INTRODUCTION

Frail modernities: Latin American infrastructures between repair and ruination

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1. Infrastructures of despair

The collapse of a tailings dam at the Samarco Mine in the Brazilian state of Minas Gerais on November 5th 2015 suddenly released around 62 million cubic meters of semi-liquid mining waste. The subsequent “wave of mud” (Creado and Helmereich 2018) travelled 879 km until reaching the Atlantic ocean, leaving a landscape of massive destruction, pollution, and death in its wake. The magnitude of the disaster immediately turned the spill into the worst environmental disaster in Brazil’s history, according to most commentators. Then, on January 25th 2019, the collapse of another tailings dam at the Brumadinho Mine, located in the same Brazilian state and owned by the same mining corporation, killed at least 248 people, mostly mine workers, becoming the deadliest industrial disaster in Brazil’s history. In just three years, a single region and company experienced two of the most polluting and deadliest disasters, not only in Brazil’s history, but in Latin America as a whole.

At the center of both disasters was the sudden collapse of a humble piece of mining infrastructure: a tailings dam. Simply defined in technical mining literature as “purpose-built sedimentation lagoons” (Lottermoser 2007, 157), tailings dams are the place where all the unwanted leftovers of the mining extraction process come to rest, forever, materializing the “ultimate sink” (Tarr 1996) principle behind most mining enterprises worldwide. In most aspects, tailings dams appear as the ultimate example of a “boring” infrastructure, or complex pieces of technology that are “designed to become invisible as [they are] stabilized” (Lampland and Star 2009, 207). But then something happened. The ever-precarious balance between water and minerals that holds tailings dams together shifted in favor of water, and the dam collapsed. We will likely never know the exact moment or place where the collapse of the dams began, but in both cases the result was the same: destruction, death, and pollution. Everywhere.

Brazil’s twin mining disasters dramatically show us how infrastructures never become completely stabilized, or even invisible, in the first place. As a large body of STS literature has explored, instead of being perfectly immutable devices, infrastructures are highly paradoxical things – large and global, yet local and intimate; malleable, yet
rigid; future-oriented, yet bound to their context of creation. Especially in moments of massive failure, and the devastation they usually unravel, infrastructures appear at the very center of some of the most pressing environmental and social issues of our times.

Such centrality has not passed unacknowledged to STS practitioners in Latin America, where the social study of infrastructures has experienced an important growth in recent years. Most studies tend to focus on the connections among the construction of infrastructures, such as roads and dams, and joint processes of State formation and modernization (for an overview see Summerhill 2006). In many cases, new infrastructures appear as the most prominent embodiment of “modern” entities, from states to ways of being a person. Especially when deployed in contexts lacking any kind of regular connectivity, infrastructures tend to be described as the ultimate form of “politics by other means” (Latour 1993), aiming to impose particular kinds of order and rationalization upon worlds that had, so far, existed largely beyond such categories.

However, as the Samarco and Brumadinho disasters remind us, there is more in the lives of infrastructures than these initial moments of planning, building and inauguration. After becoming operational, and even if they never become operational (Beasley-Murray 2017), infrastructures decay. From their inauguration day, infrastructures are exposed to a constant process of deterioration, its components being continually affected by constant usage, weather patterns, geological processes, and so on. Especially in institutional contexts characterized by low public budgets and political turmoil, constant decay is one of the key, yet often unseen, characteristics of Latin American infrastructures. Most of the time, such decay can be meaningless, only the object of quotidian practices of repair and maintenance – often invisible in their own right. Other cases may become radically meaningful, turning a project aiming at embodying visions of development and well-being into its complete opposite: an infrastructure of despair.

This cluster hopes to piece together an analytic gap regarding the social study of infrastructural decay in Latin America. Through a joint focus on processes of infrastructural repair and ruination, the cluster aims to explore the seemingly “dark side” of Latin American infrastructures, when promises of modernity turn sour and breakdown and obsolesce replace functionality. In doing so, these articles open up this field in Latin America, questioning how infrastructures, often discussed using frames imported from the Global North, might be thought to deal with contexts jointly characterized by institutional and financial scarcities, and never-ending creative appropriation and transformation. Through this, we center the study of infrastructuration as a form of nation (un)building and explore how repair/maintenance and ruination processes fit into infrastructures, making them more-than-visible things with significant, but fragile, power.

This introductory piece looks to set the stage for the empirical papers comprising the cluster. It will start by briefly summarizing some of the main general points raised by previous studies regarding the role of infrastructures in State formation in the Latin American continent, in particular their importance in the processes of post-developmentality being experienced in the region. Then it moves to briefly introduce the main literature on the concepts animating most pieces in this cluster: repair/maintenance and ruination. Our introduction concludes by briefly presenting the logic and contents behind each piece in the cluster.
2. Infrastructural inequalities

Using a jarred STS modism, we could say that Latin American states were co-produced along with infrastructures. Or, in other words, “just as states produce infrastructure, infrastructure produces states” (Hill 2017, 29). Even leaving aside the extreme case of Panama – a country purposely set-up to house a canal (Greene 2009) – in the history of most countries in the region we found infrastructural projects being used as central means to achieve national integrity and identity (Summerhill 2006). Normally such usage concentrates not on the moment of independence itself, but on the perilous decades afterwards, when newly (and usually underfunded) state bureaucracies aimed to establish control over wide territories and its untamed inhabitants – human and nonhuman alike.

In a similar way to countries like Ireland (Carroll 2002), France (Mukerji 2009) or Egypt (Mitchell 2002), large infrastructural projects in Latin America were taken as the most effective means to (supposedly) conquer rugged geographies and attain territorial sovereignty. As Kurtz (2013, 14) concluded in his region-wide analysis on the topic, “at the dawn of the twentieth century … no public good was more important from the perspective of state building” than infrastructures such as railroads. In parallel, several private entrepreneurs were also busy building multiple kinds of infrastructure (Guajardo 2015), from their own railroads to private ports, laying the material paths over which massive resource extraction endeavors were set up, which are largely maintained to this day. As a consequence, “between 1870 and 1930, Latin American nations experienced an unprecedented expansion of physical infrastructure” (Summerhill 2006, 293).

The mid-twentieth century developmentalist project (Grosfoguel 2000) also placed infrastructure – this time mostly in the form of local industrial capacity – at the very center of State politics. As noted by Hetherington (2014, 198), during that period “infrastructure was the mundane development that provided the conditional stability for the emergence or maintenance of a truly desirable kind of order.” Working in a highly centralized fashion, developmentalist governments often planned massive infrastructural projects, seeing them as parallel forms of materializing the progressive political goals supporting their rule. Following Harvey and Knox (2012), we could say that developmentalist rule was utterly “enchanted” by infrastructures, seeing them as the ultimate way “to produce a generalized sense of social good to which the majority of people subscribe” (522). This was true not only for national projects but for colonial and corporate power as well. In places such as Puerto Rico, “infrastructure played a fundamental role in the reorganization of this society by aligning heterogeneous spatial and temporal practices with the colonial project of governance” (Ficek 2018, 106).

We can therefore see that, at least until the late 1970s, state, colonial, and corporate power in Latin America was synonymous with “infrastructural power” (Mann 1984), in the most concrete sense of the term. Railroads and hydroelectric dams were much more than “matter that enable the movement of other matter” (Larkin 2013, 329). In more transcendental terms, they were seen as allowing “people to pass from a state of natural disorder to a civilized order, and then maintain that order against the natural forces of disaster and decay” (Hetherington 2014, 198). In open contrast with its supposed “invisibility” (Star 1999), infrastructures in Latin America during this period “offered spectacular proof of the presence of states, colonial powers, or multinational lenders” (Hetherington and Campbell 2014, 192).
This status of infrastructure significantly changed since the 1980s, largely as a result of the wave of neoliberal reforms implemented by governments in the region. Given that one of its main mottos was the reduction of State size and its impact on society, the building and ownership of large infrastructural projects rapidly fell out of favor. Such a view unleashed a massive wave of reduction of direct State investment in new projects and/or privatization of State-owned infrastructure. As noted by Hetherington and Campbell (2014),

> From around 1990, infrastructural investment would no longer be about marking the landscape with monuments to human intervention that might spur sluggish national economies; infrastructure instead would become a subtler affair, leading states to emphasize their role as scaffolders of human and natural capacities. (192)

As happened in multiple other areas of society, the effects of such movement were highly uneven, giving birth to multiple infrastructural inequalities. In areas deemed as relevant (usually understood as synonymous with profitable), the neoliberal moment signaled the start of a wave of corporate-led infrastructural building (Font 2015), from the emergence of “archipelagoes” (Furlong 2014) of up-to-date infrastructures in high income urban areas, surrounded by seas of low quality infrastructure, such as the fancy private urban highways of Santiago, Chile, to utterly globalized infrastructural “zones” (Easterling 2016) for profit creation, such as the maquiladoras on the US–Mexico border.

In stark contrast, in most other areas, especially the ones deemed as economically irrelevant by transnational capital, the neoliberal moment translated into a reality of massive infrastructural absence and decay, sometimes catastrophically so. In contrast with well-to-do areas, in these locations “persistent infrastructural breakdown, or total absence, is the norm. Here we witness constant deferrals and unfulfilled hopes for material benefits” (Howe et al. 2016, 4). Instead of allowing the free flows of people, information and goods supposedly characteristic of “global” capitalism, “infrastructure [created] stops and starts, ebbs and flows, visibility and invisibility” (Penfield 2019, 231) in these underserved locations. Even in the case of State-led projects, this fractured functioning has usually meant that “infrastructures clearly indented to enable state power may unexpectedly limit the scope of stateness” (Meehan 2014, 222).

In recent decades, the neoliberal program has been (partially) challenged by the emergence of a wave of populist left-wing governments in the region, from Hugo Chávez in Venezuela to Lula da Silva in Brazil. A central tool in their stated aim to redress some of the damage caused by decades of neoliberalism in the region was to relocate the State as a provider of goods and services for the population. Such aim caused a new public-led infrastructural moment in the region, especially fueled by the “commodity boom” of the mid-2000s (Kingstone 2018). However, this second infrastructural wave had very different characteristics and effects than the one preceding it.

As a start, “many states no longer had the capacity to lead large infrastructure projects … [so] despite increased spending … many efforts to enhance infrastructure in the region were soon marked by delays, cost overruns, and corruption” (Bersch and Kivumaeki 2019, 7). As a consequence, instead of offering a clear path towards the future, infrastructural projects frequently served mostly “as a constant reminder of the failure of elites to deliver on promises of societal transformation and a history that has witnessed the continual interruption of modernization efforts” (Kappeler 2017, 249). In many areas of
the continent, sometimes spanning full regions, the promises of up-to-date systems materialized into disparate infrastructural imbroglios in which “fluids link to grids, informal infrastructures meet formal ones, people-led to state-led, illegal to legal” (Penfield 2019, 232). Instead of being the utter manifestation of the modern State and capital imperial gaze, these patchwork infrastructures “actively participated in the perpetuation and production of legal and social disorders” (Uribe 2018, 16), disorders that “eventually became a continuous obstacle for the projects [themselves]” (Uribe 2018). Also, and in clear contrast with the previous unabashed optimism permeating the development of large-scale projects, an important amount of social movements in the region emerged as a reaction against the development of large-scale infrastructures, such as HidroAysén in Chile (Merino and Bello 2014) or the Supervía in Mexico (Sosa-López2017). In all, we could say that the whole politics surrounding infrastructures in Latin America has importantly changed, forcing the critical social sciences to pose new questions and search for answers in novel methodological and conceptual ways, something that STS-inspired research in the region has been doing for some years now.

3. Between repair and ruination

Since the seminal work of Hughes (1983), STS has taken a keen interest in the socio-technical complexities surrounding the development and daily usage of infrastructures, initially understood as large technical systems. The later work of Star and Bowker (Bowker 1994; Star 1999; Star and Bowker 2006) was capital to move the scholarship on the topic beyond the relatively rigid concept of systems toward the more fluid notion of infrastructures, understood as “dense social, material, aesthetic, and political formations that are critical both to differentiated experiences of everyday life and to expectations of the future” (Appel, Anand, and Gupta 2018, 3). More than being merely a set of bounded large-scale technologies, infrastructures are seen as “dynamic and emergent forms … [regarding which] we cannot specify their contours in advance” (Harvey, Jensen, and Morita 2017, 6). Infrastructures are fussy, blurry, and heterogeneous; they extend through multiple means and tempos, from novel chemical entanglements to intimate affections. Given these plural modes of emergence, “infrastructuring work is organized in complex, layered, and only partially coherent nature-cultures, interlinking ecologies, material equipment, classifications, standards, expert organizations, and concerned social groups” (Blok, Nakazora, and Winthereik 2016, 6). As a consequence, as Howe et al. (2016, 13) have concluded, “any theory of infrastructure, then, ought to be a theory of paradox.”

One of the more paradoxical aspects raised by this body of literature is that, despite usual images of strength and solidity, even timelessness, infrastructures constantly decay. “Even as infrastructure is generative, it degenerates” (Howe et al. 2016, 6). Such decay is specially manifest in the multiple kinds of failures that regularly affect existing infrastructures, “due either to internal disruption or because of a breakdown in the relations between the infrastructure and the domain of activity it is expected to sustain” (Harvey, Jensen, and Morita 2017, 5). Especially nowadays, after decades of deregulation and shrinking State power, infrastructural decay has become the norm, rather than the exception. Particularly in regions such as Latin America, where a fully functional infrastructural system rarely moves beyond a cherished promise, this constant decay of (already)
barely functional systems, has caused a growing “decoupling of infrastructure development and the notion of progress” (Harvey, Jensen, and Morita 2017, 8).

In replacement of usual arguments about progress and promises about the future, constant “breakdown saturates [infrastructures with] a particular politics of the present” (Appel, Anand, and Gupta 2018, 3). Such politics is one where the daily life of infrastructure is “negotiated through friction” (Blok, Nakazora, and Winthereik 2016, 6), through their own decadence and failure. In more than a figurative sense, nowadays “infrastructures work through their own internal inconsistencies. … Desilvey and Edensor (1983, 151), say that infrastructures work only by breaking down” (Harvey, Jensen, and Morita 2017, 13). In practice, it is only through their constant decay that infrastructures become thought and acted upon, not only by practitioners but also as a matter of scholarly reflection. So far, attention in decaying infrastructures in Latin America has focused on two particular moments: repair and ruination.

In recent years, repair (usually conjoined with maintenance) has become something of a buzzword in STS, and critical social sciences at large (Dant 2010; Graham and Thrift 2007; Henke 2007; Sims and Henke 2012). Importantly, the literature in this area has attempted to rescue labor that has often been invisibilized in conventional analyses centering on established actors within infrastructure. By looking at repair/maintenance, scholars have highlighted invisible work (Star 1999), showing that connectedness and assemblages are but short moments in the lives of infrastructures. More often than not, these moments are separated by intense disconnection and failure, and the work of repairers, maintainers, hackers, etc., is key to reassembly (Graham and Thrift 2007). Research here shows the ways in which this often undervalued labor is highly specialized and qualified, and even necessary for the maintenance of social order (Henke 1999). It should be noted that this maintenance of social order is also a point of critique, centered around the question about what social orderings we are maintaining through infrastructures, and whether infrastructures help to stabilize forms of rule that might be damaging, both socially unequal and/or environmentally unsustainable. Key to this work is the desire to pivot away from a focus on innovation to see what happens within and beyond innovation – innovation is incomplete without the work of technicians; a laboratory cannot function without daily cleaning, new technologies cannot simply “function” without being assembled on factory lines. Furthermore, maintenance and repair are also sites of innovation and innovative work (Denis, Mongili, and Pontille 2016).

When thinking about Latin American infrastructures through the lens of repair/maintenance, most researchers discard the assumption of infrastructural “normality” as a perfect functional system. In many locations throughout the region “large numbers of people have lived with persistent disrepair … Disrepair is the essential character of the network” (Furlong 2014, 145). This goes against some previous work that considered “quietly working infrastructures [as] ‘normal’” (Appel, Anand, and Gupta 2018, 22), as the very term “disruption” would imply. Yet, against expectations, disrepair in Latin America does not mean that such infrastructures are not functional. On the contrary, most of the time they exist and function in a state of partial disrepair and partial functionality. This partiality is usually allowed by the coexistence of multiple infrastructural systems, some of them of traditional origin, even indigenous one, and others explicitly presented as “modern,” products of direct State action.
For example, in her analysis of water infrastructure in Tijuana, Mexico, Meehan (2014) concludes that,

... modern infrastructures did not so much as ‘replace’ decentralized water supply in Tijuana, as grid particular phases of the water cycle, thus allowing state power to proliferate alongside so-called ‘traditional’ institutions and sources of water, such as wells and barrels. (223)

This structural disrepair and the coexistence of several infrastructures had given a novel sense to repair practices in the region. Indeed, much of the work in Latin American STS in repair and maintenance has focused on the lack of maintenance to our infrastructures, and therefore its oddly functional disrepair through diverse (at times perhaps surprising) partnerships. Some work in this area might not even be explicitly linked or even be recognizable as research in infrastructures to Anglo-STS frameworks as they explore alternative models of world-building through what Dagnino (2004) calls “social technologies.” Social technologies are some scholars’ response to Latin American concerns regarding infrastructural malaise or, as Thomas puts it, “chronic sanitation, water supply, energy, food and housing problems” (Neder and Thomas 2010, 1). “Repair” and “maintenance,” in this context, have more to do with social inclusion of marginalized users to these basic facilities – in many ways, it attempts to counter the maintenance of established power structures as it involves the creation of local technologies that then connect to pre-existing contexts for ease of integration and expansion. Another approach to research in infrastructures in Latin America is a focus on the evaluation of technological programs for basic infrastructure, like Furtado’s et al. (2009) work on Prosab (a sanitation research program in Brazil). They develop new methodologies for assessing the outcomes of large technological programs, engaging with questions of social impact of infrastructures developed for a “social purpose” and their maintenance over time. These different Latin American approaches to thinking about infrastructure – social purposes and maintenance/repair – seem to point to different conceptions of what maintenance means, to whom, and for what purposes while still demonstrating a transborder preoccupation: the margins, and those who are left there.

However, repair is never solely a practice of maintaining partly functional infrastructures. In parallel, infrastructural repair in the region could be also a form of power. As explored by Ureta (2014) regarding the case of a failing public transport system in Santiago, Chile, repair practices can also be focused on restoring a particular kind of rule, the one certain technical actors and their form of expertise favor much more than a technical system. In cases such as this, repair usually comes with concepts of normalization, and is not really centered on fixing a failing infrastructure, but on maintaining the kind of rule originally associated with it.

There are situations in which not even this political repair is possible, though. When infrastructures utterly collapse, as the two Brazilian examples opening this piece, there is simply no space for repair. The same could be said, in a less spectacular fashion, of infrastructures deemed as too damaged or worn to justify the investment needed to put them back into (partial) functionality. Or functional infrastructures that become obsolete due to the assemblage of a new system. Or planned infrastructures that never reached a functional state, remaining forever in limbo of unfulfilled potentiality. All these situations point us to a parallel form of being infrastructural: ruination.

One of the most paradoxical consequences of our current relentless thirst for novelty and innovation is that “never have so many ruins been produced; so many sites
abandoned” (Pétursdóttir and Olsen 2014, 1). Especially from an environmental point of view, the claim that we are now living in the Anthropocene has been usually paired with the recognition “that in many, if not most, cases we live and work among various kinds of ruined or faltering infrastructure” (Howe et al. 2016, 3). Everywhere you look, you can find remains, sometimes reaching colossal scales, of infrastructural systems of the recent past. As the literature on the topic has made clear (for an overview see Desilvey and Edensor 2013), in most cases these “modern” ruins do not have enough attributes to be considered as patrimony, thereby warranting protection by official bodies. Then, instead of being displayed in museums or becoming tourist attractions, these remains “display themselves in the ongoing process of ruining – where ruination itself, the active process of withering and decay, becomes conspicuous and draws our attention” (Pétursdóttir and Olsen 2014, 7). Instead of being solid and eternal, as promised, ruins remind us that infrastructures are forever incomplete and precarious, constantly pulling towards becoming something else, being their current shape only a momentary (and always fleeting) achievement.

Besides their physical presence, these remains “symbolize the ruins of an anticipated future, and the debris of an anticipated or experienced liberal modernity” (Appel, Anand, and Gupta 2018, 27). More in particular, these ruins “remind us that infrastructures have the potential to offer numerous benefits but that they are also ultimately incapable of forever satisfying the tasks they are meant to carry out” (Howe et al. 2016, 7). For this reason, encountering these ruins is rarely a passive exercise, but is commonly read “as a sense of decay, fragmentation, and degradation seen through the lens of a promised future” (Yarrow 2017, 583). Ruination is affective, as well as material.

In Latin America, as probably everywhere, infrastructural ruination often precedes the infrastructures themselves. This is because infrastructures do not grow on a tabula rasa, but must actively remove entities populating its proposed spaces, usually without offering any alternative to such entities than to become a ruin, part of the “externalities” of infrastructure construction. This ruination is especially concentrated on the natural world. As Oliveira (2018) examines regarding hydroelectrical dams in Brazil, their construction “radically altered landscapes, changed productive structures, destroyed habitats, displaced thousands of people and launched a process of environmental degradation that continues to haunt Brazilian society” (342–343). Furthermore, such ruination is not focused only on natural environments. As explored by Cáceres (2018), the 1970s construction of a massive cross-over of the Panamerican highway through downtown Santiago “signified the demolition of hundreds of constructions” (143), thereby displacing thousands of its, mostly low-income, residents.

In some cases, ruination is the only status an infrastructure might achieve. Beasley-Murray (2017) recalls the case of the Ochagavia Hospital in Santiago Chile. Designed to be one of the main embodiments of Allende’s socialist project of national transformation, the hospital was still under construction when the military took power on September 11th 1973, being swiftly decommissioned afterwards. As a result, the hospital “went straight from building site to ruin without ever attaining even the aura of completion” (305). Through its ruination,

… it is not so much the past that has been interrupted but the future: the future toward which the “Chilean Way” was to lead. The crumbling walls of the hospital, which was to have been a
centerpiece of Popular Unity’s welfare state, stand as quiet reproach, as an insistent reminder of what might have been. … this is a ruin that is not the foundation for the present, but rather for a future that still has yet to arrive. In the meantime, it is a structure that stubbornly refuses to be overcoded or written over. It seems to resist any attempt to complete it, any attempt to articulate its meaning within a hegemonic project. It is evidence of a utopian impulse that goes beyond the bounds of present strictures and disappointments. (2017, 304)

Ruination appears as a lived condition, as the dark side of the partial functionality of many infrastructural/political projects in the region. As explored by Salas-Landa (2016) in the oil town of Poza Rica in Mexico, infrastructure commonly ruins environments and people through its very functioning, mainly in the form of “slow” environmental violence (Nixon 2011). In order to keep the refinery working, such ruination become invisible to most involved actors, only being made evident in moments of controversy. Ruination is neither a stable nor a self-evident phenomenon, but a condition whose “visibility and invisibility … is constantly being renegotiated and achieved by those living amid it” (3).

This liminal status and intermittent visibility of ruination is particularly evident when infrastructural disaster strikes. Recalling again the case of the Samarco mining disaster in Brazil, in moments such as these, ruination leaves its marginal position to become an existential condition, automatically turning the affected environment into “a place of memory and forgetting, a site of present struggle, a site of future transformation, and a medium of ongoing, even chronic, toxicity” (Creado and Helmreich 2018, 37). Something similar was experienced in Puerto Rico in September 2017 in the wake of the passage of Hurricane Maria, whose more lethal consequences were not caused by the hurricane itself, but by the fact that after its passage “infrastructures that helped constitute modern colonial subjects were gone, along with the promise of progress and development with state investment in the wellbeing of the population” (Ficek 2018, 109), causing “something like the end of the world” (Ficek 2018).

In all, Latin American infrastructural ruination has left behind an ample legacy of ruined entities, from individuals to complete landscapes. Through his search for the ruined infrastructures of colonial projects in the Argentinian north, Gordillo (2011, 2013, 2014) invites to see these remains not as ruins proper, but better defined as rubble. As he recalls,

I arrived at the foot of the Argentine Andes looking for “ruins” and found something much more complex, perplexing, and politically and conceptually more revealing: a meshwork of nodes of rubble defined by a dizzying multiplicity of forms, sizes, origins, and significance. I arrived there looking for debris from a distant past, and residents taught me that those nodes of rubble, recent and old, were part of the affective and social configurations of the present. And the one process of destruction I initially intended to focus on, …, opened up a multiplicity of destructions. … It was this array of entanglements that forced me to examine ruins as nodes that form constellations. (Gordillo 2014, 19–20)

In contrast with the (at least tentative) patrimonial value attached to ruins, conceptualizing infrastructural ruination as rubble aims to “deglamorize ruins by revealing the material sedimentation of destruction” (Gordillo 2014, 10). Replacing the stability of ruins, infrastructural remains seen as rubble appear dynamic, more a node in a larger network than objects themselves. Rubble “reveal a fracture between the material decay one sees in the present and the configuration of that same place or object in the past; they evoke tensions, ruptures, and absences” (Gordillo 2011, 143).
A joint focus on practices of infrastructural repair and ruination, then, aims at revealing the overtones of infrastructural development in Latin America; the objects, people, animals, processes and full geographies affected, transformed, even erased, by modernist infrastructural projects, from national development to resource extraction. It is a sobering view, for sure, lying open the usual devastation and suffering that has accompanied large-scale interventions in the continent. But, it is also a hopeful one. Because lying between the interstices of constant decay and ruination there are also seeds of hope, “in their suggestion that modernity can be surpassed – when time is no longer imagined as a rigid line extending infinitely into a future horizon” (Dawdy 2010, 777). We expect the pieces of this cluster to be a contribution to this optimist task.

4. The cluster

This cluster on repair and ruination in Latin American infrastructures is the first collection with this focus, to our knowledge. It is diverse, and does not intend to brush with a single analytical framework the diversity of thought on the subject in Latin America. It is a non-exhaustive contribution to discussions of repair/maintenance and ruination, and purposively highlights what these might look like in contexts beyond the Global North.

We start our travels in Cuba, where Vincent Andrisani’s multimedia project uses an ethnographic audio documentary to explore the collective, tacit and communicatory dimensions of failing water infrastructures in Havana. Andrisani uses sonic ethnography to explore alternative ways of engaging with materiality and, through it, finds the richness of lived experiences, community, and resilience. In the “blooping” of water on his A/C unit, the author identifies the first hints of infrastructural decay, and begins to follow the yells exchanged by neighbors to warn one another of water overflowing in the local reservoir. Andrisani describes these daily occurrences, and finds in them the audible character of decaying infrastructure. It calls into question the words we choose to describe these networks: for so long, we’ve resorted to descriptions based on “visibility,” but Andrisani invites other senses to the discussion.

Traveling South, Tatiana Acevedo explores the messy, interwoven nature of light and water in southwest Barranquilla, Colombia, in the late twentieth/early twenty-first century. Her work focuses on a community classified by the state as “subnormal” – a construction of marginality. She shows these moments not as “failure” and “absence” of the state, but rather as an active, purpose-driven malfunction of energy and water infrastructures, creating systemic power inequalities that are layered with questions of gender and race. It is a significant exploration of responsibility of repair/maintenance of infrastructures, and whose categories are being analyzed – in this case, a malfunctioning infrastructure was legal and sanctioned by the state, to the demise and erasure of the lives of community members.

In Ecuador, we have José David Gómez’s article on what is quickly becoming a fascinating case study for many scholars: Yachay, the City of Knowledge. Yachay is a massive public infrastructure project by Rafael Correa’s Ecuadorian government; it was expected to become a large hub that would enable a Triple-Helix model of collaboration, and a center of economic development for the region and the country. Yet, what was promised/expected and what was, and is being delivered, Gómez shows, are very different things. The author uses the concept of expectations to discuss the Yachay project and, through ethnographic fieldwork in the City of Knowledge under two different presidents
(Rafael Correa and Lenin Moreno), he traces how temporalities play a role in infrastructure building, and therefore repair/maintenance. Particularly, Gómez argues that representations of the future as well as the past shape the ways the present is actualized and materialized. In sites that are both “under construction” but also already/always decaying, expectations and imaginations of the past/future play particularly complex roles.

In Chile, Sarah Pink, Juan Francisco Salazar, and Melisa Duque apply discussions of repair and maintenance to the world of bank notes and monetary transactions. In using such ubiquitous technology embedded in the broader infrastructure of banking, these authors focus on the variety of repair acts that people engage in with their banknotes – from taped attempts to keep bank notes intact, to stapling and tearing them off stapled bunches, partially destroying them. The authors point to the ambiguity of categories such as “finished/complete” or “broken/repaired” to describe these technologies within the network, as they are largely dependent on discourses and definitions of the banknotes’ functionality. We see here the messiness of infrastructures bleeding into its extended technologies.

Finally, we end our travels in Argentina, where Stephanie McCallum offers us a case-study of the Argentinian railway revolution of the early 2010s, based on the revitalization of rail infrastructure and the purchase of new Chinese rollingstock. McCallum expertly traces this “arrival of modernity” in Buenos Aires, showing how the promises of renewal and modernity clashed with anxieties about local compatibilities with foreign technologies. Through her rich ethnographic research, ranging from observations of traveling through the network to conversations with commuters and railroad workers, McCallum describes how a disaster epitomizes the evidence of infrastructural decay and catalyzes changes to the network. She shows how the promise of modernity, and its enactment, are often very different; how fleeting and frail modernity often is, too, subject to necessary repair and potential decay.

Each and every one of these articles grapples with questions of complexity and ambiguity in the shapes and lives of infrastructures, their repair/maintenance, and their ruination. We are delighted to be presenting them in this collection of Tapuya. We are grateful to all reviewers and their thoughtful comments, and we had the pleasure of working closely with authors as they edited their articles. Each of the articles contends with a different infrastructure, a different Latin American country, a different focus. We hope that they convey the wonderful diversity of Latin American thought on such broad topics, and that they each highlight our collective concern: who cares about our infrastructures?

**Disclosure statement**

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**Notes on contributors**

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References
Appel, H., N. Anand, and A. Gupta. 2018. “Introduction: Temporality, Politics, and the Promise of Infrastructure.” In The Promise of Infrastructure, 1–38. Durham, NC: Duke University Press.
Beasley-Murray, Jon. 2017. “Utopia in Ruins: The Ochalavía Hospital.” In Performing Utopias in the Contemporary Americas, edited by Kim Beauchesne and Alessandra Santos, 301–313. New York: Palgrave Macmillan US. doi:10.1057/978-1-137-56873-1_16.
Bersch, Katherine, and Riutta-Ilona Koivumaeki. 2019. “Making Inroads: Infrastructure, State Capacity, and Chinese Dominance in Latin American Development.” Studies in Comparative International Development. doi:10.1007/s12116-019-09282-5.
Blok, Anders, Moe Nakazora, and Brit Ross Winthereik. 2016. “Infrastructuring Environments.” Science as Culture 25 (1): 1–22. doi:10.1080/09505431.2015.1081500.
Bowker, G. 1994. Science on the Run: Information Management and Industrial Geophysics at Schlumberger, 1920–1940. Cambridge, MA: MIT Press.
Cáceres, G. 2018. “¿Urbanismo Moderno?: Cuando Una Infraestructura Vial Atravesó El Centro de Santiago de Chile (1965–1978),” Registros 14 (2): 130–147.
Carroll, P. 2002. “Material Designs: Engineering Cultures and Engineering States – Ireland 1650–1900.” Theory and Society 31: 75–114.
Creado, E., and S. Helmereich. 2018. “A Wave of Mud: The Travel of Toxic Water, from Bento Rodrigues to the Brazilian Atlantic.” Revista Do Instituto de Estudos Brasileiros 69: 33–51.
Dagnino, R. 2004. “A tecnología social e seus desafios.” Tecnologia social: uma estratégia para o desenvolvimento. Rio de Janeiro: Fundação Banco do Brasil 1: 187–210.
Dant, Tim. 2010. “The Work of Repair: Gesture, Emotion and Sensual Knowledge.” Sociological Research Online 15 (3): 7.
Dawdy, Shannon Lee. 2010. “Clockpunk Anthropology and the Ruins of Modernity.” Current Anthropology 51 (6): 761–793. doi:10.1086/657626.
Denis, J., A. Mongili, and D. Pontille. 2016. “Maintenance & Repair in Science and Technology Studies.” TECNOSCIENZA: Italian Journal of Science & Technology Studies 6 (2): 5–16.
Desilvey, Caitlin, and Tim Edensor. 2013. “Reckoning with Ruins.” Progress in Human Geography 37 (4): 465–485. doi:10.1177/0309132512462271.
Easterling, K. 2016. Extrastatecraft: The Power of Infrastructure Space. London: Verso.
Ficek, R. 2018. “Infrastructure and Colonial Difference in Puerto Rico after Hurricane Maria.” Transforming Anthropology 26 (2): 102–117.
Font, M. 2015. The State and the Private Sector in Latin America: The Shift to Partnership. New York, NY: Palgrave Macmillan.
Furlong, K. 2014. “STS Beyond the ‘Modern Infrastructure Ideal’: Extending Theory by Engaging with Infrastructure Challenges in the South.” Technology in Society 38: 139–147.
Furtado, A. T., A. Bin, M. B. M. Bonacelli, S. R. Paulino, M. A. Miglino, and P. F. D. De Castro. 2009. “Evaluation of the Results and Impacts of a Social-Oriented Technology Program in Brazil: The Case of Prosab (a sanitation research program).” Research Evaluation 18 (4): 289–300.

Gordillo, G. 2011. “Ships Stranded in the Forest: Debris of Progress on a Phantom River.” Current Anthropology 52 (2): 141–167.

Gordillo, G. 2013. “Bringing a Place in Ruins Back to Life.” In Reclaiming Archaeology Beyond the Tropes of Modernity, edited by A. Gonzalez-Ruibal, 323–336. London: Routledge.

Greene, J. 2009. The Canal Builders: Making America’s Empire at the Panama Canal. London: Penguin.

Grosfoguel, Ramón. 2000. “Developmentalism, Modernity, and Dependency Theory in Latin America.” Nepantla: Views from South 1 (2): 347–374.

Guajardo, G. 2015. “Infraestructura y Logística en la Historia Económica: Una Contribución a Partir de Los Casos de Chile y México, ca. 1850-1970.” Américas Latina en la Historia Económica 22 (2): 7–27.

Harvey, P., C. B. Jensen, and A. Morita. 2017. “Introduction: Infrastructural Complications.” In Infrastructures and Social Complexity A Companion, 1–22. London: Routledge.

Harvey, P., and H. Knox. 2012. “The Enchantments of Infrastructure.” Mobilities 7 (4): 521–536.

Henke, C. 1999. “The Mechanics of Workplace Order: Toward a Sociology of Repair.” Berkeley Journal of Sociology 44: 55–81. http://www.jstor.org/stable/41035546

Henke, C. 2007. “Situation Normal? Repairing a Risky Ecology.” Social Studies of Science 37 (1): 135–142.

Hetherington, K. 2014. “Waiting for the Surveyor: Development Promises and the Temporality of Infrastructure.” The Journal of Latin American and Caribbean Anthropology 19 (2): 195–211.

Hetherington, K., and J. Campbell. 2014. “Nature, Infrastructure, and the State: Rethinking Development in Latin America.” The Journal of Latin American and Caribbean Anthropology 19 (2): 191–194.

Hill, J. 2017. “Circuits of State Water, Electricity, and Power in Chihuahua, 1905–1936.” Radical History Review 2017: 13–38.

Hughes, T. P. 1983. Networks of Power: Electrification in Western Society 1880-1930. Baltimore, MA: The Johns Hopkins University Press.

Kappeler, A. 2017. “From Reactionary Modernization to Endogenous Development: The Revolution in Hydroelectricity in Venezuela.” Dialectical Anthropology 41: 241–262.

Kingstone, Peter. 2018. The Political Economy of Latin America: Reflections on Neoliberalism and Development after the Commodity Boom. New York: Routledge. doi:10.4324/9781315682877.

Kurtz, M. 2013. Latin American State Building in Comparative Perspective Social Foundations of Institutional Order. Cambridge: Cambridge University Press.

Lampland, M., and S. L. Star. 2009. Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life. Ithaca, NY: Cornell University Press.

Larkin, B. 2013. “The Politics and Poetics of Infrastructure.” Annual Review of Anthropology 42: 327–343.

Latour, B. 1993. We Have Never Been Modern. Cambridge, MA: Harvard University Press.

Lottermoser, B. 2007. Mine Wastes: Characterization, Treatment, Environmental Impacts. Berlin: Springer.

Mann, Michael. 1984. “The Autonomous Power of the State: Its Origins, Mechanisms and Results.” European Journal of Sociology / Archives Européennes de Sociologie 25 (02): 185–213. doi:10.1017/S0003975600004239.

Meehan, Katie M. 2014. “Tool-Power: Water Infrastructure as Wellsprings of State Power.” Geoforum; Journal of Physical, Human, and Regional Geosciences 57 (November): 215–224. doi:10.1016/j.geoforum.2013.08.005.
Merino, M., and M. Bello. 2014. “Discourse Coalitions in the Controversy Around the HydroAysen Project in the Patagonia Region of Chile.” International Journal of Social Science Studies 2 (3): 1–11. doi:10.11114/ijssss.v2i3.395.

Mitchell, T. 2002. Rule of Experts: Egypt, Techno-Politics, Modernity. Berkeley, CA: University of California Press.

Mukerji, Chandra. 2009. Impossible Engineering: Technology and Territoriality on the Canal Du Midi. Princeton, NJ: Princeton University Press.

Neder, R. T., and H. Thomas. 2010. The Movement for Social Technology in Latin-America (its Meaning for the Research about Degrowth and Ecologicial Sustainability). UNB: Centro de Desenvolvimento Sustentável.

Nixon, R. 2011. Slow Violence and the Environmentalism of the Poor. Cambridge, MA: Harvard University Press.

Oliveira, Nathalia Capellini Carvalho de. 2018. “A grande aceleração e a construção de barragens hidrelétricas no Brasil.” Varia Historia 34 (65): 315–346. doi:10.1590/0104-87752018000200003.

Penfield, Amy. 2019. “The Wild Inside Out: Fluid Infrastructure in an Amazonian Mining Region.” Social Anthropology 27 (2): 221–235. doi:10.1111/1469-8676.12647.

Pétursdóttir, Þ, and B. Olsen. 2014. “An Archaeology of Ruins.” In Ruin Memories: Materialities, Aesthetics and the Archaeology of the Recent Past, 3–30. London: Routledge.

Salas-Landa, M. 2016. “Crude Residues: The Workings of Failing Oil Infrastructure in Poza Rica, Veracruz, Mexico.” Environment and Planning A: Economy and Space 48 (4): 718–735. doi:10.1177/0308518X15594618.

Sims, B., and C. Henke. 2012. “Repairing Credibility: Repositioning Nuclear Weapons Knowledge after the Cold War.” Social Studies of Science 42 (3): 324–347.

Sosa-López, O. 2017. “Urban Mobility and Politics in Mexico City: The Case of the Frente Amplio Contra La Supervia.” Latin American Perspectives 44 (2): 184–204. doi:10.1177/0094582X16682781.

Star, S. L. 1999. “The Ethnography of Infrastructure.” American Behavioral Scientist 43 (3): 377–391.

Star, S. L., and G. Bowker. 2006. “How to Infrastructure.” In Handbook of New Media: Social Shaping and Social Consequences of ICTs, edited by L. Lievrouw and S. Livingstone, 230–245. London: SAGE.

Summerhill, W. 2006. “The Development of Infrastructure.” In The Cambridge Economic History of Latin America, edited by V. Bulmer-Thomas, 293–326. New York, NY: Cambridge University Press.

Tarr, J. 1996. The Search for the Ultimate Sink: Urban Pollution in Historical Perspective. Akron, OH: University of Akron Press.

Ureta, S. 2014. “Normalizing Transantiago: On the Challenges (and Limits) of Repairing Infrastructures.” Social Studies of Science 44 (3): 368–392.

Uribe, Simón. 2018. “Illegible Infrastructures: Road Building and the Making of State-Spaces in the Colombian Amazon.” Environment and Planning D: Society and Space. doi:10.1177/0263775818788358.

Yarrow, T. 2017. “Remains of the Future: Rethinking the Space and Time of Ruination through the Volta Resettlement Project, Ghana.” Cultural Anthropology 32 (4): 566–591. doi:10.14506/ca32.4.06.