a way that a solution could not be prolonged, and the imperative of repair demanded creativity and improvisation. Patchwork, as a practice carried out by workers within the public utility, also has a distinct spatiality. Its presence is shaped by pressure, as the relatively rapid response to the leak that Gallo fixed suggests. As we looked at the now dry hole from afar, one of the workers told me a story of how a leak in a self-constructed neighborhood in one of Mexico City's many ravines was only found when a landslide forced the government's attention. After assessing the situation, the workers found the issue: the roots of a tree had broken a pipe, causing a leak that went on, according to this worker's calculations, for at least 15 years.

In this section, I have stayed with the question of repair and how it unfolds at the moment of breakdown. I have shown how patchwork is a relational practice, shaped both by workers' previous experiences of repair and by the materiality of Mexico City's infrastructure. I have highlighted how specific geohistorical conditions shape patchwork, whether as a result of ground subsidence, structural austerity, or infrastructural deterioration and decay. I have also analyzed how patchwork is a political practice, shaped and shaping inequalities and hierarchies within the work teams, across SACMEX, and at the urban scale. In doing so, I have enriched existing empirical and conceptual discussions on repair as practice. I have done so by separating the work of practice from the logic of maintenance, which are often discussed together. In existing literature, this stance can be related to empirical lacunae, where manual work remained beyond the scope of research (Barnes, 2017), or to conceptual frameworks, where pre-emptive work of maintenance is brought together with the adaptive work of repair (Baptista, 2019) or that of infrastructure operation (Alda-Vidal et al., 2018; Anand, 2017). In staying with repair, I have opened the space to analyze how other logics, namely that of adaptation, shape and are shaped by patchwork. This is what I now turn to.

The logic of adaptation

Anticipating breakdown

Much previous labor was needed for Gallo to be able to carry out his patchwork fix. If the moment of rupture highlights the improvisational character of patchwork, its reliance on embodied expertise and practical knowledge, and how it responds to breakdown materiality,

also suggests that some form of anticipation might be at play. That Gallo had pieces of scrap metal lying around in the back of the truck he shares with his team points to this. As I carried out fieldwork and became more and more engaged with the everyday activities of workers across SACMEX, I got to observe and participate in these anticipatory practices and logics. They take place not at the moment of breakdown but at the warehouses and yards where workers wait for the next call. Despite this physical and temporal distance, breakdown remains a pressing concern and a future certainty. While the specificity of each instance of disrepair is unknown as workers prepare the materials and fixes they might use in the future, their experiences of previous patchwork allow them to anticipate not in the dark but in light of what usually happens within the Mexico City's water grid.

Artemio and Pablo work at a different sector than Gallo. They too are part of a repair team, although their main tasks have to do with fixing pumps and engines rather than pipes, given that their sector—Lerma—is where 12% of the total Mexico City's water is extracted. Their work has a different pace. If in central Mexico City emergency calls and breakdowns that exert pressure on officials, workers, and engineers are most common, in Lerma failures are less frequent, more distant and require different technical adaptations. Whereas Gallo bracelet acts upon infrastructure as a form to contain excess water, the patchwork fixes that Artemio and Pablo carry out are normally concerned with getting water out of the ground. This usually implies working not only with metal pipes but with the many electrical and mechanical components that allow pumps and engines to function. This added technical complexity, added to the slower pace of repair labor, means that anticipatory practices are more visible in Lerma than in most of the sites I could observe in Mexico City.

When days were slow, Artemio and Pablo spent a good amount of time in their sector's warehouse. There, they stored spare pieces, tools, and cables out in the open and in a seemingly disorganized way. Malfunctioning pumps, engine parts, pipe sections, hammers, pliers, and many more objects were lying around, some rusty and some still covered in mud and water. This disorder, however, was only apparent. Both workers, and indeed others, knew what was kept there, and how it might be put to work. I often sat with them as they took the time to find out what was available and figure out how to use it when breakdown finally happened. They also prepared other fixes in advance: on several occasions, they assembled longer cables from short pieces that had been left over from a previous repair using tin solder they heated on a small charcoal stove and insulating cable. They did so with the ease that comes from practice and, eventually, mastery over the process. While working, they often discussed future patchwork fixes and how their present labor might come in handy then. Driven by the imperative of sustaining water flow and understanding the relevance of their labor in achieving so, Pablo and Artemio speculated not only about repair but also about socio-material change and its relative unpredictability.

Anticipation and speculation are integral parts of what I name as the logic of adaptation. When workers prepare fixes in advance, considering how breakdown may occur in the nearby future, and how their current actions can influence their forthcoming ones, they are working with a set of relations that are in continuous flow. Whereas most of current literature on maintenance highlights the role of repair in returning relations and objects to a "former, officially authorized state" (Barnes, 2017: 154), here the concern is not with what is officially sanctioned but with what might just work. This anticipatory and speculative labor is different from the preventative one that characterizes maintenance (Baptista, 2019), as it is done always in relation to the moment of breakdown and not with the intention of impeding or delaying it. In this it differs too from the work of operating infrastructures (Alda-Vidal et al., 2018; Anand, 2017), as it is not concerned with sustaining an already ongoing flow but with restoring one that has stopped amidst continuous socio-material change. Relations and

things do not go necessarily back to officially authorized states but often are repaired in ways that both make previously existing relations endure and allow infrastructures to adapt.

This concern with the encounter, namely with the moment in which breakdown calls upon patchwork as a repair practice, can also be deployed to understand what the role and specificity of human labor is and what are its socio-material limits. Anticipation and speculation always imply a degree of unknowability. Workers may know what kinds of breakdown are more common, and sites where this occurs more often—the place where Gallo fixed the leak being a case in point. However, their calculations cannot fully account for the specificities of each failure site. The concern is not with repairing these breakdowns as they should be, but instead with fixing them as they can. In doing so, workers are operating within the boundaries and limits set by existing infrastructures and by the materials and knowledge available to them. Their goal there is not to return things to their ideal or original form, but to fashion normality as an ongoing process that is always shaped by infrastructure and other socio-material relations. However, anticipation and speculation, and certainly improvisation at the moment of breakdown, suggest a purposefulness that is specific to human labor. Patchwork is indeed a hybrid process (Gandy, 2005), yet one in which human work plays a specific role. The consequences of this specificity can be also observed in the material form that infrastructure takes and on what this materiality implies.

Incremental labor and the formal grid

Whenever a patchwork fix is installed, the grid does not go back to adhere to its original design and to the materials that were used when it was first built. Instead, new materials and new designs become part of it, often bearing the marks of specific workers and their ways of doing patchwork. This small-scale adaptation can be thought of as a form of incrementality (Silver, 2014). These, and the practices of infrastructure convertibility associated to them, have been richly explored in cities of the Global South (Simone, 2004, 2013). There, they are what enables the urban majorities to make spaces for living amidst precarious and uncertain conditions. Through these practices and logics, alternative forms of service provision are achieved through collective experimentation, always making the most of what is at hand. Not unlike these forms of incrementality, patchwork also relies on collective experimentation, as ways of doing patchwork are learned by doing together. The logic of adaptation also requires the conversion of discarded pieces, scrap metal, and malfunctioning infrastructures to construct new working ones that might be used when breakdown occurs. Amidst ongoing austerity, precarious wages, and insufficient materials, workers make do with whatever is at hand in navigating uncertainty and disrepair.

However, patchwork is different from other forms of incrementality insofar it works not on spaces of informality and heterogeneity, but on those characterized as formal and standardized. Moreover, it is carried out by public workers under the purposefully distracted gaze of field engineers and other SACMEX officials, and not by urban dwellers in the margins or beyond formal networks and the state. Patchwork is neither fully official nor completely unofficial. It exists in an in-between where improvisation, adaptation, and incrementality allow urban water to flow through the formal, state-owned, and publicly operated network. Against ideals of standardized infrastructure, it is patchwork what enables infrastructure to function. It does so not through thorough planning, but through a calculation of probabilities and the deployment of ways of knowing and doing based on previous practices and experiences. These do not aim to offer definitive solutions, and neither can ensure that decay is definitely fended off. Instead, patchwork only promises (Anand et al., 2018) to deliver something that works for a limited period, and that to do so must adapt

infrastructures materially through human labor. Patchwork is always facing the uncertain, reminding us that "long histories of repetition need not constitute likely guarantees" (Simone, 2013: 245). What worked before might not do so in the future, as the city, infrastructure, soil, water, and labor change constantly and in often unexpected ways.

Moreover, the political stakes of incrementality in the formal grid are different from those that characterize the heterogeneous infrastructural configurations (Lawhon et al., 2018) of cities across the Global South. Patchwork does not necessarily prefigure new forms of producing infrastructure and resource flows, as other forms of incrementality might do (Silver, 2014). Instead, it shows how these practices can also be deployed to ensure that already existing infrastructures and flows are sustained through adaptive labor. These, despite being constantly achieved and always in the making, are adapted in temporalities and spatialities saturated by the accretions of previous infrastructure (Anand, 2017), and the intransigence (Carse, 2014) of their forms and the relations they enable. Patchwork highlights how repair does not necessary entail a return to officially authorized orders, although it most certainly does so in many cases and geographies. Instead, it shows that it can also be part of the constant adaptation of infrastructures and the many relations that exist through and within them, often challenging or exceeding officially sanctioned practices and rules.

Patchworking urban modernity

Studies of hydraulic infrastructures and modernity in Mexico City highlight three characteristics. First, they show how the construction of standardized infrastructure monopolies (Graham and Marvin, 2001) was an ideal shared by Mexican elites since, at least, the end of the 19th century (Perló Cohen, 1999; Vitz, 2018).Second, that this ideal was always exclusionary, and that it deepened already existing spatial differences linked to racial and class inequalities, which endure today and might deepen in the future (Romero Lankao, 2010). Third, that this stark difference and inequality represents an unfinished (Duhau and Girola, 1990) or lagging modernity (Sánchez-Mejorada Fernández, 2005), where the formal, central city stands in contrast and opposition to the sprawling, informal, unplanned peripheries. This body of work rightly emphasizes the historical and contemporary inequalities that characterize the Mexican capital, where behind the 97% formal coverage of the networked pipe system (CONAGUA, 2018), realities of intermittent supply, poor water quality, and heterogeneity proliferate (De Alba, 2017; Schwarz, 2017). However, this focus has left the central city largely unexplored, being depicted as a site where the modern infrastructural ideal was and is put in practice.

Patchwork contributes to the study of urban modernity by unsettling the supposed stability of formal supply in Mexico City, and queries the somewhat forgotten space of the planned city, and its networked water infrastructures. Take Gallo's bracelet into consideration yet again. It temporarily solves a problem in the formal network through an ad-hoc intervention that he learned through constant engagement with the field, and that relies on his practical knowledge and embodied expertise. This fix does not adhere to any officially sanctioned rulebook, nor does it ensure the standardization and engineered planning that characterizes urban modernity. Instead, patchwork as practice and logic challenges already existing standards and norms, and in doing so it enables the production of a differently modern infrastructure, still operating but not through standards, rules, and codes but through ad-hoc, incremental adaptations. The promise of reliable and constant supply that characterizes planned Mexico City, and the socio-material relations this enables, endure not by returning to a previously existing order but by adapting the grid to changing

conditions through patchwork. Instead of a stark opposition between formal and informal, planned and unplanned, and heterogeneous and unitary infrastructure and urban space, there is a more fluid set of relations that are enabled and adapted through human labor. Crucially, this work is not that of engineers and planners, who often do not know how patchwork is carried out and its adaptive logic. Instead, it is the labor of manual workers that is called upon, alongside their forms of knowing and doing, practical and embodied.

That even the central city does not adhere to ideals of standardized, unitary infrastructure, and to the rule of official planning and engineering, does not imply that distinctions between it and the unplanned city are unimportant. Indeed, the fact that leaks go unnoticed for decades in the self-built peripheries attests to their continued relevance. Gallo's bracelets, installed in the vicinity of Lomas de Chapultepec, a wealthy neighborhood in west Mexico City, has had a mean consumption between 600 and 1000 liters per person per day in the past years (Aguilar, 2007; Romero Lankao, 2010). In contrast, the peripheral boroughs of Chalco and Iztapalapa have reported available water at 60 and 28 liters, respectively (Capilla Vilchis, 2018). These already existing inequalities are compounded by the uneven presence of patchwork, and the ways in which pressure shapes these fixes and calls upon workers' labor differentially. These inequalities are also linked to different attitudes toward manual workers across Mexico City. When carrying out patchwork fixes in the central city, workers were often challenged by neighbors and employees working at the affected households and offices. Their presence was sometimes perceived as a nuisance that punctured the normal flow of water, even if it was required to restore it through patchwork. In contrast, in the periphery they were mostly greeted with a mix of relief and indignation, as the workers became not only those who repair infrastructures, but SACMEX representatives, even if only momentarily.

This fleeting role of workers as government representatives echoes arguments regarding the proliferation of intermediaries in the peripheries of Mexico City (De Alba, 2017). There, these intermediaries both challenge and enable the continued participation of the state in the tasks of water supply, often through heterogeneous infrastructural configurations. Here, the stakes are different, as SACMEX workers enable the participation of the state in the provision of water, but do so not in ways that directly challenge the state's political authority, as they do not become intermediaries that construct alternative forms of territorialized power through hydraulic infrastructures. Instead, their challenge works at the scale of infrastructure, as it both upends momentarily the established hierarchies within SACMEX, and it highlights how the endurance or urban modernity requires improvisational and incremental labor. Indeed, workers are crucial in sustaining the role of the state in the provision of urban modernity through an infrastructure monopoly, yet they do so in ways that challenge assumptions about standardization and the formality of the piped network and the seamlessness of the unitary city. At the same time, their relative autonomy shows how their practices cannot be conceptualized as only executing orders drafted elsewhere but must be queried as operating according to their own geohistorically specific characteristics and logics.

The role of patchwork in the adaptation of the formal network, and in the provision of urban modernity, echoes findings from other cities and spaces across the Global South. The constant work that infrastructures require resonates with notions of service provision being always in the making (Baptista, 2019). Unfinished and ongoing, infrastructure and the relations it enables are constantly being adapted in relation to changing socio-material conditions. Certainly, this work is not beyond the maintenance of certain entrenched forms of inequality. This both relates to workers' own notions of order, disorder, and their territorial correlates in urban space (Alda-Vidal et al., 2018), as well as to the different

forms of pressure that urban dwellers, public officials, and bureaucrats exert (Anand, 2011). In carrying out patchwork, workers sustain the role of the state in providing water, proving that this type of labor is necessary for it to endure (Barnes, 2017). At the same time, the way in which patchwork is called upon differently across the unequal and uneven geographies of Mexico City highlights how indeed the city has been historically shaped by differentiated access to water and sanitation, not unlike other metropoles in the Global South (Anand, 2017; Gandy, 2008). The city is a site of fractured modernity (Gandy, 2014), where risk and disease are distributed unequally, and where class and racial inequality follow lines of uneven water and sanitation access.

However, patchwork also contributes to this body of work in specific and novel ways, complementing and challenging our knowledge about how modernity, as an infrastructurally enabled process and ideal, is made, repaired and adapted, particularly in contexts of ongoing and deepening disrepair and decay. In the planned and networked central Mexico City, it is patchwork that which allows water to flow and infrastructures to be adapted to changing socio-material relations. It does so not by returning infrastructure to a previously approved official order or by preventing failure. Instead, it works always at the moment of breakdown, and through an adaptive logic that challenges and exceeds official norms, rules, and ways of doing. Patchwork, as a way of doing that is not only shaped by practical knowledge but enacted through embodied forms of expertise, shapes infrastructure in ways that are not standardized, but neither incommensurable. This means not only that modernity is plural and adaptive, as already highlighted by numerous works on the urban condition in Mexico City and elsewhere in the Global South, but that manual work, namely that of repair, has a crucial role in enabling this. Crucially, patchwork shines light on the central city and the formal grid, often assumed unproblematically modern. If modernity in Mexico City is not only fractured but constantly being patched, it could be relevant to query whether these practices and logics are present elsewhere, bearing different names and being the result of specific geohistorical processes and changing socio-material conditions.

Conclusion

This article has introduced the concept of patchwork to understand how repair practices are carried out in the Mexico City's networked water system. The concept follows manual workers' own descriptions of their labor, and of the way in which it relates to infrastructure in a context of structural austerity, widespread material breakdown, subsiding soils, depleting aquifers, and precarious employment conditions. Analytically, patchwork is mobilized by separating repair practice from maintenance logics. This move allows me to further elaborate on how repair is done, to what end and through which means. I find that repair does not necessarily imply the return to officially sanctioned configurations but might instead enable infrastructure to adapt to changing socio-material conditions in ways that are shaped by improvisational labor and the situated politics of patchwork. I elaborate on this by exploring the logic of adaptation. I show how it relies on anticipatory and speculative thinking, yet always remains rooted in the moment of breakdown as a paradoxical certainty: its occurrence is given but the specific shape it might take is not fully known in advance. In this it differs from maintenance, which also includes preventative actions that seek to avoid breakdown, and those of operation that assume ongoing flow.

When thinking of adaptation in relation to the materiality of the grid, I show how patchwork is an incremental practice that differs from others insofar it is carried out by state workers on the publicly owned grid. There, incrementality does not produce a quilt-like heterogenous configuration that prefigures other forms of service provision and

infrastructure, but rather sustains existing ones through constant patching. That these repair practices do not adhere to official ways of doing and planning shows how the functioning of the planned, formal network, particularly in the relatively unexplored space of central Mexico City, relies also on unplanned practices. Their presence and role, allowed by SACMEX officials as it sustains water flow in austerity and breakdown conditions, show that the current work of modern infrastructural configurations do not mirror the ideals that drove their construction. Instead, they are enabled by patchwork as an incremental, improvisational, and adaptive practice and logic. This echoes arguments that depict urban modernity in the Global South as plural, unequal, and adaptive, but contributes distinctively by highlighting the role that manual work, in particular that of repair, does on the formal grid. Patchwork might be present elsewhere, perhaps under different names and through diverse local practices, but still playing a fundamental role in adapting infrastructures and socio-material relations to continuous change.

Patchwork can enable the adaptation of unequal and uneven forms of power and resource distribution. However, it does so in ways that allow for the formulation of alternative infrastructure and repair imaginaries. Just as this form of repair work is bounded by already existing infrastructural configurations, and by the materialities of urban space, it also shows how the ideals that have driven the making and repairing of infrastructure in Mexico City are themselves bounded, often in ways that go unrecognized. Might patchwork inform a humbler infrastructural ideal? This can be one that acknowledges the need for adaptation and the inevitability of breakdown and does so not by relegating these practices and relations underground, but by making them an object of public concern and recognition, and open to political contention. This might be one that departs from the fact that it must be built amidst already unequal relations, against the uneven reach of repair labor, and considering how infrastructure is bounded by other lively socio-materialities. Then, adaptation, improvisation, and incrementality might become part of the transformation of formal grids in ways that bring forth more just and sustainable configurations.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Alejandro De Coss-Corzo https://orcid.org/0000-0002-9405-0513

References

Aguilar, José Antonio (2007) El excusado y la barbarie. *Revista del Consumidor*.

Alda-Vidal C, Kooy M and Rusca M (2018) Mapping operation and maintenance: An everyday urbanism analysis of inequalities within piped water supply in Lilongwe, Malawi. *Urban Geography* 39(1): 104–121.

Anand N (2011) PRESSURE: The PoliTechnics of water supply in Mumbai. *Cultural Anthropology: Journal of the Society for Cultural Anthropology* 26(4): 542–564.

Anand N (2015) Leaky states: Water audits, ignorance, and the politics of infrastructure. *Public Culture* 27(2): 305–330.

Anand N (2017) *Hydraulic City: Water & the Infrastructures of Citizenship in Mumbai*. Durham, NC: Duke University Press.

Anand N, Gupta A and Appel H (eds) (2018) *The Promise of Infrastructure*. Durham, NC: Duke University Press.

Aquino E (2017) Sismo dejó sin agua y en crisis al sur-oriente de la Ciudad de México. Available at: https://www.animalpolitico.com/2017/10/sismo-agua-crisis-sur-oriente-ciudad/ (accessed 01 April 2020).

Bakker K and Bridge G (2006) Material worlds? Resource geographies and the 'matter of nature'. *Progress in Human Geography* 30(1): 5–27.

Baptista I (2019) Electricity services always in the making: Informality and the work of infrastructure maintenance and repair in an African city. *Urban Studies* 56(3): 510–525.

Barnes J (2014) *Cultivating the Nile: The Everyday Politics of Water in Egypt*. Durham, NC: Duke University Press.

Barnes J (2017) States of maintenance: Power, politics, and Egypt's irrigation infrastructure. *Environment and Planning D: Society and Space* 35(1): 146–164.

Björkman L (2015) *Pipe Politics, Contested Waters: Embedded Infrastructures of Millenial Mumbai*. Durham, NC: Duke University Press.

Björkman L (2018) The engineer and the plumber: Mediating Mumbai's conflicting infrastructural imaginaries. *International Journal of Urban and Regional Research* 42(2): 276–294.

Cabral-Cano E, Dixon TH, Miralles-Wilhelm F, et al. (2008) Space geodetic imaging of rapid ground subsidence in Mexico City. *Geological Society of America Bulletin* 120(11–12): 1556–1566.

Capilla Vilchis R (2018) La crisis del agua en México. Available at: https://agua.org.mx/la-crisis-del-agua-en-mexico-conacyt/ (accessed 30 March 2020).

Carse A (2014) *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal*. Cambridge: The MIT Press.

Chu JY (2014) When infrastructures attack: The workings of disrepair in China. *American Ethnologist* 41(2): 351–367.

CONAGUA (2018) *Estadísticas Del Agua en México*. Mexico City: CONAGUA.

Cullell JM (2019) La plomería infinita de la ciudad con 13.000 kilómetros de tubería. Available at: https://elpais.com/sociedad/2019/12/05/actualidad/1575507656_866002.html (accessed 7 April 2020).

De Alba F (2017) Challenging state modernity: Governmental adaptation and informal water politics in Mexico City. *Current Sociology* 65(2): 182–194.

Denis J and Pontille D (2014) Maintenance work and the performativity of urban inscriptions: The case of Paris subway signs. *Environment and Planning D: Society and Space* 32: 404–416.

Duhau E and Girola L (1990) La ciudad y la modernidad inconclusa. *Acta Sociológica* 5(12): 1–18.

Furlong K (2011) Small technologies, big change: Rethinking infrastructure through STS and geography. *Progress in Human Geography* 35(4): 460–482.

Gandy M (2005) Cyborg urbanization: Complexity and monstrosity in the contemporary city. *International Journal of Urban and Regional Research* 29(1): 26–49.

Gandy M (2008) Landscapes of disaster: Water, modernity, and urban fragmentation in Mumbai. *Environment and Planning A* 40: 180–130.

Gandy M (2014) *The Fabric of Space: Water, Modernity, and the Urban Imagination*. Cambridge: The MIT Press.

Graham S and Marvin S (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*. London: Routledge.

Graham S and Thrift N (2007) Out of order: Understanding repair and maintenance. *Theory, Culture & Society* 24(3): 1–25.

Kaika M (2005) *City of Flows: Modernity, Nature, and the City*. Oxford: Routledge.

Kaika M and Swyngedouw E (2000) Fetishizing the modern city: The phantasmagoria of urban technological networks. *International Journal of Urban and Regional Research* 24(1): 120–138.

Lawhon M, Nilsson D, Silver J, et al. (2018) Thinking through heterogeneous infrastructure configurations. *Urban Studies* 55(4): 720–732.

Meehan KM (2014) Tool-power: Water infrastructure as wellsprings of state power. *Geoforum* 57: 215–224.
Noticieros Televisa (2019) Sacmex tendrá presupuesto de 5, 977 mdp en 2019: Sheinbaum. Available at: https://noticieros.televisa.com/ultimas-noticias/sacmex-tendra-presupuesto-de-5-977-mdp-en-2019-sheinbaum/ (accessed 18 April 2020).
Perló Cohen M (1999) *El Paradigma Porfiriano: Historia Del Desagüe Del Valle de México*. Mexico City: UNAM-PUEC-ISS.
Romero Lankao P (2010) Water in Mexico City: What will climate change bring to its history of water-related hazards and vulnerabilities? *Environment and Urbanization* 22(1): 157–178.
SACMEX (2018) *Diagnóstico, Logros y Desafíos*. Mexico City: SACMEX.
Sánchez-Mejorada Fernández MC (2005) *Rezagos de la Modernidad: Memorias de Una Ciudad Presente*. Mexico City: Universidad Autónoma Metropolitana.
Schwarz A (2017) *Demanding Water: A Sociospatial Approach to Domestic Water Use in Mexico City*. Stuttgart: Steiner Franz Verlag.
Schwenkel C (2015) Spectacular infrastructure and its breakdown in socialist Vietnam. *American Ethnologist* 42(3): 520–534.
Scott JC (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. London: Yale University Press.
Silver J (2014) Incremental infrastructures: Material improvisation and social collaboration across post-colonial Accra. *Urban Geography* 35(6): 788–804.
Silver J (2015) Disrupted infrastructures: An urban political ecology of interrupted electricity in Accra. *International Journal of Urban and Regional Research* 39(5): 984–1003.
Simone A (2004) People as infrastructure: Intersecting fragments in Johannesburg. *Public Culture* 16(3): 407–429.
Simone A (2013) Cities of uncertainty: Jakarta, the urban majority, and inventive political technologies. *Theory, Culture & Society* 30(7/8): 243–263.
Strebel I (2011) The living building: Towards a geography of maintenance work. *Social & Cultural Geography* 12(3): 243–262.
Swyngedouw E (2004) *Social Power and the Urbanisation of Water: Flows of Power*. Oxford: Oxford University Press.
Ureta S (2014) Normalizing Transantiago: On the challenges (and limits) of repairing infrastructures. *Social Studies of Science* 44(3): 368–392.
Vitz M (2018) *A City on a Lake: Urban Political Ecology and the Growth of Mexico City*. Durham, NC: Duke University Press.
Von Schnitzler A (2008) Citizenship prepaid: Water, calculability, and techno-politics in South Africa. *Journal of Southern African Studies* 34(4): 899–917.
Wester P (2009) Capturing the waters: The hydraulic mission in the Lerma-Chapala Basin, Mexico (1876–1976). *Water History* 1(1): 9–29.

Alejandro De Coss-Corzo is a Post-Doctoral Research Associate at the Department of Geography, Durham University. His work focuses on analyzing the everyday relations between urban infrastructures and human labor. His PhD project (LSE Sociology) looked at this question through an ethnography of repair, maintenance, and operation work in the Mexico City's water network. He is now researching how digital technologies and infrastructures are used in contexts of emergency in Mexico, and how they might enable particular forms of knowledge, action, and governance.