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Sensing Chennai from the air with Barad

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ABSTRACT

This paper offers a relational strategy for approaching the urban as elemental, focusing on the airs of Chennai in South India. It contributes to the field of elemental urbanism, which is concerned with how earthly forces pervade and come to matter in and shape contemporary cities. It approaches these questions through a performative, Baradian methodology, whose analytical starting point is the author's immersion in Chennai's airs, from which what unfolds is then traced. After reviewing recent literature on the elemental and the atmospheric, the paper is divided into four sections that correspond with the aerial phenomena the author encountered in Chennai – breezes, cyclones, waves, and particulates. The paper incorporates two modes of writing – one embodied and intimate, the other historical and analytical. They link the personal to the political and are meant to be read diffractively through one another, to engender new insights and understandings of the relations between the two. The paper concludes by revisiting Barad's methodology, drawing out its ethical implications and suggesting an avenue for future elemental urban research.

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Introduction

As my airplane descended on Chennai in November 2015, the sky was dark and heavy with clouds. The air was filled with water vapour and visibility was limited. As the landscape slowly emerged through the fog, vast spectral expanses of water covered the landscape, reflecting the grey above. But it was the palpable presence of the dense, viscous wet air that enveloped me as I disembarked from the airplane that made a lasting impression on me. When I visited the city two years later, the physicality of air was again apparent. It was just after the city had been buffeted by Cyclone Vardah, whose winds had uprooted trees and ripped façade panels off recently constructed buildings. Fallen trees, broken branches, and building debris lay piled up along roads and in vacant lots. In these and subsequent visits to the city, air took on visceral, affective properties: from the stench of the River Coomb to the salubrious airs of the Theosophical Society along the River Adyar; from the toxins hanging over Ennore Creek to the ocean breezes of Elliot's Beach; from the urban heat islands of Medavakkam and T. Nagar, to the cooling ambience of suburban water bodies; from cyclones, depressions and heat waves to the electromagnetic infrastructure and exhaust fumes of the IT

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corridor - the city and its history took shape for me through its airs, winds, waves and particulates.

This paper offers a relational strategy for approaching urban airs as elemental, focusing on Chennai in South India. It approaches air as a lively force that shapes and is shaped by urban life, economics, politics, and culture in intra-related processes of mutual becoming, yet cannot be reduced to them. Consideration of urban airs opens up questions of atmospheres, depressions, politics, and policies; of winds, clouds, seasons, and forecasts; of birds, seeds, insects, dust, disease, and aerosols; of sounds and music; of wind-driven trading systems; of air on the air and in the media; of the many systems and technologies through which knowledge of air is produced – religious, cultural, political, scientific, everyday; of visualizations of the air and their political effect; of airports, heat islands, and aerial infrastructure; and of the micro-politics of urban life performed by air – air pollution, toxic gases, air conditioning, bodily airs (Bremner & Cullen, 2017).

The paper builds on Farias and Kemmer's idea of elemental urbanism (2024, p. 3), which is concerned with how earthly forces pervade and come to matter in and shape contemporary cities. Taking issue with urban political ecology, which, in their view, deprived natural elements of their vibrancy and agency, Farias and Kemmer proposed that re-imagining the urban through its constant interactions with the elements had the potential to radically change how the urban is listened to, questioned and made. Farias and Kemmer's approach can be read as part of recent orientations to the elemental in human geography, the environmental humanities, anthropology, science and technology studies, material feminism, decolonial studies and others, as part of an effort to understand and think with the material ontologies of the earth (Gross, 2012), and to rethink and reimagine human relations with the "stuff of the world" (Jackson & Fannin, 2011, p. 438), as the necessary condition for life in its various forms (Englemann & McCormack, 2017).

While elemental debates have been led by cultural geographers (Adey, 2015; Anderson & Wylie, 2009; Englemann & McCormack, 2021; Jackson & Fannin, 2011; McCormack, 2015), other intellectual traditions – phenomenology (Bohm & Thibaud, 2017), anthropology (Ingold, 2010; Vannini et al., 2012), material feminisms (Kirby, 2008; Neimanis & Hamilton, 2018; Tuana, 2008), black studies (Sharpe, 2016), decolonial studies (Ghertner, 2021; Mbembe, 2020), and others, have contributed to and informed the debates. The elemental has been cast variously as matter, molecule, milieu and media (Englemann & McCormack, 2021). Some have approached it as fundamental chemical substances with particular properties and capacities to develop affinities with and combine with other elements, or not (Adey, 2015; Jue & Ruiz, 2021; McCormack, 2015; Neale et al., 2022); as different categories of matter (air, earth, fire, water), or as environmental milieus in which life is immersed (Englemann & McCormack, 2017; McCormack, 2016; Neimanis & Hamilton, 2018; Sharpe, 2016); as social forms, forces and energies, cosmological entities, and epistemic objects (Papadopoulos et al., 2021); or as an ethical politics (Engelmann, 2021; Jue & Ruiz, 2021; McCormack, 2018; Neale et al., 2022). In this paper, I take a relational approach to the elemental (see e.g. Jue & Ruiz, 2021; Martin, 2011; Nieuwenhuis, 2019), extending Barad's (2007) idea of phenomena to it, to understand Chennai's airs as relationally configured material-discursive phenomena.

As part of the orientation toward the elemental, air has, since Jackson and Fannin's invocation to turn away from the "logics of solids" (2011, p. 436), been invoked elementally in various ways that cojoin the meteorological and the affective through the idea of atmosphere (Anderson, 2009; Ash, 2013; Edensor, 2012; Gandy, 2017; McCormack, 2008, 2018; Stephens, 2015; Stewart, 2007). In the meteorological sense, atmosphere is taken to refer to the "turbulent zone of gaseous matter surrounding the earth and through the lower reaches of which human and non-human life moves," and in the atmospheric sense, to "something distributed yet palpable, a quality of environmental immersion that registers in and through sensing bodies while also remaining diffuse, in the air, ethereal" (McCormack, 2008, p. 413). While for some, atmosphere is used as an abstract metaphor for how affect and/or politics are spatialized (e.g. Edensor, 2012; Sorensen, 2015; Sumartojo & Pink, 2019; Tavares, 2008) for others, the breathable, meteorological and climatic properties of air are intrinsic to its affective potential (Adams-Huchenson, 2019; Engelmann, 2021; Verlie, 2019). Scholars have approached the air through the body (Martin, 2011; Nieuwenhuis, 2019); through breath (Mbembe, 2020); through attunement to the everyday (Stewart, 2007, 2011); via its elemental material/ affective thing power (Bennett, 2010; Gross, 2012); as part of geo-political assemblages (Ghertner, 2021; Tuana, 2008); through chemical – alchemic logics of affinity and political – mythic philosophical elementalism (Adey, 2015); as allure (Anderson & Wylie, 2009; Engelmann, 2021; Englemann & McCormack, 2017; McCormack, 2015, 2018); through envelopment and exposure (McCormack, 2018); or through esthetic practices attuned to the diverse ways in which elements are sensed in bodies and devices (Englemann & McCormack, 2017). Many authors have used material/ affective orienting devices to explore aerial phenomena, including fog (Martin, 2011; Stull & Turpin, 2017); smog (Adey, 2013); smoke and dust (Nasser, 2021, 2025; Sabin & Cantos, 2023; Sharan, 2020); pollution and toxicity (Calvillo, 2023; Ghertner, 2020, 2021), pollen (Calvillo, 2023); the *vilayati kikaar* (Bhat, 2021); weather (e.g. Adams-Huchenson, 2019; Endfield, 2019; Gannon, 2016; Ingold, 2010; Simpson, 2019; Vannini et al., 2012), including heat (McHugh, 2022), rain (Nuttall, 2020), thunderstorms (deLanda, 2011), cyclones (Swee, 2017; Tuana, 2008), and wind (Chang & Chien, 2023; Engelmann, 2023; Hepach et al., 2024); through balloons (Engelmann, 2015; McCormack, 2018), literature (Adey, 2015; Nuttall, 2024), esthetic practice (Engelmann, 2015; 2021) and more. In this paper, I draw on the orientation device, or what Barad (2008, p. 135) would call the "agential cut" of my bodily material-discursive sensations of air in Chennai, to understand some of the ways in which its elementality pervades, comes to matter, and shapes life and space in the city.

Within studies of atmosphere, there is a growing interest in urban atmospheres in both meteorological and affective senses (Gandy, 2017). Choy (2011) suggested that the "bad airs" attributed to parts of Hong Kong by urban elites were shorthand for the distaste they felt toward the urban poor. Adey's (2013) study of megacity airs argued that the urban climatology that emerged as a discipline in the latter half of the twentieth century was rooted in the meteorological study of air quality indicators and particulate matter and said little about "the atmospheres emanating from, expressing and intervening with the individuals and collectives that live in megacities" (Adey, 2013, p. 297). Gandy (2017) examined the artificial lighting of urban space as an affective realm of late capital. Falkhof and van Staden (2020) attributed the atmosphere of anxiety to

urban life in Johannesburg. Nasser (2021, 2025) used dust as a way of deepening and disrupting her readings of Cairo, and Tripathy and McFarlane (2022) studied “perceptions of atmosphere” (p. 664) in neighborhoods close to Deonar, Mumbai’s largest garbage dump, revealing lived experiences of urban poverty, urban inequality, and urban politics. Other studies of urban air in India include Sharan (2020), who analyzed colonial approaches to smoke and dust in Bombay and Calcutta between c.1860 and c. 1940, and Ghertner (2020, 2021), who argued that the contemporary logics of bodily sequestration in relation to air pollution in Delhi extended such colonial logics and foreclosed possibilities of atmospheric justice.

It is to this body of atmospheric urban scholarship in India that I add, through a reading of the city of Chennai in southeast India, using a methodological strategy that draws on Barad’s ideas (2007, 2008) of phenomena and intra-action. For Barad, phenomena or “things-in-relation,” (Barad, 2008, p. 135) are the primary ontological units of reality, and knowledge is produced through performative intra-actions between the material-discursive components (or what she calls the “relata”) of phenomena (Barad, 2007, p. 28). Intra-action is an onto-epistemological-ethical proposition that knowledge is not representational, but performative, situational, and emerges within phenomena through relational dynamics between intra-acting agencies (Colman, 2018). Knowledge, in other words, is a practice of knowing in being, or what Barad referred to as the “the iterative becoming of spacetime-mattering” (Barad, 2007, p. 234). In my work on Chennai, turning to intra-action as methodology was underpinned by my positionality as a stranger and an outsider to the city. I am a white woman, who cannot speak Tamil, and was discomforted by the history of research as a colonial encounter and of the extractive legacies and violence of the appropriating Western gaze (Smith, 2012). Instead of approaching Chennai as an object from which I might extract knowledge about, I began from my immersion in the city’s airs, as the material-discursive life-world in which my research took shape, acknowledging, after Haraway (1997), that my own body and subjectivity were part of my apparatus of knowing.

It was in early August that my co-researchers and I decided to visit St Thomas Mount, the hillock just south of Guindy in Chennai where Thomas Dydimus, the Doubting Apostle, was allegedly martyred in 72 CE. We were dropped off by a tuk-tuk at the base of the hillock on an overcast afternoon and walked up the snaking road to the level terrace at its peak. As we ascended, we became aware of an approaching storm ruffling foliage and darkening the sky. On reaching the top of the mount, we were surrounded by heavy, dark clouds moving rapidly towards us from the north-west. Against this backdrop of oncoming rain, visitors snapped selfies and Pope John Paul II raised his hand in a sign of blessing (Figure 1). Suddenly the rain arrived; the sky turned white, obliterating views of the city beyond; for three or four minutes we were enveloped in pelting rain beating down on the paving stones, smelling of the dust it had drawn from the air; rain drops made noisy little crowns as they splashed up from the hard surface before flowing rapidly down the hill; visitors ambled undercover, laughing and chatting, in no hurry to avoid getting wet. Then as rapidly as it had arrived, the rain passed; as it moved out over the Bay of Bengal, the city came into view again; sunlight broke through the clouds, eventually turning the horizon pink. This experience of being enveloped by the sky led us to explore a new way of taking photographs. We turned our phones on their sides and panned them upwards till they were horizontal above our heads, joining the land to the sky.



Figure 1. Storm approaching Saint Thomas Mount, 5 August 2017. Photograph by the author.

I visited Chennai four times between 2017 and 2021, ranging from periods of a few days to eight weeks. I resided in different parts of the city, walked its streets, sat in its coffee shops, strolled its beaches, conducted interviews with meteorologists, planners, academics, architects, government officials, NGO staff and community activists. As I moved around the city, I began to take note of the air around me. I became attentive to its movements, to how it assailed my nostrils; I began to recognise its smells and tastes; I felt constrictions in my throat when exposed to construction and coal dust; its oceanic wetness and saltiness touched my skin; I felt its heat and stickiness; I watched its mosquitos, crows, and clouds; I noted the different sounds of rain clattering down on concrete pavements or metal roofs. Immersed within it, air became my intra-locutor with the city; it made me vulnerable and helped me to work through my positionality and the colonial histories of Western research practice. By developing a critical and

difference-attentive mode of consciousness and thought attentive to its elemental politics, my understanding of the city took shape.

Wafts of colonial airs still linger in Chennai: in street names such as Armenian Street, Magazine Road and Wall Tax Road; in place names such as ‘Parangi Malai,’ meaning European Hill, the other name for St Thomas Mount, where colonial residents went to “go a hauking” and to “take fresh air” (Muthiah, 2014, p. 127); in the benchmark pillar of the geodetic survey of India in the grounds of the Regional Meteorological Centre in Nungambakkam; in the colonial décor of the Madras Boat Club still frequented by Chennai’s social elite; in Fort Saint George, the bastion of the early British settlement, now the seat of the Tamil Nadu Government; in the many imposing colonial edifices that line Marina Beach, in the tree-lined streets of Thiruvanmiyur, which reflect the tendency for those who could and can afford it to gravitate to the southern and western parts of the city cooled by vegetation and cleaner air (Arabindoo, 2009); and in the busy commercial neighbourhood of George Town, once known as Black Town, laid out to the north of the Fort to house the city’s traders.

While interlocution is an interchange of speech or a conversation between autonomous agents, intra-location by contrast, like Barad’s intra-action, suggests subjects and knowledge produced relationally through conversational practice (Bremner et al., 2023). My relations with air became a material-discursive conversational practice, through which I began to make sense of Chennai physically, historically, spatially and politically. I learned about the city through breathing and sensing its airs and going where they took me, developing what (Solomon & Kaika, 2024, p. 1504) calls an embodied, “skin in the game” research method. The knowledge this method produced was inconclusive, partial, riddled by relations of power, and full of gaps and inconsistencies, but situated and potent. It was “partial, locatable, critical knowledge, sustaining the possibility of webs of connections called solidarity in politics and shared conversations in epistemology” (Haraway, 1988, p. 584).

Taking inspiration from Gannon (2016) and Nasser (2021), the paper is written using two modes of writing – one embodied and intimate, the other historical and analytical. They link the personal to the political and are meant to be read dialogically through one another, thereby engendering new insights and understandings of the relations between the two. The paper is divided into four sections, organized around aerial phenomena I encountered in Chennai – breezes, cyclones, waves, and particulates. The first section offers an account of the gentle, everyday breezes that make the city habitable and how they have shaped life and urban space in the city. The second discusses two cyclones that bore down on Chennai in 2016 and 2017, enveloping it in vortices of nervous activity and fear, and awakening memories of earlier cyclones sedimented in the city’s history. The third section examines the electromagnetic waves that have surged through the air and underpinned Chennai’s economy since the late 1990s and their affinities for certain types of architecture and urbanism; and the fourth reveals that, for the fishers of Ennore Creek, this burgeoning economy has brought, not expansion, but a constriction of their ability to breathe.

Breeze

It was the east breezes that made Chennai, the stifling city I visited in August for a number of years, habitable. I stayed in a small guesthouse in a neighbourhood called Rhadhakrishnan

Nagar located south of the Adyar River about one km from the sea. It was a dense, middle-class neighbourhood of three to four storied apartment blocks behind walls or fences (Figure 2). Overhead, tree foliage and electricity wires filtered the tropical sun. The air was hot, lethargic and humid, but at about 4.00 pm every day, breezes would start to waft in from the sea, lowering temperatures and bringing welcome relief from the sultry heat. As the temperature dropped, the streets became alive with food vendors, tea sellers, service suppliers, housewives shopping for the daily meal and children returning home from school. I too started to venture out, joining in the rhythms of daily life of those who lived in the neighbourhood and were attuned to the rhythms of its airs.

Chennai, the capital city of Tamil Nadu, known as Madras until 1996, fronts the Bay of Bengal on the southeastern coastal plain of India, a low-lying landscape of seasonal rivers, sand dunes, backwater lakes, wetlands, and salt pans. Its origin myth tells of its founding in 1639 on a 10-square-kilometer land grant on a coastal spit by the ruler Darmala Venkatapati Nayak to Francis Day of the East India Company (Love, 1913). The land was within the traditional limits of the village of Madraspatnam, where, long predating the British settlement, fisherfolk had lived on the shore in “fragrant seaside villages ... broken by the glittering waves of the ocean ruffled by the east-wind,” (a passage from the Tamil poem, *Akananuru* (10; 8–13) in Ray, 2000, p. 347). Today, Chennai is a hot and humid city and its air is relatively still for most of the year (Jeganathan et al., 2016); but, each afternoon, the “minor weather event” (Gannon, 2016, p. 79) of an east breeze blows in from the sea and makes the hot, humid, breathless city



Figure 2. Ravishankar Nagar, 14 July 2017. Photograph by the author.

uninhabitable. Numerous accounts of early Madras refer to its excessive heat and the relief that the east breeze offered. For instance, Thomas Bowrey, who visited Madras in 1669, wrote, “This Fort ... is not at any time very cold or on the Contrary Very Hott, haveinge the full benefit of all Sea breezes of wind ...” (Love, 1913, p. 280). Alexander Hamilton (1727, p. 358), the owner of a number of sailing ships that passed through the city in the eighteenth century, wrote: “Fort Saint George ... is situated in one of the most incommodious Places I ever saw ... the Sun from April to September scorching hot, and if the Sea-breezes did not moisten and cool the Air when they blow, the place could not possibly be inhabited.” By all accounts then, it was the daily movement of the east breeze that made early Madras habitable. As the city developed, long urban blocks were laid out along the coast to the north of the Fort on slightly raised coastal dunes to take advantage of it.

Early Madras was surrounded by the ancient towns of Mylapore, Triplicane, Tiruvotiyur and Thiruvanniyur, each displaying characteristics typical of south Indian towns. They were dominated by a temple and its adjoining water tank, with commercial and residential neighborhoods organized in concentric patterns around them according to caste groupings. Higher castes were at the center, where they benefited from the convective cooling offered by the tree-lined tanks, lower castes toward the periphery (Madras Tercentenary Publication Committee, 1939). The villages were separated from one another by scrubland, wooded groves, wetlands, paddy fields and rainwater tanks (Murali, 2003). A survey of the distribution of population groups of Madras in 1918 (Lanchester, 1918) showed that the urban blocks to the north of Fort Saint George were occupied by Muslim and lower caste Hindu traders, who took advantage of the east breezes, while Brahmins still preferred living around temple tanks, and colonial settlers lived in garden estate suburbs on the western edges of the city or along the Adyar River to the south. Until today, upper castes and classes still gravitate to the southern and western parts of the city where water, vegetation and air movement generates coolness and cleaner air (Arabindoo, 2009). In these ways, the daily rhythms of breezes and air currents become part of the city’s spatial layout, social hierarchies and ways of life.

Cyclone

I have not lived through a cyclone, but I was in Chennai during a break in the torrential depression driven rain and floods of December 2015. I recall a combination of a slightly festive atmosphere - children had been given off school, university exams were cancelled; I joined residents alongside the Adyar River nervously fascinated as we watched the slowly rising flood waters reaching the underside of the bridge and seeping into the housing colonies along its banks. I recall a whole day of watching sheets of torrential rain falling into the courtyard of the hotel where I was staying and not being able to venture out.

It was Henry Piddington, a mercantile mariner who settled in Calcutta in 1829, who coined the word cyclone from the Greek *kyklon*, meaning the coil of a snake (Piddington, 1848), to name the vortices of air, heat, and moisture for which the Bay of Bengal was notorious and which were dreaded and feared by all who traversed or lived alongside it (Eliot, 1879). The first recorded cyclone to make landfall at Madras was on 12 March 1640, when its colonial nucleus, Fort Saint George, was under construction. It

destroyed two vessels that were anchored offshore. Cyclones followed at approximately twenty-year intervals: on 28 February 1662, “the like hath not hapned in the knowledge of any man alive at that time of yeare” (Love, 1913, p. 179); on 22 November 1668, when men and livestock were carried into the sea, houses were ruined, trees uprooted, and it was feared that the Fort would collapse; and on 3 November 1684, when at

About Eight at night, arose a very violent Tempest from the N.W., which Continued Round-
ing to the Southward for about 7 h, with the greatest Rage that Could be in the force of the
wind, as appeared by its Ruinous effects in so short a tyme, Killing Severall, and blowing
down many howses, walls and Trees, and levelling most of the adjacent Gardins with the
Common Sand. Nor was there any building in Town able to Support it Selfe against it,
but being Sensible of its power and danger, trembled or fell with weakness ... (Love,
1913, p. 479).

Love (1913) recorded 18 cyclones striking Madras between its founding and the end of the eighteenth century. Devi (2011) accounted for 15 during the nineteenth century and, based on the India Meteorological Department data, 30 cyclones classified as severe crossed the coast of Tamil Nadu between 1891 and 2017, of which ten struck close to Chennai (India Meteorological Department, 2017; Mohapatra et al., 2012).

On 30 November 2016, the Chennai Weather Office issued a warning that a depression forming over the Bay of Bengal was likely to intensify into a cyclone and cross the northern Tamil Nadu coast. The storm was named Cyclone *Nada*. Animations of its build-up and track were shown on television and advisories were issued. The storm revived memories of the floods of 2015, only 12 months earlier. Severely criticized for lack of preparedness and response to those floods, the Tamil Nadu government was on high alert. Chennai-ites were asked to “cooperate, not to panic and to closely monitor broadcasts via TV or radio for any updates” (Stain & Bagla, 2016). A two-day holiday was declared for schools, university exams were canceled, and fishers were asked not to venture out to sea. Teams of the National Disaster Force were posted in Cuddalore near Pondicherry. The Indian navy assumed a high degree of readiness, with two naval ships, the *Shakya* and the *Satpura* on hand with divers, doctors, inflatable rubber boats, helicopters, and relief supplies, and shelters were prepared for those who might need to be evacuated from low-lying areas. A day later, the approaching storm was downgraded to a deep depression and, by the time it crossed the coast near Nagapattinam on 2 December, it had been downgraded still further to a depression. Chennai experienced light rain and thundershowers.

Eleven days later, at 14.20 on 13 December 2016, a severe cyclone (Category 1 on the Saffir-Simpson scale) made landfall at Chennai. Its track had been monitored by satellites, buoys and doppler radar and various weather prediction models used to predict its genesis, track and intensity (Ayyappan et al., 2017). Advisories were first issued when the cyclone was a few hundred kilometers from the shore, with three-hourly forecasts thereafter. Central, state and district-level disaster management agencies were put on high alert for rescue operations. Anticipating power outages, Tamil Nadu’s power utility TANGENCO redeployed workers and equipment from other districts (Janardhanan, 2016; Ravishankar, 2016). People living along the coast and in low-lying areas were evacuated. The storm was named Cyclone *Vardah*, an Urdu word meaning red rose. It struck with winds of 140 kmph and for 90 min, 120 kmph

winds pounded Chennai. They whipped up very high tides, a 1-m storm surge and 160 mm of rain fell in six hours. Winds then decreased to 60–70 kmph as the cyclone moved inland and brought torrential rainfall to the interior of Tamil Nadu, Andhra Pradesh and Karnataka. Vardah was India's strongest cyclone since October 2014 when Cyclone *Hudud* had crossed into Andhra Pradesh. It was the most severe cyclone to hit Chennai in more than two decades, claiming 100 lives and causing \$3.4 billion in damage (Jozuka, 2016).

Despite warnings, residents were shocked by the intensity of the storm. "In all my 50 years in Chennai, I have seen nothing like this storm," said a tea shop owner in Thoraipakkam (Govindarajan & Yaminan, 2016). It uprooted trees, overturned cars, damaged buildings, closed the port and airport, and disrupted public transport and telecommunications. Undersea fiber optic cables were damaged, slowing down internet speed and having a knock-on effect on IT, banking, telecommunications and social media (Bagla, 2016; Live-mint, 2016). This was particularly painful for residents, as the Government of India's remonetization effort to create a cashless society had just been introduced (Govindarajan & Yaminan, 2016). More than seventy relief camps were set up, and an extensive multi-sectoral team was deployed for relief work and cleaning-up operations (Janardhanan, 2016). The city's trees too had been sucked into the vortex. Before the cyclone, Chennai's tree cover was already very low and was shrinking by 2% per year (TNN, 2018). To compensate, the Chennai Corporation had planted fast-growing trees such as the rain tree (*Albizia saman*) and the *gulmohar* (*Delonix regia*) for their shade, rather than slower-growing species with deep-rooted stability such as mango and neem. The fast-growing varieties could not withstand the cyclone's gale-force winds (Warrier, 2016). An estimated 25% were uprooted, destroying habitats, damaging buildings and vehicles, cutting off access to suburbs and disrupting power supply (Warrier, 2016). When I was in Chennai six months after the storm, uprooted trees and decomposing vegetation still lay in vacant plots or on roadsides as haunting reminders of the cyclone's force (Figure 3). The loss of tree cover contributed significantly to the heat of the summers that followed (Natarajan, 2019).

What *Nada* and *Vardah* revealed is that as much as urban space and social hierarchies in Chennai register daily air movements, so too the city periodically becomes a swirling cyclonic vortex, not only of air and moisture, but also of individual and collective anticipation, anxiety and activity. Meteorologists, government and civil society agencies, disaster managers, civil administrators, print and visual media, social media, relief efforts and relief supplies are all sucked into and swirl around the cyclonic vortex with urgency and/or political expediency (Express Web Desk, 2016; Ravishankar, 2016); overhead electricity lines, undersea cables, aluminum and glass cladding snap and lift. This vortex of material-discursive activity is activated by the elemental forces of atmospheric modes of world-making, which are utterly indifferent to human history and recalcitrant to human authority, yet to which human agency is called upon to respond (Clark, 2011; Farias, 2015). Once the vortex has died down, memories of cyclones continue to circulate amidst people's relations with the world they inhabit. Benchmarked, compared, inscribed and commemorated, they become the very substance of place, its politics and the subjectivities that inhabit it.



Figure 3. Cyclone debris with buffalo, Shalimar Gardens, 10 July 2017. Photograph by the author.

Wave

In August 2017, I spent time in Medavakkam and Perumbakkam in southwest Chennai to understand the impact of the IT economy or the city's periphery. I experienced dusty, untarred roads heaving with trucks, cars, motorbikes, auto rickshaws and cattle. Paddy fields lay adjacent multi-storey condominiums. Roads were lined with hoardings marketing housing developments with names like Maple Creek, Dove's Nest, Egret Park, Serene, Nuevo Vivenda and Pristine Acres and bylines like 'the pinnacle of living', 'experience life-style as its best', 'turn dreams into reality', 'experience inner peace,' etc. Many were ironically marketed as 'vaastu' compliant, referring to vastu shastra, the ancient Indian guide for house design. Behind the billboards, real estate was being pegged out on land that till recently was marsh or wetland. Concrete mixers, cement, sand, aggregate, steel reinforcing rods and bricks lay hoarded, awaiting use. Hastily erected structures to house migrant construction workers, most of whom were from Andhra Pradesh and Odisha, weaved between building sites. Many of the completed apartment blocks were already cracking, hardly surprising given that they were built on heaving clays. Their waste water and sewage flowed onto vacant properties or wetlands, for investment in housing had not been matched by investment in infrastructure. Instigated by policies and legislation to restructure Chennai's economy around IT, and lubricated by corruption, the value of urban wetlands and peripheral agricultural land as real estate was being mobilised to create land and build housing to meet the aspirations of the emerging IT middle class. Educational and health facilities, shopping malls and sports and entertainment complexes followed (Kennedy et al., 2014) (Figure 4).



Figure 4. Road and housing construction, Perumbakkam, 21 July 2017. Photograph by the author.

Tuning to Chennai's airs involves more than tuning to its breezes and recurring cyclonic vortices. It also involves tuning to the electromagnetic waves that pulse through it. In this section of the paper, I investigate how electromagnetic waves came to matter in Chennai, exhibited affinities for particular kinds of architecture and urbanism and propagated new intensities of heat and inequality.

In the 1990s, Indian Prime Minister P.V. Narasimha Rao introduced economic reforms that changed the country's economic direction from a centralized planned economy to a liberalized, market-driven one (Wadhva, 2004). Information technology (IT) was declared the engine of economic growth. States began to implement economic reforms broadly in line with federal economic directives. Tamil Nadu was well-positioned to take advantage of these reforms. It introduced its first IT policy in 1997 (Government of Tamil Nadu, 1997) and, by 2014, it was ranked third in the country for IT services after Karnataka and Maharashtra. Almost all of its IT export-orientated activities and 66% of its IT workforce were concentrated in south Chennai (Homm & Bohle, 2012; Kennedy et al., 2014; Vijayabaskar, 2010). The infrastructural spine of this new economy is the Rajiv Gandhi Salai or IT Corridor, which runs from Taramani in Chennai to Mahabalipuram. The decision to turn what had been a meandering coastal road originating in colonial times into an infrastructural corridor was made in 1997. The road became known as the "Old" Mahabalipuram Road (OMR) when the parallel East Coast Road was upgraded (2000–2002), becoming the "New" road to Mahabalipuram. In 2008, the upgraded OMR was rebranded the Rajiv Gandhi Salai (OMR Rider, 2014), and incentives for export-orientated IT premises were applied to properties up to 500 m on either side of it. In the early 2000s, as a way of attracting the private sector to the corridor, the

government of Tamil Nadu made three real estate investments at key nodes along its length (Kuppuswamy, 2014). The first was TIDEL Park in Taramani at the corridor's northern end, where a number of education, engineering and technology institutions formed a nascent IT cluster. TIDEL Park was a huge, 120,000 square meter office building that offered a "plug-and-play environment" to IT companies. It was instantly occupied (Kuppuswamy, 2014). The second investment was made in 2005 when the Electronics Corporation of Tamil Nadu (ELCOT) acquired 377 hectares of land at Sholinganallur, a major crossroads connecting the IT corridor to the airport. ELCOT was developed as an IT SEZ offering serviced property for long-term rent to IT companies. In the same year, the State Industries Promotion Corporation of Tamil Nadu (SIPCOT) acquired land for SIPCOT IT Park at Siruseri, 30 kms south of TIDEL Park, where, in 2011, India's top IT company, Tata Consultancy Services, built a new headquarters complex. It relocated its entire 20,000-strong Chennai workforce to the premises, pushing up demand for housing in the area. The emerging constellations of IT premises surrounded by a sprawling conurbation of residential infrastructure served as a "visible motif" of the underlying structural, economic, and social changes underway in the city (Kennedy & Sood, 2016, p. 41).

IT economies are underpinned by an infrastructure of electromagnetic charges, frequencies, wave fields, and intensities, which nations now view as national resources, much like water, land, or minerals. In India, competition over wave-lengths and frequencies is now governed by national legislation (Ravi & West, 2015). While electromagnetic waves propagate through air, water, solid matter, a vacuum, or outer space, the materiality of a medium and obstructions by obdurate matter interfere with their transmission. In air, humidity, pressure, heat, and cold, rain, wind, and electric storms reflect, refract, distort, amplify, or scatter waves, impacting their propagation and wireless signal strength (Amajama, 2016; Mat et al., 2018; Meng et al., 2011). Dunne and Raby (2001) showed in computer models of radio propagation in urban environments that buildings and other solids diffract radio waves, producing micro "electro-climates" (p. 104) of different degrees of wireless signal strength. Extending this idea, I suggest that electromagnetic waves have an affinity for certain kinds of architecture and urbanism, or what I would call an "electro-urbanism," designed to sequester them from interference, delay, or impediment, maximise their propagation, and materialise the imaginary of ubiquitous global connectivity (Forsyth, 2014). Electro-urbanism includes spatially delineated duty-free enclaves or Special Economic Zones, where space is treated as foreign territory for the purposes of trade operations, duties, and tariffs (Sashi Kumar, 2008); incentivized IT campuses comprising boxy office buildings surrounded by landscape features and oceans of parking (Forsyth, 2014); deep, sealed office blocks, modular housing estates, concrete and glass façades, aluminum cladding, air conditioning, electricity pylons, masts, antennas, and asphalt. In South Chennai, as agricultural land, marshes, and wetlands were blanketed by waves of electro-urbanism, vegetative cover decreased, hard surfaces replaced soft ones, and the radiant heat they generated caused air temperatures to soar (Rajan & Amirtham, 2021). Rising temperatures, rising incomes, cheap electricity, and new building typologies meant that traditional ways of keeping air cool, such as drenching sheets in water and hanging them in windows or spreading chalk on roofs, were forgotten (Dzieza, 2017). To make deep office blocks, glass towers, and boxy multi-story housing, shopping malls, and gyms habitable

required air conditioning. But air conditioning is not only a producer of coolth; it is also a producer of heat. Cooler, conditioned inside air raises temperatures outside (International Energy Agency, 2018). The differential space-times of exposure to this process make the inequalities of electro-climates, shaped by social, cultural, and political histories, palpable. For the car drivers of IT executives who wait in hot, asphalt parking lots all day to transport their employers home, or the road side hawkers who provide their lunches, or the construction workers who toil in the heat, the experience of the electro-climate is very different from those whom they service, who experience it from the comfort of air-conditioned IT hubs, cars, shopping malls, leisure centers, or homes (Kennedy et al., 2014).

Air is equal but pollution ain't, there's levels of grey, even in space
But cops and hawkers, building workers, sweepers, roadside sleepers,
Are left wheezing, sneezing,
Dust and these things.
#NoFilter

(Sofia Ashraf, *Let Chennai Breathe*, Vettiver Collective, 2020a)

Particulate Matter

In August 2017, I took a 'toxic tour' of the Ennore wetlands led by Chennai activists who had, since 2011, joined hands with fishing communities to resist the destruction of their lives and livelihoods by industrial development. We gathered early one Saturday morning on Eliot's beach in Besant Nagar to the south of the city, where groups of adults and children were walking or going through exercise routines as the sun rose. About ten of us clambered aboard a bus and were driven north across the Coomb River and through George Town. On reaching Ennore, we turned inland and disembarked at an open piece of ground facing the tall concrete chimney of the now decommissioned Ennore Thermal Power Station. Here we gathered around a large map of the creek to discuss what we were about to see. For a first-time visitor, even one used to reading maps, the map was difficult. In shades of monotone blue, what was land and what was water and how to orientate oneself within it, was dubious. We crossed the creek in our bus via one of the many bridges built over it, and saw a wide, deep blue, tidal expanse of water, where a single fisherman stood paddling his shallow flat-bottomed boat. The tall red and white chimneys and confusing spaghetti conveyor belts of the Vallur Thermal Power Station loomed large across the water. We were then shown sites of the illegal reclaiming of the wetlands by the port authority and illegal dumping of fly ash by the North Chennai Thermal Power Station, both of which were subject to court injunctions at the time. But it was when we got out on appropriately named 'Ash Pipeline Road' that I became aware of the air. It was filled with a fine grey-white dust; it smelled putrid and felt abrasive in my throat as I breathed it in (Figure 5). The ash-laden air was made worse by road dust kicked up the heavy vehicles that plied the poorly maintained roads. Just above the ground, lines of rusting pipes carrying fly ash slurry to its deposition pond leaked more into the wetlands than they carried to it. Three engineers were standing over yet another leak, figuring out, without much urgency, how to stop it.

The fourth section of this paper extends my discussion of Chennai's air as a "constellation of megacity inequality" (Adey, 2013, p. 294). Since colonial times, the northern, more low-lying parts of Chennai have been industrial and working class (Raman, 2020). In the 1950s, the Ennore-Manali region, then outside the formal limits of the city, was targeted by the State for petroleum, petrochemical and coal-based industries.



Figure 5. Ash pipeline Road, Ennore, 22 July 2017. Photograph by the author.

From the 1970s onwards, but accelerating in the 1990s, the Tamil Nadu Generation and Distribution Corporation (TANGEDCO) commissioned a series of thermal powerplants and a coal handling port in the vicinity of Ennore to power Chennai's growing electro-economy.¹ With its dedicated sub-stations, computer servers, air conditioning and internalized lifestyles, the city's energy demands had soared. By the mid 2000s, Ennore-Manali had become the fossil-fueled engine that powered the city's growth, and its air was the most polluted in the city (Kumar, 2016, 2022). Coal dust, fly ash, particulate matter, sulfur dioxide, nitrogen oxide and heavy metals had built up in the air and people's bodies to such an extent that the Coastal Resource Centre (CRC), a Chennai-based NGO, declared Ennore-Manali's air "Unfit to Breathe" (Coastal Resource Centre, 2016). In response to complaints about air pollution by Ennore's residents, the NGO undertook a 24-hour study in February 2016, sampling air from the rooftops of homes in the villages of Kattukuppam, Mughathwara Kuppam, Athipattu and Ernavur and analyzing them for PM2.5 and heavy metals. The air in all four villages was found to exceed the 24-hour WHO standard for PM2.5; all exceeded guidelines for long-term exposure to manganese; two samples exceeded guidelines for lead and one for arsenic and nickel. A public health specialist declared that the levels of aerial toxicity showed "that there was a significant possibility of chronic health effects" amongst Ennore's residents (Coastal Resource Centre, 2016, pp. 14–15). This report was followed by a number of others (Coastal Resource Centre, 2017; Chennai Climate Action Group,

2020, 2021; Healthy Air Initiative 2021a, 2021b) each of which expanded the area and scope of aerial pollutants analyzed.

The reports were based on what Calvillo (2023, p. 96) calls two “pollution practices” – field work and laboratory analysis – that make air pollution knowable and action able in the language of standards and levels. For pollution to be registered in this form, other of its atmospheric qualities recede into the background and require different epistemological tools to be made to appear (Barad, 2008; Ojani, 2022). At the same time as the pollution reports, the Vettiver Collective, a body of Chennai-based activists and artists, released a music video, “Let Chennai Breathe” (Vettiver Collective, 2020a), and four short interviews with north Chennai residents called “Toxic Tales” (Vettiver Collective, 2020b, 2020c, 2020d, 2020e). These media spoke in a very different language from the language of standards and levels. They expressed pollution in the languages of culture and thwarted aspiration. “Let Chennai Breathe” showed young men rapping about being unable to play the Indian contact sport *Kabbadi* any longer because of the difficulties they had in breathing.

Do our lives have any meaning left?
Is air quality the reason for this?
The game we have played for generations
I am unable to play now
My dreams, goals, skills and valour
I am unable to show through the *Kabbadi* game now.
Let the air flow freely.
Let me take a deep breath.
(Ft. G. Logan, *Let Chennai Breathe*, Vettiver Collective, 2020a).

Amongst those who had no choice but to breathe Ennore’s air, the majority of whom were fishers, salt pan workers, and subsistence farmers of India’s MBC (Most Backward Communities), Scheduled Castes, or Scheduled Tribes; wheezing and breathlessness became common, particularly amongst children (Kumar, 2016). Wheezing is a symptom of the inflammation and narrowing of the airways in response to, amongst other things, the inhalation of toxins, and signals a constriction or narrowing of the ability to breathe. Many have noted the links between un-breathability and discrimination (e.g. Adey, 2013; Auyero & Swistun, 2009; Mbembe, 2020; Sharpe, 2016). In Ennore, discrimination sedimented its violence and toxic residues in wheezing, rattling breath. But it was not only human breath that was wheezing and rattling from the electro-economy’s toxic residues. So too was Ennore Creek, the backwater of the Kosasthalaiyar River, a tidal channel that meanders northwards behind coastal sand dunes, connecting Ennore with Pulicat Lake. The creek is tidal and flanked by mangroves, mudflats, salt marshes and tidal flood plains, which were the habitat of hundreds of species – oysters, mussels, barnacles, fish, crabs, shrimps, mangroves, and marsh grasses, and until recently supported the livelihoods of tens of thousands of people who moved seasonally between land- and water-based occupations such as fishing, salt production, livestock rearing, and agriculture (Niranjana, 2025; Raman, 2020). By the mid 2000s, the creek and its wetlands had been encroached upon by the state-sponsored complex of coal-fired power plants, oil refineries and ports to such an extent that the tidal ebbs and flows on which its ecologies and life forms depended had been constricted, if not completely blocked. Fly ash, sewage sludge, dredge spoils

and construction debris built up on the creek bed, smothering its sediments and benthic life (Joint Experts Committee, 2022). The material composition of its sediments changed, and with it the webs of life that they sustained (Govindan, 2021). Toxic heavy metals bioaccumulated in the bodies of prawns and crabs and the quantity and quality of fish in the creek; their ability to reproduce was reduced, and species that inhabited the wetlands had been reduced or disappeared. For the creek, its fluid ecologies and its human and non-human inhabitants, electro-economic growth brought little other than a politics of toxic constriction, a closing in and disabled breath (Singh et al., 2017).

Conclusion

This paper has sought to make a contribution to two fields of research: the first is elemental urbanism, a small though growing body of work by architects, geographers and urbanists, who are thinking with the elemental, as a way of understanding urban life, space and politics differently. The second is what is known as embodied research, when sympathies and directions within a field are developed from a researcher's embodied experience (Solomon & Kaika, 2024). To bring these two fields together, the paper drew on Karen Barad's agential materialism, a performative method of research with the potential, I suggest, to radically change how cities are listened to, questioned and made.

For Barad, the primary ontological units of reality are not elements, or things-in-themselves, but phenomena, or things-in-relation. Within phenomena, reality materialises as knowable and meaningful through intra-actions between their relata or components, which are inseparably material (technologies, bodies, environments) and discursive (concepts, dispositions, power, values).² Intra-actions between these components produce what Barad calls "agential cuts" (2008, p. 135), or boundaries that define certain entities or properties of a phenomenon as intelligible and others not. If we think of elements as phenomena, whether as the fundamental entities of the universe as we know it, or as milieus which sustain life, human and otherwise, they are produced-in-relation, their components and properties becoming intelligible through intra-actively produced agential cuts. Elements, qua phenomena, are not yet entities that agential cuts bring provisionally into focus. This idea resonates with Adey's (2015) elemental thinking that partially withdraws the element to a position anterior to human perception and McCormack's proposition of the elemental as a "kind of generative chaos from which things and perception take shape" (2007, p. 421). I think of Adey's affinity (2015), McCormack's envelopment (2018), and Engelmann's allure (2021), as agential cuts that materialized the elemental in particular ways. In this paper, it was the attunement of my senses to Chennai's air as a material-discursive phenomenon that served as the boundary-making practice, or agential cut, through which the city became knowable as breezes, cyclones, waves, and particulates. They were the elemental starting points, not the final outcomes of the research, disclosing "vastly more expansive and divergent ontologies that the elemental moments manifest before me" (Jackson & Fannin, 2011, p. 438).

As boundary-making practices, agential cuts produce certain things as knowable and meaningful while excluding others from being so. For example, Engelmann (2023) pointed out that cultural geographers have largely approached weather phenomena through the body, which has excluded consideration of the techno-scientific practices

that sense, record and make sense of weather in other ways. While the body produces weather as knowable in certain ways, techno-scientific practices do so in other ways. The point here is not that knowledge could be otherwise, but rather that the prism that one uses to produce knowledge is part of the knowledge that is produced. What is being researched is enacted in entanglements with the way it is being researched (Sauzet, 2018). This means that agential cuts raise ethical questions about who, how and what is producing knowledge, for what purposes, and what is excluded by these practices, which brings us back to a situational onto-epistemological ethics as articulated by Haraway (1988), and renews the critical, political project of thinking with and within the elemental (McCormack, 2015). As Hollin et al. (2017, p. 932) put it:

The ethical significance of agential realism, therefore, is not just in extending the idea that things ‘could have been otherwise’ to the ontological realm, but in conceptualizing the precise moments at which things congeal ‘as they are’ by understanding the processes through which particular material properties emerge and other realities are excluded from being.

This provocation invites further situated, ethical work on how earthly forces pervade and come to matter in and shape contemporary cities, and on how the elements and the urban are entangled with power, control, coloniality, racism, and extractivism (Papadopoulos et al., 2021), as part of a “wider effort to understand the material ontology of the Earth as the necessary condition for various forms of life” (Englemann & McCormack, 2017, p. 243) for all who live on it.

Notes

1. The first of these was the Ennore Thermal Power Station (ETPS) commissioned from 1970 to 1975. It was followed by the North Chennai Thermal Power Station (NCTPS Stage 1, 1994–1996), the Vallur Thermal Power Station (2010–2012), and the NCTPS Stage 2 in 2014. Currently proposed NCTPS Stage 3, the Ennore Thermal Power Station Replacement Project, and the Ennore SEZ Super Critical Thermal Power Project, located on the ash pond of the NCTPS. If all are built, the region will have close to 10,000 MW of coal-powered generation capacity (Coastal Resource Centre, 2016).
2. Barad invented the word “intra-action,” (2007:, p. 33), as opposed to interaction, to capture what takes place in phenomena. Interaction assumes separate individual entities that interact; intra-action suggests that the components of phenomena emerge through intra-action within phenomena.

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Research ethics and consent

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Data Availability Statement

Certain of the data used in the preparation of this paper are available here: <https://westminsterresearch.westminster.ac.uk/item/wz870/monsoon-assemblages>.

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