# Roadsides

**Collection no. 006** • Fall 2021

**Senses**

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***Roadsides*** is a diamond Open Access journal designated to be a forum devoted to exploring the social, cultural and political life of infrastructure.

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Collection no. 006 was edited by: Christina Schwenkel
Managing editor: Agnieszka Joniak-Lüthi
Copyediting: David Hawkins
Layout: Chantal Hinni and Antoni Kwiatkowski

**ISSN 2624-9081**



Cover design title page: Chari Hamrathanaphon

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Swiss National Science Foundation
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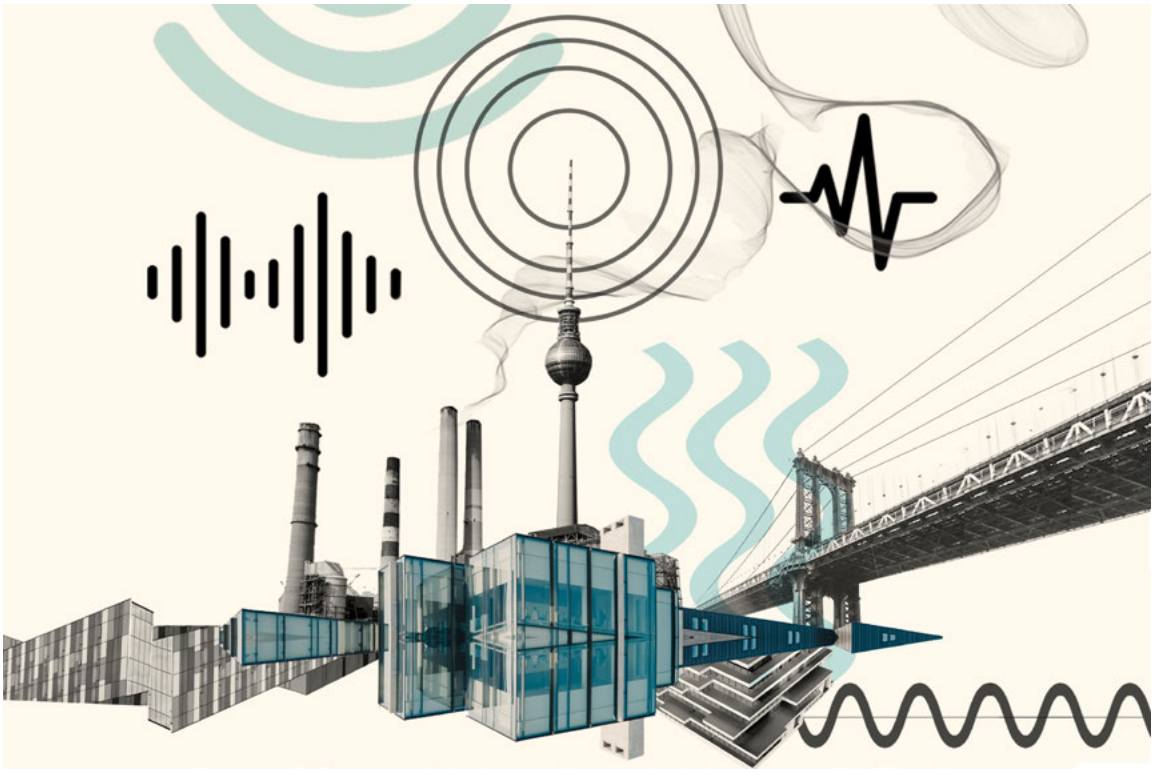
ISSN 2624-9081 • DOI 10.26034/roadsides-202100601

# Sensing Infrastructure: An Introduction

Christina Schwenkel

There is no shortage of exciting, interdisciplinary scholarship in the field of critical infrastructure studies. And yet the dominant conception of infrastructure as built matter that moves other matter has privileged the material and sociotechnical over its more intimate and sensory dimensions. This issue brings together these analytical approaches to produce more embodied understandings of the diverse and contingent ways in which humans and nonhumans apprehend and make sense of infrastructure through particular modes of sensing. It does so by revisiting the idea that infrastructure is beyond perception – invisible, silent, intangible – until it breaks down or decays. The sensations that infrastructures generate – the whiff of gas, the hum of turbines, the shock of electricity, the bitterness of chlorine – show that efforts to attune to the smells, sounds, feelings and tastes associated with infrastructure are historically grounded and culturally specific. Rather than think along the lines of sensory deprivation then, infrastructure – broken or not – evokes a range of experiences across the sensorium. And yet there is no sensorial stability here: embodied encounters with infrastructures are shown to be paradoxical and ever shifting. While infrastructures may serve to mediate and regulate the senses, the articles in this issue also demonstrate with much clarity how the meanings and values of infrastructure are in turn mediated by

the senses. Most importantly, in the face of climate change and mounting disparities around the globe, the authors show how "sensory forms of agency" (Ringel 2021: 161) have been, with varying degrees of success, generative of political action and calls for a more just infrastructural future.



***Essays in this issue explore the culturally specific ways humans and nonhumans make sense of infrastructure through overlapping modalities of sensing.***
Design: Chari Hamratanaphon.

The impetus for the issue came from my own work on mass housing in Vietnam, where people deployed sensory expressions to talk to and teach me about infrastructure: how to listen for the sound of water in the pipes to know when to open or close the valves (a good ear, my landlord advised, can hear when a tank is near full); how leaks could be either detected through smells like mold, which was also slimy to the touch, or felt as dampness in the bones that could lead to debilitating ill-health (Schwenkel 2015). The authors take a similar, non-ocularcentric approach to consider what is gained methodologically and theoretically by bringing multisensory studies together with critical studies of infrastructure.

Alejandro De Coss-Corzo pushes for thinking about the senses relationally through his own fieldwork experience of "participant sensation," or the act of "sensing along" with workers who repair hydraulic systems in Mexico City (Howes 2019: 18). Developing the idea of "embodied calculation," he shows how situated forms of collective hearing, feeling and smelling are critical to the infrastructural labor of maintenance and repair of an urban water supply system deep underground in the absence of sight. Such attunement, he argues, is learned collectively, iteratively and performatively through engagements with both infrastructural objects and the attuned perceptions of other workers.

If De Coss-Corzo reminds us that infrastructure works to define and delimit membership in a particular community of embodied practice (see also Star 1999), Rashmi Sadana invites readers to consider the ways in which infrastructure serves as a mechanism of exclusion from "sensory modernity." In her multimedia essay which immerses readers in the sounds, sights and feel of the high-speed Delhi Metro, Sadana demonstrates how a new sensory ecology and hierarchy of mobility around public transport has forged novel relationships between self and technology that augment the lines between belonging and nonbelonging in the city.

The gendered and classed politics of sensation that Sadana outlines takes on a new dimension in Kate McClellan's article on animal sensations and encounters with human-built infrastructure in a wildlife sanctuary. Moving beyond anthropocentric approaches to suggest a broader infrastructural ontology (Barua 2021), McClellan considers the ways nonhuman life forms habituate to electrical infrastructures that manage and restrict their mobility. Security fences that teach captive animals through touch and sound and the accompanying painful jolt are a reminder of how a politics of humane 'care' is entangled with the threat of electric shock.

The violence of infrastructure, apprehended through the senses by marginalized and racialized actors, appears as a key theme woven across many of the papers, even as those very sensations may also generate new social and political possibilities. Intertwining musical and literary representations of urban transformation, R. Benedito Ferrão examines the unrealized promises of Margaret Thatcher's neoliberal agenda of deregulation. Opening up an alternative view of immigrant aspirations, Ferrão narrates how postcolonial subjects encounter and navigate the former metropole sensorially with the dismantling of public infrastructure and the illusory opportunities of free-market reforms.

The retreat of the state from the provision of public goods and services, together with the emergence of new political actors, makes clear the extent to which the state can be sensed – or felt to be absent – through infrastructure. In their article on the infrastructural inheritances of settler colonial geographies, Liam Grealy and Tess Lea examine 'techno-fix' responses to oppressive heat in Australian Indigenous housing as the outcome of both climate catastrophe and a history of state infrastructural neglect. To "swelter at home," they cogently argue, is to "sense an insensitive [and fragmented] state."

State-produced vulnerability is also deeply sensed as insecurity with the creation of a militarized border infrastructure linking Uzbekistan and Kyrgyzstan. Coining the term "sensuous nostalgia," Asel Murzakulova traces changes to the everyday sensorium of place that followed the militarization of post-Soviet borderlands. Sensuous nostalgia, she persuasively contends, highlights the "colossal infrastructural changes" that transpired as a result of border securitization, changes that engendered instability and a profound longing for the social and sensory experiences of a more fluid, pre-border past.

Beyond an emerging military industrial complex in postsocialist states, the oil industrial complex in petrostates like Ecuador also shows how meanings are produced and contested through unwelcome sensory engagements with harmful infrastructures.

Focusing on "smell events" and the noxious fumes from oil processing, Nicholas Welcome analyzes how Afro-Ecuadorians struggle to make sense of toxic atmospheres and a negligent petrostate. Here, health effects associated with air pollutants are questioned as misperception or instances of "mis-sensing," as officials "gaslight" impoverished residents and deny the dangers of contamination.

Shifting from the racial politics of contaminated atmospheres to the atmospheric politics of thermal environments, Katja Jug and Madlen Kobi foreground changes to the daily rhythms of everyday life in the frigid environments of southern Chinese homes. In documenting corporeal and technological strategies to keep the cold out, this mixed-media collaboration reveals the lack of investment and unevenness of state policy on centralized heating infrastructure that leave individuals to manage thermal comfort on their own – in contrast to the government provision of heat in the north.

If infrastructures "produce the ambient conditions of everyday life" (Larkin 2013: 336) that are disproportionately felt and embodied across space, Felix Ringel evokes the temporal dynamics that shape and give meaning to sensory events. His "sensorial biography" of a prefabricated-panel city in eastern Germany considers how residents of Hoyerswerda perceive the changing of infrastructural time. Deploying oceanic metaphors as a device to conjure an embodied sense of place, he challenges the city's characterization as a "sea of concrete." His tour of mass housing offers an evocative history of socialist planning and restructuring through evolving multisensory encounters with the re/built environment.

Moving from concrete materialities to green ecologies, Dimitrios Bormpoudakis invites readers to listen to the sounds of renewable energy across differing wind-power landscapes. His multi-sited approach stresses the situated practices of listening to green infrastructures that produce feelings of both hope and despair in the face of global climate change. Whether productive of enchantment or annoyance, sensory perception of infrastructural objects, Bormpoudakis reminds us, is imbued with particular values that are historically grounded and culturally mediated.

Together, the contributors to this issue attend not only to the richness of lived, sensory geographies of infrastructure that deepen our understanding of human and nonhuman relationships to one another, to the state and to socio-technological things; they also introduce innovative methodological approaches to the study of infrastructural systems. Engaging with the senses as a means of inquiry and analysis of infrastructure and not simply as an object of study, the authors' embodied research practices of "sensory participation" (Pink 2009), or sensing *with* and *alongside* their interlocuters, allows them to experience, interpret and represent how such intensities are felt and shared, while remaining cognizant of their own positionalities. In so doing, as reviewer Bada Choi pointed out in his comments, they move away from the "lone and agentive" researcher, to emphasize their situated embodiment and relationality to other sensing bodies. In advancing a multisensory ethnography of infrastructure – one that sees the senses not as isolated, but as working in tandem with one another; after all, we perceive the world around us with the entire body, as Ingold (2004) reminds us – the contributors also invite readers to attune themselves to infrastructure through their multimedia journeys. Their deployment of song, text, field recordings, sketches and

images – images that are not meant to re-center vision but to convey other embodied sensations, like holding the nose to protest toxic fumes – raise important questions about the translatability of sensory experiences, while offering, in Welcome's words, a powerful critique that demands justice and accountability.

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**Cite as:** Schwenkel, Christina. 2021. "Sensing Infrastructure: An Introduction." *Roadsides* 6: 1-6. https://doi.org/10.26034/roadsides-202100601

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100602

# The Sensorial Management of Water in Mexico City

Alejandro De Coss-Corzo

**Introduction**

Installing the machinery that makes a water well work requires subtle and precise forms of embodied calculation: the sound of two pieces fitting together; the feeling of screwing pipes and engines together with strength and purpose; and the rapid response that is needed when one senses that something might not be properly aligned. Workers at the Mexico City public water utility (SACMEX) constantly carry out these forms of embodied calculation as a central part of their work. Embodied calculation is a skill that requires attuning the senses to water, soil, pipes, valves, levers, rust and metal, and their sounds, surfaces, smells, weights and movements. This attuning – getting a feel for infrastructure – is learned collectively and iteratively through prolonged and manifold interactions with these materials and flows, and with the bodies and senses of other workers. Crucially, I argue, embodied calculation is a skill necessary for the performance of infrastructural work. At the same time, infrastructural work shapes the senses, understood not only as perception but also as technique, central in maintaining hydraulic flows and infrastructures.

***Getting a feel for infrastructure in Lerma, state of Mexico.***
Photo: Alejandro De Coss-Corzo, 2017.

## Sensing infrastructures in practice

Ethnographic accounts of infrastructure show that sensing is crucial for the performance of infrastructural labour and for the development of the skills it requires. Take, for example, Ashley Carse's account of how pilots navigate the vessels that pass through the Panama Canal (2020). Pilots there highlight the role that "feel" has in enabling them to carry out their labour, which constitutes manoeuvring enormous ships and thousands of tonnes of cargo along the canal while remaining attentive to changing water currents, winds and weights. This work requires pilots to be attuned not only to technical skills learnt through various forms of training, but to distinct forms of sensing that are necessary for their work. Reflecting on pilots' experiences, narratives and ways of doing, Carse defines this form of sensing – feel – as "a learned attentiveness to dynamic environmental, technical, and social phenomena and the

embodied knowledge of how to respond to dynamic conditions" (Carse 2020: 3). In this concept, and in pilots' work, perception and the sensorial are not separate from the materialities of infrastructural form and flow, but rather always co-constituting each other.

Carse's concept of feel resonates with broader work on sensing across various disciplines, including geography, anthropology and sociology. These contributions highlight the fact that the senses do not merely mediate the relation between an outside world of materiality and an inside world of mind, but that perception and the sensorial are relationally developed through interactions with the environment (Ingold 2000; Pink 2010). The question here is not about how senses are produced differently by culture and sociality (Bull et al. 2006; Howes and Classen 2013), but rather how sociality and culture are constituted by relational forms of sensing and perceiving (Chau 2008). Indeed, it is through the senses that people negotiate how they live with infrastructures and their failings (Salas Landa 2015). Returning to labour, this suggests that the question is not about how senses are important for the performance of various forms of work (Hockey and Allen-Collinson 2009), but rather how work is constituted by forms of sensing, understood both as practice and as technique (Mauss 1973; Bear 2014; Shilling 2017). It is through sensing that urban workers classify risk (Zeiderman 2016: 76–82) or tell apart the formal from the informal (Baptista 2019). This requires considering the sensorial as a collective education of attention (Ingold 2001) through which workers develop skills that enable infrastructural labour and sustain infrastructural relations and forms.

**The right click**

Reassembling a water pump requires attuning attention to specific sensorial registers, as suggested in the introduction. These involve all the senses working simultaneously, but often rely on particular forms of hearing, smell or touch. It is the sound and sensation of a pipe falling correctly into place that gives SACMEX workers the knowledge that their work is yielding the results they want. The right sort of click is not too loud, as pieces fit together without excessive friction; it feels fluid to the touch, the pipe threads sliding easily into the submerged pump, aided by oil and grease – an ever-present smell at work. By contrast, the wrong click makes a jarring, creaking noise, and offers far too much resistance. Being attentive to the right click lets workers know when it is time to screw the pipe and pump together or when it is time to start over again. Hearing and touch come together here to constitute a dynamic form of embodied calculation that is attentive to specific infrastructural materialities and that constitutes particular forms of sensing and working with infrastructure.

The image "Waiting/working for the right clicking sound" shows one such moment. Workers had been trying to get a well working again after it broke down weeks before. They lifted a piece of pipe using heavy machinery, making sure it was aligned by pulling it with a chord as it was lowered, and tentatively screwing it to the pump already sunk in the aquifer until the right clicking sound indicated that it had fallen into place. Once the click was there, workers rapidly screwed the two pieces together, feeling

***Waiting/working for the right clicking sound in Lerma, state of Mexico.*** Photo: Alejandro De Coss-Corzo, 2016.

no unwanted resistance other than that of two heavy pieces of metal being moved. Being one of my first days in the field, the sound of the right click was not completely clear to me, even if its importance was unmissable. Workers were evidently attuned to it, remaining silent as the piece was lowered and speaking up when the wrong or right sound was heard. An animated "*¡va, va, va!*" (Spanish for 'go, go, go!') means pump and pipe can be assembled; a sharp tug and a shouted direction, "*¡izquierda!*" ('left!'), lets workers know the pipe movement must be adjusted. The click, then, is not given but made. The infrastructural relations that are calculated through the senses are always being produced through and with the body.

**Learning to sense**

Observing workers' embodied calculations was constitutive of an education of attention that developed my own forms of sensing infrastructure. However, attention cannot be educated solely by passive observation – sensing is a matter of doing. I learned this early on during my one-year fieldwork placement at SACMEX, when ingeniero Hernán advised me to do what workers did if I wanted to be taken seriously. More importantly, he suggested, this would also allow me to understand better how the skills they require are developed and put into practice. For example, learning how to

***Feeling for unwanted water flows in Lomas de Chapultepec, Mexico City.*** Photo: Alejandro De Coss-Corzo, 2016.

feel and hear the right click implied my active participation in reassembling pumps, a task I carried out several times during fieldwork under the watchful, and sometimes nervous, gaze of other workers. Standing below the descending pipe piece, one must wait for it to be properly aligned, being careful to step with caution as the soil is often muddy and slippery. Alignment requires a visual confirmation that is aided by touch and force, as workers push and pull the pipe until it falls correctly into place. However, ocular confirmation is not enough. The question overall is one of hearing and feeling, working together, and shaping each other. The right click is a sound and feel, identified through learned forms of hearing and touching.

Other senses too are attuned and developed when working with infrastructure. Workers learn how to smell for chlorine in order to ascertain whether machines are doing their work properly or if they are releasing too many or too little chemicals. They must also learn how to smell the faintest whiff of a cable burning, to avoid the engines that are being installed breaking down. Crucially, sensing is an adaptive relational practice that allows workers to remain attuned to changing conditions in infrastructure. When operating rusty valves, workers feel for stiffness and pressure, and adapt their work practices in relation with these shifting infrastructural materialities and relations. When repairing a leak, workers feel for water pressure in the underground of the city, knee deep in water and surrounded by the noises of busy streets. The adaptiveness of such sensing demonstrates how perception is not a matter of representation that implies a separation of mind and the world 'out there', but rather a matter of constant and selective interaction and transaction (Shilling 2017). Sensing infrastructure is a skilled practice that enables not only infrastructural labour but the very work that infrastructures do. Amidst often unexpected breakdown and ongoing material changes, sensing is what underpins the embodied calculations that make water flow in Mexico City.

## Sensing as calculation

I want to conclude by suggesting two ways in which engagements with the senses can contribute to critical understandings of infrastructure. On the one hand, embodied calculation shows how the senses are critical for infrastructural labour and the very functioning of infrastructure. On the other, conceptualizing infrastructure as constitutive of the senses through practices of adaptive learning and doing can enable richer accounts of labour and human agency (Rose 2017). Taken together, these insights enrich our understandings of how body, sensing, infrastructure and the environment shape each other in processes of relational calculation within and the beyond work of infrastructural maintenance and repair.

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**Cite as:** De Coss-Corzo, Alejandro. 2021. “The sensorial management of water in Mexico City.” *Roadsides* 6: 7-14. https://doi.org/10.26034/roadsides-202100602

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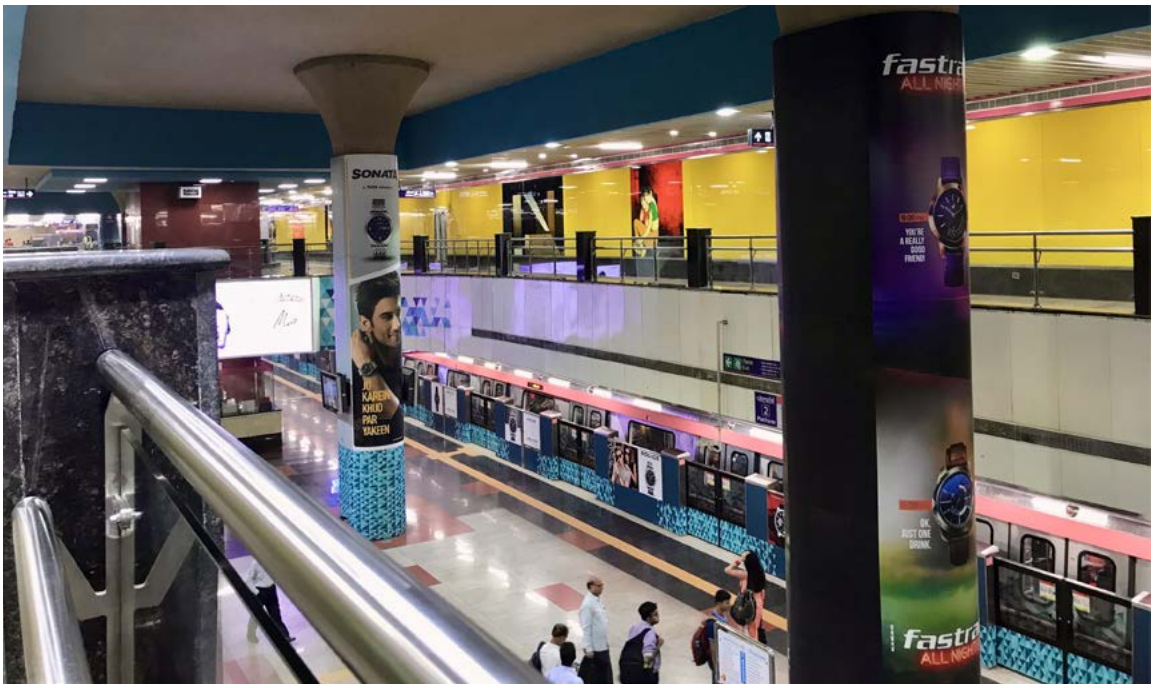
ISSN 2624-9081 • DOI 10.26034/roadsides-202100603

# Urban Transport and the Politics of Sensation in Delhi

Rashmi Sadana

The Delhi Metro is South Asia's first multi-line, high-speed urban metro rail system, a sensorium of upward mobility in this city of twenty million. Outside most Delhi Metro stations, the din of traffic startles with the screech of tires on asphalt, sputtering motorcycle engines, honking horns and heaving buses.

The Metro hums by comparison. Other forms of transport in this city simply do not feel or sound this way. Trains enter and exit stations with a mechanized swish in your ears and a curtain-like breeze against your skin. There is a sensorial disjuncture smoothed out by your own movements through the system, with its sleek flooring, cool handrails and curved metal seats. Inside, continual announcements in crisp, pedagogic Hindi and English create an institutional vibe. Unlike with the noises outside, you feel you should be listening – even if you are not.




***An array of shiny, smooth surfaces, from handrails, floors, walls and the trains themselves come together to help create the Metro's sensorium. Pink Line.***
Photo: Rashmi Sadana, 2019.

Sensing the inside versus outside, with all their disjunctive elements, tells you where you are, but also perhaps who you are. Who is invited into and who is excluded from the Metro sensorium? Delhi's is one of the cheapest metro systems in the world, transporting three million riders a day, yet it is also out of reach for the poor and for many working-class people, most of whom walk, bike or take the bus. What then are the politics of these inside–outside sensations? This essay argues that the Delhi Metro does not simply smooth things out (it is not just a leveler), whether based on class, gender or other social grouping; rather, it also amplifies social belonging and exclusion.

The interface between Delhi's metro system, and the roads above and below it, offers a new way – materially, sensorially and socially – to think about and experience 'inside' and 'outside'. The Metro sensorium produces "the ambient conditions of everyday life" (Larkin 2013: 336) as well as an "affective atmosphere" making for a new built environment (Low 2017: 156). These conditions and atmosphere strike a sensual contrast with the streets of the city, where the smells of fumes, food, piss and the sounds of traffic, chirping birds and ringing bells are constant. On the Delhi Metro, you are at once at an acoustic remove. When you enter a station, a kind of quiet settles in as the regulated coolness seeps into your pores. You quickly adjust. Yet with its engulfing fluorescence, there is still more to the Metro than meets the eye. Entering the system can invoke a chamber effect, where voices echo as they bounce off the walls and people moving through attune to a new sensorial environment. The Metro is not just a technology but a mechanism, a way to and a way to be: a system that offers mobility but also a new angle from which to imagine oneself.

The Metro is most potent as an embodied experience, an aspect of modernity that people can sense and step into (Sadana 2022). With the drop of a token or the slide of a travel card, you gain entry to an elsewhere – a place whose sensorial cues make

you feel different than you do outside. Yet for many, this is also precisely why riding it can be alienating; not everyone feels this comfort is meant for them, and so the sensations can be unsettling. The only thing to do is listen and look – to see how others respond to and manage the sensorial situation. While many on the Metro talk over the mechanical drone, the ding-dongs of opening doors and the whining shush of a departing train, others tune out on devices, or just sit watching it all, engulfed in a sensory modernity that requires pause.

***Switching on a 'live' photo from Delhi is to experience a blast of sound, reminding you where you have been, what you have recorded and the sensorial disjuncture of being on versus off the Metro. Outside Mundka station.*** Photo: Rashmi Sadana, 2018.

The sensation of who is in and who is out structures the Delhi Metro experience, even as there is a grey area in which the majority of people adjust and adapt. So, the Metro's sensorium is not a static experience; how you relate to it can change over time. The aspirational quality of the Metro is rooted in the immersive experience of the system. Over the many years I have ridden it, people have most often talked to me about the air conditioning, but nearly as frequently about the speed and the feeling of "going superfast" – a feeling rooted in the body. This is why you sit down or grab a handrail in a moving train. It affects your balance. The city moves around you and you move with it; the system is solid, but you are liquid.

Kamala, a beauty technician who I sometimes ride with on the Delhi Metro, tells me the Metro is "*undhar he undhar*," encompassed, enclosed, all inside. She works all day in other people's homes, taking care of their hair, skin, nails, but on the Metro she is the one who relaxes and enjoys the conditioned air. She does not ride in the ladies' coach – she does not need to, she is with other women all day. She does not want to be encased by their chatter, echoing a common perception of the ladies' coach, with its burst of colorful flowy fabrics and loud conversations.

***The sensorial disjuncture of the Metro can be understood through people's gestures as they acclimate often warm, sweaty bodies to the inside environment. Blue Line.***
Photo: Rashmi Sadana, 2015.

By contrast, the general (mixed) coach is calm and quiet, and no one bothers her.

Meanwhile, upper-class residents of several south Delhi neighborhoods had earlier led a campaign against the Metro coming into their communities on elevated viaducts. They feared the noise, among other things. Then, once the Metro came, they praised the soundproof mechanisms built into it. The Metro would not compromise the residents' sonic atmosphere after all. They would not have to hear it. Now it is actually the silence of the passing trains that these residents marvel over.


***The clamor and clatter of water collection from a water truck beneath a viaduct. Seventy-five percent of the Delhi Metro system looms over the city on elevated tracks. Okhla, Violet Line.*** Photo: Rashmi Sadana, 2015.

Built over the last twenty-four years, since the late 1990s, the Delhi Metro creates a new idea of inside and outside, while it also calibrates one's place in the city or distance from it in novel ways. In the everyday of the Metro, it is not the visual aspect of the train moving through the urban landscape that matters so much. Rather, it is the sensorial disjuncture one experiences upon entering the system, a disjuncture that, once smoothed out and regularized in the form of a commute, can also be personally transformative. And that is where the Metro's promise lies, in its literal and social mobility – even if it is a futile mobility for some, useless and leading nowhere.

Outside Okhla Metro station, under the viaduct locals gather around a municipal water truck. The informal settlement here beneath the Metro lacks consistent water infrastructure, even as state-of-the-art trains pass overhead. Most people in this neighborhood tell me they do not ride the Metro in their midst, because they do not have the kinds of jobs – in their minds, government jobs – that would require and enable them to take it. They only step into the Metro occasionally, yet they also live with it every day, as it cuts through their space, intones in the air. To hear versus to be heard. Many feel they have an infrastructure they do not need (the Metro), even as their water supply continues to be uneven and unpredictable.

The Metro, unlike water trucks, offers no goods. It gives an energy and potentiality, a forward motion for many; but it can also emphasize a kind of stagnation. The Metro


***On a Metro platform, the comparative quiet enables phone absorption and the feeling of comfort provided by the clean floors, spurring some to slip off their shoes. Violet Line.***
Photo: Rashmi Sadana, 2018.

enables a much wider swathe of the population to experience high-tech, efficient transport, yet the system raises questions too: Why can't more of the city's infrastructures be like the Metro? Why can't they bestow the feeling of smoothness, quiet and comfort?

Groups of local women who gather to sit and chat under trees on the Okhla station premises ask just such questions. Once a month, they take the Metro two stops to the Kalkaji Mandir. It is such a short distance that it would be cheaper and not that much slower to go by bus or even walk, but riding the Metro to the temple has become part of the experience, with the feel of steel and the train's vibrations. Non-visual sensations offer distinct spatial impressions, not only of the trains but also of the vastness of the city itself – an indirect perception that becomes part of one's experiential data (Tuan 1977: 16). On this journey, the women briefly attune themselves to the manufactured sounds of the system, which blend into the visit to the temple, one exalted state leading to another. The journey produces a feeling of inclusion, though not one of consequential mobility. What, then, are the foreclosed promises of the Metro's sensorium? Who can claim this comfort, be comforted?

Infrastructures are "open-ended structural forms" (Harvey and Knox 2015: 6). And we could think of the Delhi Metro in this way, for it continually leads into and out of the city streets and localities; it has many 'orifices'. Sensorially, it marks an inside and an outside, and yet offers numerous passageways from one to the other, making for a kind of flexibility and possibility in a system that is otherwise solid and immoveable as a whole. *Infra* is Latin for 'below', suggesting that which cannot be seen but which essentially connects. The Metro is both above and below, linking different locations in the city, while the Metro sensorium itself takes travelers to a globalized space of transport, with international protocols. It is this latter kind of connection – to a global modernity – that elevates the Delhi Metro and those who ride it, making for a collective sensory encounter. 'Globalized' here does not mean Metro riders will necessarily take it to the Indira Gandhi International Airport and catch a flight (though they can do that via the Orange Line); rather, it is that they can claim this world-class-ness without leaving India.

Focusing on the sensations of the Delhi Metro enables us to see the system as a place, an "intense particularity" (Feld and Basso 1996: 11), and not just a form of urban transport or even global infrastructure. The place of the Metro is made by and emerges from the tissue of everyday life: the multi-sensory experiences of people, their perceptions and the activities those perceptions unleash. The Metro is hardly a blank canvas, an empty train, but rather encapsulates the power dynamics and tensions of the city, as symbol and material object. It registers sensorially both where people are coming from and where they might hope to go.

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**Acknowledgments:**

The research on which this article is based was supported by grants from the National Endowment for the Humanities, American Council of Learned Societies, Weatherhead Foundation, School for Advanced Research and American Institute of Indian Studies. Special thanks go to Christina Schwenkel and to the peer reviewers of this article, D. Asher Ghertner, Anru Lee and Aditi Saraf, for their generous and helpful comments.

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**Cite as:** Sadana, Rashmi. 2021. "Urban Transport and the Politics of Sensation in Delhi." *Roadsides* 6: 15-23. https://doi.org/10.26034/roadsides-202100603

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100604

# Electric Refuge:
## The Shock of Animal Infrastructure in Jordan

Kate McClellan

In 2017, a young male lion named Kahraba was part of a contingent of wild animals rescued from an abandoned, war-ravaged zoo in Aleppo, Syria, and transported to Al Ma'wa, a new animal sanctuary in the hills of northern Jordan.[1] Billed as the first of its kind in the Middle East and as an alternative to zoos, the main goal of this sanctuary – a 110-hectare facility with sprawling animal enclosures – is to rehabilitate and protect the thirty-plus wild animals in its care.

Kahraba, whose name in Arabic means 'Electricity', was named by Yusef, an animal handler from a nearby village. Yusef was there when Kahraba was introduced to his new enclosure at Al Ma'wa, a much larger, more naturalistic space than he had ever known. As Yusef tells it, Kahraba became so crazy – in ecstasy almost – when he saw the trees, grass and spaciousness of his new home that he repeatedly ran into the tall, electrified fence surrounding his enclosure, despite the shocks he received over and over. Some might read Kahraba's behavior as a desperate bid to escape captivity, but Yusef and others at Al Ma'wa instead stress the silliness and almost cuteness of the incident; in their reading, Kahraba is not a victim but, as the sanctuary's website describes him, a "calm, happy-go-lucky lion" who has been given a second chance

at life. Though he no longer touches the electric fence, his name has stuck, and his story at Al Ma'wa has become one that, via electricity, shifted from immense trauma to exuberant happiness.

***Kahraba ('Electricity'), a lion rescued from an abandoned zoo in Aleppo, Syria, resting in his enclosure at Al Ma'wa, Jordan.***
Photo: courtesy of Saif al-Rawashdeh.

How does the violence of electric shock become a story of redemption and care? Here, I use Kahraba's story to think through the political and sensory aspects of infrastructural experience at Al Ma'wa. Scholars have shown that infrastructure is always political (Anand, Gupta and Appel 2018) and always mediated by sensory experience (Schwenkel 2015); and a growing body of literature aims to decenter the human in infrastructural studies by examining the relationships between infrastructures and the ecologies – human and nonhuman – that surround them (Krieg, Barua and Fisher 2020). Drawing on these insights, I consider how the infrastructure of electric fencing at Al Ma'wa is politically potent because of, not despite, the fact that its intended subjects are nonhuman. I suggest that it is precisely the guesswork involved in understanding how animals sense, feel and think about electric infrastructure that makes electricity a useful tool at Al Ma'wa. The sensation that different animals feel when touching an electrified fence; the ability of animals to sense electricity through sound, sight, touch and smell; the meaning-making process of learning through shock that their enclosures are unbreachable – these experiences are to a large extent unknown by humans. Animal sensations of electric infrastructure are thus easily interpreted and

narrativized to particular ends; as told by Al Ma'wa, Kahraba's story is happy rather than sad, and he feels shock rather than pain.[2]

On a 2019 tour I took of Al Ma'wa, Kahraba was resting in the shade of a tree near Halab and Dana, the other lions in his pride, looking content as he drifted in and out of sleep. Despite being situated about six feet from the electric fence, he gave no indication that he would touch it. He had, in the interpretation of Yusef and others at Al Ma'wa, learned to sense both the danger and the security of living in his electrified refuge. Like Kahraba's enclosure, all the living spaces for Al Ma'wa's animals are surrounded by tall fences comprising double layers of wiring: the first, inner fence consists of horizontal rungs of wire, about a foot and a half apart; the second, outer layer is a chain-linked fence held together by green-painted posts and bars. The fences are designed to reflect the size, ability and characteristics of the animals enclosed within: hyenas, who are excellent diggers but do not jump or climb very well, have the shortest fences, whereas tigers, who are expert jumpers and climbers, have the tallest.[3] Electricity is, literally and figuratively, what gives these fences their power: both layers of fence are electrified but operate on different electrical systems and have separate back-up generators, ensuring that at least one electric barrier would still be working should the power fail on the other.

The electric fencing demands attention from humans and animals alike. As a visitor, one necessarily has to engage with the fences that enclose the animals' spaces: remember to not touch them, take photographs through the small openings in the chain links, and contend with the sounds and smells of the generators that run if there is a temporary

***Electric fencing mediates human and animal experiences at Al Ma'wa: visitors' photographs often contain visible reminders of the animals' captivity; and, within some enclosures, even trees are surrounded by electric fencing.*** Photos: Kate McClellan, 2019.

problem with the main power supply. They are also always sensorially, materially and semiotically present for the (captive) animals who must live within them. They mark the boundaries of the animals' new homes and, like the infrastructural habitus Barua (2021) describes, they thus define how and where the animals inhabit their worlds. In some cases, the fences even infiltrate some of the features inside the animals' homes; in the tiger enclosure, for instance, trees close to the perimeter are also surrounded by electric fencing to prevent the tigers from using them to climb out.

Unlike human visitors at Al Ma'wa, who are repeatedly advised by staff and signage not to touch the electric fences, the animals at the refuge must tactilely engage with their electrified enclosure – at least initially – so that they associate the shocks with their boundary fences. This takes place through a kind of sensory pedagogy, or what one might call sensory conditioning, in which animals are taught how to touch and ultimately avoid the electricity that surrounds them.

"Animals are intelligent," Yusef said. "They try as much as possible to avoid things that harm them. If an animal is hurt by a wire, then it knows that this wire has electricity and it will stay far away."[4] To facilitate this sensory training, the voltage of the fences' electricity is set to a level that, as Yusef explained, is "just to let the animal feel that there is something there." After initially touching and becoming familiar with the fencing, the animals are conditioned to *not touch*. What remains, then, is a longer lasting, remembered sensation, framed by other sensory reminders of electricity (the sounds of the generators, the smell of electric discharge) that may be meaningful to the animals but that are not marked by the shock of tactile engagement.

The staff I spoke with were reluctant to label the sensation of shock as painful, but rather characterized it as shocking, surprising and enough to teach the animals that they cannot leave. Drawing on his own personal experience of touching the electrified fencing, Sami, another animal handler, took care to distinguish the animals' experience of shock from the painful shocks humans might be familiar with:

> *Do the animals feel pain? When I do maintenance on these wires, I might touch them by mistake… [But] the electrical system we have here is completely different from the system we have at home, [which]… has very strong electricity: if you touch the electricity, it will pull you. What we have here is completely the opposite. When it is touched … there will be a shock, but it pushes the animal away and disconnects at the same time.*

Sami thus reads the shocks the animals receive as a different kind of electric sensation than that which humans experience – a sensation interpreted as uncomfortable rather than painful.[5] But he is still uncertain: "Do the animals feel pain?"

This uncertainty about what it is like for animals to sense electricity – to hear, feel, touch and know its potentials – is in this way politically useful, as it opens up the narrativization of animal lives to a range of options. Kahraba's experience of electricity – and, indeed, Kahraba himself – is thus characterized as happy-go-lucky and free, rather than sad and captive; and Al Ma'wa is not a site of domination and captivity, but rather a place of humane care. These are both narratives that, based on a particular reading

of Al Ma'wa's animals' experiences, support the general ethos of animal rescue work more broadly (Abrell 2021). In this sense, infrastructure itself is a potent storytelling tool used to make meaning for humans and animals alike: it is not only in how beings interact with infrastructure – materially, discursively, sensorially – but also in how those interactions are then interpreted, narrated and used, that infrastructures become powerful mechanisms of both control and resistance.

**Notes:**

[1] The research at Al Ma'wa took place in 2014 and 2019. Thanks to Helen Ayoub for additional research assistance.

[2] Al Ma'wa is not unique in this regard: the use of electric fences is standard practice in zoos, nature reserves and animal sanctuaries, and is widely viewed as a humane way to control animal movement.

[3] See Barua (2021) and Larkin (2018) for more on infrastructural design.

[4] See, for instance, Whiting 2016, for a review of the use of electric "pain technologies" in controlling animal behavior.

[5] Jane Desmond's discussion of the uncertainty in interpreting bulls' experiences of electrical stimulation (2016: 1–4) and Kay Milton's (2005) notion of egomorphism, which theorizes how humans interpret animal feelings on a person-based level, are both useful here.

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**Cite as:** McClellan, Kate. 2021. "Electric Refuge: The Shock of Animal Infrastructure in Jordan." *Roadsides* 6: 24-29. https://doi.org/10.26034/roadsides-202100604

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100605

# The Music of Neoliberalism: "Only You" in Roger King's *A Girl from Zanzibar*

R. Benedito Ferrão

Marcella D'Souza arrives in England from Zanzibar with a vision. The Goan-Arab protagonist of Roger King's *A Girl from Zanzibar* dreams of herself upstairs in "a fashionable London house. There was a party… My dress… was expensive. I was smiling, chatting… Oddly,… I was also the pensive, shadowy girl standing in the street below, looking up at the woman in the window" (King 2002: 4). Replete with the sensoriality of the city, this written description of a migrant's encounter with the First World privileges the visual. Yet this account of immigrant aspiration conceals the unheard urban soundscape of modernity and its infrastructures, like traffic and the electric buzz of streetlights. Even the music from the party is inaudible. Consider how Alison Moyet's opening lyrics in "Only You" aurally echo Marcella's fantasy: "Looking from a window above / It's like a story of love / Can you hear me? / Came back only yesterday / I'm moving further away / Want you near me" (Yazoo 1982).

Yazoo "Only You"

As I 'hear' the song by the British band in the novel, it plays like the synthpop soundtrack to the fraught nature of infrastructural changes effected by the Thatcherite government,

the neoliberal regime in power at the time of Marcella's arrival in England. When heard alongside *A Girl from Zanzibar*, "Only You" lyrically and historically signals infrastructural change in the 1980s, while striking a discordant note of resistance.

Although the sonic illustrates the effects of neoliberalism that are the mise-en-scène of King's novel, it is also instructive to consider how broadcasting utilities in Britain were (de)regulated by the Conservatives during Margaret Thatcher's tenure. By restructuring the British Broadcasting Corporation, and limiting its coverage, the Prime Minister eroded its "institutional reputation… [and] the right of free expression" (Edgerton 1996: 124). Accordingly, Thatcher's circumscription of acceptable public broadcasting influenced the cultural zeitgeist and the communal sensorium shared by a populace attuned to the same audiovisual programs, nationwide. The endgame, however, was the privatization of radio and television (ibid.: 126).

Examining the relationship between biopolitics and neoliberalism, Michel Foucault identifies the evolution of a form of governmentality that "rationalize[s] the problems posed to government practice by phenomena characteristic of a set of living beings forming a population" (2008: 317), only so that the state can free itself of and transfer these responsibilities to the private sector. For the Thatcher administration, shirking off its biopolitical role in managing affordable housing was a hallmark of its neoliberal governmental strategy, not unlike its divestiture of public broadcasting. Additionally, "by refusing to allow councils to build more stock, [the Conservatives] ultimately forced up [housing] prices as demand rose" (Bragg 2009). Seizing opportunity in the wake of the privatization of government properties, Marcella's real-estate dealings are precisely how she achieves her immigrant dreams. But they do not last. Nor is the song silently playing in King's novel an amenable accompaniment.

Although an undocumented migrant, Marcella's middle-class background, education, business experience and knowledge of English give her the "skills and social capital to facilitate [her] station… [as a] technocrat" (Prashad 2000: 101); she becomes a model minority in the once-metropolitan imperial center. Seed investment from an acquaintance allows Marcella to become a businesswoman. She gets rich "because the Conservatives were selling off poor people's council homes" (King 2002: 245), which Marcella buys and turns into upmarket properties. Even her outsider status affords Marcella an advantage. She muses: "Asians trusted me because I was Asian, Middle-Easterners because I was Middle-Eastern, Africans because I was African… Zanzibar's accumulated history had prepared me perfectly" (ibid.: 209). Suturing a colonial heritage to postcolonial neoliberalism, Marcella's model minority status is inflected by her interraciality which, when parlayed into a purposeful multiculturalism, is pressed into the service of the economy.

And yet, there is a hollowness to these efforts. Evidencing the picaresque nature of the novel, later in life when she resides in the United States, Marcella recalls the dream that simultaneously placed her in a luxurious flat and on the desolate street below, causing her to attest elegiacally: "This was all I had for Europe…" (King 2002: 4). This reflection is mirrored in the moment where the figures in Yazoo's song and King's tale look out ponderously onto the world below from windows. Where Marcella admits that she sees herself as "the pensive, shadowy girl standing in the street" (King 2002:

4), the "[o]nly you" of the song's lyrics suggests one person viewing another as they are "moving further away" (Yazoo 1982). Nevertheless, as the protagonists report their sightings from the reflective surface of windows, what if both are actually gazing upon themselves in the (looking) glass? This self-perception, akin to the mirror-phase of development, as Jacques Lacan holds, gives rise to the "*I*… before it is objectified in the dialectic of identification with the other" (1968: 72, italics original).

***(Not) Only You***
Illustration: Vanessa de Sa, 2021.

In turn, Abdul R. JanMohamed classifies what he sees in "the colonialist cognitive framework and colonialist literary representation [as a] manichean allegory – a field of diverse yet interchangeable oppositions between… self and Other, subject and object" (1985: 63). What colonialism rents asunder, the postcolonial subject in *A Girl from Zanzibar* attempts to resolve by internalizing the other who is the distanced image of their own self. "Only You" and the dreamscape in the novel overlap in their portrayal of a Manichean duality, where a subject sees herself as at once successful *and* potentially indigent. The unnamed "you" in the song is like the rich Marcella being watched by her houseless double at street-level, whom she yearns to have near as if to protect this separated twin. For Marcella, her immigrant dream and source of profit – the housing market – is also the font of hypothetical loss (which becomes a self-fulfilling prophecy). Leaving behind a former colony to live in the West as an undocumented person of color, she enriches herself from the destitution of others in a country that has pulled back from its biopolitical responsibilities. But if the state

can do this to its own citizens, what qualms would it have to dispossess someone who has gained entry to the country illicitly? It is this infrastructural capriciousness that Marcella negotiates, even as she lives a privileged life – a duality of plenty and precarity sonically paralleled in "Only You."

In addition to the dismantling of public broadcasting and housing enterprises, interference in labor and energy industries was also on the neoliberal agenda in Thatcher's England. The year 1984 saw the closure of Yorkshire's coalpits, which resulted in union-led strikes by miners; anticipating such actions, Thatcher had stockpiled coal to undermine protests (Jeavans 2004). The Conservatives' desire was to circumvent "a nationalised coal industry requiring massive subsidies [for this] was anathema to the Thatcher government's long-term economic goals" (ibid.). Further, as Billy Bragg (2009) uncovers: "Without powerful unions…, the wages of ordinary workers were held in check while the cost of housing… spiral[ed] upwards." This made workers susceptible to another of Thatcher's schemes, in which "a newly deregulated banking sector began offering ever more 'attractive' loans" that would cause future financial problems (ibid.).

King fictionalizes the aforementioned events. Cocooned in wealthy Bayswater, Marcella admits to not knowing the "news from England" (2002: 228), as if falling into Thatcher's trap of an enfeebled national broadcasting service that would limit publicly available information (Edgerton 1996: 126–27). Disconnected from national goings on, Marcella is unaware that "[s]triking coal miners were… fighting with police… The police were battling people in the cities too, mostly black people" (King 2002: 229). With no need to be concerned about her livelihood in the way of the miners, it is also true that Marcella benefits from schemes put in place by the same administration that dispossessed those workers. But in a twist, Marcella's undocumented status is revealed when she gets drawn into a skirmish involving Kamara, a Black friend of hers, and "policemen [who] had just finished a spell in Yorkshire, battling striking miners. Earlier… they had been fighting a mainly black riot… against the police actions in London's Tottenham and apparently still had it in their heads when they surfaced… in cheerful multi-racial Bayswater" where they levy a trumped-up charge against Kamara, which also embroils Marcella and results in her incarceration (King 2002: 275).

In the face of nationwide unrest in 1984, mobile or "[f]lying pickets became a regular feature at [pit protests]," their aim being to convince miners "to stay away from work" (Jeavans 2004). The Christmas prior, an a cappella version of "Only You" topped the 1983 UK charts and was, reputedly, Thatcher's favorite holiday song (Webb 2012: 156). It was not Yazoo performing this time, but The Flying Pickets. The name of the band came from its members' involvement in a socialist theatre production about the British miners' strikes of the 1970s (The Flying Pickets 2021). The re-release of "Only You" on an album the next year coincided with the 1984 strikes and, through the story behind The Flying Pickets' name, telescoped the history of the 1970s miner protests into the political milieu of the 1980s – although the outcome was very different.

The Flying Pickets "Only You"

Thatcher may, ironically, have heard the track on the very broadcasting service she was disassembling. What did she make of the genesis of this band that sang her

favorite holiday song? That question may remain unanswered. However, the more persistent query is the one in the song's lyrics: "Can you hear me?" (Yazoo 1982). A call to hear the song's association with protest history, its reverberation in *A Girl from Zanzibar* intones the limits of a neoliberal society. In this echo chamber of immigrant aspirations – of being "Only You" – what is left unheard is the instructive discordance "in the street below."

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**Cite as:** Ferrão, R. Benedito. 2021. "The Music of Neoliberalism: "Only You" in Roger King's *A Girl from Zanzibar.*" *Roadsides* 6: 30-35. https://doi.org/10.26034/roadsides-202100605

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100606

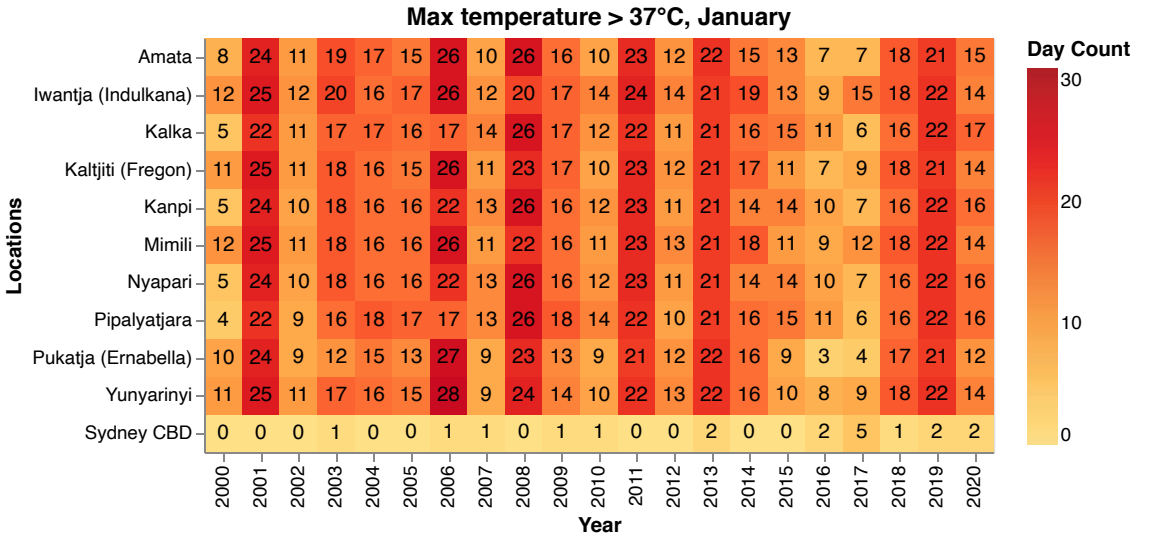
# Sensing the State in Hot Houses

Liam Grealy and Tess Lea

Australian Indigenous housing, water and energy infrastructures are the unheralded achievements of Indigenous political action, representing an insistence on the right to live on or near ancestral country. Even so, when mitigating the sensory effects of infrastructural inheritances from fragmented state service histories and climate catastrophe, there is no wishing unbearable heat away by leaning on Indigenous political savvy and resilience (Whyte 2017). In remote Indigenous communities, houses are sweltering, and the settler state's infrastructural gestures remain partial and inadequate (Weszkalnys 2017).

Take the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands, a region in northwest South Australia, abutting the Northern Territory and Western Australia borders. Here, 371 houses across ten communities are managed by the South Australian Housing Trust (Housing SA), in conjunction with the Indigenous community-controlled health service, Nganampa Health Council. This unusual collaborative approach represents long negotiations driven by Indigenous lobbying – remote property maintenance is more usually characterised by reactive government-run programmes that force residents to endure broken things (Arrigoitia 2014; Lea 2020a; Grealy 2021). Even so, the thermal

prognosis is grim. Maximum temperatures are rising and the period of sustained high heat over summer is beginning earlier and lasting longer.

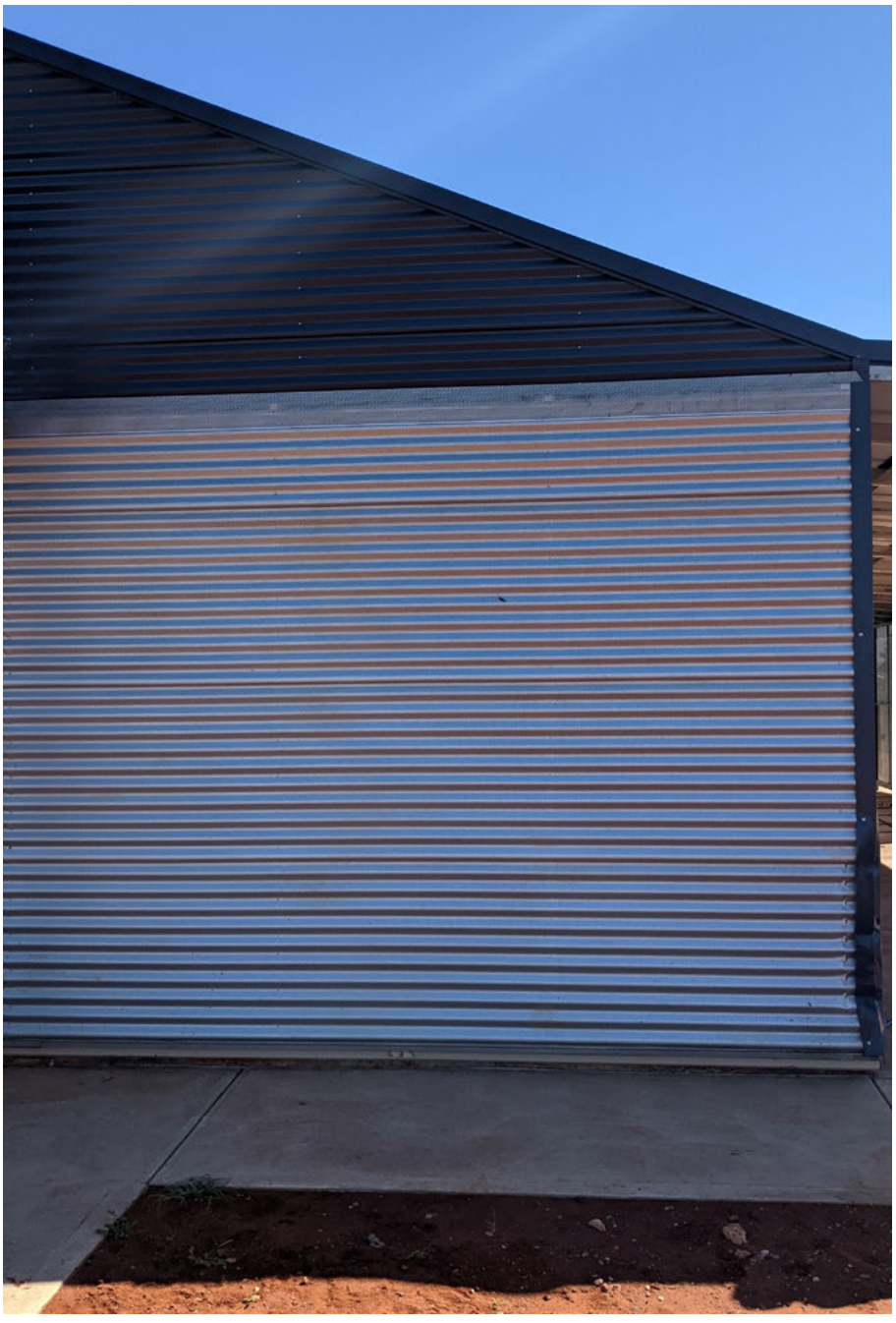



***Number of days the maximum temperature exceeded 37°C in APY Lands communities, 2000–2020.***
Image: Chao Sun (Sydney Informatics Hub Project Scheme) in Lea et al. 2021.

Yet, just as houses must afford greater thermal protection, the Australian national government – traditionally the major funder of remote Indigenous housing – is extracting itself from funding obligations. Federal funding provided to the South Australian government can be used to replace derelict houses but not to increase needed housing stock, despite crowding pressures. While new builds might incorporate some thermal considerations, such as siting, insulation, exterior shading and technologies such as Zincalume custom orb skin, legacy housing stock is inadequately designed to protect residents from current and projected temperature increases (Green et al. 2009; Lea et al. 2021). Even as global warming is pushing remote Australia into new extremes (Race et al. 2016), the Australian government has no plans to alter its regulatory approach to thermal performance in housing (Moore et al. 2019). All this is regardless of how widespread standards – such as those developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers – are based on demographically narrow experiments in the first instance (Shove 2003; Murphy 2006; Chang 2016).

In dominant efforts to control the living environment by mechanical means, thermal comfort is presumed to align with non-recognition – as with noticing infrastructure (Leigh Star 1999), noticing temperature is an index of discomfort (Heschong 1979). But what of technologically induced infrastructural indifference? Domestic air-conditioning units, and the energy infrastructures sitting behind them, have removed imperatives to design houses that protect from serious heat or adjust to local climates (Basile 2014). So we have a situation where Indigenous communities across Australia showcase similar styles of building in radically different climate zones.

What does it mean to experience sustained high temperatures inside settler state-provided infrastructure, amid foreshortened design imperatives and the need to wrangle affordances from past and imminent techno-fixes bequeathed through fragmented policy



***A perforated Zincalume custom orb skin is attached to the external wall of this new house on the APY Lands in order to reduce internal temperatures.***
Photo: Liam Grealy, 2021.

offerings? Temperature is metabolised differently based on multiple bio-variables, and there are different population tolerances of high heat (de Vet 2017). Yet not only are there limits to acclimatisation (Opperman et al. 2020), there are also known vulnerabilities. For instance, Indigenous people in the Northern Territory experience the highest Australian rates of Type 2 diabetes and, relatedly, of lower limb amputations (Dillon et al. 2017), with renal disease being exacerbated by heat stress (Kenny et al. 2016). Sensations of fatigue, exhaustion, nausea, inertia and chronicity also index state policy (in)attention: domestic infrastructures are in disrepair; climate-appropriate housing

***A water-intensive evaporative cooler set adjacent to a house on the APY Lands. This mode of cooling becomes relatively ineffective at high temperatures and in high relative humidity.*** Photo: Liam Grealy, 2021.

was never provided; and crowding exacerbates thermal discomfort given all-round undersupply. To swelter at home in such contexts is to experience the cumulative infrastructural neglect of settler colonial geographies and infrastructural legacies. It is to sense an insensitive state.

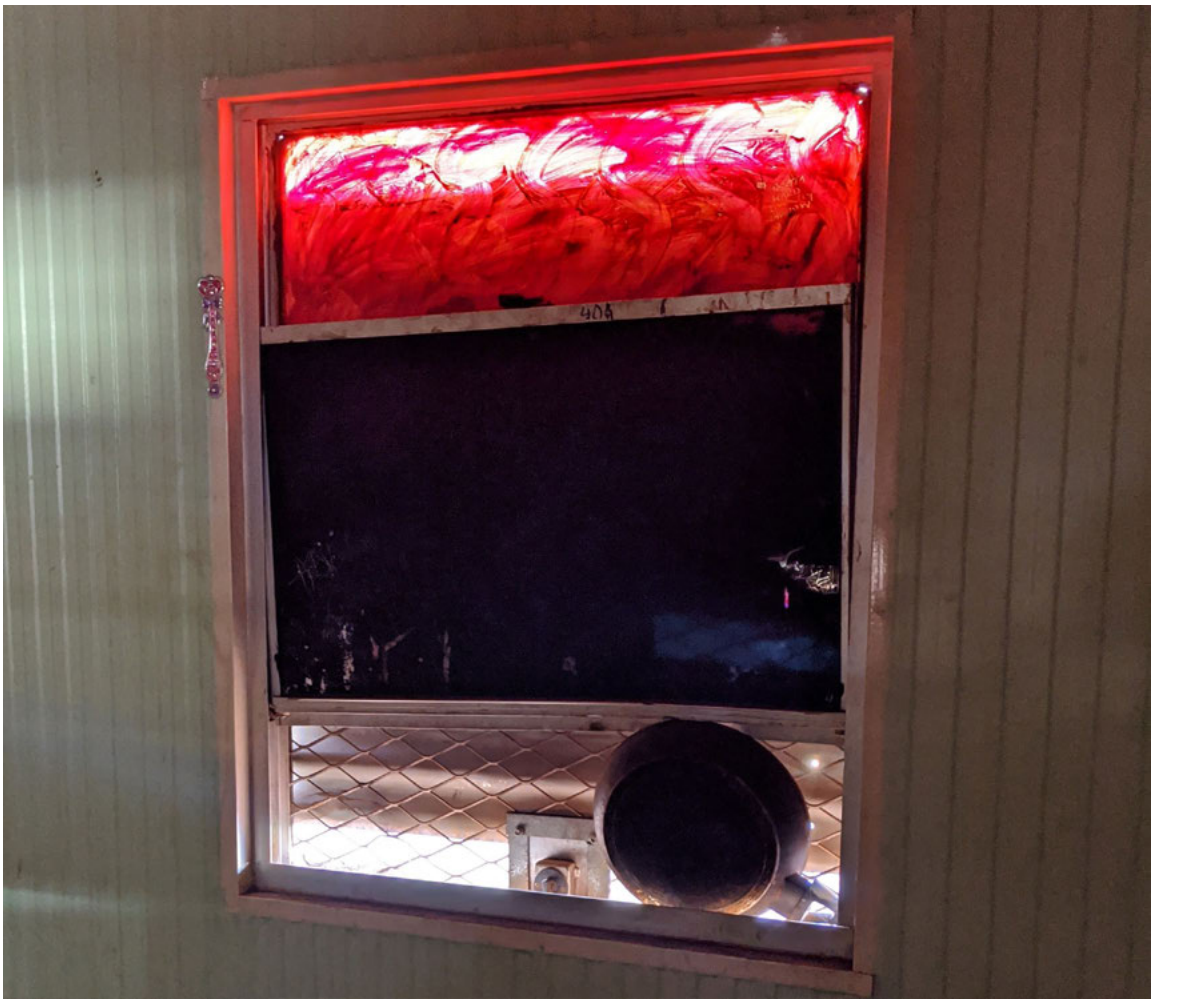
At present, all Indigenous houses managed by Housing SA on the APY Lands have evaporative coolers, the techno-fix of earlier decades. 'Evaps', or 'swampys' as they are often known locally, are a mechanical cooling technology that draws in outside air through moistened pads so as to distribute cooler, moister air into the house. Because evaporative cooling systems are far less effective as temperature, humidity and crowding levels increase (when they are most needed), tenant presumptions of hardware failure during the hotter months often see tradespeople summoned to investigate broken units that may in fact be fully functional – and totally ineffective. In general, and especially on the APY Lands where the artesian water is 'hard' due to dissolved minerals, the evaporative cooler pads require regular flushing and replacement. Water is evaporated to provide the cooling effect and bled to clean componentry of salt concentrations (Saman et al. 2009). Swampys consume water, but denuded alluvial groundwater also makes governments reluctant to build new housing without community bores guaranteeing water supply. Sensing the still-colonial state through its infrastructure is also to mark extraction legacies that First Nations people did not precipitate (Whyte 2017).

Most Indigenous people in remote areas occupy leased social housing, where it can be difficult for tenants to either modify their accommodation or to have a say about the design features that would improve their thermal comfort. Thermal inequality extends from household to community spaces (Parsons 2021): there are no enclosed shopping malls, movie theatres, water gardens or libraries to retreat to, and green infrastructural commons are scant to non-existent. Within these limits, Indigenous householders implement vernacular solutions to hot houses by painting windowpanes, attaching insulation to window frames and hanging tarpaulins and DIY shade sails on verandas. Alternatively, residents may install a costlier-to-run but cheaper upfront 'window rattler' air conditioning unit, to operate alongside an evaporative system. When operated simultaneously, neither a rattler nor a swampy functions properly: refrigerated air conditioning works by dehumidifying sealed indoor environments, whereas evaporative coolers introduce humidity and require ventilation for warm air to escape.

Given the lack of government funding to improve the thermal performance of Indigenous housing, some state and territory jurisdictions are shifting to more controllable refrigerated air conditioning, in turn promising new state sensoria. For instance, the New South Wales Aboriginal Housing Office has been installing reverse-cycle split-system air-conditioning units since 2016. To limit expenditure, the units are allocated by thermal geography: sites that fall within an isotherm range of 33°C or higher. In the few years since the inception of the scheme, climate change has dramatically expanded this isotherm geography and, relatedly, the number of qualifying houses. Separate issues are faced on the APY Lands. Installation of refrigerated air-conditioning units has been thwarted by inadequate budgets to manage the upfront costs of new hardware and by the damage caused through dust and cockroach infestations during trial installations. Feral camels, introduced to freight goods for early settlers, are also drawn to the technology: "We


***A precariously installed refrigerated air conditioner, below a security screen.***
Photo: Liam Grealy, 2021.

have been stuck in stinking hot and uncomfortable conditions, feeling unwell, because all the camels are coming in… getting in around the houses and trying to get water through air-conditioners," says Marita Baker, an artist and resident on the APY Lands.



***Window painted to reduce heat.***
Photo: Liam Grealy, 2021.

Then again, should a refrigerated air-conditioning programme somehow be universalised across remote Indigenous Australia, householder energy insecurity issues will intensify. Involuntary electricity disconnections from prepayment systems are increasing (Riley 2021). As an answer to sensed heat, then, and alongside low-cost householder fixes, refrigerated air conditioning offers new modes of sensing the state. With energy poverty on the ever-hotter horizon, policymakers and housing providers are turning to the next techno-fix: photo-voltaic panels and household battery systems to generate and store renewable energy in order to offset the costs of power consumption (Fourth&Centre 2018). Such technological promises contain embedded naivetes about labour and stable state services in remote communities (Hong 2021). All such interventions have maintenance requirements, aggravated by the harsh environmental conditions of the desert, and residents must endure the sensoria of any neglected state-administered infrastructures in the meantime (Ramakrishnan et al. 2020).

If thermal comfort is not only a right but a health need, then mechanical air conditioning is essential. Yet a certain "thermal moralism" can imbue discussions of increasing heat (Lea 2020b: 33). A masculine promotion of tolerating high temperatures (de Vet 2017), inflected by colonial ideas about the capacity of remote Indigenous residents to endure heat (Chang 2016), meets architectural arguments for the environmental benefits of passive cooling techniques, promoted by professionals enjoying air-conditioned office spaces. Thermal moralists fail to address the heightened vulnerability of elderly and unwell residents to sustained high temperatures in much Indigenous housing, and happily ignore the increasing difficulty of remote regions to retain labour under high heat (Zoellner et al. 2017). But the ongoing efficacy of any technological installation requires continued policy and infrastructural engagements, and uncharismatic repair and maintenance. There is no magic to the techno-fix, more a return to the mundane issue of tending corroding materials to eke enduring habitability from legacy infrastructures within partial policy attentiveness. As a felt state, overheating in remote housing is an infrastructural phenomenology of settler state attention, neglect and material (non) provisioning.

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**Cite as:** Grealy, Liam and Tess Lea. 2021. "Sensing the State in Hot Houses." *Roadsides* 6: 36-45. https://doi.org/10.26034/roadsides-202100606

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100607

# Sensuous Nostalgia: Insecurity in the Borderlands of the Fergana Valley

Asel Murzakulova

Between 1999 and 2010, Uzbekistan and Kyrgyzstan militarized their borders while destroying shared infrastructure and creating new ones in the process. Fence lines, observation towers, ditches, border outposts and land laced with anti-personnel mines appeared along a stretch of 1,170 kilometres of the Fergana Valley.[1] Border villages were gradually transformed into insecure spaces. As one of my interlocutors whom I interviewed in 2017 described: "Previously there were no border guards here and you could travel safely. Now the border guards can stop and interrogate me... I always feel really tense when I cross the bridge at the border and try to get across faster."

During my field trips, I visited the ruins of various border-crossing points. One of them remains intact even though it has not been functional since 2005, when Uzbekistan closed its border with Kyrgyzstan during the Andijan Events – violent anti-government protests in Uzbekistan. Before the border was shut down, thousands of people moved through the crossing point every day, with a constant around-the-clock hubbub. When taking a photo while on the bridge, I had a mixed sense of anxiety from being in an iron box with only one way out and vulnerable to possible surveillance by soldiers from a nearby observation tower. The murmur of the river below – a sound that is often

associated with calmness and serenity – felt unfamiliar in this place. Here, border securitization has changed the very soundscape of infrastructure.

***One of the largest border-crossing bridges, now closed, between Uzbekistan and Kyrgyzstan in the city of Kara-Suu, Osh Province, Kyrgyzstan.***
Photo: Asel Murzakulova, 2021.

Nick Megoran (2017) shows that in the Fergana Valley, the spatialization of the new nation-states Uzbekistan and Kyrgyzstan led to the destruction of villages that had uncertain status in terms of territorial sovereignty. In other parts of the valley, the continual construction of 'independent roads' (*nezavisimye joldor* in the mix of Russian and Kyrgyz used locally, or *koz karandysyz joldor* in straight Kyrgyz) designed to bypass the neighbouring state's territory produced a sense of "infrastructural hope" that promises a secure border life for some, but growing uncertainty and fragility for others (Reeves 2017). Along the Central Asian borders with China, new transborder bazaars developed, capturing the spirit of entrepreneurship while assuring alternative sources of livelihood (Alff 2016). This article draws attention to the less researched, sensuous dimensions of infrastructural transformations in the post-socialist period. I indicate how infrastructural changes, including militarization of the border between Kyrgyzstan and Uzbekistan, have led to the obliteration of local village life, and with it the loss of an everyday sensorium that was connected to a perception of Soviet-era security. I argue that these colossal infrastructural changes, as part of border securitization, evoke a special type of sensuous nostalgia for the sensory experiences connected to the pre-border past. Sensuous nostalgia has its own set of sensory referents, including the noise of crowded spaces of mobility, like at railway stations, the feel of a cool breeze under the shade of trees, and the soundscapes associated with rural sociality,

such as the crowing of roosters. These nostalgic sensations are associated with a once-peaceful and predictable life, in contrast to new border materializations that have created insecure spaces marked by the novel and less desirable sensations of militarized infrastructures.

In November 2017, during my fieldwork on the Kyrgyz–Uzbek border along the Kara-Darya River I met a middle-aged man named Shukhrat-*aka*.[2] He told me: "Under the Soviet Union everything was held in common, there were no borders! When this whole mess started [the collapse of the USSR and the establishment of the market economy in 1991], everyone just survived as best they could." Shukhrat-*aka* made a living in those days by transporting various goods to sell between the village and the city. "At that time, life at the urban bazaar was thriving – unlike now." The once-bustling, crowded markets emptied out, as did railroad stations, from where Shukhrat-*aka* could formerly travel freely between Osh (Kyrgyzstan), Tashkent (Uzbekistan) and Siberian (Russia) cities, which are now separated by state borders. He experienced this narrowing of his mobility through changes in the sensorium, for example the disappearance of certain sounds from now-transborder spaces: solicitations from taxi drivers, offers from cargo porters, shouts of *samsa* and drink vendors – all of which have disappeared from railway soundscapes.[3] Looking at the now vacant buildings, Shukhrat-*aka* spoke of how they used to sound. By referring to the memory of sounds of railway stations, he points to what was lost, even if the material objects continue to exist.

***A vacant railway station in Kara-Suu. With border securitization and the restriction of mobility between Uzbekistan and Kyrgyzstan, this building is no longer one of the noisiest places in the city.*** Photo: Asel Murzakulova, 2021.

Shukhrat-*aka*'s family grew rice on their plot of land, and like many villagers, he planted poplar trees around the perimeter of his paddy field: "I purposely planted poplars close to each other so the tree trunk would grow straight and be suitable for building a house for my son when he grew up." Poplars thus cultivated in the valley represent an "infrastructural species" (Carse 2014: 133), as a source of timber for traditional house construction techniques (Kg. *synch*).

***Poplars were part of the safe space sensorium. But Shukhrat-aka was forced to fell the trees as part of border securitization measures.***
Photo: Asel Murzakulova, 2021.

Then Shukhrat-*aka* was forced to partake in the destruction of his particular sensory world. In summer 2010, some border guards and the village head came to Shukhrat-*aka* with a mandate to fell the perimeter of trees. They blocked the construction of new military infrastructure, he was told. This led to suspicion in the village: "There were rumors that our land would be given away [to Uzbekistan]." He recounted the process of clearing the land: "I took some tools and went with my son to the field. I remember the day well: it was very hot and when the poplars fell, the heat became unbearable." His new sense of vulnerability came from both the political context – the presence of border guards – and the loss of privacy and the protection of shade, exacerbated by the valley's arid climate.

Gradually, the authorities installed concrete posts and barbed wire where the poplars once stood. Shukhrat-*aka* no longer used his land for fear of being detained by border guards. When we returned together to his plot in 2017, the green wall of poplars and the characteristic rustling of their leaves in wind had been replaced by an entirely different sensory experience: that of insecurity and alienation. Border guards routinely inspected the territory along the fence, checking the barbed wire clutches and repairing the ones damaged by summer heat. This infrastructure does not require Shukhrats-*aka*'s care.


***The inscription "Fence for sale" (Kg.* chek satylat*) is to be read with irony in the Fergana Valley borderlands. The word* chek *can be understood as 'fence', 'land for agricultural use' and 'border'.***
Photo: Asel Murzakulova, 2021.

Attention to shifts in border infrastructures and the sensorium enriches the current debate in critical security studies of Central Asia (Kennedy-Pipe 2004; Megoran 2005; Koch 2018; Lemon 2018) by showing how sensuous nostalgia associated with security serves to navigate the new border environment. The feeling of insecurity is experienced as changes to sensory space, for example in the sounds made by dying poplars. The creak of dry trees has replaced the once-rustling leaves in now-abandoned fields around which centered pre-border village life.

***Dried out poplars in an abandoned field near the border.***
Photo: Asel Murzakulova, 2021.

Uncertainty about future life at the border forced many villagers to move elsewhere. Shukhrat-*aka*'s neighbors left their home in 2016. He reflected nostalgically on rural life through his memory of the sounds of crowing roosters, for him an embodiment of past security. The neighbours gifted him their rooster when they left, a gesture symbolizing the social ties that had once linked them and which now came to a halt.

Nostalgia in post-socialist societies has been explored as a sentiment that helps to make sense of the transformations that accompanied the collapse of the Soviet socialist project while contesting and affirming the new order (Berdahl 1999). The experiences of people in the Fergana Valley develop this understanding of nostalgia by considering the sensuous dimension of the landscape, which shifted from a place of peace and security to a threatening, militarized border that severed social and economic relationships. Sensuous nostalgia here works as an asset to reflect critically on formation of the nation-state and to challenge the 'normalization' of border infrastructure in rural life. When discussing the sensorium of the new border, my interviewees nostalgically recalled the more fluid sensations and experiences of the past, showing the temporal change to infrastructural sensing (Ingold 1993).

Infrastructural transformations related to militarization of the border have radically altered the sensorium of those who live in the Fergana Valley's borderlands today, where the sensing of infrastructure shapes how people navigate safe and unsafe places. Addressing sensuous nostalgia reveals the tension between the perceptions of the valley's inhabitants and what the border infrastructure nominally embodies: local residents actually experience the presence of border guards and an infrastructure designed to ensure security as reflections of social, economic and physical insecurity. Sensuous nostalgia thus draws attention to everyday vulnerability in this region thoroughly transformed by the rise of new borders.

**Notes:**

[1] Uzbekistan fully demined its borders in the Fergana Valley in 2020.

[2] To preserve anonymity, the name is a pseudonym, as is the name of the village. *Aka* is a respectful appellation for a middle-aged man, usually someone older than oneself.

[3] *Samsa* are traditional baked pastries with meat and onion filling.

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**Acknowledgements:**

This article draws on fieldwork material collected during the University of Central Asia project "Improving Stability and better natural resource management in Kyrgyzstan and Tajikistan" funded by DFID between 2016 and 2020. I would like to thank Christina Schwenkel, Madeleine Reeves and Till Mostowlansky for invaluable comments and suggestions which helped me improve the paper. The opinions expressed are mine alone and do not express those of any institution or organization.

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**Cite as:** Murzakulova, Asel. 2021. "Sensuous Nostalgia: Insecurity in the Borderlands of the Fergana Valley." *Roadsides* 6: 46-53. https://doi.org/10.2634/roadsides-202100607

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100608

# The Smell of Petroleum: Sensing Toxic Infrastructures

Nicholas Welcome

On 5 February 2010, a photo appeared in the Ecuadorian newspaper *La Hora* captioned "Gas Causes Alarm." The previous day the smell of petroleum had inundated the city of Esmeraldas on Ecuador's northwest coast, setting off concerns about a gas leak. The image focused on the hill between the city center and the State Petroleum Refinery, the country's largest oil-processing plant. Curiously, the photo shows no smoke or other sign of a perceivable problem. There is no indication of what the content of the photo actually is, except for the presence of a blurred man in the foreground, holding his nose in an attempt to ward off a smell, presumably from the refinery. Yet while the heart of Esmeraldas was exposed to toxic gas, as suggested by the caption, the national oil company PetroEcuador remained conspicuously silent about the leak. Smell here served as proof of its lack of accountability.

Silence about toxicity was not out of character for PetroEcuador. Closer to the refinery – in an area of the city known as the Southern Neighborhoods – this odor is not a newsworthy event but an everyday norm. Gritty, humid, acrid and sulphureous, the smell of petroleum is a clear sign of residents' close proximity to toxic infrastructure. The PetroEcuador installation dominates the landscape here; its pipelines and smokestacks

dwarf the small concrete homes that dot its perimeter. At night the plant's torch – the flare that burns away the gases and particulate matter that enter the ambient air – bathes the surrounding area in petrochemical light. Opened in 1976, the state once claimed that petroleum from this plant would radically transform Esmeraldas, improving urban life for the city's Afro-Ecuadorian majority by generating thousands

***A mural in front of the city's Catholic cathedral representing fumes and smoke emanating from the refinery.***
Photo: Nicholas Welcome, 2009.

of jobs in the oil industry. Mirroring the aspirations of other emergent petro-states, petroleum promised rapid development and inclusive citizenship (Apter 2005), though the industry soon became a monument to ambivalence (Cepek 2018: 9). While oil has provided good jobs for a privileged few, much of the population remains mired in poverty and the plant itself has decayed due to a lack of maintenance, sickening those most exposed to industrial fumes.

While leaking infrastructure and harmful pollution are points of serious concern for urban residents, PetroEcuador downplays their environmental and health impacts by asserting that only those working inside the facility are at risk. In effect, they gaslight residents by pushing them to question their own sensory encounters – including exposure to toxic odors apprehended through smell and other sensations. While the community understands smell as a kind of sentinel experience, warning them of environmental hazards and potential health risks (Davis-Jackson 2011; Keck and Lakoff 2013), the petro-state responds by suppressing information and dismissing sensory experiences of racialized infrastructural violence. In what follows I explore how the smell of airborne contaminants offers novel ways for urban residents to contest the unaccountability of PetroEcuador and its techniques of "toxic gaslighting" (Grandia 2020; see also Waldman 2016).

**Sensing and denying danger**

In anthropology's turn toward thinking about atmospheres (Choy 2011; Ahmann and Kenner 2020), Choy and Zee (2015) have called attention to conditions of "suspension" to look past the material breakdown of particles in air and toward the processes we use to make sense of them. This pushes us to think about how we sense pollution and how that sensing is politicized (Choy and Zee 2015: 213). On the one hand, smell is a bodily reaction that acts as a warning to some (Davis-Jackson 2011; Keck and Lakoff 2013). On the other, as a cultural response, smell can be mobilized or dismissed as gases and dust become points of interpretation. Smell is a cultural phenomenon that becomes a locus of power where people can define and impose meaning, mark difference and create sites of contestation (Corbin 1986). Infrastructures like the refinery evoke a multiplicity of embodied sensations, with smell often being seen as a sign of productivity or disrepair (Schwenkel 2015).

When addressing pollution in Esmeraldas, residents of the Southern Neighborhoods – the largely impoverished Afro-Ecuadorian districts that stretch four kilometers east of the refinery – and PetroEcuador's unionized, permanent workers often focus on different qualities of the air as they either assert or deny the presence of danger. Pollution is both a 'thing' and an assemblage of matter (Bennet 2010: 21). Locals talk about air pollutants holistically, experienced in multi-sensory ways as a mixture of tangible dust and noxious odors and gases, where the olfactory senses are particularly powerful signifiers of decay and danger. This atmosphere, perceived through smell, is unstable: it condenses, stills and dissipates through the day. The Southern Neighborhoods are particularly associated with the smell of petroleum.

***The refinery's torch as seen in the Southern Neighborhoods. The flames make visible the pollution one smells in this sector of the city.*** Photo: Nicholas Welcome, 2009.

Maria's experience is useful for thinking how these tensions around smell work in practice. A thirty-year-old Black woman, Maria was a self-supporting mother of one, who lived in a neighborhood directly abutting the refinery. Maria worked as an interim secretary at the plant and, through a series of conversations, she often mentioned how the smell at work was overwhelming. She was eventually forced to leave her position because she developed what she described as an "allergy" to the refinery. The smell of oil processing was inescapable at work, causing bouts of sneezing and coughing fits. Medical personnel at the refinery diagnosed her with irritation from exposure to fumes and dust and suggested she wear a mask. Doctors thus framed her affliction as an individual work matter, rather than part of a larger environmental issue.

This diagnosis was deeply problematic as Maria also lived near the refinery. At night when the wind died down, the smell of gas spread through her neighborhood and into her house, even though her doors and windows were closed tight to keep out the fumes. Neighbors remarked that the toxic atmosphere was overpowering, burning their eyes and making it difficult to breathe – much like Maria's experience at work. A European Union-funded study confirmed that wind patterns concentrated and circulated pollutants through these neighborhoods (Jurado 2006). Some residents claimed that the effects were so strong that children would reportedly faint or vomit, which caused a Catholic school to leave the neighborhood in 2006. Whether at work or home, it was hard to escape the reach of the refinery's toxic atmosphere.

In contrast to Maria, PetroEcuador's permanent workers, whose union jobs were secured by having stayed for at least three years in technical or maintenance positions, were acculturated to downplay the hazards of smells. While they did not deny the existence of contamination, they asserted that pollution only posed a danger to those who worked at the plant itself. According to this logic, toxicity was considered an acceptable risk because the trade-off was well-compensated employment. In a work setting marked by a strict gendered division of labor, where most low-level employees like Maria faced precarity without a long-term contract, the ability to put up with the smell of petroleum was considered a masculine virtue. Male operations workers largely lived outside of the zone of influence of the refinery – residing either in the city center or in the PetroEcuador Villas, an isolated community that prevailing winds and distance kept free of air pollution. This division between permanent workers and the community at large generated a discursive field where the discrepancy between the groups allowed for denial and misrecognition by PetroEcuador.

**Toxic infrastructure by gaslight**

These quotidian situations forefront the question of how PetroEcuador comes to know smell. While managers at the refinery carry an air of expertise, their own strategies of sensing are questionable. In 2011 Ecuador's Comptroller, the state agency responsible for monitoring spending and the management of government resources, released an audit showing that the refinery has had no operational air-monitoring infrastructure since 2006. Rather than using sentinel devices – technologies that mimic the senses to measure pollutants – the refinery used security cameras to visually monitor for leaks. The report also revealed that PetroEcuador had commissioned but suppressed numerous health studies on the industry (DAPA 2010). PetroEcuador used its power of approval to filter information, impeding this knowledge from becoming public.

In this environment where the olfactory senses are called into question and where the environmental sciences have been corrupted by corporate aims, it is worth considering again the photo of smell discussed at the beginning. In this "smell event," most residents would look at the hill to see if there is any sign of danger. In the absence of a visible sign of breakdown like smoke or a fire, holding the nose is a means to convey awareness of the dangerous presence and persistence of noxious chemicals in the air. This simple act is actually a powerful critique that pushes for accountability from PetroEcuador.

***A refinery fire as seen from the center of Esmeraldas: when confronted with a petrochemical odor locals look for a sign of activity from the facility.***
Photo: Nicholas Welcome, 2010.

The stink of toxic infrastructure can be fleeting, an issue that makes ethnographic explorations of smell particularly challenging. Smell events are unpredictable, while everyday contamination and its odors are written off as inevitable and thus tolerable. In highlighting a bodily response to an unwelcome olfactory experience, the photographer attempted to give visibility not only to the violence and risk of toxic infrastructure but also to PetroEcuador's practices of gaslighting through its manipulation of reality and denial of responsibility.

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**Cite as:** Welcome, Nicholas. 2021. “The Smell of Petroleum: Sensing Toxic Infrastructures.” *Roadsides* 6: 54-61. https://doi.org/10.26034/roadsides-202100608

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100609

# Sensing the Cold:
## Biopolitics of Heating Infrastructures in Chongqing (China)

Katja Jug and Madlen Kobi

Heat and cold as human sensations are naturally related to climatic conditions. They are mitigated through material culture, including architecture, technical devices, clothing and so on (Vannini et al. 2012; Krause 2013; Rahm 2015). In urban areas today, we are heavily reliant on infrastructure to mediate atmospheric conditions: pipes, grids and energy plants provide gas and electricity used for indoor climate control. These infrastructures are embedded in biopolitical questions and shape citizen–state relationships (Fennell 2011; Johnson 2016), because thermal comfort is closely linked to the construction and maintenance of networks and also to the regulation of energy supply. Neoliberalization after the break-up of the Soviet Union, for example, had profound consequences for heating infrastructure because responsibility for the heating of dwellings was shifted from the state to individual citizens (Collier 2011).

This photo-essay investigates the situation in contemporary China, where the provision of heating infrastructure follows the Huai River Heating Divide – a policy from the 1950s that split China into a heated north, where an urban heating network is provided, and an unheated south. From a biopolitical perspective, the Chinese state privileges northern citizens' bodies' access to warmth through a highly subsidized heating network, while

those southerners who live in areas with cold winters have to assume responsibility for thermal comfort themselves (Kobi 2020). Relying on ethnographic data, photography, onomatopoeia and soundscapes collected in Chongqing since 2017, the essay argues that thermal comfort in the colder months cannot be read just on the thermometer, but is a place-based experience entwined with the sounds, sights and tastes that accompany the effects of seasonal change. The photographs are part of *Frozen Unfrozen: A Poster Novel* (Jug 2021), while the audio files were mainly recorded by residents themselves to convey the atmosphere of winter in Chongqing, a city located right below the Heating Divide, in the 'hot summer and cold winter zone' (Ch. 夏热冬冷地区). Average winter temperatures here range between 5°C and 10°C, and it is misty and rainy where the high-rise apartments line the banks of the Changjiang (Yangtze) River.

Architectural structures and heating networks are meant to create warmth and cosiness in domestic spaces. In contrast, we explore undesirable atmospheres that can arise within urban built structures. The sensation of living in unheated apartments in Chongqing is expressed through the uttering of sighs. Cold apartments result from the Heating Divide, but also from the materiality of uninsulated concrete walls and freezing draughts around loose window frames. Shivering is here an index for the lack of governmental care and residents' own responsibility to mitigate the cold. In the absence of the possibility of simply turning on the heating, citizens of Chongqing warm themselves via different methods concerned with individual bodies rather than controlling room atmospheres. One example is the practice of going out for a walk in the hilly terrain, climbing up and down the many stairways that crisscross the city territory.

Indoor body-warming techniques, on the other hand, include the use of different heat-radiating objects and devices, as visualized in the staged photographs with residents in a Chongqing apartment. On entering their homes, people grab a warm pullover, padded slippers, handwarmers or a blanket. For instance, Xiaotong, a white-collar worker who often works from home, always has a thermos at his disposal for pouring hot tea every so often. He also uses a heating plate not only to keep food warm but also to warm himself.

How the cold in Chongqing is dealt with depends largely on one's socioeconomic status. Those of lesser means layer up with clothes or wear quilted pyjamas, the cheapest way to keep warm. As one research participant commented: "The number of quilted pyjamas people wear is an indicator of the social status of a compound. If you walk around in Tiandi [an upper-class residential area], you see only few of them."

Since the electrification of residential households in the 1980s, Chongqing residents have used electric thermal devices such as air-conditioning units or portable heaters. The sound of these devices adds a monotonous ambient noise to home-making practices. Everyone has their own preferences for devices; sometimes this may be linked to memories. Xiaotong, who immigrated from rural Gansu Province in northwest China, remarked that his mother prefers the heat of the 'little sun' (小太阳, infrared heater) because its red colour evokes a sense of cosiness associated with the coal fire in her country homestead. Others dislike infrared heaters because they "make your legs feel numb" due to the intensity of the heat emitted, as one resident explained.



ZAP

BZZZZZZ ZAP PSST

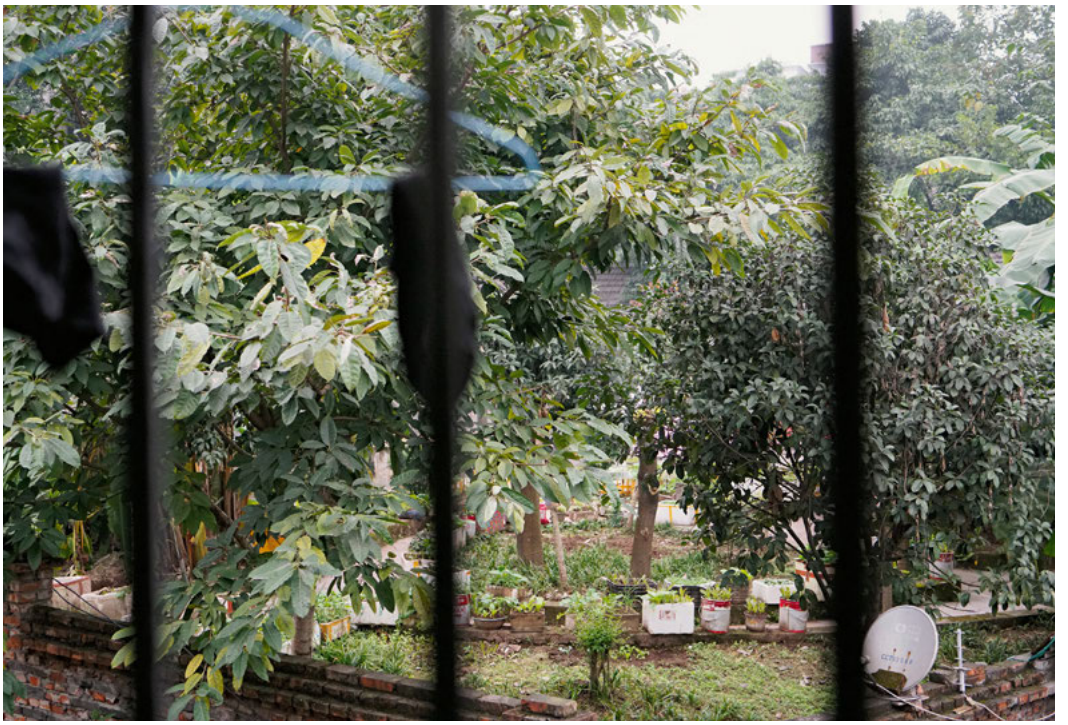
ZAP

Electric Heater 电暖器

GRGG

GRGG FIZZLE FIZZLE SMOOOTCH

Garden 花园



Blanket 被子

Living Room 客厅

Slippers 拖鞋

The ability to pay for the power needed to run such devices is proportionate to the level of thermal comfort attained. Some affluent members of society can afford to install electric underfloor heating and thus shift the objective of thermal comfort from the individual body to the wider atmosphere of the living space. Those who are not so well off, meanwhile, must warm themselves with less energy-dependent practices. In addition to being a class issue, heating in the south has caused a "comfort generation gap" (Texeira 2019): the younger generation seems less resilient to the cold than the elderly, who have also experienced the era before electrification when indoor spaces were always unheated.

The Heating Divide in China has separated the country into heated north and unheated south, creating a geographically varied biopolitics. In a neoliberal setting, those living in the south have to rely on private means to cover electricity costs for the running of heating devices. The state has effectively put the management of thermal comfort onto the shoulders of individuals (Collier 2011) and thus avoids the huge economic investment required to run a comprehensive heating infrastructure. Leaving Chongqing residents in the cold is also related to mitigating the health-damaging air pollution in China. Saving energy by not providing heating networks aligns with ambitious governmental plans to reduce coal-based carbon emissions. Populations outside of Beijing already suffer from periodic shutdowns of state-run heating installations in order to ameliorate the smog situation in the capital. By paying attention to the sensing of cold in Chongqing apartments, a clear understanding emerges of how individual citizens' thermal wellbeing is entwined with state decisions on the provision of heating and energy infrastructures.

**Acknowledgments:**

We would like to sincerely thank our research participants in Chongqing for providing us with sound impressions from their lives (audio files 2, 3, 5, 6). In addition, Asa Roast generously agreed that we could include part of his Chongqing audio recordings (audio file 1), which were released in Bivouac Recording's "60 Minute Cities" series (https://soundcloud.com/bivouacrecording/sets/60-minute-cities-chongqing). We also warmly thank Amateur Ambiences for granting permission to use part of the audio track of his Chongqing Walk (https://www.youtube.com/watch?v=Ti6DSEkTYJY) (audio file 4).

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**Cite as:** Jug, Katja and Madlen Kobi. 2021. "Biopolitics of Heating Infrastructures in Chongqing (China)." *Roadsides* 6: 62-71. https://doi.org/10.26034/roadsides-202100609

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100610

# Tides of Concrete:
## Sensing Infrastructural Times in a Former Socialist Model City

Felix Ringel

This is an episodic sensorial biography (Desjarlais 2003) of a city made of concrete. It recounts how urban modernist infrastructures, shaped by their main construction material, created a new historical-sensorial experience. It tracks an infrastructural intimacy, whose cracks, tremors and concussions mark epochal changes in what – for want of a more precise term – others have coined "infrastructural times:" the similarly intricate relations between specific infrastructures and the times in which they exist (Barry 2015; Anand et al. 2018; Appel 2018; Joniak-Lüthi 2019). The maritime metaphors deployed below are not intended to naturalize these dramatic changes. Rather, they introduce a different temporal context to this infrastructure's precarious materiality in order to disturb our own sense of time.

**A sea of concrete**

The history of the city of Hoyerswerda's socialist Neustadt, or 'new town', begins with the sand on – and with – which it was built. This sand belongs to Europe's biggest

inland dune system (*Binnendünengebiet*, in German). A sea of sand turned into a 'sea of concrete', a Meer aus Beton, as the Germans have it. To the carefully selected sand (grain size matters!) add water (no salt!) and lime, and turn slurping/slopping/sloshing slurry into artificial stone. Concrete: the material to build modernity (Zarecor 2011). But still somehow reminiscent of a day at the beach. For sensory effect, add the sounds of seagulls and the smell of saltwater on a light coastal breeze.

***'Cliffs' in Neustadt's city centre, with a view to the old town.***
Photo: Felix Ringel, 2008.

**Flow**

Neustadt's construction started in 1955 with Living Complex 1 (*Wohnkomplex* or WK 1), the first of what would eventually amount to ten living complexes. Initially, houses were built in 'large block mode' (*Grossblockbauweise*); the rest of Neustadt was constructed from panels cast by the city's own domestic construction company (*Wohnungsbaukombinat*).

One architect reported how a French delegation visited the Hoyerswerda Neustadt in the wake of WK 1's construction (Ringel 2018). They had laughed, he remembered, at the idea of building an entire city out of industrially prefabricated concrete panels. Now the architect smirked when recounting the story: the constructors ended up successfully completing their city in 1990, the last year of the German Democratic Republic's (GDR) existence, using over three hundred different kinds of tailor-made panels.

As the flow of concrete sloshed onto the construction sites, there were concerns about building a city, literally, on sand. But throughout socialist-modernist times, Neustadt remained under construction. Never ready. Always in motion. As if one could hear waves breaking, echoing along its linear streets.

***'Waves' of deconstruction, WK 10.***
Photo: Mirko Kolodziej, 2010.

The Neustädter, inhabitants of this new city, came to Hoyerswerda for the comparative luxury of its apartments, featuring 'warm water from the wall' (*warm Wasser aus der Wand*), during a severe postwar housing crisis. Over time, the residents' first impressions merged with the planners' visions of a 'city without fences' (*Stadt ohne Zäune*), and a 'city without chimneys' (*Stadt ohne Schornsteine*). The absence of fences relates to the spatial organization of this new city, and its abolition of private housing property. Meanwhile, the technical demands of the construction cranes piecing the individual panels together determined its layout. To avoid delays and costly transposition of the cranes, apartment blocks were aligned in parallel rectangular grids. Main traffic flows were directed around the complexes, facilitating easy movement and minimizing noise.

The many children in what was then Germany's demographically youngest city could be heard playing loudly on the lawns and playgrounds adjacent to their blocks. Parents called their kids in for dinner through open windows. Neighbours home from nightshift asked for quiet. One can still smell the Sunday aromas of dishes being prepared amidst the busy rattling of cooking implements and crockery. Neustadt's design fostered sensuous proximity inside its houses, too. The acoustic qualities of concrete made audible neighbours' arguments or parties, complicating as much as catalysing new social relationships. As kids, we conversed with the children downstairs through the heating pipes. Visiting friends' apartments always felt uncannily familiar, as they had exactly the same layout and featured similar furnishings.

The phrase 'city without chimneys' alludes to the absence of fumes in Hoyerswerda. Communal heating came, via a network of enormous insulated pipes, from a powerplant twenty kilometers to the north. I do not believe that every time the new citizens turned on their radiators or the hot water 'from the wall', the warmth reminded them of socialist modernity's vanguardism. But these new sensorial experiences (Fehérváry 2013; Rubin 2016; Schwenkel 2020) nurtured a feeling that one was ahead of the times. Neustadt's infrastructures materialized progress toward a modern-socialist future.

**The turning tide**

Arguably, Neustadt's progress stalled in 1989, with East Germany's Wende or 'turning point'. Others detected decline earlier. Premonitions appeared in the form of changes in the city's infrastructure. Take the youngest district, WK 10, built throughout the

***'Surf', WK 10.***
Photo: Mirko Kolodziej, 2009.

1980s. By then, building materials were in short supply. Planners were permitted to contravene the government directive that buildings of more than five floors must feature elevators. That out-of-breath feeling on climbing to the upper storeys provides a subtle yet visceral reminder that a certain period in time had come to a standstill.

Several visitors to art projects in WK 10 remarked on the low quality of the materials. Not discernible by eye, only my fingertips felt the increased porosity compared to WK 1's apparently 'supreme' concrete. This sense of touch traces the GDR's economic decline – as does another deviation from the plan. Throughout the 1970s, planners squeezed several thirteen-floor high-rise blocks into the heart of Neustadt, instead of building a proper city centre featuring cinemas, shops and bars. More concrete in less space; more 'dormitory town' (*Schlafstadt*) and 'workers' lockers' (*Arbeiterschließfächer*[1]) than model city. It was as if the young socialist republic had lost sight of its future.

**Ebb**

Its material decomposition would take longer, but in the 1990s, the city started to retreat. Tens of thousands of inhabitants, recently made unemployed, left for work in West Germany, particularly the young and well educated. The blocks grew quieter and fewer children roamed the complexes. Without the three daily shifts going to the mines, Neustadt lost its heartbeat, as the city's concrete infrastructures lost their appeal. Socialist housing turned into 'social housing', standing not for a modern future but an obsolete past. People still reminisce about Neustadt's bustling, youthful period before those days.

Like the citizens, the houses too began to disappear – victims of an 'artificial correction' (*künstliche Bereinigung*) of the local housing market. Deconstruction commenced in 1998. At first, demolitions occurred randomly. Later, calls were made to 'back-build' (*zurückbauen*) the city from the outskirts, to avoid another kind of porosity, this time in Neustadt's overall gestalt. Underground infrastructures were adjusted; the sewage pipes in the widely abandoned second-youngest district, WK 9, were downscaled by injecting more concrete. By 2013, the first WK underwent 'area-wide' (*flächendeckend*) demolition: apartment blocks, streets, pavements, streetlamps were all broken into pieces and flushed away after the swell of demolition dust had settled. In a strange reversal, Neustadt's youngest district, WK 10, went first.

Shrinkage at that rate is quick business. Abandoned blocks hardly counted as ruins, of modernity (Hell and Schönle 2010) or otherwise. They were emptied and removed in a few short months, their concrete swiftly turned into rubble (Gordillo 2014; Harms 2016) and fed back into capitalist productivity as aggregates for new infrastructures elsewhere. Thus, the now-brittle panels melted into a stream of concrete directed away from the city. The times had taken a different direction.

Deconstruction, vacancy, shrinkage and decline have their own eerie sounds and silences too. Stillness started with the staggered departure of former tenants. Noise came with the bulldozers and cranes. In contrast to inhabitants of renovated blocks,

those staying behind in unrenovated houses usually endured both. No more hellos on the staircase, no quick chat across balconies, no sound of children's play outside.

The demolition commences with boarded-up entrances and the erecting of fences (at last!) to secure the sites. First, they take out windows and doors, so as not to litter the rubble. It is spookiest when the concrete is all by itself. Wind rushes through the empty houses, blows around bare corners. Then the bulldozer picks apart the buildings panel by panel, in a spectacle observed by passers-by and former residents. As the final goodbye from walls that used to be homes, one hears the sounds of grating and crunching, jarring and squeaking – all drowned in a constant spray of water aiming to keep down airborne concrete particles. Cranes rip off and drop panels from the thirteenth floor; you can feel their impact as they hit the ground.

***'Melting' block, with security fence, WK 10.*** Photo: Mirko Kolodziej, 2009.

These sensorial experiences are unsettling at first – unforeseen, unforefelt. Then you get used to it, and the absence of the houses and the people that lived in them. An uneasiness remains though: fully functional apartments are taken down because there are no people left to dwell there. This uncanniness again most haunts those who live in unrenovated blocks, awaiting the official letter declaring planned demolition. Those in renovated houses can relax in quietude: the investments in their homes secure them for another twenty years. These renovated buildings hide their concrete under cladding in decidedly un-modern pastel shades. They are modern houses in postmodern times, at odds with the current era in a different way to their unrenovated counterparts.

***'Drowning' in concrete, WK 10.***
Photo: Mirko Kolodziej, 2009.

**Sensing infrastructural times**

There are confusing temporal complexities at the heart of the multi-sensorial relations people have with an infrastructure as intimate as their home. Different times, rhythms and ruptures overlap and interact in and around them. Through touch, sound, smell and hearing, inhabitants experience their infrastructures' precarious existence in time (Schwenkel 2015), and detect changes that, on their own, are impenetrable to sight or incomprehensible by reason (Howes 2003). They co-produce a sense of the times their infrastructures inhabit with them. Attuning to Neustadt's ebbing sea of concrete, they sense that something fundamental is changing – and must learn yet again to navigate their city's tumultuous present.

**Notes:**

[1] Understood as the place where workers would be literally 'locked away' at night.

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**Cite as:** Ringel, Felix. 2021. "Tides of Concrete: Sensing Infrastructural Times in a Former Socialist Model City." *Roadsides* 6: 72-80. https://doi.org/10.26034/roadsides-202100610

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ISSN 2624-9081 • DOI 10.26034/roadsides-202100611

# Listening to Green Energy:
## Towards Charming Anthropocenes

Dimitrios Bormpoudakis

There is an "odd hum" that people living within hearing distance of EDF's Dungeness nuclear power station in southern Kent, England often describe as soothing: "I don't think I would be able to sleep without that power station there… It's like a car ticking over, only very faint, I listen to it as I'm drifting off" (Harris 2012). Elsewhere, the "loud bangs" heard from EDF's Heysham nuclear station scared local residents and led to an EDF press release offering an explanation and promising to "eliminate this occurring to avoid [loud bangs] happening in the future."

The objectives of this essay are first to provide some insight into when and where energy infrastructure is audible. Second, heeding Laleh Khalili's (2021) call to think of (energy) infrastructures as not "always death-dealing," I explore whether infrastructures can be sensed differently – in ways that open up modes of living "with and alongside" them. I argue that studying how different communities, actors and stakeholders (*sensu* Rice 2013) listen or listened to energy infrastructures can add another layer of complexity to what infrastructure is: functional infrastructure might be sensed, or it might not. However, it is certainly sensed when it bothers, hurts or produces injustice as a consequence of its working. Drawing from two case studies – on the Greek island of Crete and in

South East England – I make the case that the sounds of particular infrastructures, such as offshore wind power, are like the Anthropocene and its landscapes: grim and hopeful at the same time.

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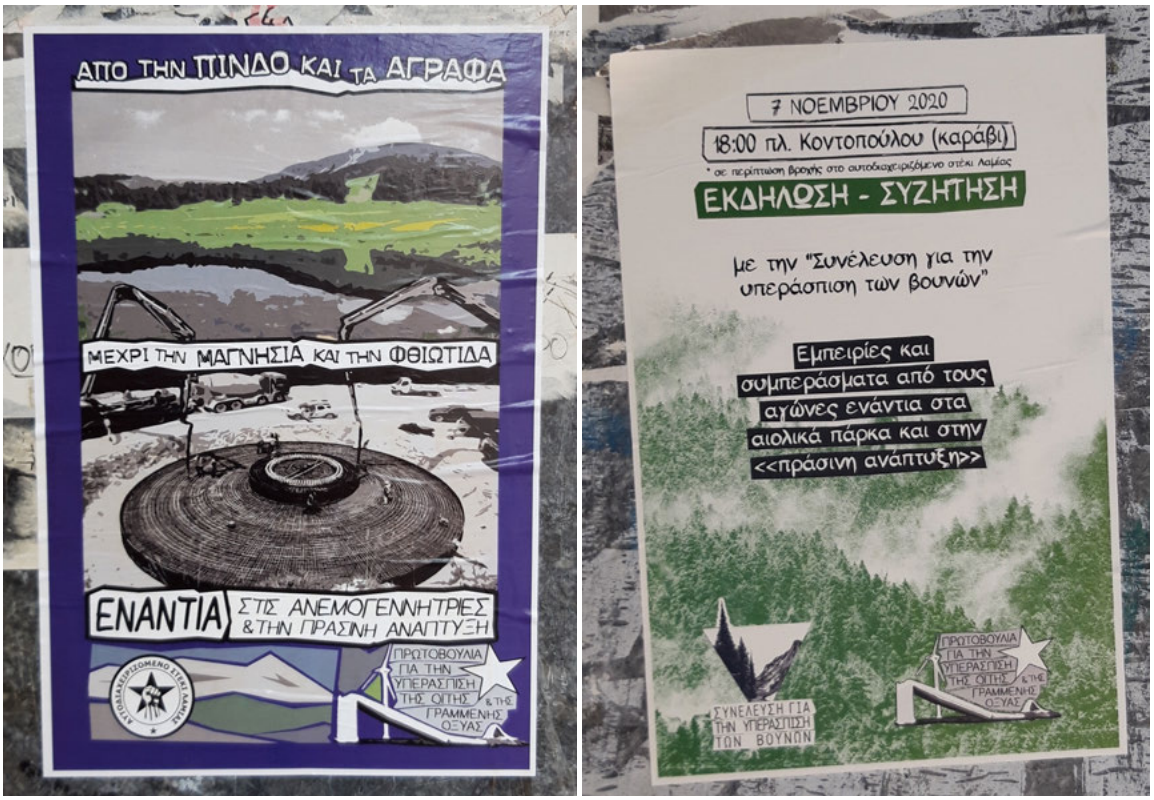
The global green energy rush (Riofrancos 2019) has reached Greece. The installation of wind energy capacity went up from 1,087 MW in 2009 to 4,114 MW in 2020, an increase of nearly four hundred percent in a decade. This crisis-enabled green energy proliferation has encountered significant backlash, inter alia for reasons of procedural justice (Siamanta 2019). Wind power has borne the brunt of this dissatisfaction, as communities resist what they often see as a "green scam" instigated by "investor-conquerors" (interview with activist; Heraclion, 2019). For the anti-green energy movement, there seem to be only two avenues: either large-scale offshore wind farms, or decentralized, low-output systems, focused on domestic and local scales. In Crete, the recent struggle against the installation of what are called by their detractors "industrial-scale renewable energy resources" (see also Siamanta 2019) and the transformation of the island into a "battery" (interview; Plakias, 2019) includes an interesting aural dimension.




***Street posters from Lamia, central Greece. Left: "From Pindos and Agrafa, to Magnesia and Fthiotida, against wind turbines and green growth." Right: "Experiences and lessons learned from the struggle against wind parks and 'green growth'."*** Photos: Dimitrios Bormpoudakis, 2020.

In Cretan dialect, *zvuros* literally means a largish wasp that emits a buzzing and threatening sound, while metaphorically it refers to an annoying teenager who goes around on a modified scooter that produces an annoying, deafening racket from its exhaust. Making reference to the drone of a turbine when spinning, a vernacular name for wind turbines

in Crete is also *zvuros* (plural *zvuri*), commonly used among those opposed to their presence on Cretan mountains. Not only are the sounds of the turbines perceived as a constant and dangerous nuisance, but their installation is seen as a land-grabbing (*leilasia gis*) exercise with negative implications for land access, ecosystem health, biodiversity and rural (and urban) livelihoods that depend on agriculture and tourism. For instance: "instead of constructing new highways or increasing university funding, the government is building new *zvuri*" (SYRIZA, the previous governing party); or "in the beginning there were only two or three on a remote mountaintop; we would see them from far away and wonder what these *zvuri* are doing there" (anarchist squat Rosa Nera). The proliferation and increasing size (and hence noise emitted) of the wind turbines have made their sounds central to how their effects on human and animal communities are perceived:

> *[Zvuri] produce low-frequency sound that creates problems for the fauna and people.* (Rosa Nera)

> *[We want wind turbines] that respect nature, birds, animals… that do not create visual and sound pollution.* (Interview with activist against the installation of industrial-scale renewable energy; Plakias, 2019)

> *Why would someone leave Athens for this island, if more than half of it is an industrial zone? If when sitting on the main beach she sees the turbines and hears the drone and cannot take a stroll in the wild part of the island.* (Interview with member of affected community; Plakias, 2019)

In Crete wind turbines are installed on treeless mountaintops, areas that are important in two additional ways: as part of Cretan identity, in that these high-altitude areas symbolically went "un-conquered by Venetians, Ottomans and Germans"; and for tourism, as "Crete needs and lives from mass tourism" (member of affected community; Plakias, 2019). For their detractors, the drone or mechanical clang of the wind turbines, as sensed amidst insect sounds and birdsong in the summer or through the strong wind and rain of the winter, are an intrusion associated with a particular type of development which they reject: it is the noise of the "green scam" that threatens their identity and one of their most important sources of income.

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Now consider the visual similarity of the wirescape from the Crab and Winkle Way near Canterbury in South East England with the one that appears in *Power and the Land*, a documentary film from 1940. Directed by Dutch communist filmmaker Joris Ivens on behalf of the Rural Electrification Administration, the film documents and propagandizes the effort of the state during the New Deal era in the United States to bring electricity to rural areas. The voiceover stresses the extra-visual element of the wirescape, describing an idyllic frontier of the senses: "Now, wires ring out the country. Stretching out, long wires are reaching out were wires never went before. There is a tune as the wind blows through the wires…"

***View of the Crab and Winkle Way, connecting the city of Canterbury with the coastal town of Whitstable.***
Photo: Dimitrios Bormpoudakis, 2016.

***Still from* Power and the Land, *the 1940 documentary by Joris Ivens.***
Source: FDR Presidential Library under a CC0 1.0 Universal licence.

For white rural Americans of the New Deal era,[1] who were yearning for the modernization that was supposed to come with electricity, this low-voltage powerline wirescape produced – according to the narration – "a tune." To today's ears sitting on a bench by the Crab and Winkle Way, the sound of the high-voltage powerlines connecting the 175-turbine London Array offshore wind park to the national grid can – contingent on sociocultural background, atmospheric conditions or even mood – have a rather different effect/affect. For most, especially homeowners living next to the wires (Sims and Dent 2005), it is hardly a tune but more of a disruptive buzz, a jarring and sinister intrusion into the peaceful 'Garden of England' landscape for which rural Kent is known. Despite the visual similarities between Ivens' film and the wirescape of modern-day Kent, their sound worlds are quite distinct. The field recording from the bench is dominated by the buzzing sound of what is termed 'the corona discharge', the energy released as the electricity from the wires interacts with the air. The nature of the sound produced is modulated by the quality of surrounding atmosphere, whether it is foggy, windy or raining.

And yet, a different positioning of the microphone, a sunnier or less humid day, or even a different way of processing the recording, can all transform how we listen to energy infrastructures from the bench. In the second bench field recording, we can imagine and hear how we might live with and alongside infrastructure. Presumably, for the Crab and Winkle Line Trust the sound of infrastructure here is not just a buzz, and that is why they added a bench at this particular point in the path (there is only one more bench on the whole 6-mile path, next to an old cemetery near the University of Kent campus). Like the sounds that enliven it, such a notion chimes with the community assembled haphazardly around the bench: the wildflowers, birds, insects, pylons and wires, joggers, empty beer cans, walkers' voices and laughter, dogs, rolling paper packets, crisps and cookie wrappers. All these elements indicate a convivial assemblage of human and non-human animals, plants, technology and waste. This multi-species and multi-object assemblage does not point to a contradiction-free Anthropocene, but to the Anthropocene as a critical utopia as in Ursula Le Guin's *The Dispossessed* (1974).


***Walkers' litter left behind the bench.***
Photo: Dimitrios Bormpoudakis, 2016.

Reflecting on the fact that these particular wires carry electricity from one of the largest offshore wind farms in the world also makes us reconsider the sounds emanating from this renewable energy infrastructure: for the output of this farm is almost three times that of all turbines installed on Crete as of 2020 (approx. 630 MW versus 220 MW). The sounds of high-voltage renewable energy in this context might be a "tune," as was the sound of electricity for those impoverished, mostly white rural Americans of the interwar era, and unlike the noise of the *zvuri* in Crete. Here, sitting on a bench by a pylon in the Kentish countryside, we can sense the contradictory, sinister and hopeful affects of the Anthropocene.

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The global push for greener energy infrastructure is affecting communities – mainly rural ones – across the world, creating opportunities and injustices along existing and novel socio-spatial cleavages, such as by threatening land-based livelihoods and ecosystems both near and far away from their installation (Riofrancos 2019). Studying how different communities listen to energy infrastructure indicates that a possible future "charming Anthropocene" (Buck 2015) will not arrive free of contention or contradictions. The sounds of renewable energy infrastructures, key components in all scenarios for climate change mitigation and adaptation regardless of scale or voltage capacity, will surely be there to annoy and enchant us.

**Notes:**

[1] As Murphy (2020) notes, the "strict practices of racial segregation thwarted black participation."

**Acknowledgments:**

The research for this essay has been funded by the Hellenic Foundation for Research and Innovation (HFRI) and the General Secretariat for Research and Technology (GSRT), under the HFRI Fellowship grant entitled "From the 'right to the city' to the 'right to nature': Exploring environmental movements in the era of the Anthropocene as pathways to social-ecological sustainability" (GSRT Code 235, KE 275 ELKE).

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**Cite as:** Bormpoudakis, Dimitrios 2021. "Listening to Green Energy: Towards Charming Anthropocenes." *Roadsides* 6: 81-87. https://doi.org/10.26034/roadsides-202100611

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