

Article



The temporal fragility of infrastructure: Theorizing decay, maintenance, and repair

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Abstract

Recent studies have reconceptualized infrastructure as comprising both material and social processes, thus offering insights into lived experiences, governance, and socio-spatial reordering. More specific attention to infrastructure's temporality has challenged its supposed inertia and inevitable completeness, leading to an engagement with questions of the dynamics of infrastructure over different phases of its lifespan, and their generative effects. In this paper, we advance these debates through a focus on the processes of decay, maintenance, and repair that characterize such phases of infrastructural life, by exploring how specific infrastructures are materially shaped by, and shape, social, political, and socio-ecological arrangements. Our intervention has two related aims: first, to conceptualize decay, maintenance, and repair as both temporal phases of infrastructure's dynamic materiality and its specific affective conditions; second, to trace how these phases of infrastructural life rework embodied labor, differentiated citizenship, and socio-ecological relations. We argue that attention to infrastructure's "temporal fragility" elucidates the articulation between everyday capacities and desires to labor, the creation of and demands made by political constituents, and the uneven distribution of opportunities and resources.

Keywords

Infrastructural life, temporality, materiality, embodiment, affect, labor, power, socio-ecological relations

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Introduction

In the 1990s, drinking water infrastructure for villages in Rajasthan, India, promised to reverse caste inequality through access to clean water via public standposts. Materially consisting of pipes, concrete stands, and brass taps, the public standposts and their intersection with social actors—contractors, Village Water Committees (VWCs), and caste-based neighborhoods—were expected to deliver time and labor savings in obtaining water, particularly for women. In practice, however, construction decisions were dominated by elites, who colluded to bypass inspection processes and dominated VWCs, rendering the roles of elected women and members from caste-oppressed groups tokenistic. The VWCs ceased to maintain standposts as they began to decay. Taps were stolen, pipes leaked, and concrete crumbled. Maintenance increasingly fell to individual users, who sealed faucets with torn strips of cloth and collected leaking water with pots. Chips, cracks, and disintegrating concrete were not repaired. Dominant caste households capitalized on the decay to illicitly connect hoses to the standposts, depressurizing the whole system and leaving the most marginalized castes in the outermost areas with no or low flows. Contrary to the project's intention, the physical, temporal, and emotional burdens of obtaining water simultaneously increased for women from caste-oppressed backgrounds and decreased for dominant caste women. The former refrained from complaining about the illicit connections to the offending households, the VWCs, or the state, since silence was the means by which they preserved the power relations that enabled them to ask dominant caste women for water in times of need (see O'Reilly, 2006; O'Reilly and Dhanju, 2014).

This example illustrates the distinct socio-political struggles, socio-ecological arrangements, and embodied experiences that emerged during phases of infrastructural decay, repair, and maintenance. The changing material form of the standposts shaped social and institutional relations, physical decay, and particular kinds of repair work, which, in turn, both enabled the uneven distribution of water that differentially affected women's bodies and lives, and served to sustain dominant power relations. Tracing decay, maintenance, and repair thus discloses how infrastructure's materiality over time is central to the production of social difference—such as intersections of gender, race, caste, class, and sexuality—power relations, and access to resources.

Recent scholarly debates around infrastructure have attended to the processes that underpin, and are generated by, ongoing material ventures to build and improve infrastructure, particularly in the Southern city, as well as the symbolic promise that infrastructure holds for improving social worlds, both of which are demonstrated by our example. Here, critical urban scholars have expanded our understandings of infrastructure by theorizing its everyday contestations (Arefin, 2019; Graham and McFarlane, 2015; Lemanski, 2020; McFarlane and Silver, 2017), incremental forms (De Coss-Corzo, 2020; Silver, 2014), relationalities (Amin, 2014; Simone, 2004; Star and Ruhleder, 1996), experimentation (Castán Broto and Bulkeley, 2015), violence (Jabary Salamanca, 2015; Rodgers and O'Neill, 2012), genealogies (Kimari and Ernston, 2020), and affect and embodiment (Chalfin, 2019; Schwenkel, 2015; Truelove, 2019). Authors from allied disciplines have advanced understandings of infrastructure as intersecting with, and mediating, social processes, thus offering insights into lived experiences, governance, and socio-spatial reordering. Ethnographic studies—including on “leaky” water pipes in Mumbai (Anand, 2011), solid waste in Dakar (Fredericks, 2014, 2018), roads in Peru (Harvey, 2018; Knox, 2017), and utility meters in South Africa (von Schnitzler, 2013)—have pointed to the ways in which infrastructure exerts shifting agency in negotiations between citizens and the state over access to basic infrastructure and services. These analyses highlight how infrastructure can drive both spectacular

and everyday transformations of material and social dynamics, while its failure or breakdown draws together material disruption, social anxiety, and uncertainty (Star and Ruhleder, 1996).

As this latter observation indicates, increased attention has been paid to the life phases that connect infrastructure's development, use, and deterioration, challenging long-held assumptions of its linearity and of the notion that the "completion" of an infrastructural project signals its end of interest or inquiry (Gupta, 2018; Harvey, 2018). As Anand et al. (2018) observe, it is in the "different phases of infrastructure's life span – design, financing, construction, completion, maintenance, repair, breakdown, obsolescence and ruin – [where] one can see the operation of multiple temporalities and trajectories" (18). Moreover, as our example shows, these temporalities are more than merely moments in time; they are predicated upon, and produce, different material conditions, social perceptions and labor, power geometries and policies, and socio-ecological relations.

It is at this intersection of the temporal, material, and social that we offer our intervention. Given that infrastructure is ever-changing, we explore the dynamic phases of infrastructure and their associated material and affective conditions, to highlight the "temporal fragility" of infrastructure and its contingent social relationships. We focus specifically on the decay, maintenance, and repair that characterize such phases of infrastructural life, on the grounds that these specific temporal phases shed light on the labor enacted by ordinary people to secure connectivity and flows, which often goes unremarked or understudied, but which encapsulates embodied and affective experiences (Doshi, 2017; Truelove, 2019). In defining affect, we are less concerned with the "slippage" between emotion and affect (Dawney, 2011: 599), but rather center the body in our analysis of affect: "*what is at work*: [of] what resonates through bodies as a result of historical imbrications of material relations and [of] what these resonations can *tell us* about those relations" (Dawney, 2011; italics in original). By attending to affect, we trace infrastructure's ability to evoke the sensorial and aesthetic, such as longing, anguish, and aspiration (Larkin, 2013; Limbert, 2001)—which are by their very nature temporal and multiple, depending on where infrastructure is in its life course and how people view it (Anand et al., 2018). For instance, the imminent construction of a new road can revive a community's confidence that they matter to the state in terms of development, while suspended or seemingly never-ending construction may evoke despair (Harvey, 2018). The various temporalities of material infrastructure can, each in their own and in overlapping ways, elicit affect, mediated by the positionality of the subject and imbricated with materiality, which in turn, changes with an infrastructure's life phases. Here, temporal fragility of infrastructure is intertwined with a range of embodied, situated, and sensory experiences. In turn, affective responses, such as despair over interminable delays to road construction, may inspire human labor and ingenuity to maintain, repair and/or allow infrastructure to decay, thus altering its life phase and affective attachments. In many ways, then, the temporal connects the material, affective and the social aspects of infrastructure, and so attention to temporality gives us the full weight of infrastructures in flux, and how they are mutually configured by social relations over space and time.

This intervention thus has two related aims: first, to conceptualize decay, repair and maintenance as both temporal phases of infrastructure's dynamic materiality and its specific affective engagements; and, second, to trace how these phases of infrastructural life rework the articulation between everyday capacities and desires to labor, the creation of and demands made by political constituents, and the uneven distribution of opportunities and resources. It explores the following two questions: when, why, how, and by whom is infrastructure maintained, repaired, or left to decay? Furthermore, what are the affective, labor, and political

implications of infrastructure's shifting materialities and meanings? We examine the dynamics of infrastructural decay, maintenance, and repair in relation to three key dimensions that have animated infrastructure scholarship, but often in discrete ways: embodied labor, differentiated citizenship, and socio-ecological relations. We argue that the lens of decay, maintenance, and repair shifts the focus back to how infrastructure is remade and reshaped in a continual fashion, signifying its "temporal fragility", and the ways in which it is generative of particular configurations of people, power, and nature over space and time.

Within this intervention, it is important to situate our framing of infrastructure in relation to current directions, which have entailed a shift from an understanding of infrastructure as the material artifacts that support global connections and social life (Graham and Marvin, 2001), toward the inclusion of social relations that enable societies to function (Simone, 2004). While we are sympathetic to the latter framing, we see its explanatory power as partial in understanding infrastructure's materiality and its situated meanings and relations over time. Similar to Carse (2017), we feel that this analytical move potentially leads to a "flattening" (35) of infrastructure, whereby the dynamic materiality of infrastructural objects is relegated to the background as the intricacy of social interactions is privileged. We approach infrastructure as elemental in form but also generative of, and imbued with, aspirations and significance, in order to bridge the material and social, and "to tack back and forth between the 'insides' and 'outsides' of infrastructures" (Carse, 2017: 36). In doing so, we make an analytic distinction similar to Fredericks (2018) between people *as* infrastructure (Simone, 2004) and infrastructural labor,¹ which is as much about materiality as it is about the body, and the wider social relations and political worlds generated. Thus, we (mostly) situate ourselves with Harvey et al. (2015) and their "provisional clarifications" on defining infrastructure as "extended material assemblages that generate effects and structure social relations, either through engineered or non-engineered activities . . . [with] simultaneous internal multiplicity . . . and connective capacities *outwards*" (5; italics in original). However, instead of thinking with assemblage theory, as we justify in more detail later, we find that *configuration* is more productive in foregrounding infrastructure's temporality alongside changes in material form, and accounting for the politics of affective responses and physical labor—ultimately questions of social justice—associated with decay, maintenance, and repair.

The paper proceeds as follows. Based on an extensive literature review, the next section considers conceptual framings of infrastructure and its temporality to develop a theoretical framework for decay, maintenance, and repair. To this end, the first subsection addresses the tensions between interpreting infrastructure through its social representations and its specific material forms, while making a case for thinking through infrastructural *configurations*, and the second subsection justifies our focus on decay, maintenance, and repair, and sets out its analytical purchase, so as to foreground our primary contribution, the theorization of infrastructure's temporal fragility in the third subsection. Our second section then proceeds to demonstrate what decay, maintenance, and repair as specific temporal-material phases of infrastructural life both obscure and reveal about three specific dimensions: embodied labor in the first subsection, differentiated citizenship in the second subsection, and socio-ecological relations in the third subsection. We conclude in the last section by presenting our argument that decay, maintenance, and repair illuminate the "temporal fragility" of infrastructure, a necessary condition for wider counterhegemonic spatial practices.

Theorizing decay, maintenance, and repair

Our purpose in this section is to review existing literature across a range of fields of inquiry in order to justify, elaborate, and theorize decay, maintenance, and repair as specific

infrastructural phases with attendant material and affective implications. We first address how the material and social dimensions of infrastructure have been conceptualized in the literature, and how these inform our thinking vis-à-vis infrastructural *configurations*. We then unpack the modalities of the infrastructural configurations, by examining infrastructural decay, maintenance, and repair, and set out the analytical purchase of these life phases. These phases foreground our main contribution: the theorization of infrastructure's temporal fragility and contingent social relations. We argue for an understanding of infrastructure as dynamic materiality undergoing decay, maintenance, and repair, which in turn, constitute certain types of affective dimensions and embodied labor.

Navigating the social and material: Infrastructural configurations

An area of infrastructural investigation that draws together the social and the material, the plural and the specific, and “sites of tension and mismatch” (Carse, 2017: 36), is an infrastructure's life. Explicit consideration of an infrastructure's life brings together the changes to an infrastructure's material form over time and the (often unequal) embodied labor that is embedded in these transformations. Life phases identified in the literature include destruction, decay, ruination, repair, maintenance, and rebuild (Anand et al., 2018; Humphrey, 2005; Simone, 2004). While these terms are often used to capture infrastructure not “in order” or “working to standard”, collapsing these phases, or ignoring their particularities, means missing how materiality in these various phases is connected to infrastructural labor, and how fluidity and transitions between decay and repair mobilize particular affective responses and actants. For instance, writing on dam repair along the River Nile, Barnes (2017) finds that repair and maintenance are not necessarily synonymous, and she carefully chooses the latter to reflect informants' situated articulations. The social embeddedness of infrastructure renders understandings of repair and maintenance more complex; as Graham and Thrift (2007) contemplate, “what [is] the ‘thing’ that is being maintained and repaired: is it the thing itself or the negotiated [dis]order that surrounds it or some ‘larger’ entity?” (4). Scale, then, is an important aspect of embeddedness, and ultimately determines the extent of decay, repair, and maintenance and the terrains upon which they become contested. Scale can disclose the politically transformative potential of repair versus the ramifications of small adjustments to keep the “system” going (Henke, 2007, cited in Barnes, 2017); more broadly, scale exists as both an “analytic category and a political claim” (Hecht, 2018: 111) among people and the materials with which they interface. Thus, we suggest that an attunement to life phases and scale reveals the labor of those who repair, maintain, and/or allow infrastructure to decay, and teases out the political meanings actors associate with their work.

In our theorization, we closely follow the material turn and its exploration of materials' agency in building and transforming social worlds, speaking to Latour's (2005) oft-cited call to draw together in analysis the “missing masses”, or the things and objects that come to be understood as “allies” and actors in their own right (Bennett, 2005; Edensor, 2011). This has meant that “no longer do we have a material substrate on which social life proceeds. Now [...] materials themselves are being recognized as specific, relational, agential and importantly, political” (Knox, 2017: 366). In addition to the focus on material (re)ordering, a wider ontological turn in anthropology and other disciplines, and more specifically, the ontology of infrastructure, has reframed infrastructure as “conceptually unruly”, being both “things and the relation between things” (Larkin, 2013: 329). Yet, Larkin also reminds us that the heterogeneity that proliferates from thinking about infrastructural networks necessitates some delineation, thus determining what aspects of the network will be considered. We thus, simultaneously, seek to push calls for infrastructural specificity forward,

acknowledging and foregrounding the agency of materials, but always keeping this in a taut relationship with how affective responses, social imaginaries, and political forces remake said materials. The necessary delineation, following Larkin (2013), can be achieved through a focus on an infrastructure's temporality—decay, maintenance, and repair—as we argue in the following sections, capturing the material processes and embedded social relations with greater finesse than broader notions of infrastructural networks.

If infrastructure's inherent multiplicity raises questions of specificity, infrastructural assemblages also raise ones of accountability. Reconciling the effects, agencies, and generative qualities of materials with the multiplicity inherent in theorizing infrastructure—all while maintaining attention to difference, responsibility, and inequality—becomes, for us, a key concern when viewing infrastructure and its relations through an assemblage approach. The abstraction of assemblage thinking can make identifying the power relations and assigning blame for social exclusion and injustice difficult. Approaching infrastructure with similar concerns, Rodgers and O'Neill (2012) query what alternative frameworks “raise the question of responsibility for systematic wrongs . . . when the identified culprit is neither a person nor a policy but a faceless set of fleeting social connections?” (402). Understanding infrastructure's exclusions through languages of “assemblage”, “alliance”, and “network” is further complicated as concepts such as “state”, “power”, and “neoliberalism” can become subsumed (Knox, 2017). Assemblage thinking may obfuscate relationships of power that are mobilized and stabilized through infrastructure; therefore, we advocate for a situated approach that takes infrastructure's changing material form together with embodied labor and affective responses as the means to tease out the micro-politics of caring for infrastructure and of access more broadly.

We find that a more productive consideration of infrastructural materiality is through a *configuration*. While decay, maintenance, and repair simultaneously coincide, yet retain their distinction as temporal phases in an infrastructure's life, thinking through *configurations* brings the temporal and material together as well as granular embodied labor and systemic power relationships. Others have also used “configuration” in relation to infrastructure, though it operates as a somewhat different lens. For instance, Lawhon et al. (2018) eschew both assemblage and systems thinking to propose “heterogeneous infrastructure configurations” (HICs). Through this analytic, the authors argue that HICs “enable a clearer analysis of infrastructural artefacts not as individual objects but as parts of geographically spread socio-technologic configurations”, which bring together “relations, capacities and operations, entailing different risks and power relationships” (722). We take inspiration from their focus on infrastructure beyond individual objects and consideration of its materiality and dynamic changes. However, we adopt configuration here to specifically map infrastructure's temporality alongside changes in material form, enabling us to see how each (in)decision and the affective responses and physical labor associated with it address decay or repair—on the part of individuals, communities, engineers, government officials, and political regimes, for instance—and, allowing us to think about who cares for infrastructure and how this translates to ethical and just access. Our use of configuration is intentional: it is differently defined so that infrastructure's temporal instability and contingent social relationships can be drawn together *and* deconstructed analytically to disclose the morality of choices made regarding decay, maintenance, and repair and the conditions under which those choices are made.

The analytical purchase of decay, maintenance, and repair

Before proceeding, we discuss our particular selection of the three infrastructural phases: decay, maintenance, and repair; and how they have been conceptualized in the literature.

Why these three phases, and why do they matter? First, the significance of fixing infrastructure has had deep engagement given the frequency of breakdown and disruption. Widely cited work, such as Star and Ruhleder (1996), argues that infrastructure often remains invisible until breakdown, and Graham and Thrift (2007) point to the space that exists between restoration and breakdown, populated by the many instances of maintenance and repair. Relatedly, recent literature has also questioned the possibility and purchase of the “modern infrastructure ideal”, articulated by Graham and Marvin (2001) in scholarship on Southern urbanism, instead pointing to the frequency of infrastructural disruption (De Coss-Corzo, 2020; Lawhon et al., 2018; Silver, 2016). Modernist ideals of control made the application of standardized infrastructure solutions appealing to planners and governments in Southern cities, who sought to manage heterogeneous environments (Carse, 2017). Such ideals held continuity from colonial rule to post-colonial governments, as demonstrated by Kooy and Bakker (2008) in their tracing of water supply and distribution in Jakarta. Thus, disruption, in this case of water, has a colonial legacy and can be understood through the “interrelationship between discursive strategies, socio-economic agendas, identity formation and infrastructure creation” (385); such an interrelationship points to the complexity of people’s engagements with infrastructure over its life course, where responses to decay, maintenance, and repair reflects multiple meanings that are produced, and the social relations of power negotiated among actors at varying scales.

Second, if disruption is the norm (cf. Lawhon et al., 2018), then attending to the ways in which specific forms of disruption become manifest during an infrastructure’s life speaks to trajectories of temporality, materiality, and work in important ways. The value of repair and maintenance cannot be overstated in the face of disruption, even if such work is often in the background, or if those who perform such work are overlooked, given its ongoing nature in the face of ever-encroaching decay. In an oft-cited essay on repair, Jackson (2014) proposes “broken world thinking”, an ontological, methodological, and empirical approach consisting of two opposing forces—a world on the verge of falling apart and a world that is maintained and restored—that are held together by repair. Instead of consigning repair a lesser importance than innovation, those who fix and repair see “different worlds” by virtue of fixer knowledge. The ethical also emerges in “broken world thinking”, by giving weight to infrastructural labor over time (Jackson, 2014, 2015). Here, Mattern’s (2018) work is also incisive, pointing to care(ful), but also exhausting, strenuous, and unremunerated labor that sustains maintenance across a variety of disciplines and fields, and the scales it collapses, from the intimacy of the home to large, public infrastructures. She concludes with the following questions: “Who gets to organize the maintenance of infrastructure and who then executes the work? Who gets cared for at home, and who does the tending and mending?” (Mattern, 2018: n.p.). Those who do the critical work of repairing are in need of care too, bridging the affective with the material and furthering a feminist political commitment to excavating and supporting these dualities. The work of maintenance and repair and those who do it are often out of sight, and yet, are critical to the functioning of infrastructure and its contingent social relations. As such, re-centering the care of infrastructure, and the care of those who care for it, may provide important avenues for justice and social change.

Third, while other life phases invoke destruction and suspension, often in irreversible or indefinite ways, decay, maintenance, and repair maintain their dynamism, and importantly do not foreclose change, hope, transgression, and resistance. For instance, Gupta (2018), writing on partially built mega-infrastructure projects in Bangalore, argues that current infrastructural ruination and rubble are of the future, and not of the past; they are understood through “in-between-ness”: “between the hopes of modernity and the progress

embodied in the start of construction and the suspension of those hopes in the half-built structure” (70). Although Gupta usefully underscores the ephemerality and elusiveness of infrastructure, he argues that “ruination prefigures even the completion of projects” (72), thus suggesting a determinacy despite a push for “temporal openness” in understanding infrastructure. We also mobilize feminist critical concerns with embodied care, as does Martínez (2017), who argues that “brokenness is never final, indifferent, autonomous, impervious to change”, but rather “available for new relationships and reconstitutions” (349). Lastly, “breakdown” is more commonly grouped together with repair and maintenance, instead of decay, particularly in STS (see, for instance, Jackson, 2014). Our choice is intentional here: breakdown signals an inevitability, whereas decay allows for multiplicity in meaning and temporality, echoing authors such as DeSilvey (2006), who encourages alternative ways of viewing decay, beyond that of erasure and antagonism. Thus, we suggest that decay, maintenance, and repair as life phases signal a sensitivity to the ways in which infrastructural labor manifests and transforms infrastructure in unexpected ways.

Fourth and finally, repair is increasingly common to vocabularies seeking to articulate Southern urbanism(s). For instance, Bhan (2019) uses repair to conceptually shift housing policy away from upgrading, arguing that repair better captures immediate functional fixes, the use of readily available materials, completion by any actor, diverse forms of knowledge, and a “sensitivity” of reusing materials. Similarly, Millington (2019) advocates for a “critical spatial politics of repair . . . that is work and labour, but it is also about forms of collective presence that fill in the cracks of a world in breakdown” (n.p.) In these accounts, repair serves as pedagogy, praxis, and methodology. If we are to take seriously the role of repair and maintenance in reworking uneven landscapes and its potential as a counterhegemonic spatial practice (as we discuss later), then locating its manifestations and effects alongside decay can flesh out the lived experiences of shifting infrastructural configurations. We thus now turn our attention to the temporality of those configurations.

The “temporal fragility” of infrastructure

Our engagement with infrastructural time and temporality is in conversation with recent work (Appel, 2018; Gupta, 2018; Stamatopoulou-Robbins, 2020) that maps how expectations of infrastructures failing, developing, existing, and enduring over set time periods and scales, diverge from everyday experiences of infrastructures. If (social) time is structured through historical pasts and has implications for future social reproduction, then temporality allows us to unpack what becomes *mediated* in the process. Shifting to infrastructure, it, too, co-configures time, but also temporalities where the “spatial, technical, material, logistical, political, and social properties of infrastructure” converge (Anand et al., 2018: 19). While materiality is important to our theorization as discussed, our interest in temporality goes beyond crumbling stone or corroding pipe over time, and instead looks to the ways in which materiality creates, sustains, and is in turn shaped by, affective encounters: from coping with infrastructure demolition and decay, managing expectations when infrastructures do not function as “normal”, and to everyday exclusions that infrastructure (in need of repair) creates. Furthermore, multiple temporalities that emerge through an infrastructure’s life help us think of living among, between, and within emergent and ongoing phases. This has resonances with the work of Stamatopoulou-Robbins (2020) on sewage infrastructure in Palestine and her push to understand how by *inhabiting* specific temporalities such as one she terms “failure-to-build”—the decades-long suspension of building waste infrastructure in occupied territories—ordinary people experience and make sense of dominance, non-sovereignty, and time via infrastructure. Thus, in our writing, attention

to temporality enables us to follow human and infrastructural life, their entanglements, inhabitations, and residues.

Phases of infrastructural life can be episodic, overlapping, and/or continuous, opening up multiple trajectories of (in)activity, (in)decision, acceleration or delay. Consider repairs made by the urban poor to housing.² The decision to shift from *kaccha*, or informal building materials, to more *pukka* (permanent) forms in India, is deeply connected to security of tenure, which is often dependent on provision of other infrastructural connections by the state (Ramakrishnan, 2014). A tarpaulin roof may be replaced by tin, proper doors installed, and walls painted if the immediate or short-term threat of eviction and displacement is considered minimal. Such decisions can gather speed or decelerate due to shifting political climates, environmental degradation, and threats of development and/or forces of gentrification. As Bhan (2019) writes on the Indian context, “[y]ou inhabit and build both incrementally and simultaneously: brick by brick, one layer at a time, moving forward but also sometimes falling behind” (645–646), thus suggestive of temporalities beyond the linear.

Temporal expansiveness undergirds these modalities. For instance, Gupta (2018) suggests that conceptualizing infrastructure through a “teleological timeline” resulting in completion misses the various social and political interruptions that affect its installation. Instead, a more expansive view registers a project’s progression, abandonment, or adjustment, showing that there is no “end” to infrastructure. Here, decay, maintenance, and repair speak importantly to both an infrastructure’s creation, existence, and supposed “afterlife”: these different temporalities connect laboring bodies, wider environments, and materiality in ways that shatter predictable outcomes or “end-points” to an infrastructural story. Revisiting housing among the urban poor and its resultant trajectories demonstrate that its “finish” is illusory, and instead, even after the basic structure is constructed, ordinary people may prolong the labor of incremental additions, or utilize materials of lesser quality during times of (greater) economic uncertainty. Furthermore, a lack of political will for housing security or the threat of eviction may result in the removal of material layers as people seek to transfer infrastructural investments elsewhere. Further yet, these may be compounded by the presence of hazards such as fires and flooding, where daily maintenance of particular standards of living become unrealizable in the face of more systemic repairs. Infrastructural time, then, “folds over on itself; it oscillates and stutters as progress and relapse coincide... This stuttering time reflects the fact that infrastructure does not so much ‘arrive’... as advance and retreat” (Appel, 2018: 45), which in turn is mediated by materials’ multiple temporalities. Temporality’s relevance is also apparent in work by Anand (2011) and von Schnitzler (2013), who usefully point to the uncertain effects ordinary citizens face when negotiating for infrastructure access and ever-changing political relationships that are remade through and by infrastructure over time (cf. Anand et al., 2018).

These social, political, and temporal potentialities inform our intervention, although we find that fragility offers a fruitful pathway to recognize the intimacies, histories, and imaginaries that connect laboring bodies to infrastructure. Temporal fragility still invokes “temporal openness” (Gupta, 2018) and means that practices of repair and maintenance often shift (or are discarded) in anticipation of emergent or transformed infrastructural states. While fragility is an inherent paradox of infrastructure, as noted by Star (1999) who writes that the “system is necessarily fragile... depending on local and situated contingencies” (387), it is simultaneously a window into infrastructural life and labor-worlds. Temporal fragility then, is not about describing a particular state or condition, but rather observing, mapping, and responding to the continual repatterning of infrastructural forms, relations, and social worlds. We argued earlier that the power of thinking with infrastructural configurations lies in what it can define, hold to account, and bring to the

fore: configurations gesture to specific material forms and their ongoing processes of decay, maintenance, and repair, in turn drawing our attention to the affective conditions and embodied labor that marks these phases, and unsettles people's relations with the state and nature. Temporal fragility is intimately linked to our usage of configurations because it speaks to the emergent and dynamic nature of infrastructural materiality—as people rework, resist and reject infrastructural determinacy and official scripts on how infrastructure should and can be used.

The contingent social relations of decay, maintenance, and repair

In this section, we detail what decay, maintenance, and repair as specific phases, and as parts of a larger temporal-material configuration of infrastructural life, both obscure and reveal about three key dimensions that have animated infrastructure scholarship, but often in discrete ways: embodied labor, differentiated citizenship, and socio-ecological relations. Temporal fragility brings these dimensions together as the connective thread, and we explicitly engage with the ways that temporal fragility fragments and intersects with material forms and the work they require, while reconfiguring political and socio-ecological relations.

Embodied labor

Temporal fragility invokes the visceral and sensory experiences that are generated in between and during phases of an infrastructure's life. If material forms themselves are unstable and unpredictable over time, so too are the surrounding affects that entangle people and infrastructures; simultaneously, the labor that decay, repair, and maintenance demands evokes shifting, fleeting, and multiple affects. But this labor is often punishing and exploitative. Doshi (2017) argues that struggles over nature exact a bodily toll, and that attention to social reproduction, visceral experiences, and subjectivities can redress the under-theorization of physical embodiment, particularly in urban geography. Here, the ability to “rescript” or “refashion” shifting materialities is intimately linked to the body, and the ways in which infrastructural affect and labor are mutually co-constituted through the physical, psychosocial, and sensorial, have bodily implications. We return to our earlier definition of affect as entangled material relations resonating through bodies, and in turn, these resonations inform us about the histories and strength of such relations (Dawney, 2011). Building on this, we explore the multiple affective registers at play as affect moves across and connects infrastructural life, labor, and materiality to the body: this includes the physicality and gendered toll; the barriers and risks involved; and, the anticipation of what is to come when labor is performed, compounding feelings of neglect and marginality, or moving people in more positive ways.

In order to amplify the affect that moves through and between laboring bodies, we thus insist on attention to embodiment, similar to Doshi (2017), a term we use to capture not only visceral experiences and the physical body, but also, as Mountz (2018) explains, “where power operating at larger scales is understood” (762). “[T]he shared *relations* that format the materialities of city, [global] capital and body as one” (footnote p. 501, italics in original) come into view through Chalfin's (2019) examination of infrastructural configurations, consisting of affects (such as hope and desire) and physical labor of waste-sorting, and interacting with material decay—in this case, a dumpsite. What becomes visible through the lens of embodiment are configurations of decay, maintenance, and repair that encompass affective responses to physical labor and materiality. Lancione and McFarlane (2016) also recognize the embodied, affective experience of interfacing with infrastructure. While

these authors acknowledge the central role of infrastructure in their comparative study of sanitation on the peripheries of Turin and Mumbai, they shift their gaze to include the embodied labor constantly expended in relation to water supply and sanitation, and the surrounding gendered stress, exhaustion, and shame. A key part of our analysis, then, is excavating how exactly infrastructural decay, maintenance, and repair map onto embodied labor, affects, and how it reshapes the lifeworlds of individuals. Put differently, bodies that labor under conditions of socio-spatial and intersecting inequalities are the sites where political agency is formed, or conversely, where “contradictory and regressive logics” (Doshi, 2017: 127) also occur, such as slum dwellers’ aspirations for exclusionary development that ultimately is anti-poor (see also Ghertner, 2011).

For Schwenkel (2015), affect, labors of maintenance and repair, and gender became inextricably linked during a period of infrastructural breakdown in state-neglected, socialist-era housing in Vietnam. The loss of hydraulic pressure led to a breakdown in water infrastructure, serving not only to reinforce gendered divisions of labor, but also to rework gender in important ways. Schwenkel argues that a “collective ethos” of maintenance emerged among both men and women due to this physical “labor of care” that included resource redistribution. Returning to our earlier discussion of infrastructural care (Jackson, 2014, 2015), Mattern (2018) argues that “care” may have less to do with the reproduction of societal value and more to do with the affective responses to maintenance. This calls for understanding where care (as a labor practice) fits with maintenance and repair, and who decides what deserves care, when, and at what juncture (cf. Martin et al., 2015).

The new connections, redistributions, and subjectivities that emerge when maintenance work upends certain gender and social relations may be one mode of understanding infrastructural labor and care. Anand et al. (2018) similarly note that the investment of “labor and care into everyday maintenance and repair make more-than-human assemblies of infrastructure that are generative of differentiated materializations of rights, resources and aspirations . . .” (12). An apt illustration of rights materialized through infrastructural labor comes from Fredericks’s (2014) study of solid waste collectors in Dakar. Shifting government policies meant that waste infrastructure became displaced more firmly onto bodies and marginal groups, such as poor women and youth. Fredericks argues that “the materiality of the labor process matters” (539) as waste-workers bear the brunt of demanding physical work, the threat of resultant diseases, and the stigma of working with garbage. Through mobilization, the collectors achieved visibility of their work in the city and shaped a local understanding of its worth, placing pressure on the city government to create safer infrastructure. Fredericks’s situated ethnography demonstrates that affects—in this case, stigma and worth—are an important aspect of infrastructural configurations, revealing how subjectivities are reconfigured and political power increased for those on the margins, or a “vibrant politics of refusal to be refuse” (533).

And yet, it is not always the case that infrastructural systems in need of maintenance or repair are tended to or cared for. What happens when care for infrastructures is suspended and, instead, decay is embraced? The materiality of labor is not solely relegated to the realm of maintenance and repair, as decay also requires certain affective and embodied engagements. Again, Schwenkel’s (2015) work is illustrative. Residents held the state ultimately responsible for repair, and thus they ignored issues of mold and water seepage, covered up holes and cracks, and tolerated putrid smells from water leaks. As the earlier case of gradual housing maintenance and repairs among the urban poor also showed, choosing not to build, or to let decay, materially symbolizes the expectations ordinary people hold of the state for service provision and the forms of infrastructural integrity they considered acceptable. More spectacular forms of infrastructural decay include solid waste workers’ strikes in Dakar, that

“deploy the power of dirt to creatively subvert ordering paradigms” (Fredericks, 2014: 542), providing a stark, sensory confrontation with government officials through the multiple affective and political effects of rotting garbage.

Highlighting the entanglement of embodied labor practices and their affects with infrastructural decay, maintenance, and repair, also subverts commonly held assumptions about the knowledges “required” to fix infrastructure. Star (1999) argues that infrastructure is a set of learned practices to which outsiders must become accustomed; it is bound by “conventions of practice”; and, it is fixed modularly, so that “[n]obody is really in charge of infrastructure” (382). Thus, although there are communities of practice that loosely delineate infrastructure and its use, repair and maintenance work remains specific to one part of the system, and at a specific scale (as discussed above), given infrastructure’s inherent complexity. So-called “experts” may be ultimately “responsible” for repair work, especially on behalf of the state, but uncertainties over materiality, actual scale of usage due to illicit connections, and extent of informal improvisations made to systems by users, may make technical fixes superfluous or the ability to control an infrastructural system difficult. This is demonstrated well in Anand’s (2015) work on engineers’ (mis)apprehension of water flows in Mumbai and their difficulty in accounting for “leakages”, where the “accreted histories of law, technology, and politics – the intermittent supply, ageing pipes, laws proscribing access, fickle meters, engineers allocating water – made it extremely difficult for consultants to count, know and reform the leaky pipes of the city” (324; see also Truelove, 2018).

Expanding the realm of fixers beyond the “experts” allows us to see how experimentation and improvisation can lead to an unexpected lease of life for decaying infrastructure, or even modify it on a micro-level completely. Those who repair and maintain also help us think through infrastructure beyond design to the forms of work that are normally hidden (Jackson, 2015), and to the instances where repair and maintenance constitute an important part of livelihoods (Cross and Murray, 2018). Moreover, this work is creative and resourceful, where an intimate knowledge of material properties allows for novel material configurations (Carr and Gibson, 2016; De Coss-Corzo, 2020). Similarly, Castán Broto and Bulkeley (2015), in their work on low-carbon initiatives in a Bangalore gated colony, find that the maintenance arising from “experimental disruptions” of infrastructure “are not so much an attempt to tame nature and technology but...[are] a means to redefine new infrastructure configurations” (200). This speaks to the way in which we think about infrastructure as the temporal and material entangled with affect: these configurations constantly shift, as people hack, bypass, tinker, and manipulate. This, in turn, calls for attention to infrastructural ethics, and the uneven responsibilities and burdens, as the labor of repair and reassembly marks some bodies more than others (cf. Fredericks, 2014).

In sum, we draw on these specific literatures that relate to infrastructural phases of decay, maintenance, and repair to argue that embodied labor unsettles notions of who cares for infrastructure over time, even if this work is seemingly mundane. Taken together, these shifting configurations demonstrate how at varied points and scales of an infrastructure’s life course, some bodies are able to thrive, whereas other bodies are diminished. Affective responses, such as frustration and aspiration, permeate these configurations, demonstrating how inequality and difference are in turn shaped by what infrastructures signify to ordinary communities and individuals.

Differentiated citizenship

In giving space to the laboring body in our analyses, questions of power, subject formation, and citizenship arise. By considering how vulnerable bodies relate to phases of decay,

maintenance, and repair, we can shed light on the changing nature of the relationship between ordinary people, agencies of the state, and socio-ecological relations (to which we turn later). Decay, maintenance, and repair within infrastructural configurations can thus work in multiple ways: indexing both political imaginaries and aspirations for the future; shaping experiences of cooperation, contestation, and resistance; and evoking varied subjectivities of belonging and marginality. Furthermore, materialities physically demarcate connectivity and inclusion to the wider neighborhood, city, region, and nation-state. If the labor that surrounds infrastructural decay, maintenance, and repair is contingent upon specific temporalities that shape who mends what, when, and under what conditions, then the material can be made moral, that is, to further social justice. We suggest that an examination of infrastructure, attending to notions of decay and repair, may open up possibilities for when and where infrastructure might galvanize social or political action, or preclude it (as through the dispersal or displacement of a community).

Important to this discussion is the vantage point that temporal fragility provides for examinations of citizenship differentiated across racialized, classed, and gendered bodies (along with other intersecting identities), and the ways in which political landscapes are opened, foreclosed, and reconfigured by everyday claims-making over and through material forms. These demands operate across formal and informal political spheres (cf. Chatterjee, 2004) and thus are often made to varying levels of bureaucracy, multiple intermediaries, and at times emerge as active modes of resistance. Simultaneously, such demands are intricately connected to the meanings these infrastructural forms hold at various points of its (after)life course—itself a feature of shifting materialities. The work we draw on in this section speaks to the ways in which infrastructures are rendered visible, mobilized for political demands, and in turn, are reshaped through active, everyday practices of tampering, dismantling, re-connecting, and rewiring. As Lemanski (2020) makes clear in recent work on “infrastructural citizenship”, the connections between infrastructure and citizenship are often under-theorized, particularly in the discipline of geography, and are often viewed through a narrow prism of one-off infrastructural protests as the exemplar of citizenship, rather than taking a wider perspective of mutual relationships with the state. A view of infrastructure through temporal fragility, then, delineates the ways in which political negotiations—and ultimately the rights and responsibilities citizenship affords and the meaning-making that happens in the interim—become mapped onto the different phases of an infrastructure’s life.

Here, we also refer back to the work of Anand (2011) and von Schnitzler (2013) to illustrate the ways in which political relationships transpire from material forms, and equally, the ways in which the tenor and nature of infrastructural disputes reshape the material form itself. Anand (2011), for instance, notes the “unviability” of pumping water uphill to certain low-income urban settlements, which has as much, if not more, to do with class than topography, since middle and high-income groups have access to the technology and energy needed to transport water. Pressure then works on multiple levels, whereby residents “create pressure through differentiated rights and material technologies” (558) to access water with adequate hydraulic pressure from the public system—or what Anand terms “hydraulic citizenship”. In a similar vein, von Schnitzler (2013) discusses how the prepaid meter in South Africa has a political life of its own, as residents find ways to manipulate meters to avoid high water bills. Fraught relationships emerged between city officials, meter engineers, and ordinary residents, as the security and “tamper-proof” nature of the meter became subjects of contention. The meter thus becomes a “political terrain” upon which “central political questions of civic virtue, basic needs, and the rights and obligations of citizenship”

(673) are contested and negotiated. The meter's meaning changes over time and space, according to von Schnitzler, and becomes "rescripted" on the micro level.

While the state may fail altogether to provide infrastructure, or securitize infrastructures in certain communities, state bureaucracies and institutions suppress some lives and favor others vis-à-vis (the lack of) infrastructural maintenance. State actors (in particular) can actively use decay to further accelerate processes of eviction, dispossession, and exclusion; the infrastructure of the (often racialized and gendered) poor may be relegated to the margins, and infrastructure denied altogether in the name of urban planning, progress, and development. This is well-illustrated in the case of Flint, where state-sanctioned decay of water infrastructure furthered a racialized dispossession among African-American residents, and rationalized policies of austerity (Ranganathan, 2016). In a case where the state mobilizes a slightly different tactic, Chu's (2014) work demonstrates that, in Fuzhou, the "slow crumble and sudden disconnections of infrastructure... embody the spectral forces of state plans for eviction and demolition... its disrepair becoming the passive-aggressive zone of encounter between state actors, land developers, and citizens" (352). For even when the state sanctions the decay of infrastructure, individuals and communities continue to find ways to maintain and repair it, making indirect and direct claims to belonging and citizenship. Thus, understanding material engagements over time, and the multiple actors it entangles, means recognizing subversive and counter-hegemonic practices. Similarly, even in processes of decay, Chu (2014) finds bottom-up opportunities to challenge state power: many residents appropriated the "unruly bricks" (360) from their own houses that were smashed by state developers, and reconfigured the disrepair into physical fortresses or into makeshift shelters to stymie eviction. Thus, communities and individuals utilize different tactics to cope with and resist infrastructural disenfranchisement by mobilizing temporal fragility to their (relative and often temporary) advantage.

Material forms, then, become crucial sites to contest citizenship and belonging, from the ways in which ordinary people understand their relationships to the state, to engagement in acts that challenge and/or reinforce infrastructural (and broader) exclusions. Through a case study of public housing infrastructure in Cape Town, Lemanski (2020) demonstrates how the relationship between citizen and the state became (further) fractured as residents adapted housing infrastructures to accommodate more families than formally planned, while the state refused to acknowledge the necessary increased infrastructural provision. Citizenship therefore is continually reconfigured through infrastructure, for what the state views as a static transfer of public housing is rendered by residents to suit their needs, ultimately changing how citizenship is understood between both parties. Ultimately, violent protests occurred as a "direct consequence of the disjuncture between people's own moves to claim citizenship and the state's attempts to impose divergent forms of citizenship" (Lemanski, 2020: 13). The emergent and ongoing revision of the "citizenship relationship" Lemanski details is important to underscore (also see Baptista, 2019), and is echoed in our own framework of temporal fragility; we further push for understandings of how disjunctures occur across infrastructures undergoing decay, maintenance, and repair.

In drawing together these case studies, we see that infrastructural labor and care demonstrate a continual reworking of infrastructures as their materialities shift over time; they also reconfigure the broad contours of politics and political relationships. In this way, the lens of temporal fragility captures the potentiality of many varying modes of engagement, which brings together the shifting infrastructural phases and wider configurations of affect, labor, and political subjectivities. The specific alignment of material and temporal, then, co-constitute how decay is perceived and acted upon, and what politics become(s) triggered. More specifically, complex temporalities of decay, maintenance, and repair—fragile,

shifting, fleeting, and simultaneous—allow a material form that can be potentially reconfigured, disrupting power dynamics and opening space to rectify uneven access and exclusions.

Socio-ecological relations

Examining how infrastructural decay, maintenance, and repair shapes political power and citizenship, in turn, directs attention to the ways in which socio-ecological relations become reworked through phases of infrastructural life. By emphasizing the wider contingent social relations produced by configurations of infrastructure, the lens of temporal fragility elucidates how the processes of decay, maintenance, and repair can transcend their functional purposes to (re)produce uneven socio-ecological orders, in terms of reinforcing unequal access to resources and serving neoliberal agendas for the (re)regulation of nature, but also offering potential to forge progressive or emancipatory socio-ecological relations. The literature on the production and distribution of water resources proves illustrative of the analytical power of temporal fragility for revealing ongoing reworkings of nature through infrastructure, whose form and function changes over time. By following water pipes and sewerage networks—critical infrastructure for human life and well-being and thus key sites of struggle and control—we foreground the co-constitution of humans and nature, and the connective tissue that binds this relationality to infrastructural configurations.

While infrastructure has (some) agency, as (or more) importantly, it is enrolled in new power geometries to facilitate decay, maintenance, and repair, as well as to reconfigure existing socio-ecological relations occurring over its life course. Far from a linear trajectory, the relationship between infrastructure and socio-ecological relations involves ongoing negotiations between institutions and individuals through phases of decay, maintenance, and repair. Indeed, Barnes (2017) finds that maintenance is not an “inherent good”, but rather a “field of socio-material contestation” (148). She observes that maintenance of irrigation works occurs at multiple levels: on an individual level farmers are responsible for maintaining irrigation ditches, although blockages (and lack of maintenance) may actually be advantageous depending on where along the system one farms; on an interpersonal level between farmers as they negotiate communal relationships; and between farmers and state irrigation engineers, as the latter choose how and when to “assert control” over the infrastructure through annual maintenance. Socio-ecological relations, thus formed over and through infrastructure, are not always constant or consistent. Utility and convenience may drive expectations for infrastructure; nevertheless, access must be constantly navigated through shifting infrastructural configurations involving multiple actants and scales.

As noted earlier, infrastructure should not be seen as the object of decay, maintenance, or repair (Castán Broto and Bulkeley, 2015; Graham and Thrift, 2007), but rather as an agent in enabling or constraining (potentially uneven) socio-ecological change over space and time. Previous work has highlighted both the agency of non-human materials and the human practices that make infrastructure work, in revealing how infrastructure (re)produces uneven access to services and resources. Considering the role of non-human objects in reconfiguring socio-ecological relations has revealed factors that may otherwise go unrecognized. For instance, Ranganathan (2015) argued that storm-water drains were crucial in enabling the conversion of wetlands to real estate to generate new investment opportunities in Bangalore. Yet, the agency of materials is often, at least in part, mobilized by human actions. With this in mind, Alda-Vidal et al. (2018) advocate a move away from analyzing infrastructure as an artifact, and toward the human practices through which it is made to operate (see also Anand, 2011; Furlong and Kooy, 2017; von Schnitzler, 2013), for instance through water utility engineers’ (sub)conscious decisions to favor wealthier consumers at the

expense of poorer ones when shutting off water system valves during maintenance and repair work. The lens of temporal fragility combines these insights in relation to material and human agency, but also looks to excavate the wider and deeper contingent social relations and processes at play in the production and construction of nature.

Examining the trajectories of infrastructure illuminates how maintenance and repair can reinforce social subjectivities, increase emotional and physical labor, and reassign responsibilities, often to underpin neoliberal reforms (Loftus and Budds, 2016). For example, Spronk (2009) describes how a low-cost sanitation system under a public–private partnership in El Alto connected unserved Aymara neighborhoods to sanitation, yet in a way that, unlike the paying customers of La Paz’s standard sewerage systems, transferred the work of installation, maintenance, and repair from the state or the company to the household. The system comprised uPVC pipes with shared household connections, installed with free labor from recipients. The shallow depth of installation and the fragility of the plastic meant that pipes had to be laid under yards rather than streets, which transferred responsibility for maintenance to the household. The gentle gradient arising from shallow installation, and the narrow gauge of the pipes, made the system prone to clogging, which not only required large flows of (billable) water to clear waste, but also rendered households reliant on their neighbors to clear blockages and repair leaks. The poorly functioning system reinforced the ethnicity-based stigmatization of exclusion from sanitation. Examining the connections between the materiality of infrastructure at any moment, and its shaping of the social relations of control over nature, is thus rendered more apparent through the lens of temporal fragility.

These cases also point to how infrastructure’s material condition at particular moments can form a conduit for the pursuit of political objectives beyond the intended function of the infrastructure in question, also often in ways that reinforce social inequality. Authors have noted various dynamics, from discipline and rule, to aspirations of legitimacy and legality. In this way, Meehan (2013) argues that city authorities in Tijuana derived state power from illegal water connections, by actively seeking out and closing off perforations in water pipes made by itinerant populations, in order to try to eradicate these visible poor people from the urban landscape, while tolerating similarly illegal water connections in informal settlements, as they house many of the city’s key workers. These insights from political ecologies of water suggest that particular instances of maintenance and repair may be promoted for their alignment with wider agendas. Like the example of Flint, above, Amirhadji et al. (2013) describe how some residents in Detroit responded to water service disconnections due to unpaid bills by illegally re-connecting themselves, an act facilitated by the very simple mechanical valve that regulates flow through a quarter-turn. The action was not simply theft, but resistance against the indebtedness incurred due to the higher costs that arose from the serious under-investment in the public water utility, and which disproportionately affected low-income and predominantly Black households (see also Harris et al., 2020). Allowing decay or undertaking repair can thus go beyond a pragmatic act to constitute a means of serving underlying agendas, and in particular the promotion of neoliberal environmental reforms.

Just as phases of infrastructure have the potential to reinforce exclusion from resources, as suggested by the examples above, they can also rework socio-ecological relations in ways that disrupt dominant power structures and relations (see Doshi, 2017). Molden and Meehan (2018) describe how a campaign to repair traditional public stone water spouts in Kathmandu did not simply concern the restoration of cultural heritage, but became a means by which residents evoked traditional relations with nature to contest modern engineering systems and ideals. The relationships generated through repair and maintenance can

therefore open up possibilities for ordinary people to take more control over their own development processes, as they unmake, make, and remake infrastructure and themselves, which renders them worthy of closer attention in infrastructure debates.

Conclusion

At the second annual “Festival of Maintenance”,³ a panel on “fragility” had the following overarching question: “what about things that people don’t realise are fragile . . . and therefore don’t care about them properly?” (Festival of Maintenance, 2019: n.p.). While the focus of our intervention has been on the ways in which people *do* realize, encounter, challenge, and even embrace, fragility vis-à-vis decay with routines of repair and maintenance, the emphasis on fragility highlights the imbrication of care(ful), affective, and embodied labors with material form. Thus, the intimate engagement ordinary people have with infrastructure rests upon its inherent dynamic nature—its temporal fragility—in any given context. Through an infrastructure’s life phases, we are able to see the *longue durée* of infrastructure, speaking to ways in which decay, maintenance, and repair have marked and continue to mark bodies, subjectivities, and natures. We take seriously the need to demarcate the limits and boundaries of ethnographic work on infrastructure (though not the forms of infrastructure under investigation itself), not least to understand how power and difference become reinforced and reinscribed on material forms and lives, livelihoods, and landscapes. Here, thinking with configurations becomes productive as a way to center temporality, but also account for the relational dynamics between power and labor.

Our reworking of Lawhon et al.’s (2018) term “configurations” to include infrastructures’ temporal fragility enhances its conceptual utility by enabling the placement of the temporal and material side by side, thereby revealing a shifting, parallel relationship that can account for the contingent politics of affective responses and physical labor. Temporal fragility is integral to our usage of configurations because it encompasses shifts in cooperation, contestation, and resistance—within a context of systemic power relationships—and dynamic materiality. Over infrastructures’ life phases, processes of decay, maintenance, and repair can be used to trace the multiple meanings associated with these phases and the embodied labor used to make infrastructure function as suits immediate purposes, wider political agendas, and alternative socio-ecological orders. As infrastructure’s materiality changes over time, infrastructure can be enrolled in political change, and as embodied experiences and struggles for access shift, openings created by infrastructure’s temporal fragility can be leveraged. For if infrastructure’s materiality is central to the production of social difference, then, infrastructure’s temporal fragility is also central to new configurations of infrastructural labor and affective responses that anticipate social justice. Decay, maintenance, and repair delineate the repatterning of power geometries, and associated embodied and affective experiences.

Taking this forward, the task that arises from discussing infrastructure through this lens is to more fully engage with temporality and materiality as situated and emergent opportunities to reimagine political claims and futures. This task becomes all the more pressing in the midst of the global Covid-19 pandemic, especially given the ways in which some infrastructures are being left to decay by various state actors, leading to a prioritization of certain lives over others, but also through the emergence of new, progressive political demands for infrastructural care and repair. Temporal fragility offers an important framing for how we understand infrastructures experienced in the everyday, on the brink of “failure”, or during repair. Returning to the above question of who decides what deserves care, and at what juncture, our framework attends to ever-changing reworkings, where significance is given to

the maneuvers and manipulations that stymie or halt decay. Of course, social actors from state agencies to individuals can decide that infrastructures do not deserve care and supported decay can generate positive affects—related to agency and resistance—thus demonstrating an indeterminacy in ways of perceiving and engaging with infrastructure. And yet, temporal fragility makes infrastructure more epistemologically grounded even amidst this emergent nature, where infrastructure’s materiality undergoes continual reconfiguration and in turn renders political subjectivities and processes more visible.

Highlights

- We conceptualize decay, maintenance, and repair as both temporal phases of infrastructure’s dynamic materiality and its specific affective conditions.
- We trace how these phases of infrastructural life rework three dimensions: embodied labor, differentiated citizenship, and socio-ecological relations.
- The lens of decay, maintenance, and repair focuses on how infrastructure is remade and reshaped continually, signifying its “temporal fragility”.
- When viewed alongside dynamic infrastructural materiality, “temporal fragility” is generative of particular configurations of people, power, and nature.

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Notes

1. This position is also partially inspired by a Society for Cultural Anthropology blog, “Teaching Infrastructures: A Conversation with Gabrielle Hecht” (Salovaara, 2019). Hecht talks about using Carse’s essay “Keyword: Infrastructure” (2017) as an introductory text in her graduate seminar, where questions such as “What distinctions should we make between infrastructural labor and people *as* infrastructure?” (Salovaara, 2019: n.p.; italics in original text) are debated.
2. We include housing as a form of infrastructure alongside more traditionally considered forms, such as pipes, meters, and wires (see Power and Mee, 2020, for instance), given the ways in which relational processes and social meanings are tied to its materiality.
3. The second annual “Festival of Maintenance” is described as a “celebration of those who maintain different parts of our world, how they do it, and recognizing the often hidden work done in repair, custodianship, stewardship, tending and caring for the things that matter” (2019: n.p.) (<https://festivalofmaintenance.org.uk/about-us/>).

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